NATURELA ELECTRONICS
13 ANA FELIXOVA
9020 VARNA, BULGARIA
WWW.NATURELA-BG.COM
+359 52 504 506
+359 52 504 507
office@naturela-bg.com

GLC CERTIFIED ISO 9001

# Electronic Pellet Burner Controller

# NPBC-V3M

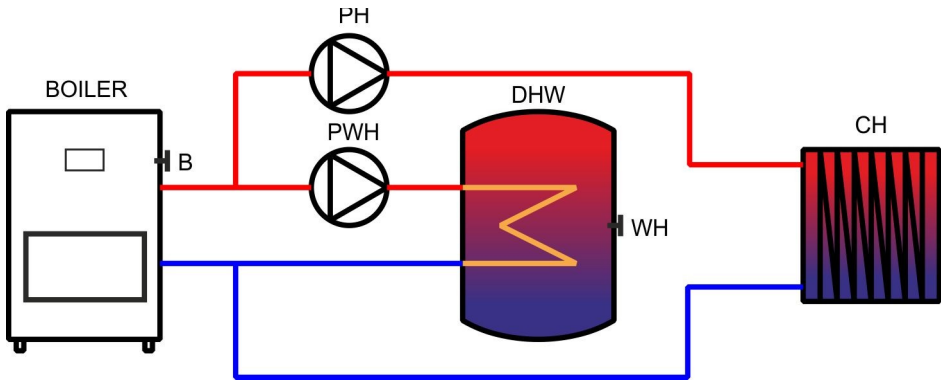
SOFTWARE VERSION 3.3a/3.2

## CHANGES IN THE USER MANUAL OR IN THE CONTROLLER'S SOFTWARE

| Version of the user manual | Changes | Page |
|---|---|---|
| 2.2 | 1. The software version is changed to 3.0/3.0<br>2. Different control logic of the circulation pumps of the installations.<br>3. Included Bulgarian language<br>4. A new way of operation in Service settings mode. After entering this mode, browsing all the menus is not by pressing the F button, but by pressing the arrow buttons. ▲ shows the next menu and ▼ - the previous.<br>5. After turning the burner off, the work of the internal auger motor is restricted up to 1 minute. | 1<br>7, 8<br>14<br>15 |
| 2.4 | 1. The software version is changed to 3.2/3.1<br>2. After an unsuccessful ignition try, on every next attempt, the portion of loaded fuel will be half of the amount of the previous one. This helps to prevent the jam up of the burner with fuel after few unsuccessful ignition attempts.<br>3. An option to power up the FC output during the Intermediate cleaning procedures. This output may supply power to a device for periodical mechanical cleanings of the burning chamber.<br>4. An option to set constant active time for the internal auger motor in addition to its active time that depends on the fuel auger's active time.<br>5. Increased maximum work time of the cleaning fan during the cleaning cycles (FC output) – from 60 to 600 seconds. Adjustment step is changed to 10 seconds. | 1<br>12<br>19<br>20 |
| 2.5 | 1. The software version is changed to 3.3a/3.2<br>2. The appearance of the error messages is changed<br>3. Decreased maximum work time for the cleaning fan during the cleaning cycles (FC output) from 600 to 250 seconds. Adjustment step is changed to 1 second.<br>4. Overheating menu<br>5. Changes in the Intermediate Cleaning menu<br>6. Changes in the Auto Clean Setup menu<br>7. Cleaner menu – delay option after cleaning procedures, useful for mechanical cleaning actuators<br>8. External Stop function | 1<br>10<br>15<br>19<br>19<br>20<br>21<br>21 |

## INTRODUCTION

The controller **NPBC-V3M-1** is designed to run burners, which use a photo sensor to detect the burning fire. It measures the level of illumination from the burning fire. The pulsing control of the auger motor from the pellet tank allows the precise dosing of the amount of pellets that goes to the burner. **NPBC-V3M-1** is able to control an optional internal auger motor that forwards the pellets inside the burner. The controller runs two blowers: one that provides the air to the burning chamber and the other one is an additional fan, for example, for taking out the exhaust gases from the boiler, if necessary. Both blowers' power can be adjusted from the controller. NPBC-V3M-1 has an option to control the temperature of the exhaust gases by a high temperature sensor pt100, mounted in the entrance of the vent. An additional powerful blower could also be connected to the controller to blow away the ashes from the burning chamber during the cleaning procedures. The controller runs up to two circulation pumps: for the heating installation and for the hot water heater installation. **All of the controlled mechanisms must work on 220VAC or 110VAC mains power supply!**



