

TM3007 Service Manual

Revision: 0.03.50

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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.

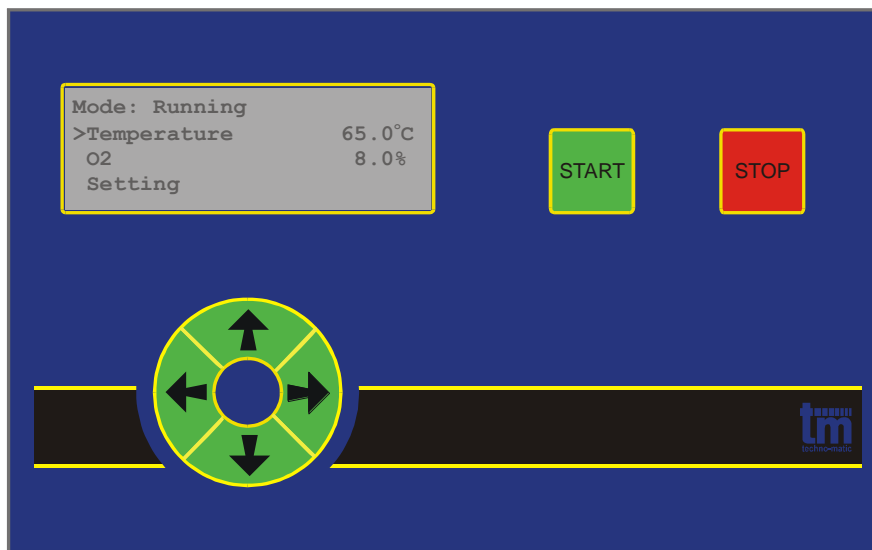
Please note: You must always turn off the power supply before actually touching anything in the system in order to avoid dangerous situations. Only persons with permission from the stoker producer and with an authorization in accordance with the national legislation must carry out any interventions/repairs 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 2.60.

Please Note! Normally the oxygen sensor is cold when the TM3007 is switched on, and therefore the computer will show a count down from 180 seconds. Then the computer will start and text will appear 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, we will start with a short description of the front of the controller.

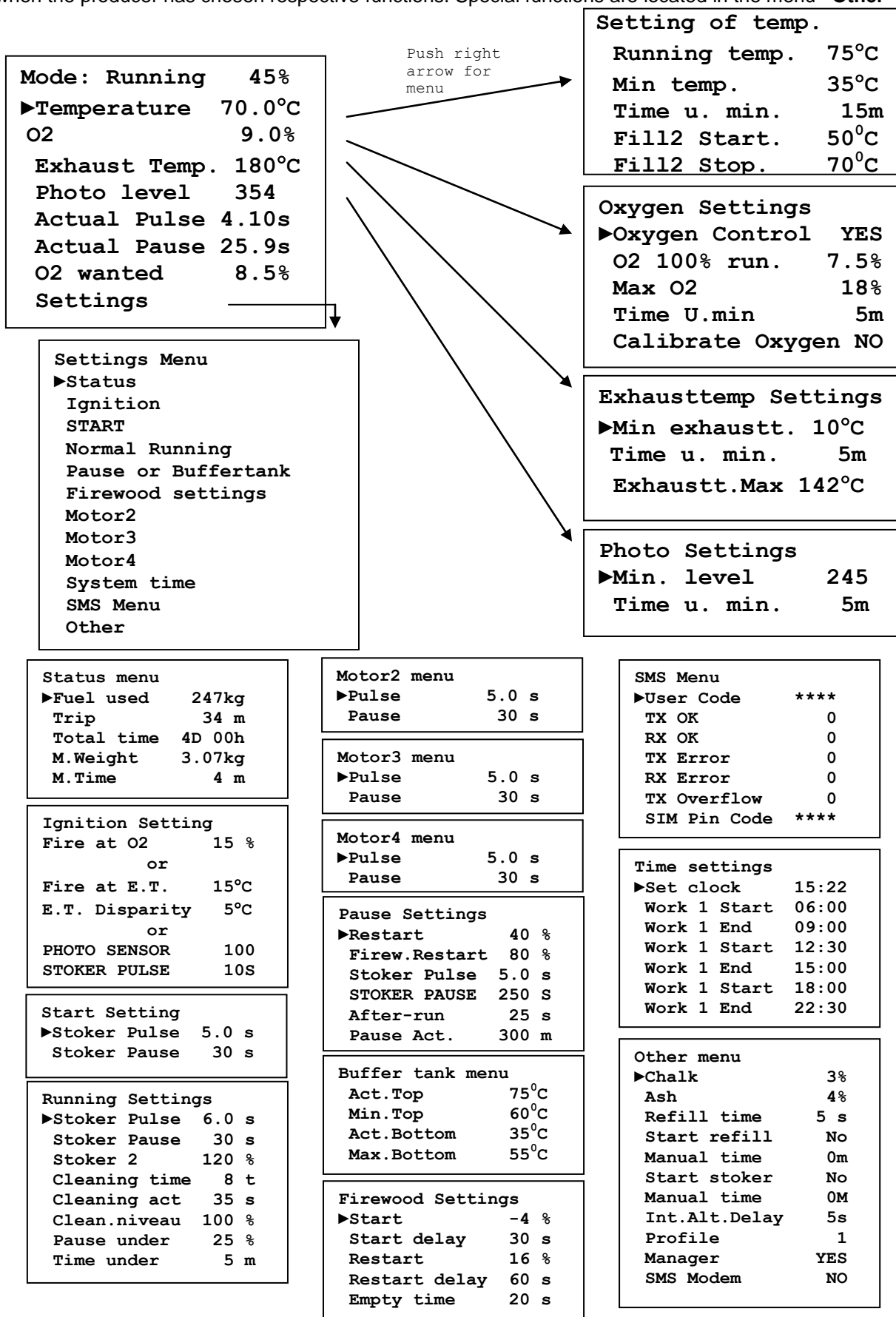


Item	Description
START Button	This button is used to start the stoker and to force-feeding with fuel.
STOP Button	This button is used for stopping the stoker.
▲ (Arrow up)	Used for choosing an upper menu and for choosing a higher value when setting the controller. Removes information.
◀ (Left Arrow)	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 menu system 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.

