

## TM3007 User Manual

Revision: 3.30

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## IMPORTANT NOTES

This documentation has been made solely to serve as an aid to the stoker producer to describe his product. Techno-Matic A/S does not issue any warranty that this documentation fulfils or satisfies the national or international demands for documenting the product since this is the duty of the individual stoker producer. Techno-Matic A/S is, however, thankful for any comment or advice that may help to improve this manual.

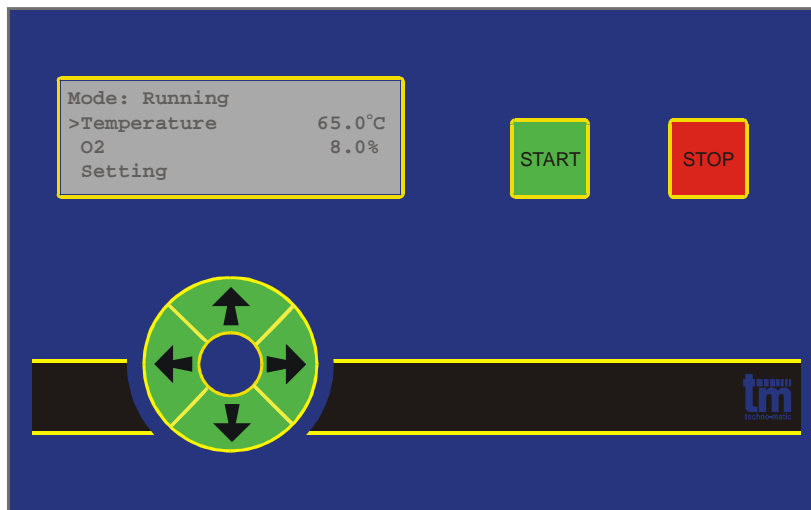
**Please note:** You must always turn off the power supply before actually touching anything in the system in order to avoid dangerous situations. Only persons with a permission from the stoker producer and with an authorization in accordance with the national legislation must carry out any interventions/repairs in the installations.

## 1 DESCRIPTION

This manual is written for the stoker producer and the service technicians. In this manual adjustments affecting very fundamental functions in the system are described. Wrong use of these functions can result in mal function and dangerous situations. It is the duty of the stoker producer and the service technician to make sure that the controller works correctly with the entered values. The service manual describes the TM3007 from the software version 7.8x. The latest edition of this documentation can be required from Techno-Matic A/S.

**Please Note!** If the TM3007 is switched on while the oxygen sensor is cold, the voltage supply for the computer will be gone for about 180 seconds and the display will be without text! Then the computer will start and text will appear again on the screen. The reason for this is that the heating element, built into the oxygen sensor, must heat up the sensor before the correct oxygen% can be measured. If you want to start before the end of a count-down, you can do this by pressing the STOP button once.

The service functions of the Stoker controller TM3007 are adjusted by using the various possibilities of the built-in menu system. In order to facilitate the description thereof, we will start with a short description of the front of the controller.