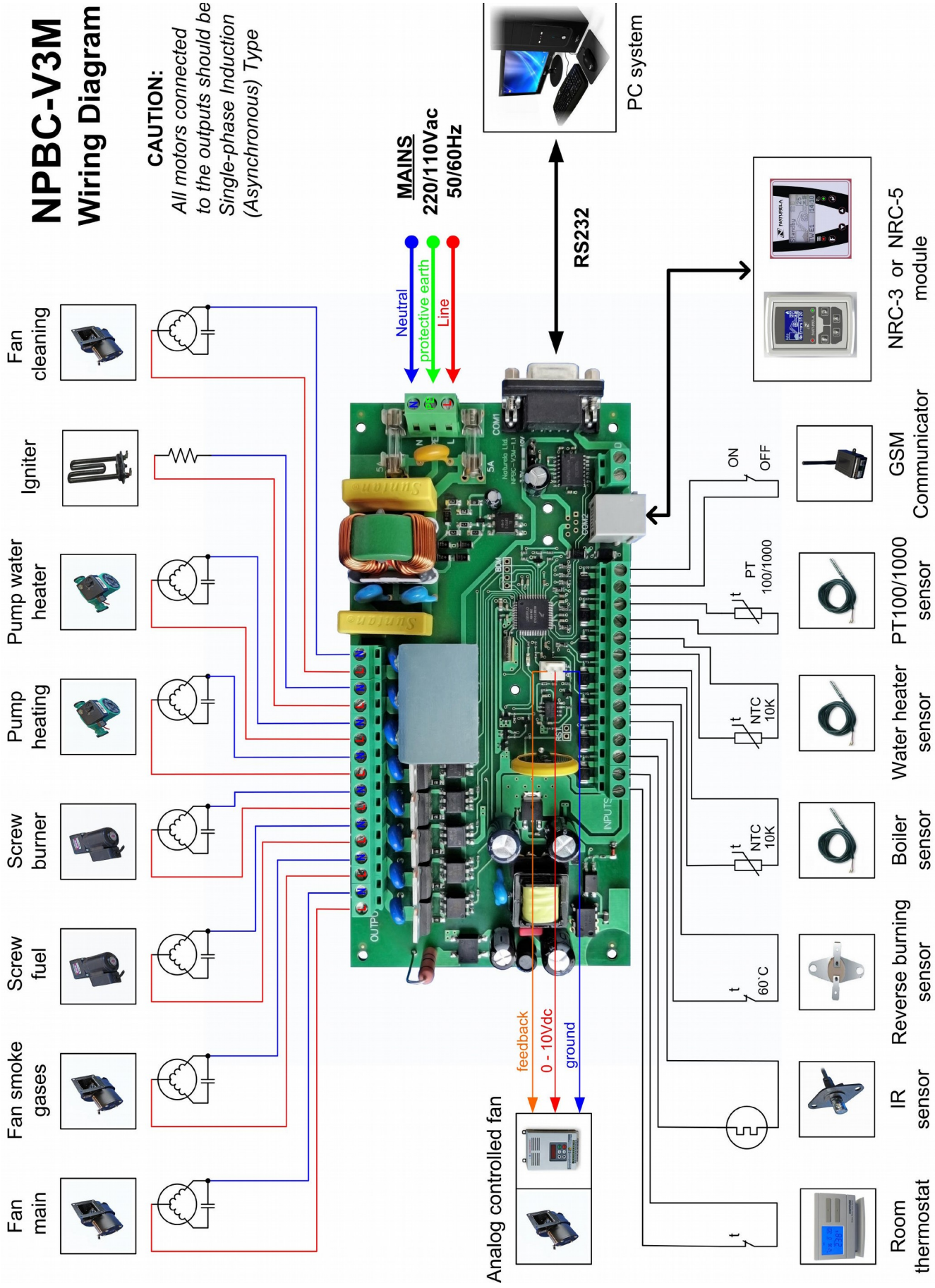

Hydraulic scheme of the outside heating and hot water installation, controlled by NPBC-V3

## MECHANISMS AND SENSORS THAT COULD BE CONNECTED TO NPBC-V3M

- Electric feed screw motor to transfer pellets from the bunker to the burner (power up to 180W)
- Electric internal auger motor to forward the fuel to the burning area (power up to 180W)
- Main blower with smooth speed control to regulate the air flow (power up to 180W)
- Cleaner motor - an additional high power blower to clean the burner ( power up to 800W)
- A blower for the flue gases (power up to 180W)
- Heater for firing the pellets ( power up to 550W)
- Hot water heater circulation pump (power up to 180W)
- Central heating circulation pump (power up to 180W)
- **(Optional)** Frequency inverter to power up a powerful air fan
- Photo sensor to detect ignition
- Temperature sensor or thermostat to control the backfire
- Temperature sensor to control the water in the boiler
- Temperature sensor for the hot water heater
- High temperature pt100 sensor to measure the temperature of the flue gases. This temperature sensor is not used to detect the burning fire, but only to provide information
- A potential free contact of a room thermostat for more precise control of the burning process, depending on the room temperature.
- RS 232 interface for connection with a computer.

## NPBC-V3M INPUTS AND OUTPUTS DESCRIPTION:

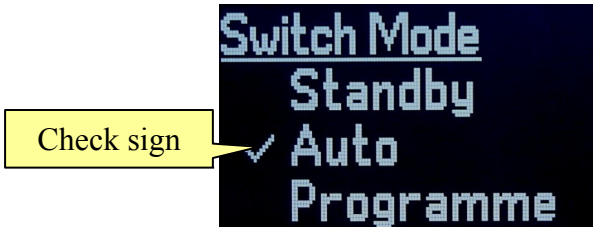
| Outputs | | Inputs | |
|---|---|---|---|
| FM | Main fan | RT | Room thermostat. To this input could be connected a normally opened or normally closed contact, with no additional voltage. |
| FSG | Fan for the flue gases | PS | Photo sensor |
| SF | Screw for fuel | RB | Reverse burning sensor |
| SB | Internal screw | B | Boiler temperature sensor |
| PH | Heating installation pump | WH | Water heater temperature sensor |
| PWH | Hot water heater pump | PT | pt100 high temperature sensor |
| IGN | Ignition heater | OD | Opened door switch **(Optional)** |
| FC | Fan for cleaning | LED | IR LED **(Optional)** |
| ACF | Analog controlled fan **(Optional)** | | |


NPBC-V3M
Wiring Diagram
CAUTION:
All motors connected to the outputs should be Single-phase Induction (Asynchronous) Type
MAINS
220/110Vac
50/60Hz
Neutral
protective earth
Line
RS232
PC system
NRC-3 or NRC-5 module
GSM Communicator
PT100/1000 sensor
Water heater sensor
Boiler sensor
Reverse burning sensor
IR sensor
Room thermostat
Analog controlled fan
feedback
0 - 10Vdc
ground
Fan cleaning
Igniter
Pump water heater
Pump heating
Screw burner
Screw fuel
Fan smoke gases
Fan main
ON
OFF
PT 100/1000
NTC 10K
NTC 10K
60`C
OUTPUTS
INPUTS

## EXPLOITATION INSTRUCTIONS

Main screen has the following view:


Press the **F** button to switch the work mode or to turn off the burner:




By pressing "▲" or "▼" buttons, move up or down the check sign „√", which indicates the mode you are going to select. The following pressing the **F** button switches to the selected mode.

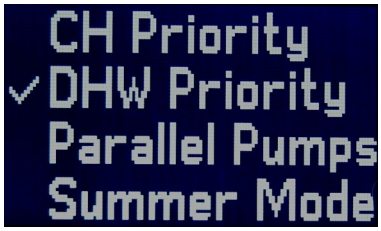
Work modes:

- **Standby** – Turn off the burner. If it was working by the moment of switching to this mode, the fire will be automatically extinguished. In the work mode field will be shown „Standby".
- **Auto –** Automatic mode. By selecting this mode the burner automatically starts and during the work process keeps the set temperature. In the work mode field will be shown „Auto".
- **Programme –** This mode has additional programming periods of the day when boiler's work is allowed. In this mode the burner starts and regulates the set temperature only during the time intervals allowed by the timer. In the work mode field appears a timer and the time of the next turning on or off, depending which is next. For example Off 22:00 means a turning off is coming next at 22:00h .

*If the clock is not set (its indication blinks) then pressing the F button switches to the time setting screen (**Set Time**) instead of mode menu.*

**Automatic work mode (Auto):**

By selecting this mode, a choice for the external installation, which is going to be heated by the boiler, appears:




Work modes with external installations:

- **CH Priority** – only the building heating installation works. The circulation pump turns on when the temperature of the water in the boiler gets higher than the set temperature in the menu CH Setup. The pump works until the temperature of the water gets lower than the set temperature. When the room thermostat activates due to reaching the set temperature, the pump keeps working, but the burner's power starts to decrease with one power level down on time intervals set from the menu **Burning Shutdown**. At the end it goes through Suspend mode too before it turns off. If the room thermostat goes back to its normal condition before the burner is off, it will continue its work according to the temperature of the water in the boiler. If the room thermostat is active for longer period (the time for Burning Shutdown + Suspend time has run out) the burner turns off and will be ignited again after the thermostat gets back to its normal condition.