Alarm	Description
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.

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 th 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 5th, 6th, 7th and 8th 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.
- **Fill2 Start.** The producer might have chosen the boiler temperature to start and stop the boiler instead of the Buffer tank sensors. When the boiler goes below this temperature, the afgers will start filling up the burner and then begin the ignition.
- **Fill2 Stop.** When the boiler reaches this temperature, the "Shutting down" will start and will empty the internal auger to prevent a "Back burn". When the Shutting down is finished the meassage "Pause extern" will be displayed.

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**)
- **Stop Time.** The time allowed to run with an oxygen% higher than the: **Max O2**
- **Min. O2.** A low oxygen% also indicates a problem and does the oxygen % continue to be below this setting in more than the STOP Time, the Boiler will stop and the error "Min O2 Stop" will be displayed.
- **Stop Time.** In not more than this time the oxygen% is allowed to go below the **Min 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
- **Stop Time.** 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.)
- **Stop Time.** 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 menu "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 O₂, 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 O₂.** 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's 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.).
- **Pause /Act.** (Active pause time) During this time the boiler runs according to the pause puls/pause and blower settings and displays "Pause /Act". After this time the boiler totally stops feeding and blowing, and displays "Pause /Off".

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.

TM3007 SERVICE MANUAL

**** Service menu**
 Output setting
 Input setting
 Ignition setting
 Pwm blower
 Startup setting
 Operation setting
 Pause setting
 Stopped setting
 Error state setting
 C.pump 2
 Rotor herd
 Oxygen
 Other
 Hot stoker
 Performance PID
 Fuel PID
 Firewood2 PID
 Blowergraph
 Blowergraph2
 Chimneygraph
 Test IO menu
 Hot Boiler 95°C
 Language English
 Retain mode NO
 Save settings NO
 TM parameter 0

**** Ignition menu**
 Ignition Time 480s
 Blower start 30s
 Stoker pulse 5s
 Part delay 0s
 Ign. Start 100s
 Ign. Pulse 3s
 Ign. Pause 6s
 Blower delay 30s
 Blower min 20%
 Blower max 50%
 Repetitions 2x
 Cooling time 1m
 Cooling level 10
 Chimney Fan 50%
 Fire at O2 14%
 Fire at E.T. 25°C
 E.T.Disparity 5°C
 Photo Sensor 433
 Fire Level 100
 Auto ignition NO
 Check fire Auto
 Ign. Usermenu YES
 S.P. Usermenu YES
 Stop IAFD YES
 Use SPP: NO
 Force SAP. NO

**** Startup menu**
 Blower leve 180%
 Exhaust fan 70%
 Start Time 2m
 Ashscr.on 10s
 Ashscr.off 10s
 Ashscr reset 5t
 AutoAshScr. P+S+T
 Skip by key NO

****Output menu**
 PowerOut1 STOKER
 PowerOut1 NONE
 PowerOut1 BLOWER
 PowerOut4 NONE
 RelayOut1 IGNITION
 RelayOut2 CIRC.PUMP
 AlarmOUT Alarm
 PWMOut None
 BKLOut BK.Light
 AUXSSR1
 AUXSSR2

**** PWM Blower menu**
 Tacho enabled YES
 Blower speed 0rm
 PWM manual 0

***** Pause menu *****
 Blower pause 50%

****Stopped Menu**
 Chimney fan 30%
 Chimney L2 30%

****Error state menu**
 Chimney fan 40%

****Oxygen menu**
 O2 control YES
 O2 100% run 6.5%
 O2 Point (X) 20%
 O2 Point (Y) 2.0%
 O2 Usermenu YES

****Other menu**
 Chalk cnt. 0
 Chalk period 30s
 Ash cnt. 0
 Ash period 60s
 Motor2 cnt. 0
 M2 as timer NO
 C.Pump on 60%
 C.Pump off 55%
 C.Pump in stop NO
 Buffer Tank NO
 Fill2 start 100s
 Fill2 stop 120s
 Fill2 cooling 300s
 Fill2 delay 10s
 Fill2 Max. 200s
 Refill level 80
 Refill alarm 150m
 Follow stoker NO
 Firewood Prog. NO
 Work timer NO
 Display type 1
 Backlight 60
 Temp/O2 update 5s
 Temp to Pres. NO

****Input menu**
 DI1= Lid open
 DI2= Thermo Motor
 DI3= Not used
 DI4= Fill2 Sta/Sto
 HS = Not used
 Restart mask 110
 Exhausttemp. NO
 Min Exhaust NO
 Photo sensor NO

****CircPump2 menu**
 C.Pump temp 25°C
 C.Pump on 25°C
 C.Pump off 25°C

****Rotor Herd menu**
 Constant run 40%
 Period 10s

**** Operation menu**
 Blower Time 5.0 s
 Blower min. 25%
 Chimney fan 50 %
 Follow Blower YES
 Min puls time 0.0 s
 Min O2 f/puls 0 %

**** Hot Stoker menu**
 Stoker temp 45°C
 Hot Stoker 60°C
 H.S. puls 10s
 H.S. pause 100s
 H.S. Disable NO

**** Performance PID**

**** Fuel PID**

*****Blowergraph*****
 10% Eff. 6.0%
 20% Eff. 8.6%
 30% Eff. 12.0%
 40% Eff. 16.0%
 50% Eff. 20.0%
 60% Eff. 25.0%
 70% Eff. 29.0%
 80% Eff. 36.0%
 90% Eff. 45.0%
 100% Eff. 100.0%

****Test IO menu**
 Test output 0
 Test input 1111
 Ain 1 Direct 865
 Ain 2 Direct 879
 Ain 3 Direct 978
 Ain 4 Direct 270
 Ain 5 direct 35

20 SERVICE MENU

In the daily use of the system, the service menu is not visible or available to the user. The stoker producer or service technician can activate the service menu by doing the following:

- Place the cursor ► against the menu point Setting in the main menu.
- Press ◀ and keep it down.
- Press ► and keep it down.
- Press START while keeping ◀ and ► down at the same time.
- The service menu will appear on the display.