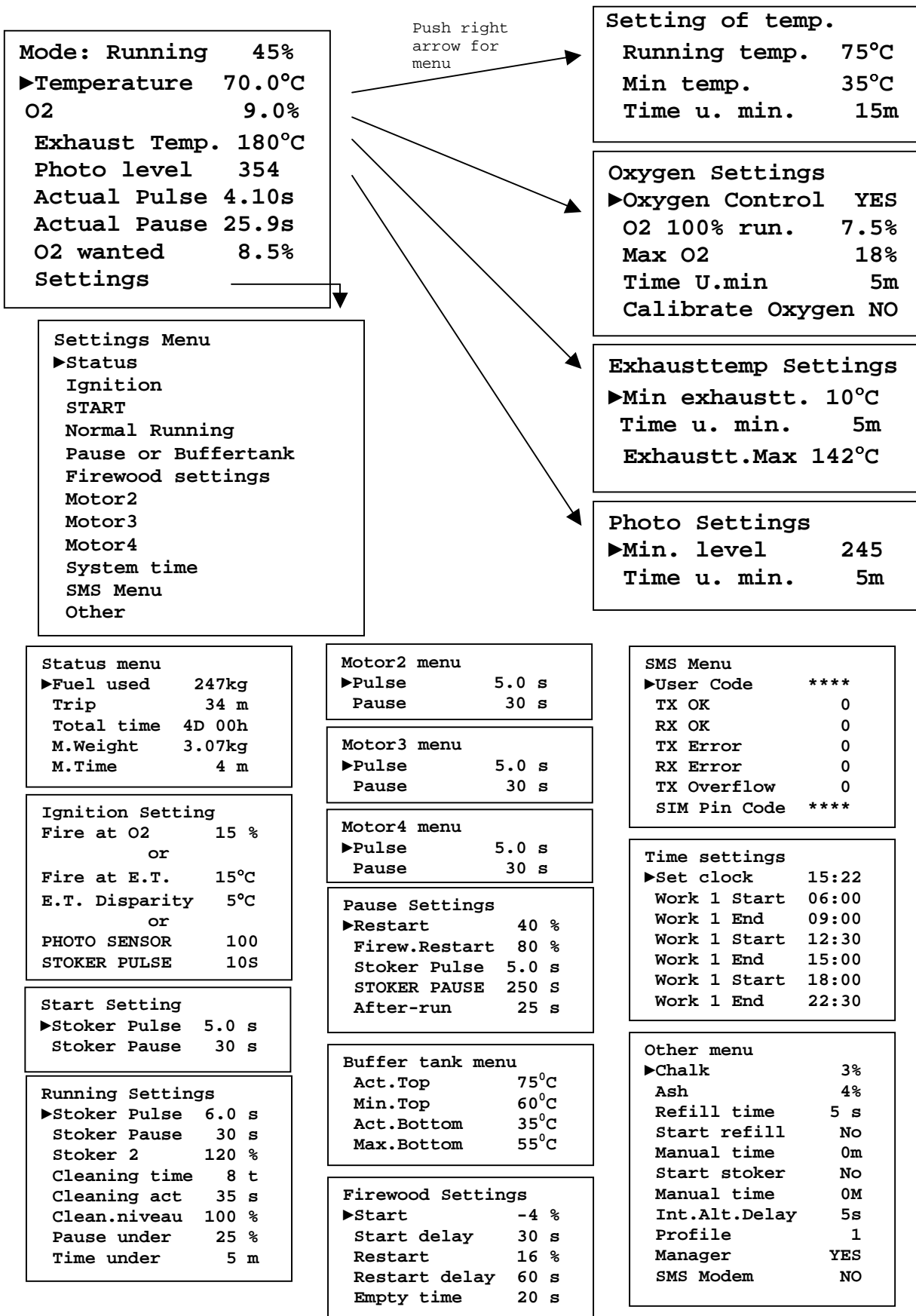


Item	Description
START Button	This button is used to start the stoker and to force-feeding with fuel.
STOP Button	This button is used for stopping the stoker.
▲ (Arrow up)	Used for choosing an upper menu and for choosing a higher value when setting the controller. Removes information.
◀ (Left Arrow)	Used for choosing previous menu, when you are not in the main menu. Cancels a setting.
▼ (Arrow down)	Used for choosing lower menu and for choosing a lower value when setting the controller.
▶ (Right Arrow)	Used for choosing a sub-menu, choose setting and accept an entered value.

In the menuesystem the cursor ▶ is used for marking the menu-line on which the commands are being used. When a parameter is being edited, the cursor will alternate between small and large ▶. This is indicated with the symbol ▷ in this manual. The controller can be in one of the following modes: **Start (Ignition), Running, Pause, Error or Stopped.**

2 USER MENU STRUCTURE

The user menus of the TM3007 are edited as shown in the figure below (Some points are only available, when the producer has chosen respective functions. Special functions are located in the menu "Other")



### **3 INDICATION OF ERRORS AND MESSAGES**

The system will indicate errors in the following situations. The alarms refer to the choice of inputs.