- **DHW Priority** – the domestic hot water heater (DHW) has a priority in heating. The pump of the water heater's installation turns on when all of the following conditions are implemented:
    - The temperature of the water in the boiler is above 35ºC
    - The difference between the temperature of the water in the boiler and in the water heater is above 5ºC
    - The temperature of the water in the water heater is lower than the temperature set in the menu **DHW Setup**, line **Set Temp.**

  After reaching the set temperature, the circulation pump turns off and then turns back on again when the temperature of the water in the water heater gets lower than the difference **Set Temp – Hysteresis** in the menu **DHW Setup**. When the water heater reaches the set temperature, if the room thermostat is activated from the menu **Addons Acctivation**, the central heating installation's pump turns on. In this case, if the room thermostat activates because of reaching the set temperature and if the temperature of the water in the water heater is higher than **Set Temp – Hysteresis**, the burner switches to **Suspend** mode. After the set time for Suspend mode runs out, the burner turns off. It turns on again when the temperature of the water in the boiler gets lower than the set temperature minus the temperature difference set for the second power level in the menu **Burn Level**. The conditions for the circulation pumps of the water heater or the heating installation should be implemented, as well.
    - *For a normal heat exchange, the set temperature of the boiler must be at least 5 degrees higher than the set temperature of the water heater!*
    - *If the room thermostat is not activated in the menu **Addons Activation**, the temperature in the rooms is considered as not reached and the central heating circulation pump*

*works unconditionally.*

- **Parallel Pumps** – both installations work: for heating and for hot water. The DHW circulation pump works until the water heater reaches the set temperature in the menu **DHW Setup**. The heating installation's circulation pump turns on when the conditions for this in the menu **CH Setup** are implemented and turns off when the room thermostat activates due to reaching the set temperature in all rooms. When both circulation pumps turn off or when the temperature of the water in the boiler gets to the set temperature, the burner switches to **Suspend** mode. It turns off after the maximum time for the Suspend mode runs out. The burner turns on again when the temperature of the water in the boiler gets lower than the set temperature minus the temperature difference set for the second power level in the menu **Burn Level**. The conditions for the circulation pumps of the water heater or the heating installation should be implemented, as well.
    - *For a normal heat exchange, the set temperature of the boiler must be at least 5 degrees higher than the set temperature of the water heater!*
    - *If the room thermostat is not activated in the menu **Addons Activation**, the temperature in the rooms is considered as not reached and the central heating circulation pump works unconditionally.*
- **Summer Mode** – the boiler works only to heat the hot water heater. The difference between this mode and **DHW Priority** is that in this mode the boiler turns on only if heating the water heater is necessary and after the set temperature is reached it turns off. On **DHW Priority** mode the boiler does not turn off and maintains the set temperature for the water. If there is a heating installation, which is not controlled by this controller, in **DHW Priority** mode it will have the required hot water.

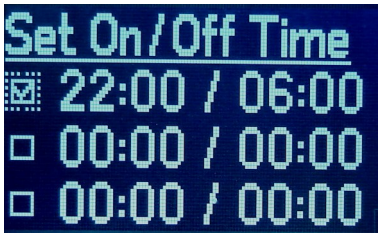
While the burner is working, the **"heating installation"** field shows one of the following symbols:

-  only the building's central heating installation works
-  only the hot water heater's installation works
-  both the building's central heating installation and the hot water heater's installation work
-  the hot water heater's installation works in Summer Mode

While in automatic mode, the only purpose of the controller is reaching and maintaining the set temperature in the boiler. Besides, the controller takes care of the periodical cleaning procedures for the burner. The frequency of these procedures can be set by **Auto Clean Setup** menu.

**Programming mode for intervals of the day when boiler's work is allowed (Programme):**

If you decide that there is no need for the boiler to work twenty four hours, you can use the options for limitation of the work time in this mode. By choosing the **Programme** mode a screen with time intervals appears:




After confirming your choice by pressing the **F** button, a screen for choosing the external installation appears. It is the same as in **Auto** mode. While working in this mode, on the upper left side of the screen appears the time of the next operation which would be turning on (**On**) or turning off (**Off**) the burner:

**Programme** mode
At 22:00h the burner turns off


**Turning off the controller:**

To turn off the controller press **F** and choose **Standby**. The screen will take the following view:

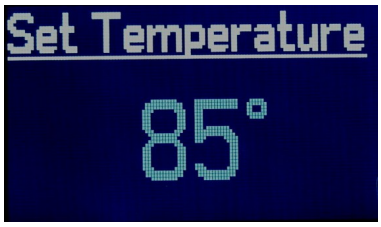

Work mode of the heated external installation

After that an extinguishing the fire and cleaning the burner procedures start automatically.

*The complete extinguishing the fire and cleaning the burner takes time. It is normal if the burner's and the boiler's aggregates continue working after selecting this mode.*
*The circulation pumps could work if the condition for them to be on are implemented even if the burner is off. This allows the rest of the heat energy of the water in the boiler to be used.*

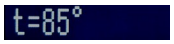
**General information for operating with the controller:**

When the controller's screen is in base position, by pressing the ▲ (+) or ▼**(-)** you enter in a mode for changing the temperature. Confirm the settings by pressing the ↵ (**Enter)** button or automatically by pressing no buttons for 6 seconds.




*If there is a water heater installation , controlled by this controller, to assure the normal heat exchange process to the water in the water heater, the set temperature here must be at least 5 degrees higher than the temperature in the menu **DHW Setup**, line **Set Temp**.*

While on main screen, by pressing the **Enter** button the additional information in the lower left side changes:



set temperature

current date

flame sensor indication

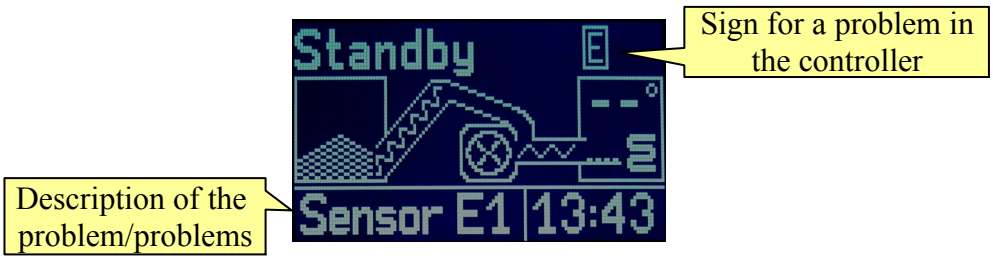
temperature in the water heater

temperature of the exhaust gases

error messages, if any. Error messages can be:

- **BB Alarm** - an alarm from the back burning thermistor
- **Sensor E1** - the temperature sensor in the boiler is disconnected or missing
- **Sensor E2** - the temperature sensor in the boiler is short
- **Frost** - the temperature in the boiler is < 0ºC (the water is frozen)
- **IgnitionFail** - ignition fail
- **Tbb E1** - the back burning temperature sensor is disconnected or missing
- **Tbb E2** - the back burning temperature sensor is short
- **Tbb Alarm** - the back burning temperature sensor alarm
- **DHW E1** - the water heater's temperature sensor is disconnected or missing
- **DHW E2** - the water heater's temperature sensor is short
- **TE E1** - the high temperature sensor pt100 is disconnected or missing
- **TE E2** - the high temperature sensor pt100 is short
- **Cleanup** - the temperature of the exhaust gases gets too high and the boiler needs to be cleaned up
- **TE Alarm** - the temperature of the exhaust gases is extremely high; the burner turns off and the boiler needs to be cleaned up before turning the burner on again

View of the screen when a problem is registered:




*If there are any errors the current additional information switches with the error message and a sign **E** appears on the top right corner of the screen. The possible messages are listed above.*

## WORKING METHOD

The burner can work either in continuous automatic mode (**Auto**) or in mode with timers. When it is in a timer mode, the burner works only during the intervals of the day set by the user. While working, the burner goes through several stages: cleaning, igniting, burning, extinguishing, cleaning again and initial state.