Generally is that only menus which are active is displayed. (Chosen in the Input- and Output- setting)

You leave the service menu in the same way you leave all other menus by pressing the ◀. We recommend the controller to be in the mode Stopped, whenever changes are made to the settings of the service menu.

The following points/parameters are available in the service menu:

- **Output setting** By pressing ► you can here change the functions of the outputs (see section 20.1).
- **Input setting** By pressing ► you can here change the input settings (see section 20.2).
- **Ignition Setting** By pressing ► you can change to the submenu Ignition setting (see section 20.3).
- **PWM Blower.** Fan controlled by a PWM signal (see section 20.4).
- **Startup Setting.** By pressing ► you can change to the submenu Startup setting (see section 20.5).
- **Operation Setting.** By pressing ► you can change to the submenu Operation setting (see section 20.6).
- **Pause Setting** By pressing ► you can change to the submenu Pause setting (see section 20.7).
- **Stopped setting.** Here the exhaust fan can be chosen to work even when the boiler is stopped. (see section 20.8).
- **Error state setting.** If the boiler needs to have the exhaust fan running in error state, it's performance-percent is set here. (see section 20.10).
- **C.Pump2 menu.** Special pump control. (see section 20.11)
- **Oxygen.** By pressing ► you can change to the submenu Oxygen setting. (see section 20.12).
- **Other.** By pressing ► you can change to the submenu Other. (see section 20.13).
- **Hot stoker.** Hot stoker settings By pressing ► you can change to the submenu Hot stoker. (see section 20.14)
- **Performance PID** By pressing ► you can change to the submenu Performance PID (see section 20.15).
- **Fuel PID** By pressing ► you can change to the submenu Fuel PID oxygen regulator (see section 20.16).
- **Firewood PID** By pressing ► you can change to the submenu Fuel PID oxygen regulator (see section 20.17)
- **Blowergraph** special menu for fan speed settings (see section 20.18)
- **Chimneygraph.** Exhaust fan's settings in operation mode
- **Test IO menu.** The inputs and outputs is here possible to test one by one. (see section 20.19)
- **Hot Boiler.** Software overheating, you can set that at e.g. 96°C and the controller will stop before the water in the boiler starts boiling.
- **Language.** The controller can be provided with various choices of languages. **WARNING!! The language can only be changed once. If the controller by accident is changed to an incorrect language, it is not possible to change it back. The controller can only be unlocked by Techno-Matic A/S**
- **Retain Mode.** If you choose YES to this point, the controller will start up again after power failures, if the controller was started when the power failed. If NO is chosen to this point, the controller will always start in the mode Stopped after a power failure. If NO has been chosen, the controller will write: ** Power Failure! **, if the power was gone while the controller was running.
- **Save Settings.** When the producer has adjusted all settings to the boiler in question, he can save a copy of the setting in the memory of the controller by choosing YES. Subsequently the user can retrieve this setting by choosing YES in the menu point Regenerate all. Please note that all settings in all menus are saved (both user and service).
- **TM Parameter.** Parameters, which can be used by Techno-Matic A/S only.

20.1 Output menu

- **PowerOut1.** 230Vac Solid-state output. All functions can be chosen to this output.
- **PowerOut2.** 230Vac Solid-state output. All functions can be chosen to this output.
- **PowerOut3.** 230Vac Solid-state output. All functions can be chosen to this output.

- **PowerOut4.** 230Vac Solid-state output. All functions can be chosen to this output.
- **RelayOut1.** 230Vac Relay output is interrupted by the “Hot boiler switch” Functions that not very often changes from off to on, and to off again can be chosen to this output.
- **RelayOut2.** 230Vac Relay output Supply is coming direct from main supply. For functions, which seldom change on and off, can be chosen to this output. (E.g. circulation pump)
- **AlarmOut.** The alarm relay can be chosen to an alternative purpose
- **PWM Out.** 10V PWM output. This 10V PWM output can, if it is not used as PWM/analogue output, be used as a normal digital output. Notice: The output will not be able to provide more than 10Vdc 25mA
- **BKL.Out.** Backlight output. Is standard set to backlight.
- **AUXSSR1.** Extra output 1 (Not standard)
- **AUXSSR2.** Extra output 2 (Not standard)
- **PWM PP.Level.** In operation mode the stoker screw will run continuously. In all other modes the screw will run in pulse/pause mode with this speed. This menu point is only visible when the PWM Stoker is “YES”

The outputs can have these functions:

- **PowerOut 1 to 4:** None, Stoker, Blower, Ignition, Refill, Chimney, Chalk, Motor2, Alarm, Blower on, Senspuls, Running, Ash, Circ. Pump, C.Pump2, Blower2, Fill2, Ashscr, Ashscr2, Smsout1, Smsout2, Smsout3, Int.Sto, PwmStokD, Pwmstok, Bk.Light, Motor3, Motor4, Rot.Herd, Fill2SLS, RevStok.
- **RelayOut 1 and 2:** None, Stoker, Ignition, Refill, Chalk, Motor2, Alarm, Blower on, Running, Ash, Circ. Pump, C.Pump2, Fill2, Ashscr, Ashscr2, Smsout1, Smsout2, Smsout3, Int.Sto. PwmStokD, Pwmstok, Bk.Light, Motor3, Motor4, Rot.Herd, Fill2SLS, RevStok.
- **AlarmOut:** None, Alarm, Blower on, Motor2, Running, Smsout1, Smsout2, Smsout3, PwmStokD, PwmStokD, Stoker, Bk.Light, Motor3, Motor4, Rot.Herd, Fill2SLS, RevStok.
- **PWM Out.** None, Stoker, Blower, Blower2, Chalk, Alarm, Bloweron, Motor2, Running, Smsout1, Smsout2, Smsout3, PwmStok, PwmBlow1, PwmBlow2, Bk.Light, Motor3, Motor4, himney, Rot.Herd, Fill2SLS, RevStok.
- **AUXSSR 1 and 2.** As **Power out 1 to 4.**

Functionality of the configurable outputs.