<b>Alarm</b>	<b>Description</b>
Error: Hot boiler	The boiler has stopped, because the hot boiler switch has been activated. The boiler can be started again by pressing START after having pressed the hot boiler thermostat again and if no other errors have been indicated.
Error: Connection	The boiler has stopped because stoker and boiler have been separated. The boiler can be started again by pressing START after having corrected the error and if no other errors have been indicated.
Error: Thermo Motor	The boiler has stopped because of a thermo drop out on the stoker motor. The boiler will start again, when the error has been corrected.
Error: Lid open	The boiler has stopped, because the lid of the fuel container is open. If no other error signals are indicated, the boiler will run again when the lid has been closed.
Error: Hot feed. Pipe	The boiler has stopped, because the feeding pipe has become hot. ▲ will remove the message.
Error: Plug is loose	The boiler has stopped, because the plug has gone loose. The boiler can be started again by pressing start after having corrected the error and if no other errors have been indicated. ▲ will remove the message.
Error: Hot Stok.pipe	The stoker brings forward fuel, because the switch at the stoke pipe has detected too high a temperature. The screw will run for the time entered in **Hot stoker, "H.S. Pulse". ▲ will remove the message.
Error: Alarm	A message, which can be used for input signals, not specified in program. ▲ will remove the message.
Error: Safety	A message, which can be used for input signals, not specified in program. ▲ will remove the message.
Error Thermo Motor2	The boiler has stopped because of a thermo drop out on an extern motor. The boiler will start again, when the error has been corrected. ▲ will remove the message.
Mode: Pause    Ext.	Special function, will force the controller into pause mode.

## TM3007 USER MANUAL

In the display will be shown a number of messages, telling the actual working mode. Beside this, the following messages can be displayed.

User messages	Description
** Hot stoker	The boiler brings forward fuel, because the thermometer probe on the stoker tube has detected too high a temperature. The boiler will start automatically when the temperature of the stoker tube has fallen. ▲ will remove the message.
** Ignition Error! **	The boiler has stopped, because the control could not ignite a fire. Probably the boiler has run out of fuel. Press START to start the boiler again. ▲ will remove the message.
** Power Failure! **	The boiler has stopped because of power failure. Press START to start the boiler again. ▲ will remove the message.
* Min. temp. Stop *	The boiler has stopped because the temperature has fallen below the minimum temperature. Press START to start the boiler again.
** Min smoke temp *	The boiler has stopped because the Smoke temperature has fallen below the minimum temperature. Press START to start the boiler again.
** Min Photo level *	The boiler has stopped because the Photo level has fallen below the minimum setting. Press START to start the boiler again.
** Max O2 Stop	The boiler has stopped because the fire has burned out. Press start to start the boiler again. ▲ will remove the message.
** Profile switch	The message tells the Profile has been changed. ▲ removes the message
** Setting saved	The boiler brings forward fuel, because the temperature sensor on the stokerpipe has detected a too high temperature. The stoker screw will run for as long as the temperature is too high.
** O2 Calibration OK	The boiler has stopped, because the signal for the entry in question has been cut. The boiler can be started again by pressing START after having corrected the error and if no other errors have been indicated.
** Calibration Error **	The boiler has stopped because stoker and boiler have been separated. The boiler can be started again by pressing START after having corrected the error and if no other errors have been indicated.
** Power Failure! **	The boiler has stopped because of power failure. Press START to start the boiler again. ▲ will remove the message.
** Cooling burner	The boiler has stopped and cools down in the "Cooling time"
** Cleaning burner	The fan is running 100% in the "Cleaning act." Time every 8 <sup>th</sup> hour. (Standard setting)
** Pellets failure **	The refill screw has been running for too long. The silo/container is empty.