Every ignition begins with a cleaning cycle, which is indicated by the symbol for a fan in the upper right corner of the screen (field **work phase**). The purpose is to clean all leftovers of the previous burning. At first, for a certain time, set in the **Cleaning on Start** menu, only the primary fan works and after that the additional cleaning fan turns on, if there is any and if it is activated from the Hardware Setup menu. After that the burner goes to igniting phase.

The igniting is indicated by the symbol in the upper right corner of the screen (field **work phase**). A portion of pellets, which is going to be ignited by the electrical heater and the fan, is loaded. When the flame sensor indicates the pellets are burning, a symbol appears in the **flame indicator** field and the burner goes to burning phase. If the pellets do not ignite before the set time is up, a new portion of pellets is loaded and a new attempt for ignition is made. After as many retries as set in the menu **General Setup**, if there still is no fire, the burner stops and a message **Ignition fail** appears.

The logic on igniting is as follows:

1. At first the heater turns on and works without air fan for as long as it is set in the menu **Cycle Setup**, line **Heater**. The purpose is to heat up faster. *Should watch out for the heater not to get overheated and damaged, if the time for turning on the cooling is too long!*
2. At the same time, while turning on the heater, a dose of pellets is fed for so long as it is set in the menu: **General Setup** , line **Feed**.
3. After the time for the heater, working without air fan, runs out, there are two more steps on which the air fan turns on. The idea is that the air fan works less intensive at first, so that it doesn't extinguish the fire, but only keeps the needed oxygen level. After the fire is steady, the fan's speed can be increased for full igniting of all the pellets.
4. If the photo sensor detects enough light, which can be set from the menu **IR Level Setup,** line , the ignition cycle breaks off and the burner goes to work mode. Two parameters are used for recognizing the light level – light level, measured by the photo sensor and time the illumination is over this level.

5. After detecting the burning fire, there is an option to wait for the first dose of pellets to completely burn out, without feeding a new portion for a certain time. This might be set from the menu **Initial burning**.
6. If by the end of the ignition cycle, realized by the above 4 steps, the fire doesn't flare up, a few more cycles are performed, starting with pellet feeding and turning on the heater without air fan. Set the number of retries from **General Setup**, line **Retries.** To avoid the burner to jam up with not-flared pellets, the amount of new portion of pellets is half of the previous portion. New portion of pellets is loaded only for the first three ignition attempts: 100%, 50% and 25% of the set amount.
7. If the fire doesn't start after all of the retries, an alarm **Ignition Fail** occurs and no more retries are going to be performed.

The burning phase is indicated by any of the following symbols in the upper right corner of the screen:  ,  ,  or  . The burner works on its lowest power level indicated by  while going from igniting to burning until the fire flares up. After that the burner goes on its second power level indicated by  . The time for the burner to work on these two power levels can be set from the menu **Burning StartUp**. After igniting phase, the power is regulated depending on the difference between the temperature in the boiler and the set temperature. The power regulation is on three levels with additional level for suspending the fire only. For each level you can set the fan speed, amount of pellets and frequency of loading. When the difference in temperatures is smaller than the set differential temperature for the first power level, the burner goes to Suspend mode, indicated by  . If the Suspend mode continues longer than the set time for this mode and there is no need of increasing the power, the burner turns off. If the difference in temperatures reaches the necessary difference for the first power level while the burner is in suspend mode and if there is still embers, it will inflame automatically.

When turning off, no matter manually or by a timer, the burner goes to extinguishing phase. This is indicated by the symbol  in the upper right corner of the screen. The fuel loading stops and the fan runs on low speed for preventing a back fire to the container with pellets, while the rest of the pellets burn out. When the sensor indicates that there is no fire, the burner goes to cleaning phase and after that in initial state.

*The controller can be set for up to 4 automatic intermediate cleanings for twenty four hours. At the time set for automatic cleaning the burner turns off, cleans and then starts automatically.*

The cleaning process is as follows:

1. The burner turns off.
2. The main blower turns on and works on maximum power for time, set in the menu **Cleaning on Stop**, line **Fan**.
3. After the above time is up, the additional fan turns on and works along with the main blower for time, set in the menu **Cleaning on Stop,** line **Cleaner.**

*If this cleaning method is unnecessary, it could be deactivated by setting the **Clean Count** in the menu **Auto Clean Setup** to 0.*

The controller has one more option for intermediate cleanings that doesn't require the extinguishing of the fire and only increases the power of the blower. The settings for this cleaning method are in the menu **Interm. Cleaning**. The parameters for this setting are: the interval between the cleaning

procedure, blower's speed for the cleaning and the duration of the procedure. During this cleaning procedures the pellet feeding doesn't stop.

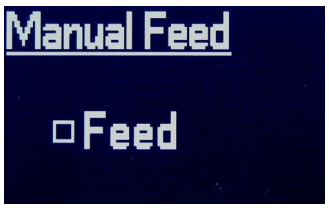
*If this cleaning method is unnecessary, it could be deactivated by setting the duration of the procedure (middle row in the menu **Interm. Cleaning**) to 0 sec.*

## USER SETTINGS

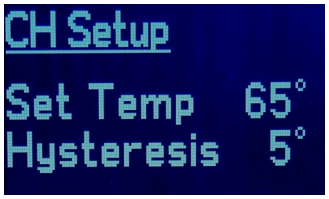
To enter settings mode press and hold the **F** button for 1.5 seconds. User settings are always available no matter in what mode the burner is working at the moment.

When the controller is in settings mode, the buttons have the following functions:

- The **Enter** button switches to the next editable field, if any
- ▲ and ▼ buttons increase or decrease the current value. If you hold the button, the value automatically changes in the relevant direction. If the setting requests a choice from a list of options the button ▲ selects the previous option and the button ▼ the next, if any.
- The F button forwards to the next setting screen and if any of the parameters has been changed, it confirms the new values. If this was the last setting screen the controller goes back to the main screen.
- If no buttons have been pressed for awhile, the controller shows the main screen and ignores the changes made on the current screen.




**Manual control of the feed screw motor – Manual Feed**. By using the up or down arrow keys turn on or off the check box in front of **Feed.** If the check box is checked the screw motor works for 10 minutes or until the check box is unchecked manually again. You can use this option to load the screw motor if it was left empty on any reasons.
***This menu is available only in Standby mode!!!***




**Setting the temperature for turning on/off the central heating pump – CH Setup**

When the temperature of the water in the boiler gets equal to the Set Temp, the central heating installation's circulation pump turns on. When the temperature of the water gets below the value set in **Set Temp – Hysteresis**, the pump turns off.
*Warning: The pump turns on/off from the room thermostat, too, depending on the work mode!*
*The temperature of the boiler set in **Set Temperature**, must be higher than the temperature set in **CH Setup.** Otherwise, this condition will not be fulfilled.*


**Domestic hot water heater temperature set – DHW Setup**
Set the temperature for the water heater to heat up from the parameter **Set Temp**. After reaching this temperature, the water heater's circulation pump turns off. It turns back on again when the temperature of the water in the water heater gets lower than **Set Temp – Hysteresis**. For the water heater's pump to turn on, the following

conditions must be implemented, as well:

- the controller must be working in **DHW Priority, Parallel pumps** or **Summer mode**
- the temperature of the water in the boiler must be above 35ºC
- the difference between the temperature of the water in the boiler and in the water heater must be more than 5ºC

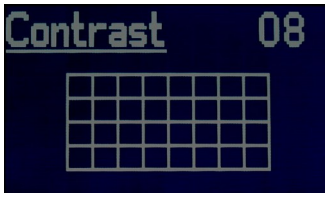
*For a normal heat exchange process, the set temperature of the boiler must be at least 5 degrees higher than the set temperature in the field* ***Set Temp****!*


**Time setting - Set Time**

Sets the clock


**Date setting - Set Date**

Sets the date




**Contrast**

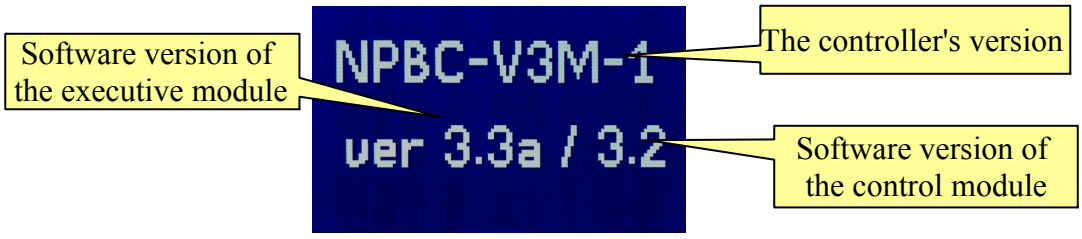
Sets the contrast of the LCD display


**Language**

Choose the language you prefer for the menus.

## FACTORY SETTINGS

Factory settings are used for adapting the controller to the specifics of the burner, the pellets which are going to be used and the boiler installation. To enter factory settings mode press and hold the **F** and the **Enter** buttons together for 3 seconds. Information about the hardware and the software version of the controller appears on the screen:



The following pressing the **Enter** button forwards to the first screen with factory settings. Browse the menus by pressing the arrow buttons: ▲ forwards to the next menu and ▼returns to the previous. If you want to change the parameters in the currently displayed menu, press the **Enter** button again. In the upper right corner of the screen appears the sign , which indicates the Edit mode:

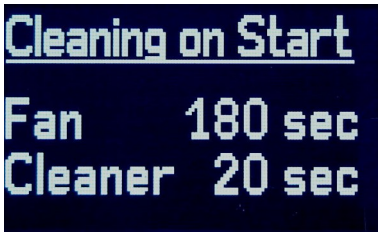

In this mode the buttons have the following functions:

- the arrow buttons ▲ or ▼change the value of the currently blinking parameter in the relevant direction;
- the **Enter** button switches to the next editable parameter;
- the **F** button saves the changes in the current menu and exits the Edit mode**;**
- if no buttons are pressed for a certain time, the controller goes back to its main screen without saving the settings in the currently displayed menu.

To exit the factory settings press **F** and confirm your choice with **Enter**:

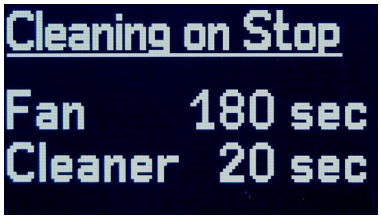

**Factory settings are as follows:**

**Cleaning on Start** – set the work time for the main (**Fan**) and the additional (**Cleaner**) air fan for the cleaning cycle before ignition

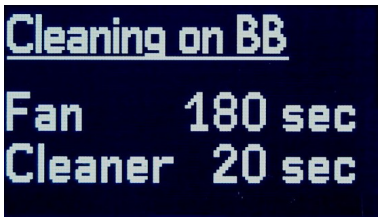



**Cleaning on Stop** – set the work time for the main (**Fan**) and the additional (**Cleaner**) air fan for the

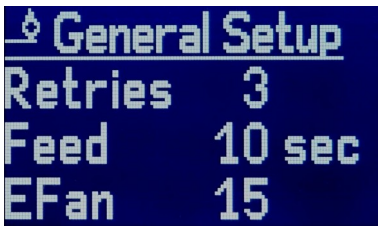
cleaning cycle after extinction. These settings also apply for the intermediate automatic cleanings.



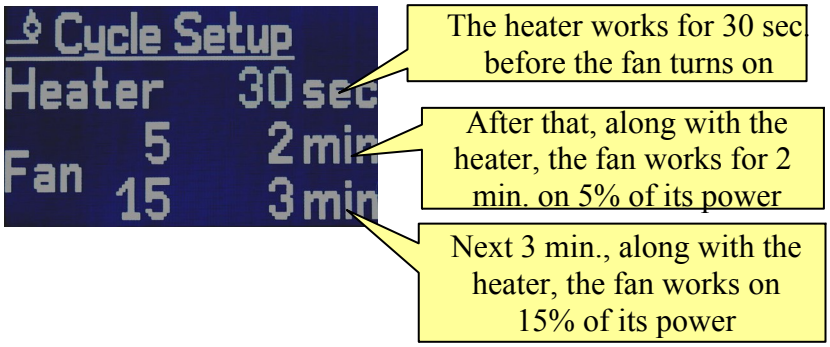

**Cleaning after extinction caused by Back Burning alarm – Cleaning on BB** – sets the work time for the main (**Fan**) and the additional (**Cleaner**) air fan for the cleaning cycle if a back burning alarm has been registered.



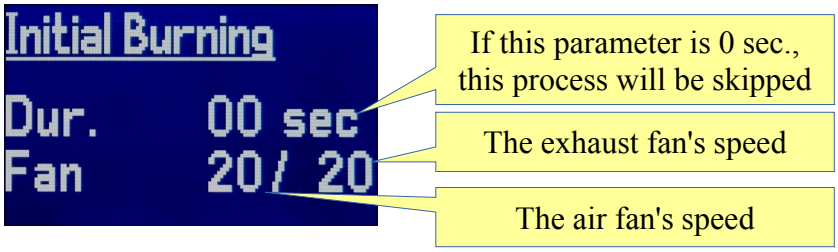

**General Setup -** - set the number of ignition attempts (**Retries**), the work time of the auger for initial feed (**Feed**) and the speed of the Exhaust Fan (**EFan**).



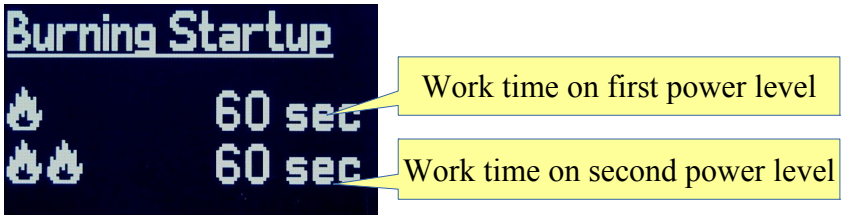

**Ignition cycle setup - Cycle Setup** – adjust the work time of the heater before the fan turns on and the following two work modes of the fan, which include speed and duration.



**Waiting for the first dose of fuel to burn out – Initial Burning –** After detecting that the pellets are burning, the controller can wait for the fire to get steady. During this initial burning, no new pellets are fed and only the air fan and the exhaust fan work. To activate this setting, enter the duration of this initial burning process without feeding new pellets (**Dur.**) and the speed of the fans (**Fan**).