- **Stoker.** Is adding fuel to the furnace, controlled by the actual output and the actual oxygen%
- **Blower.** Adds air to the furnace
- **Ignition.** Is used to supply the igniter with power
- **Refill.** For filling the Stoker tank from an external storage. A signal is needed on the A-in2 for controlling the output.
- **Chimney.** (Exhaust fan)
- **Chalk.** Used to add chalk when grain is used as fuel. The chalk output runs a percent of the stoker.
- **Motor2.** Works similar to “Chalk” or it can act as an asymmetric pulse/pause timer
- **Alarm.** Gives an output when the controller has stopped because of an error. The display tells why.
- **Bloweron.** Provides an output all time when the blower is running. Used e.g. for inverter controlled blower.
- **Senspuls.** Is not used.
- **Running.** Provides an output all time when the controller is in run mode.
- **Ash.** Works similar to “Chalk”
- **Circpump.** The output will give a signal from the water temperature reaches the start temperature and till it goes below the stop temperature
- **Circ.Pump2.** Special pump function, works with the “Hot Stoker” sensor.
- **Blower2.** (Secondary air) Adds air to the furnace. (For units supplied with both primary and secondary blowers.)
- **Fill2.** (Refill 2) Functionality as Refill when an input is given the name “Fill2 Sensor”. If “Fill2 Sensor” is not chosen on any input, a menu point “Stoker2” will appear in the Normal Running menu. Here the output is set to run a percent of the stoker.
- **AshScr.** (Ash Scraper) Special function.
- **Ash,Scr2.** Special ash Scraper
- **Smsout1.** An output called “Smsout” can be turned on and of by an SMS. Detailed description in the SMS-Manual
- **Smsout2.** As Smsout1
- **Smsout3.** As Smsout1

- **Int.Sto.** (Internal screw) Follows the stoker but has adjustment possibilities that makes it able to start before or after the stoker screw and again stop before or after the stoker screw stops.
- **PwmStokD.** Start signal for inverter controlled stoker motor.
- **PwmStok.** Pwm signal (0 – 10V) for continuous rotation of stoker screw.
- **Bk,Light.** The backlight in the display
- **Motor3.** As Motor2 but the time settings is different.
- **Motor4.** As Motor2 but the time settings is different.
- **PwmBlow1.** (Primary blower) Only possible to chose this function on the PwmOut.
- **PwmBlow2.** (Secondary blower) Only possible to chose this function on the PwmOut.
- **RotHerd.** The output will run with a percentage of the performance regulator's output.
- **FILL2SLS.** (Sluice motor) Running together with Fill2. This output has a delay, in order to empty the sluice after Fill2 has stopped.
- **RevStok.** (Reverse turning of stoker screw)

20.2 Input Menu

The parameters of this sub-menu control the function of the TM3007 in connection with safety. The menu contains the 4 digital safety inlets. Digital safety inlets 1-3 can be named with the following names:

- NOT USED/ Connection/ Thermo Motor/ Thermo Motor2/ Lid open/ Hot feed. pipe/ Hot stoker pipe/ Plug is loose/ Alarm/ Safety/ Fill2 Sens/ / Ash Scraper/ Alarm2/ Alarm3/ Safety2/ Safety3.

Digital safety inlet 4 can be named with the following names:

- NOT USED/ Ekstern pause/ Ekstern start/ Fill Sta/Sto/ Alarm2/ Alarm3/ Safety2/ Safety3.

Digital input "HS" can be named: **Hot stoker** or **Not used**.

- **Restart mask.** Here you can enter whether or not you want the 3 first safety entries to restart. 0 for restart not allowed and 1 for restart is allowed. E.g.
 - **011** Restart not allowed on 1
 - **010** Restart not allowed on 1 og 3
- **Exhaust temperature** Engaging/Disengaging of showing and using the exhaust temperature.
- **Min Exhaust.** This setting decides if the exhaust temperature should be used as an error if the temperature goes too low.
- **Min Photo.** Instead of the exhaust temperature, a photo sensor can be used to detect fire, as well as to detect fire or not during normal running.
- **Exhaust2Temp.** Special version of the PCB has 2 PT1000 inputs.

Please note that the digital entry "Hot Stoker pipe" is only used in special situations. For stokers with depot, normally the analogue entry with connected thermo-sensor is used (See20.14)

20.3 Ignition setting

The parameters of this sub-menu control the ignition sequence.

- **Ignition Time.** The total ignition time. In order to disengage the ignition, this time must be set at 0.
- **Blower start.** Here you can enter for how long the blower must run 100% in order to check if there is a fire, before the ignition starts.
- **Stoker Pulse.** The stoker pulse needed to add fuel before the ignition element starts.
- **Part delay.** Instead of the full stoker pulse at the start of the ignition time, the stoker pulse can be shared in two by entering a number of seconds here. The 1st half as normally at the start of the ignition time, then this time will pass and the 2nd half pulse will be added.
- **Ign. start.** The period of time during which there is constant voltage on the ignition element.
- **Ign. Pulse.** The period of time during which there will be voltage on the ignition element, when pulsating ignition is being used.
- **Ign. Pause.** The period of time during which there will be no voltage on the ignition element, when pulsating ignition is being used.
- **Blower delay.** Instead of starting the fan immediately, the fan can be delayed in this time.
- **Blower min.** The minimum speed, at which the blower must run during the ignition time.
- **Blower max.** The maximum speed, which the blower must reach during the ignition time.
- **Repetitions.** The number of ignition attempts.