## 4 GENNERALY

Press the START button to start the system, by doing this you activate the start procedure. By keeping the START button pressed down, the stoker is activated, and material for ignition can be brought forward (as long as START is pressed down). On systems provided with automatic ignition, the controller will make a number of ignition attempts and after having established that there is a fire burning, the controller will switch on to Start or Running Mode.

An extra press on START will force the controller into run mode.

**Please notice!** The 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> **Chapter**. (These four Chapters aren't always activated by the producer, and will therefore not always be displayed.) In run mode all the selected conditions must be met so that the installation does not stop.

## 5 TEMPERATURE SETTINGS

From the main menu: Temperature Press ► to get access to the **temperature settings**.

- **Running Temp.** Here you can enter the running temperature wanted.
- **Min temp.** It is the boiler temperature entered here, together with the next, **Time before stop**, which indicates "Min. temp. Stop".
- **Time before stop.** In running mode the boiler temperature must not be under **Min. temp.** for longer than **time before stop**. Should this happen, the boiler will stop and the display will indicate **Min. temp. Stop**. Setting must be between 1 and 120 sec.

## 6 OXYGEN SETTING

From the main menu: Press ▼ until the cursor is to the left of **O2**, and ► for the menu "**Oxygen Setting**"

- **Oxygen Control.** Here you can choose whether you want the oxygen control to be activated (YES) or not (NO).
- **O2.** Here you can set the oxygen percentage wanted at 100% air-intake (100% running). The TM3007 will calculate the oxygen percentage wanted at any air-intake to the effect that the oxygen percentage will increase, if the air-intake falls.
- **Max O2.** Above this oxygen% the controller will tell, there is no more fire. (In combination with the next: **Time before stop**)
- **Time before stop.** The time allowed to run with an oxygen% higher than the: **Max O2**
- **Calibrate Oxygen.** By pressing YES the oxygen sensor will be calibrated. This **MUST** be done, while the oxygen sensor is in open air (21% oxygen) and the system must have been switched on for more than 3 minutes, as the sensor must be warm. Having finished the calibration, the TM3007 display will show the following: `Oxygen calibrated OK`. If the TM3007 estimates that the oxygen sensor is not functioning, the following will be shown instead: `Calibration Error!` and the TM3007 will continue with the former calibration value.

Press ▼ or ▲ to alternate between the parameters. Press ► to correct a parameter (using ▼ or ▲) and ► to finish and ◀ to cancel.

## 7 EXHAUSTTEMP SETTING

From the main menu: Press ▼ until the cursor is to the left of **Exhaust temp.**, and ► for the menu "**Exhausttemp setting**"

- **Min exhaustt.** The minimum allowed exhaust temperature (smoke temperature) This temperature + the actual water temperature, indicates In combination with the next: **Time u. min.** when the fire is burned out
- **Time u. min.** The controller will allow, running with a lower temperature than **Min exhaustt.** in this time before a stop. If it comes to a stop the message "**Min. Smoke temp**" will be displayed.
- **Exhaustt. Max.** The maximum measured exhaust temperature since the last reset. Reset is done by pressing the ► twice.

## 8 PHOTO SETTINGS

From the main menu: Press ▼ until the cursor is to the left of **Photo level.**, and ► for the menu "**Photo settings**"

**Min level.** Minimum light level during normal running. (See next menu point.)

**Time u. min.** The controller will allow, running with a lower light level than **Min level.** in this time before a stop. The message "Min Photo Level" will be displayed if it comes to a stop.

## 9 STATUS

- **Fuel used.** Here you can see the total amount of fuel used, if you have tested how much the stoker auger will give in a certain time. Should be entered below in the menus "**M. weight**" and "**M. time**"
- **Trip.** The time the stoker auger has been turning. This counter can be set to zero independent of the "**Total time**"
- **Total time.** The total time the stoker auger has been running
- **M. weight** The amount of fuel, the stokers auger will feed out during the time "**M. time**" The amount of fuel you can read in the "**Fuel used**" is dependent of the accuracy of this measuring.
- **M. time.** Se upper menu

## 10 IGNITION SETTINGS

If the ignition is activated, there are three fire detecting possibilities. Fire at O<sub>2</sub>, Fire at exhaust temperature, or Photo sensor. The producer initiates these settings in the service menu. The customer then does the temperature/level settings.