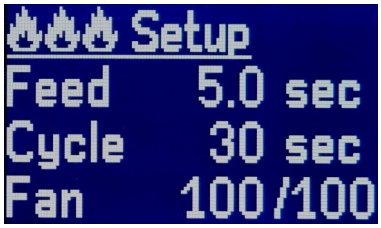



**Work time on lower power until the fire flares up – Burning Startup** – Right after ignition, the burner doesn't work on its full power to prevent extinction of the unsteady fire. It works first on its two lower power levels indicated by 🔥 and 🔥🔥 . From this menu you can set the work time for each of these two power levels



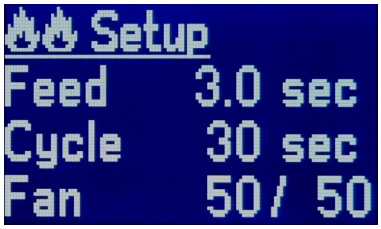

**Burn Level** – set limits for power regulation. Set the difference between the set temperature and the boiler temperature for each level.


**3rd level - 🔥🔥🔥Setup** – adjust the work mode for 3rd power level (maximum power). Set the active time of the auger when loading a portion of pellets, the cycle time before loading a new portion of pellets and the speed of the fans.

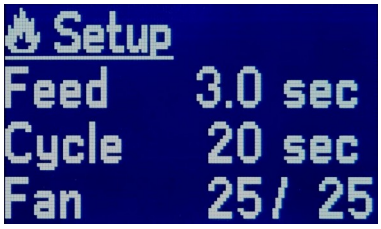



This screen means the following: on 3rd power level, on every 30 seconds (**Cycle**), the auger loads pellets for 5 seconds (**Feed)**. The fans work on 100% of their power (**Fan)**.

**2nd level - Setup** - adjust the work mode for 2nd power level. Set the active time of the auger when loading a portion of pellets, the cycle time before loading a new portion of pellets and the speed of the fans.

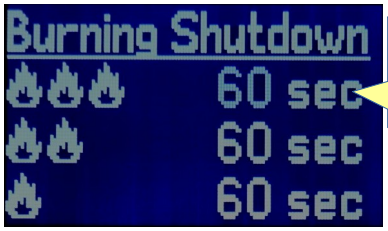



**1st level - Setup** - adjust the work mode for 1st power level. Set the active time of the auger when loading a portion of pellets, the cycle time before loading a new portion of pellets and the speed of the fans.



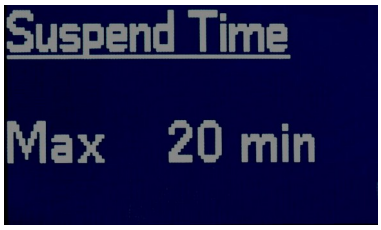

**Suspend** – adjust the Suspend mode. Set the active time of the auger when loading a portion of pellets, the cycle time before loading a new portion of pellets and the speed of the fans. Settings here are the same as above.


**Smooth extinction of the fire – Burning Shutdown –** When the room thermostat activates due to reaching the set temperature while the controller is working in **CH Priority** mode, the burner smoothly decreases the power level and if the room thermostat remains active, it shuts down. The burner goes through each power level and works on it for as long as it is set in the menu below:



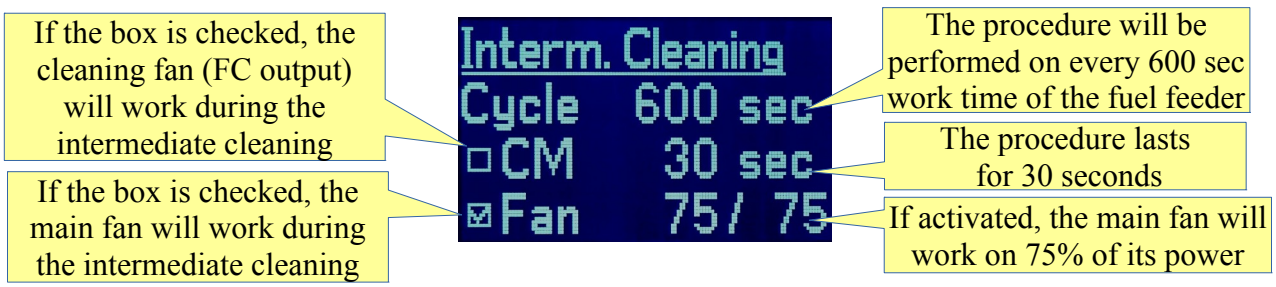

If the burner is working on this power level, in 60 seconds it will switch to the lower one

**Suspend Time** – adjust the maximum duration for maintaining the fire. If there is no need for increasing the power for longer than the time set in this setting, the burner turns off.

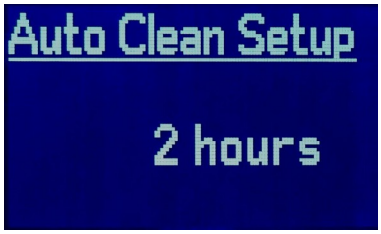



**Overheating –** If the burner works in Suspend mode, but the temperature keeps increasing, you can set the limit for it to increase. If the parameter in this menu is set to 5°C and the set temperature is 60°C, for instance, when the temperature gets to 65°C, the burner will turn off, even if the maximum time for Suspend mode hasn't run out yet.

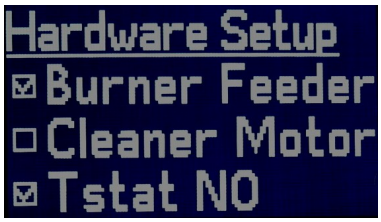

**Intermediate cleaning** – **Interm. Cleaning** – This cleaning method works while the fire is burning. The parameter Cycle indicates the total active time of the main feed screw motor between two intermediate cleaning procedures. Set the duration of the procedure from the second parameter on the second line. If you want to deactivate the intermediate cleaning procedures, set this parameter to 0. You have the option to choose the fan that you prefer for the cleaning: main fan, cleaner motor or both. If CM is checked, only the Cleaner motor works on full power. If Fan is checked (or if neither Fan, nor CM is checked), only the main fan and the exhaust fan work. You can set their power level for this cleaning procedures from the last two parameters on the last row. If both CM and Fan are checked, all of the fans will work.



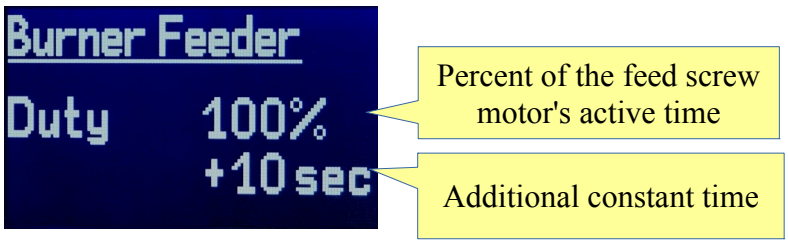
**Automatic clean up - Auto Clean Setup** – The burner has an option for Automatic cleaning procedures. During these procedures, the burner turns off, cleans itself and automatically turns on again. The parameter in this menu indicates the burning time between the automatic cleaning procedures. If the burner turns off between two cleaning procedures for some reason (for example, it has reached the set temperature, or the thermostat has activated, or else), the timer until the next procedure starts from 0 again.