- **Cooling time.** The period of time during which the blower will run 100% after unsuccessful ignition attempts. Also the period of time during which the blower will run, after “Stop” has been pressed once.
- **Cooling level.** The blower performance during the “Cooling time”
- **Chimney Fan.** Menu is visible if an output is named “Chimney” It controls the chimney fan speed during the ignition
- **Fire at O2.** When the O2 value measured drops below the percentage entered here, this will be considered as now the fire is going by the controller.
- **Fire at E.T.** The number of degrees, which the exhaust temperature must be higher than the supply pipe temperature to make the controller go to Start/Normal Running (if there is a – in front of the figure = below).
- **E.T. Disparity.** The smoke temperature must raise these degrees before the controller will go to “Start/Normal running”.
- **Photo sensor.** The actual signal value from the photo sensor.
- **Fire level.** The controller will consider it as a going fire, when the actual signal value from the photo sensor is higher than the value entered here.
- **Auto Ignition. YES** = An ignition will be started after the error message "Max O2 stop", "Min photo level" or "Min smoke temp." **NO** = the system will stop immediately after the error message "Max O2 stop", "Min photo level" or "Min smoke temp."
- **Check Fire.** Here you can choose alternative indication of fire. **AUTO/PHOTO/SMOKE/O2.** Standard is auto, choose indication according to priority (if oxygen control has been chosen, this has 1st priority). If oxygen control has been chosen, oxygen % is used. Has oxygen control not been chosen, use exhaust temperature, if chosen, or photo sensor, if you have indicated **NO** at exhaust temperature.
- **Ign. Usermenu.** By “YES” the settings for Ignition will appear in the User menu.
- **S.P. Usermenu.** (Stoker pulse in user menu) By setting this to YES, the user can change the actual stoker time during ignition. To have this setting editable for the user the “Ign. Usermenu” need to be set to “YES”, too.
- **Stop IAFD.** (Stop Ignition After Fire is Detected) By YES the boiler goes into start-up/running immediately after fire is detected. By NO the Ignition sequence will be continued until the time has run out
- **Use SPP.** (Use Stoker Puls and Pause) has only an effect when the previous “Stop IAFD” is set to NO. By YES, the start-up pulse and pause will be used, during the time from fire is detected and till the Ignition time has run out
- **Force SAP.** (Forced start-up after pause) By “YES” the boiler will run the “Start-up” between “Pause” and “Normal running”. By “NO” the boiler will go directly from “Pause” and into “Normal running”

20.4 PWM Blower

- **Tacho enabled.** By **YES** the system will stop and display an error when a tacho signal (feed back signal) is not received. By **NO** the controller will only display the speed, but not stop without the signal.
- **Blower speed.** The actual blower speed calculated from the Tacho signal

20.5 Start up menu

The parameters of this sub-menu control the function of the TM3007 in the mode Start. The menu contains:

- **Blower level.** The blower level during Start.
- **Chimney fan.** The exhaust fan speed during **startup**
- **Start Time.** Here you can adjust for how long the controller must run in Mode Start before switching on to Running Mode. On boilers fitted with automatic ignition, this time will not start until the ignition sequence has ended.
- **Skip by key.** “YES” means it is possible to force the controller into “Normal running” by pressing the “START” shortly, once the controller runs in Start up/ignition. By “NO” the conditions for changing to “Normal running” must be fulfilled.

The Ashscr. menupoints will be displayed if an output is chosen as “Ashscr”

- **Ashscr. On.** The time for the ash scraper to have power from the output
- **Ashscr. Off.** The time delay between the ash scraper moves, (The time to move back) and the start of the ignition.

- **Ashscr. reset.** If the scraper hasn't been used for this time (The system hasn't changed to pause and back through start up/ignition to normal running) the system will do a stop, run the ash scraper, and then ignite again.
- **AutoAshScr.** The ash scraper can work automatically. P+S+T = it will run after each pause, after press of Start button and after each end of the build-in timer.

20.6 Operation menu

- **Blower time.** If this is set at e.g. 5 sec., the total pulse-/pause-time of the blower will be 5 sec., to the effect that at a low blower speed the pulse is short and the pause is long, and at a high blower speed the pulse is long and the pause is short. At 100% speed the pulse will be 5 sec. and there will be no pause.
- **Blower min.** The minimum performance with which the blower can run in the mode Running.
- **Follow Blower.** If "YES" the stoker pulse will follow the performance up and down proportionally. If "NO" it is only the oxygen regulator, which can determine the stoker pulse, based on the pulse entered.
- **Min. Pulse time.** The minimum pulse time of the stoker motor. If the pulse time drops below the level entered here, the stoker motor will stop completely.
- **Min. 02 f/pulse.** At an oxygen level below the level entered here, the stoker motor will stop completely.

20.7 Pause menu

- **Blower Pause.** The blower level in the mode Pause.
- **Chimney Fan.** The Chimney fan runs with this output during the blower's "afterrun".
- **Chimney L2.** If it is required that the chimney fan shall run during the rest of the pause, this parameter shall be set to the wanted output percent.

20.8 Rotor Herd.

- **Constant run.** From this performance (%) and up the output will be constantly on.
- **Period.** By performances below the "**Constant run**" % the output will run in a part of this period (Cycle time). E.g. if the Constant run is set to 60%, the on-time by 30% performance, the "Rotor herd" output will run 55% of the "Period". The 55% is because the start output is set to 10%

20.9 Stopped menu

- **Chimney Fan.** The Chimney fan runs with this output during the "Cooling time"
- **Chimney L2.** If it is required that the chimney fan shall run even when the boiler is in stopped mode, this parameter shall be set to the wanted output percent.

20.10 Error state menu

- **Chimney Fan.** If it is required that the chimney fan shall run even when the boiler is in error mode, this parameter shall be set to the wanted output percent

20.11 C.Pump2 menu

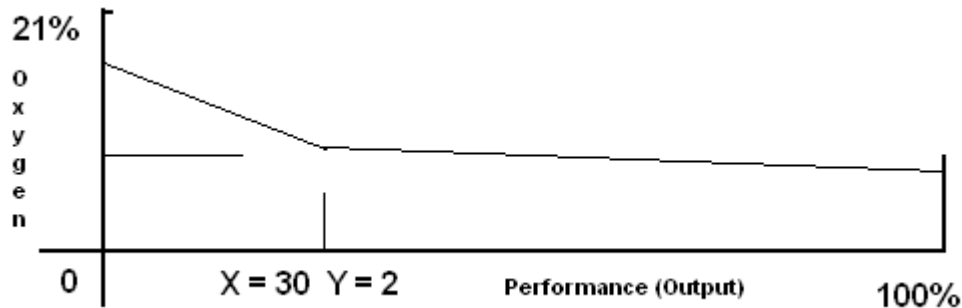
Circulation Pump2 settings will be displayed if an output is chosen as "**C.Pump2**"

- **C.Pump Temp.** Here the actual temperature is displayed.
- **C.Pump on.** The Output will be turned on when the temperature exceed this temperature.
- **C.Pump off.** The output will be turned off again, when the temperature goes below the "C.Pump on" temperature minus this value.