From the main menu: Press ▼ until the cursor is to the left of "Setting", ► for the menu "Setting menu" and ► to get access to the ignition setting.

- **Fire at O<sub>2</sub>.** The controller will interpret it as a going fire, when the oxygen% has fallen below this percent.
- **Fire at exhaust temp.** The controller will interpret it as a going fire, when the exhaust gas temperature measured exceeds the temperature of the boiler + the temperature entered here and/or when the **Exhaust Temperature difference** (rise) has been reached. (**See below, E.T. Disparity**) Exhaust Temperature difference means: The controller stores the exhaust temperature at the start of the ignition, and then the temperature must have risen by the number of degrees entered. If you only want to use one of these settings, enter 0 at the not used setting.
- **E.T. Disparity.** The temperature shall raise this entered value before fire is detected.
- **Photo sensor:** The controller will interpret it as a going fire, when the light level measured exceeds the level entered (min. 1 max. 100).
- **Stoker pulse.** The producer may have chosen the stoker pulse to be editable for the user, and it will be displayed here.

**At oxygen control alternative indication of fire can be chosen:** This means that the producer might have chosen that exhaust temperature or photo sensor is used for indication of fire, whereas in normal running mode oxygen control is being used.

Press ▼ or ▲ to alternate between the parameters. Press ► to correct a parameter (using ▼ or ▲) and ► to finish and ◀ to cancel.

## 11 START MODE

From the main menu: Press ▼ until the cursor is to the left of "Setting", ► for the menu "Setting menu" ▼ until the cursor is to the left of "Start Setting" and ► to see the menu **Start Setting**:

- **Stoker pulse** Decides how long each stoker pulse shall last.
- **Stoker pause.** Decides how long each stoker pause shall last.

Press ▼ or ▲ to alternate between the parameters. Press ► to correct a parameter (using ▼ or ▲) and ► to finish and ◀ to cancel.

## 12 RUNNING MODE

The controller will at any time control the speed of the blower and the pulse time of the stoker in order to achieve the running temperature

When the oxygen control is activated, the controller regulates the pulse time of the stoker in order to achieve the oxygen percentage wanted. The actual pulse and pause on the stoker motor can be read at the bottom of the main menu (see paragraph 2). If the oxygen control is not engaged the controller regulates the pulse time of the stoker proportionally according to the output.

From the main menu: Press ▼ until the cursor is to the left of "Setting", ► for the menu "Setting menu" ▼ until the cursor is to the left of "Running Setting" and ► to see the menu **Running Setting**:

- **Stoker pulse.** Decides how long each stoker pulse shall last. The time entered here is the maximum time for the stoker pulse, and this is used when running in manual mode,(Without oxygen control) It means, if oxygen control is activated, the Stoker pulse should be set longer than without oxygen control. E.G. is the stoker pulse in manual mode set to 5 sec. the stoker pulse in automatic mode,



should be set higher (40%) which is 7 sec. The TM3007 will vary the pulse in order to achieve the oxygen percentage wanted.