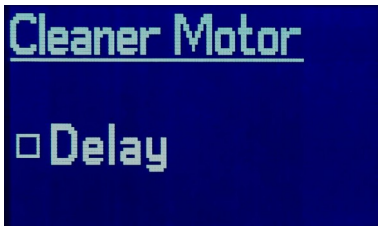

**Hardware Setup** – gives the opportunity to deactivate the internal auger motor (**Burner Feeder)** and the additional cleaning fan (**Cleaner Motor**), if the burner does not have these options. If **Tstat NO** is checked, the room thermostat will be with normally opened sockets.



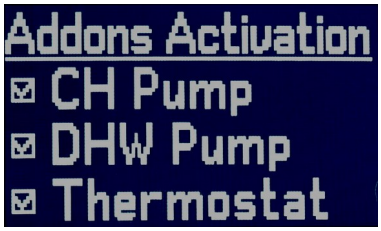

**Burner feeder active time set - Burner Feeder –** adjust the internal auger motor's (if any) active time. It turns on at the same time with the main feed screw motor. The active time of the burner feeder depends on the percents of the active time of the feed screw motor and the additional constant time. For example, if the feed screw motor works for 5 seconds for each cycle, the percentage setting is 150% and the additional constant time is 5 seconds, then the internal auger motor will start spinning at the same time with the feed screw motor and will stop in 7.5+5=12.5 seconds. The point of this settings is to provide enough time for the pellets to move from one end of the burner feeder to the other.



**Delay for the Cleaner motor – Cleaner –** This menu sets a delay time after every cleaning procedure which uses the FC output. The delay time is equal to the active time of the FC output. For example, if you use this output for a mechanical actuator, during the cleaning procedures it will be supplied with power to push out the ashes. After that the actuator will have time to get back to its normal position before the new portion of pellets is loaded.

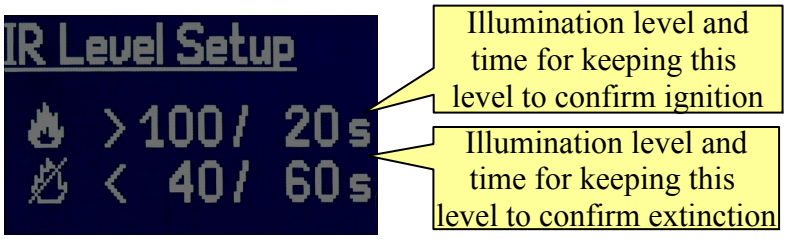



**Activating additional peripheral devices – Addons Activation** – this setting activates the additional outputs for central heating circulation pump **CH Pump** and domestic water heater circulation pump **DHW Pump. Thermostat** activates the option to work with a room thermostat.




**External Stop – Ext Stop –** This menu gives an option to use an external stop switch for the burner. Connect this switch to the OD input and set whether it is normally closed or normally opened. If there is a check sign in front of NC, this means that the switch is normally closed and when it opens, the burner will turn off.


**Flame sensor settings - IR Level Setup** – adjusts the limits of the flame sensor for recognizing ignition and extinction and the minimum time for keeping these rates to confirm the condition. Each row's format is: <illumination level>/<time for keeping this level>



**Maximum temperature - Set Temperature** – adjust the upper limit of the range for the boiler's temperature

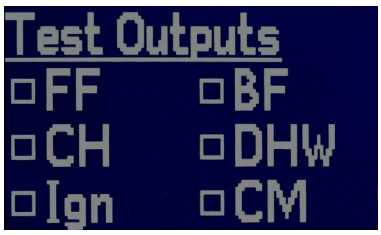

**Safety Setup** – A high temperature sensor pt100 monitors the temperature of the exhaust gases. The parameter **Warn** sets the value (in Celsius), above which the controller displays a warning message Cleanup. The parameter **Alarm** sets the value (in Celsius), above which the controller displays a message TE Alarm and turns off the burner, because the temperature of the exhaust gases is too high. In both cases the boiler needs to be cleaned up. If the burner doesn't have a high temperature sensor pt100, this function could be disabled by removing the check sign on the row **Active**.


***The following screens are available only if the burner is in Standby mode!!!***

**Test Fan Speed** – test setting for fan's speed. The power of the air fan can be increased or decreased in percents by ▲ and ▼ buttons. This function has limited active time and turns off automatically.


**Test the Exhaust fan – Test EFan Speed** – test setting for fan's speed. The power of the exhaust fan can be increased or decreased in percents by ▲ and ▼ buttons. This function has limited active time and turns off automatically.

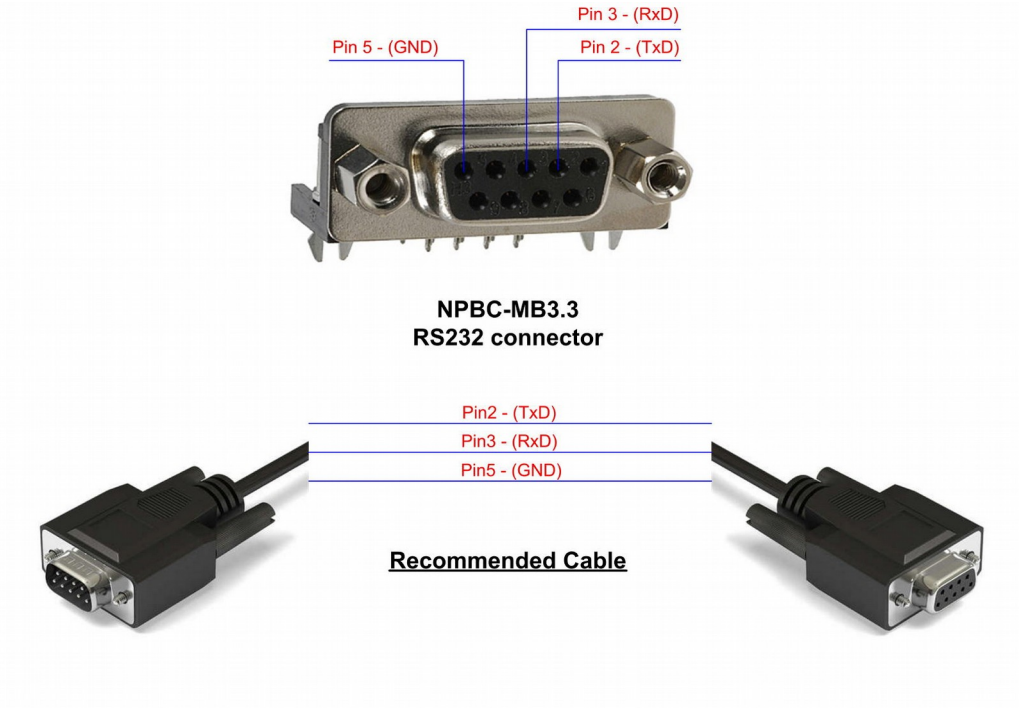
**Test turning on of the rest of the outputs – Test Outputs** – When a row is checked, power is supplied to this output for test purposes.