Notice: The H.S Disable shall be disabled to have the menu displayed. (See: 20.14)

20.12 Oxygen menu.

- **O2 Control.** YES/NO decides if the Oxygen control is activated or not
- **O2 100% run.** The Oxygen % wanted by 100% output.
- **O2 point. (X)** Tells by which performance %, the change of gradient on the oxygen curve is placed.
- **O2 point. (Y)** Tells how many percent, the curve shall be higher by the above chosen performance %, than the wanted oxygen percent at 100% performance.
At 0% performance the wanted oxygen% will always be 17%.
The wanted oxygen% at 100% performance, is adjusted by the customer, in the settings menu, "**Oxygen**"



- **Show O2 menu** (show oxygen %). If **YES** the actual oxygen % is shown in the display and in the setting the menu "oxygen" is shown. If **NO**, the showing of oxygen and settings are hidden.

20.13 Other

Chalk settings will be displayed if an output is chosen as **“Chalk”**

- **Chalk cnt.** This counter will accumulate the stoker screws on time. This is only displayed for easier calculating the right **Chalk period**.
- **Chalk period.** Decides how long the pause between each chalk pulse shall last. To this setting comes a setting in the user menu, where the length of the pulse can be set.

Ash auger settings will be displayed if an output is chosen as **“Ash”**

- **Ash cnt.** This counter will accumulate the stoker screws on time. This is only displayed for easier calculating the right **Ash period**
- **Ash period.** Decides how long the pause between each ash pulse shall last. To this setting comes a setting in the user menu, where the length of the pulse can be set.

Motor 2 settings will be displayed if an output is chosen as **“Motor2”**

- **Motor 2 cnt** This counter will accumulate the stoker screws on time. This is only displayed for easier calculating the right **Motor 2 period**. The pulse and the pause is set by the user.
- **M2 as timer.** If **NO**, the Motor 2 will run just as the **Chalk** and **Ash**. If this is set to **YES**, the Motor 2 will run as an on/off timer, independent of the controllers output.
- **Motor3.** Same functionality as Motor2
- **Motor4.** Same functionality as Motor2

Circulation Pump settings will be displayed if an output is chosen as **“C.Pump”**

- **C.Pump on.** If an output is set to "Circ.pump" the pump will start if the boiler temperature exceeds this temperature.
- **C.Pump off.** The pump stops again when the temperature comes below this temperature.
- **C.Pump in stop.** If the pump shall run during stopped mode, even the temperature is below the **“C.Pump off”** temperature, this has to be set to **YES**

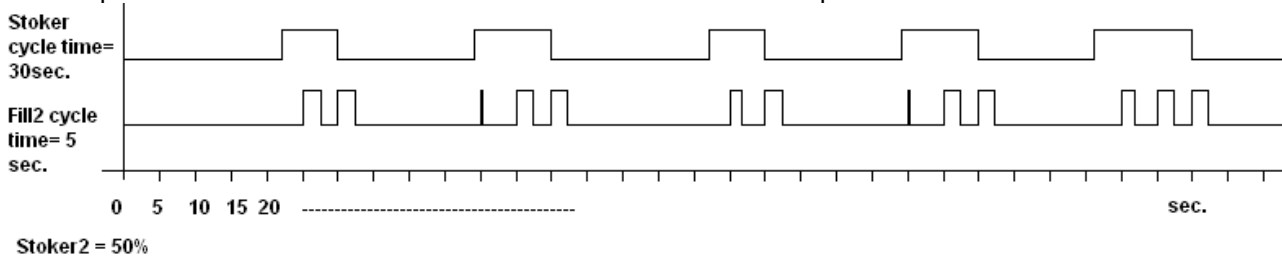
Buffer Tank. (This menu point will only be visible if the **“Fill2”** is chosen as an output) If **“NO”**, the heat system will act with normal running or pause, if the heat consumption is too low to leave the boiler into normal running with the minimum output. If **“YES”** is chosen, the controller will run with an output to keep the actual water temperature as close as possible to the set temperature, but it will not go into the pause mode. Here the **“Bottom temperature from the buffer tank** decides whenever the boiler shall shut down and stop. Then it's the **“Top temperature”** of the buffer tank that decides when it is time to start up again.

Temp. Sta/Sto. In stead of top- and buttom-temperatures, The boilers temperature sensor can decide when the start and stop must take place. If here is choosen **“YES”** there will be 2 new menu lines visible in the user menu.

Fill2 settings will be displayed if an output is chosen as **“Fill2”** and **“fill2 sta/sto”** is also chosen on input 4, or the choice **“Buffertank”** is **YES**

- **Fill2 start.** The augers will run during this time, to bring fuel into the burner before an ignition attempt. This happens when the signal to **D-in 4** leaves in order to let the boiler leave the pause and go to **Ignition / normal running**

- **Fill2 stop.** When A signal is present on the D-in 4 the boiler will go into pause-mode. To prevent a backfire the Fill2 auger will stop and the stoker auger and the blower will continue running until the auger has been running for this period to prevent a backfire during the pause period.
- **Fill2 cooling.** After the "Fill2" time is passed the fan will run in this time to cool down the burner.
- **Fill2 Cyc.** (Fill2 cycle time) The Fill2 output works the way that it follows the stokers working time, not at the stoker's cycle time, but at this time. It means; by every cycle start it counts how long time the stoker has been running since last cycle start. In the usermenu, in operation settings, there's a menu point "Stoker2", a percent adjustable from 1 to 100%. The Fill2 auger will now run in this percent of the time the stoker did run. Here below is an example shown.



Sensor controlled fuel supply. These settings will be displayed if an input is chosen as "Fill2 sensor"

- **Fill2 delay.** When the system is equipped with a "level sensor" the fill2 auger will start turning as soon the sensor stops its signal, and then run until the signal comes back + this delay.
- **Fill2 Max.** The maximum time the Fill2 auger is allowed to run without the Fill2 sensor has given a signal. An error message will be displayed and the Fill2 auger stops, but the rest of the system will continue running. After removing the error (by pressing "arrow up") the Fill2 auger will start running again.
- **Fill2SLS.** (Sluice motor) This output follows the Fill2 output, only it runs for the time entered here after the Fill2 has stopped.