- **Stoker pause.** Decides how long each stoker pause shall last.
- **Stoker 2.** Here the accordance between Stoker 1 and stoker 2 is set. The Percent can be adjusted between 5 and 100%
- **Int.Sta.Delay.** (The internal auger start delay) If an output is chosen as Int. Stoker this and the next parameters will be shown here. The internal screw will now start turning according to the "Stoker" with this delay. The delay can be negative and the internal screw will then start turning before the "Stoker screw"
- **Int.Sto.Delay.** (The internal auger's stop delay) The internal screw will stop turning according to the "Stoker" with this delay. The delay can be negative and the internal screw will then stop turning before the "Stoker screw"
- **Cleaning time.** In this adjustable interval the blower will run in the "**Cleaning Act**" time.
- **Cleaning Act.** See the above line
- **Cleaning niveau.** The wanted blower performance during the "**Cleaning time**"
- **Pause under.** The performance %, below which the boiler must have operated before the system will switch on to Pause mode and the performance beyond which the boiler must operate before the system switches to Running mode. Must be adjusted within the range 5 - 50%.
- **Time under.** Is used together with **Pause under** to adjust, when the system must switch on to Pause mode. Must be adjusted within the range 5 – 60 minutes.

Press ▼ or ▲ to alternate between the parameters. Press ► to correct a parameter (using ▼ or ▲) and ► to finish and ◀ to cancel.

### 13 PAUSE MODE

If the running temperature wanted + 6 degrees is reached, or the performance is less than what has been set in **Pause under**, the system will switch on to Pause mode. During Pause a little fuel will be supplied to avoid burning back and to maintain the fire. When the performance gets beyond what has been set in **Pause under** or the temperature has dropped to 2°C below the running temperature wanted, the system will switch on to Start Mode/Running Mode.

For the main menu: Press ▼ until the cursor is to the left of "Setting", ► for the menu "Setting menu" ▼ until the cursor is to the left of "Pause Setting" and ► to see the menu **Pause Setting**:

- **Restart.** The output% where the controller will leave the pause, and go to Ignition/Start up or normal running.
- **Firew. Restart.** (Wanted restart output by the use of firewood) When the ◀ (Left arrow) is pressed for 3 seconds, to enable the function, the system will change to pause until the calculated output (Shown in display) exceeds this entered restart output. This will cause the temperature to decrease a few °C before the system will change to "Normal running". This is done to have the firewood burned by a high output, to get the best efficient.
- **Stoker pulse** Decides how long each stoker pulse shall last. (If this running temperature wanted is exceeded by 8 degrees, the pulse will be reduced to one third). If 0 is entered here, there will be no stoking the boiler during the pause. This setting at 0 is normal for units with automatic ignition. At the same time normally an after-run time is entered, so the fire will be blown out and the burner can be cooled down.
- **Stoker pause.** Decides how long each stoker pause shall last.
- **After-run.** Decides for how long the blower must continue to run after a stoker pulse. When the controller switches from Running to Pause Mode, the blower will also run for this period of time. (Setting from 0 to 900 sec.).

Press ▼ or ▲ to alternate between the parameters. Press ► to correct a parameter (using ▼ or ▲) and ► to finish and ◀ to cancel.

## **14 BUFFER TANK**

This menu will only be displayed if the producer has chosen the option. (In the service menu) The choice of this function will cause the "Pause menu" to be inactive. (Disappear from the settings menu)

- **Start temp.** When the temperature comes below this temperature in the top of the buffer tank, the controller will first fill up the auger and burner. After filling up the controller will proceed with ignition/start up/normal running. An automatic fill up will only take place when the controller has done the stop because of the max Bottom is reached. Starting by manually pressing the start button will not cause an automatic fill up.
- **Stop temp.** When the measured temperature in the bottom of the buffer tank exceeds this temperature, the controller will empty the auger and burner, and then go into a stop. During the emptying period, the output will be minimum 40%. If the "**STOP**" is pressed during this period, the controller will stop immediately, and the automatic fill up will not take place by the next press on the "**START**".
- **Act. Top.** The actual temperature measured in the top of Buffer tank (where sensor is placed).
- **Act. Bottom.** The actual temperature measured in the bottom of Buffer tank (where sensor is placed)

## **15 FIREWOOD SETTINGS**

- **Start.** (Firewood program start) If the oxygen percent goes below the wanted O2% with this adjustable % (usually -) in the time entered in "Start Delay", the controller will act by change state to "Firewood program". The stoker screw stops, and the internal auger will continue running in "Empty time" The blower will continue running but now the blower performance is now controlled according to the oxygen%
- **Start Delay.** See previous menu point.
- **Restart.** (Firewood program ends) When the oxygen% raises above this % and stay there in the time "Restart delay", the controller will stop the firewood program and go back to the normal running.
- **Restart Delay.** See previous menu point.
- **Empty time.** The internal auger will continue running in this time after the firewood program is started.