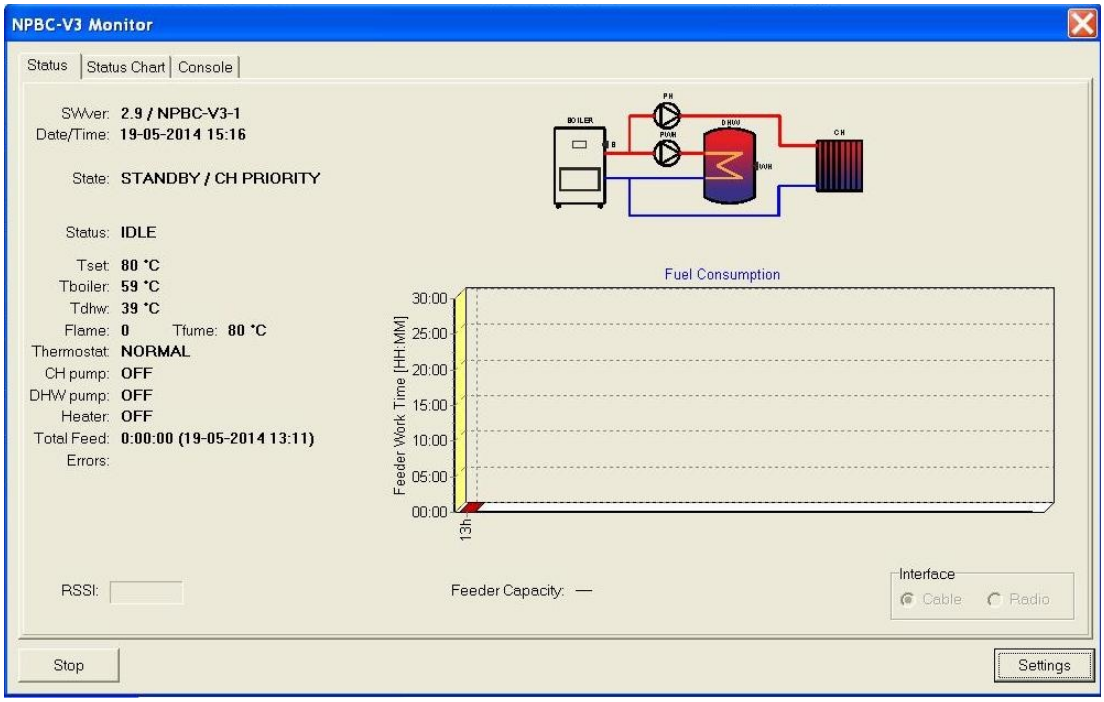
## SETUP PARAMETERS RANGE FOR NPBC-V3M

| Setup Menu | Parameter | Unit | Min | Max | Default |
|---|---|---|---|---|---|
| CH Setup | Set Temp | °C | 35 | 80 | 65 |
| | Hysteresis | °C | 1 | 5 | 5 |
| DHW Setup | Set Temp | °C | 20 | 65 | 45 |
| | Hysteresis | °C | 1 | 5 | 2 |
| Contrast | Contrast | level | 0 | 20 | 9 |
| Cleaning on Start | Fan | seconds | 10 | 600 | 180 |
| | Cleaner | seconds | 0 | 250 | 2 |
| Cleaning on Stop | Fan | seconds | 10 | 600 | 180 |
| | Cleaner | seconds | 0 | 250 | 2 |
| Cleaning on BB | Fan | seconds | 10 | 600 | 180 |
| | Cleaner | seconds | 0 | 250 | 2 |
| General Setup | Retries | | 0 | 5 | 3 |
| | Feed | seconds | 1 | 99 | 10 |
| | EFan | speed level | 1 | 100 | 15 |
| Ignition Cycle Setup | Heater | seconds | 0 | 600 | 30 |
| | Fan phase 1 | speed level | 1 | 100 | 5 |
| | | minutes | 1 | 9 | 2 |
| | Fan phase 2 | speed level | 1 | 100 | 15 |
| | | minutes | 1 | 9 | 3 |
| Initial Burning | Duration | seconds | 0 | 300 | 0 |
| | Fan column 1 | speed level | 1 | 100 | 20 |
| | Fan column 2 | speed level | 1 | 100 | 20 |
| Burning Startup | 1st Power Level | seconds | 10 | 600 | 60 |
| | 2nd Power Level | seconds | 10 | 600 | 60 |
| Burn Level | dT for 3rd Power Level | °C | 0 | 30 | 10 |
| | dT for 2nd Power Level | °C | 0 | 20 | 5 |
| | dT for 1st Power Level | °C | 0 | 10 | 0 |
| 3rd Burn Level Setup | Feed | seconds | 0.1 | 25.0 | 5.0 |
| | Cycle | seconds | 4 | 120 | 30 |

| | | | | | |
|---|---|---|---|---|---|
| | Fan column 1 | speed level | 1 | 100 | 100 |
| | Fan column 2 | speed level | 1 | 100 | 100 |
| 2nd Burn Level Setup | Feed | seconds | 0.1 | 25.0 | 3.0 |
| | Cycle | seconds | 4 | 120 | 30 |
| | Fan column 1 | speed level | 1 | 100 | 50 |
| | Fan column 2 | speed level | 1 | 100 | 50 |
| 1st Burn Level Setup | Feed | seconds | 0.1 | 25.0 | 3.0 |
| | Cycle | seconds | 4 | 120 | 20 |
| | Fan column 1 | speed level | 1 | 100 | 25 |
| | Fan column 2 | speed level | 1 | 100 | 25 |
| Suspend Burn Level | Feed | seconds | 0.1 | 25.0 | 2.0 |
| | Cycle | seconds | 10 | 120 | 120 |
| | Fan column 1 | speed level | 1 | 100 | 5 |
| | Fan column 2 | speed level | 1 | 100 | 5 |
| Burning Shutdown | 3rd Power Level | seconds | 10 | 300 | 60 |
| | 2nd Power Level | seconds | 10 | 300 | 60 |
| | 1st Power Level | seconds | 10 | 300 | 60 |
| Suspend Time | Suspend Time | minutes | 0 | 180 | 20 |
| Overheating | Max | °C | 0 | 20 | 0 |
| Interm. Cleaning | Cycle | seconds | 10 | 900 | 600 |
| | Duration | seconds | 0 | 120 | 30 |
| | Fan, column 1 | speed level | 1 | 100 | 75 |
| | Fan, column 2 | speed level | 1 | 100 | 75 |
| Auto Clean Setup | Cycle | hours | 0 | 24 | 2 |
| Burner Feeder | Duty | % | 110 | 500 | 150 |
| | | seconds | 0 | 30 | 0 |
| IR Level Setup | Detect Ignition | level | 1 | 150 | 100 |
| | | seconds | 10 | 240 | 20 |
| | Detect Extinction | level | 0 | 150 | 40 |
| | | seconds | 10 | 240 | 60 |
| Set Temperature | Max | °C | 25 | 85 | 85 |
| Safety Setup | Warn | °C | 150 | 300 | 200 |
| | Alarm | °C | 200 | 350 | 220 |
| Test Fan Speed | | speed level | 0 | 100 | 0 |
| Test EFan Speed | | speed level | 0 | 100 | 0 |




**NPBC_Monitor.exe  NPBC-V3M monitoring software**



## SETTING ALL PARAMETERS WITH NPBC_MONITOR.EXE