Refill settings will be displayed if an output is chosen as "Refill"

- **Refill Level** The controller will consider it as a signal to start refilling, when the actual signal value of the photo sensor is higher than the value entered here.
- **Refill alarm.** This period of time must be set as high that the depot is full, this means longer than is entered in: "Setting" "Normal Running" "Refill time"
- **Follow stoker.** Is used in connection with refill. If **YES**, the refill will only run when the stoker is running. If **No**, the refill will run constantly in the refill time "Setting" "Normal Running" "Refill time"

Miscellaneous settings

- **Firewood prog.** Here is decided if the Firewood program shall be accessible from the user menu.
- **Firewood2 prog.** By "YES" the firewood2 program is enabled. An additional menu "Firewood PID" will be visible in the service menu, and the menu Firewood settings will be visible in the user menu.
- **Work timer.** A "YES" here will cause the clock to be shown in the display and in the user menu will be added a menu "System Time" This feature allows the user to set up to 3 starts/stops during the day.
- **Display type** By pressing ►, you can choose display type with ▲ or ▼ Accept with ► or Avoid changes by pressing ◀. (If the wrong display type has been chosen, the symbol °C e. g. will not appear correctly on the screen).
- **Backlight.** Here the display backlight can be adjusted. **NOTICE!** A bright light will shorten the lifetime of the display. Therefore just set the backlight as high as necessary to read the display.
- **Temp/O2 update** The period of time between update of temperature and indication of oxygen.
- **Temp2Pres. Temperature or pressure(%)**

20.14 Hot Stoker menu

- **Stoker temp.** The actual temperature measured at the stoker pipe, if a sensor has been fitted.
- **Hot Stoker.** Electronic burning back safety device. If the temperature at the stoker pipe should exceed the temperature entered here, the controller will consider this as the start of a burning back. If this happens in the modes Running or Pause, the controller will switch off the blower and use the pulse and pause parameters entered here, until the temperature of the stoker tube is below the entered value again. If it happens in the mode Start, the controller will react in the same way, apart from the fact that it does not turn off the blower.
The controller display will give the message ** Hot Stoker! **, a message, which will remain on the display until erased by the user.
- **H.S. Puls** Hot Stoker pulse.

- **H.S. Pause.** Hot Stoker pause.
- **H.S. Disable** (Analogue input disengaged. Yes or No?). When you use the analogue input, as input signal for refill, make sure that NO is indicated here. Only if the **C.Pump2** is chosen on an output, the H.S.Disable shall be **YES**

The **PID service menus** make it possible to adjust the regulators, which the TM3007 use in the Mode Running,

The parameters of this sub-menu must be adjusted only by persons, trained or authorized to do so by Techno-Matic A/S. This paragraph does not comprise any explanation on the function and mode of operation of the PID regulators. You will find the following parameters in the PID service menu:

20.15 Performance PID

- **Prop Band.** Amplification factor for the blower output-regulator. (Standard = 33)
- **Sampling time.** Updating-time for the blower output-regulator. (Standard = 30)
- **Integral time.** Integration-time for the blower output-regulator. (Standard = 400)
- **Derivative time.** Differentiation time for the blower output-regulator. (Standard = 400)
- **Regulator Min.** Minimum limit for Integral output and the regulator output (Standard = 1)
- **Regulator Max.** Maximum limit for Integral output and the regulator output (Standard = 100)
- **I. Part start.** The start output from the Integral part (Standard = 40), which the controller will have as start output if the actual water temperature is exactly as the set temperature. Practically the proportional part of the regulator will change this up or down, according to the actual temperature compared to the set temperature
- **P- Part Min.** The proportional parts maximum output if temperature is above the set temperature (Standard = -100) Low limit for the proportional part
- **P- Part Max.** The proportional parts maximum output if temperature is below the set temperature (Standard = 100) High limit for the proportional part
- **D- Part Min.** The Derivative parts maximum output if temperature is raising (Standard = -40)
- **D- Part Max** The derivative parts maximum output if temperature is falling (Standard = -40)

20.16 Oxygen PID

- **Prop Band.** Amplification factor for regulator on stoker. (Standard = 25)
- **Sampling time.** Updating-time for the oxygen-regulator. (Standard = 30)
- **Integral time.** Integration-time for regulator on stoker. (Standard = 240)
- **Derivative time.** Differentiation time for regulator on stoker. (Standard = 0)
- **Regulator Min.** Minimum limit for Integral output and the regulator output (Standard = 0)
- **Regulator Max.** Maximum limit for Integral output and the regulator output (Standard = 100)
- **I. Part start.** The start output from the Integral part (Standard = 40), which the controller will have as start output if the actual oxygen% is exactly as the wanted oxygen%, practically the proportional part of the regulator will change this up or down, according to actual oxygen% compared to the wanted oxygen%
- **P- Part Min.** Low limit for the proportional part (Standard = -100)
- **P- Part Max.** High limit for the proportional part (Standard = 100)
- **D- Part Min.** The Derivative parts maximum output if oxygen% is raising (Standard = -40)
- **D- Part Max** The Derivative parts maximum output if oxygen% is falling (Standard = -40)