## **16 SYSTEM TIME (TIME SETTINGS)**

The controller can be configured to start / stop (Work) at different times of the day. Max 3 starts / stops can be set as the times when the heating system must be running. The most manageable is to set " Work 1 Start" to the first time at the day you want the heating system to start, for example pm. 06:00 and then stop again at. 08.00 " Work 1 Stop." Is the start time, for example "Work 2 Start" asked before than stop "Work 1 Stop" the system will continue in run-mode.

**Set clock.** Here the clock can be adjusted if the time is not right

**Work 1 Start.** First working time start

**Work 1 Stop.** First working time stop

**Work 2 Start.** Second working time start

**Work 2 Stop.** Second working time stop

**Work 3 Start.** Third working time start

**Work 3 Stop.** Third working time stop

## **17 MOTOR2 (3 AND 4)**

- **Motor 2 pulse.** Decides how long each motor 2 pulse shall last.
- **Motor 2 pause.** Decides how long each motor 2 pause shall last. The producer may have decided the Pause time should depend on the stoker screw's runtime (Like the Chalk and Ash.)

## **18 OTHER**

From the main menu: Press ▼ until the cursor is to the left of "**Other**", ► for the menu "Setting menu" ▼ until the cursor is to the left of "Motor 2" and ► to see the menu **Other setting**:

Not all menu points will be shown. Only the points which refer to an enabled output will be visible

- **Chalk.** Here is entered the percent of the stoker on-time the chalk distributor shall run
- **Ash.** Here is entered the percent of the stoker on-time the ash screw shall run
- **Refill time.** The refill time for external refill screw. (Starts when the sensor gives a signal and stops when the time has run out. (The sensor can be either a photocell or capacitive sensor).
- **Start Refill.** If you enter **YES** here, the refill screw will start and run for the period of time entered in **Manual Time**. The period of time the refill screw must run in order to fill up.
- **Start stoker.** If you enter **YES** here, the stoker screw will start and run for the period of time entered in **Manual Time**. The period of time the stoker screw must run in order to fill up the burner. Can be stopped by pushing **Stop**.
- **Manual Time.** The period of time the stoker screw must run in order to fill up the burner.
- **Int.Alt.Delay** . The internal screw's delay in all other states than "Normal running" (Start Up, Ignition and Pause)
- **Profile No** . Here is possible to enter 1 – 2 or 3. This parameter is used for different settings, as example for having summer and winter settings, Pellets, chips and grain settings, or perhaps for 3 different types of burner units. The method of saving parameters is different for each stoker producer, and will not be explained here.
- **Manager.** By **YES** the serial port can communicate with the TM Bio-Manager. By **NO** the the port can communicate with a GSM-modem. By **NO**, please read the additional **SMS manual**
- **SMS Modem.** By an YES, the SMS Menu will be visible in the settings menu. When the COM1 is already chosen as communication port for the TM Bio-Manager, (Manager = YES) COM2 is automatically chosen to communicate with the modem. If the setting Manager = NO, an additional line will be shown in the SMS-Menu, "**Modem Com Port**" where the choose is **COM1** or **COM2**

## **19 STOP MODE**

By pressing the button STOP once the system will stop and the blower will run for the period of time indicated in "Cooling Time" under ignition. By pressing the stop button twice the blower will stop. The display will indicate that the system is in the mode Stop. The system will stop the boiler automatically in case of errors. In paragraph 3 you will find a list of the errors and how to handle them.

**20 IGNITION SEQUENCE**

The diagram below describes the ignition sequence used.