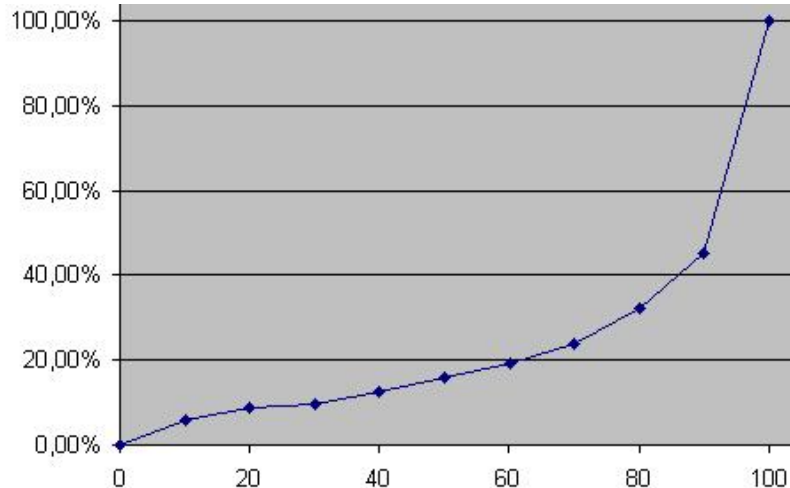
20.17 Firewood PID

- **Prop Band.** Amplification factor for the firewood regulator. (Standard = 25)
- **Sampling time.** Updating-time for the firewood regulator. (Standard = 30)
- **Integral time.** Integration-time for the firewood regulator. (Standard = 240)
- **Derivative time.** Differentiation time for firewood regulator. (Standard = 0)
- **Regulator Min.** Minimum limit for Integral output and the regulator output (Standard = 0)
- **Regulator Max.** Maximum limit for Integral output and the regulator output (Standard = 100)
- **I. Part start.** The start output from the Integral part (Standard = 40)
- **P- Part Min.** Low limit for the proportional part (Standard = -100)
- **P- Part Max.** High limit for the proportional part (Standard = 100)
- **D- Part Min.** The Derivative parts minimum output (Standard = -40)
- **D- Part Max** The Derivative parts maximum output (Standard = -40)

20.18 Blowergraph, Blowergraph2 and Chimney Graph

Here you can adjust the blower graphs. (In order to use this setting, choice of blowergraph must be 0 "**Blowergraph = 0**" User defined. (This setting is standard). Can only be set by Techno-Matic A/S or producer by using the TmManager). The numbers in the column to the left indicate the fixed performance%. The numbers to the right are adjustable and indicate the blower-speed in %. See example below: The controller shows 50% performance, which means that the blower runs with 15,9% speed (meaning that the blower is getting current in 15,9% of time).

0% Output	0,0 %
10% Output	6,0 %
20% Output	8,6 %
30% Output	9,6 %
40% Output	12,5 %
50% Output	15,9 %
60% Output	19,2 %
70% Output	24,0 %
80% Output	32,0 %
90% Output	45,2 %
100% Output	100,0 %



20.19 Test IO menu

Test output. To test outputs individually set the numbers from 1 to 11 according to the outputs in the **Output menu** This parameter should always be set to zero unless the outputs is tested.

PWM manual. By choosing a number between 1 and 100, the fan will work manually. In aut. Mode this setting **MUST be zero**

Test input. If a signal is present on an input the current number will show 1 if no signal it will show 0

Ain 1 direct. This parameter shows the actual signal on the analog input 1 (Water temperature)

Ain 2 direct. This parameter shows the actual signal on the analog input 2 (Hot stoker)

Ain 3 direct. This parameter shows the actual signal on the analog input 3 (Smoke temperature/Photo sensor)

Ain 4 direct. This parameter shows the actual signal on the analog input 4 (Oxygen sensor)

Ain 5 direct. This parameter shows the actual signal on the analog input 4 (Current measuring)

21 RUNNING-IN THE OXYGEN CONTROL

In order to be able to adjust the TM3007 oxygen control, we recommend the following procedure: **Please note that the stoker screw must be full of fuel, before you press "Start"**.

1. If there is no ignition on the system, the ignition time must be set at 0 sec. and the start up time at xx minutes.
2. If the burner is equipped with automatic ignition, the ignition setting in the service menu (section 15.3) must be adjusted first. Especially important are stoker pulse, ignition time and start pulse. (If you do not want pulsating ignition, adjust ignition time and start pulse alike).
3. Go back to the main menu and press start. Wait until the ignition procedure has been finished. Is the oxygen% dropping during the period? (At exhaust temperature, does the exhaust temperature rise?) If the TM3007 goes on to "Normal Running" you can go on with point 5.
4. If the system stops and the display indicates * ignition Error *, you must go back to the ignition settings in the service menu. No precise values can be given, as these are dependent on the system. But look into the burner. Is there fuel enough for an ignition? (or is there too much), Stoker pulse must be raised or lowered. Was the oxygen% on its way down- (exhaust temperature up-) during the first ignition attempt? If yes, maybe the "Ignition time" should be longer. Alternatively "Repetitions" can be raised. It is also possible to raise "Fire at O2" (fire at exhaust temp.) down. Then go back to start in point 3.

5. Adjust the running parameters (section 11), so that the oxygen% is near the value wanted. If it sounds as if the blower revolutions fluctuate a lot at performances under 100%, it might help to lower the time "Blower time" in **service menu** "Operation setting".
6. Allow the controller time to make the adjustment!
7. At a certain point of time the system will go down in performance. Some systems can go very far down 15-20%, others cannot go further down than 40-50%. "Blower min" in **Service menu** "Operation setting" must suit the minimum performance, to which the system can go down. Further "Pause under" xx% in "Setting" "Normal Running" must be adjusted to fit the system. If the temperature rises beyond the set temperature, the controller will go into pause mode 6 degrees over the set-point and go into running mode again 2 degrees under (Ignition, Start, if chosen).
8. Pause settings: Pulse and Pause times must be set so that embers can be kept. The temperature must not go up, even at a minimum consumption. If the burner is provided with ignition, the stoker pulse can be set at 0, thus disengaging the pause stoking. In that case it can be advantageous to raise "Afterrun" to allow the blower to run for a few minutes to blow out the fire. **Please note that only certain types of units are capable of burning out completely during pause.**

Now the TM3007 will adjust the air-intake and the fuel admission within reasonable limits, so the preset running temperature and oxygen percentage will be kept. Changing the regulator settings (paragraph 12.1 and 12.2) must only be considered in very extreme cases and only after having consulted Techno-Matic A/S.

Please note: In order to obtain the best measuring of the oxygen %, the lambda probe must be placed in the smoke outlet from the boiler (at the top) or as close to the boiler as possible, and you must make sure that there are no leaks (cleanout doors or the like), through which air can be admitted, which might result in an inaccurate oxygen measuring.

Further you must take when cleaning the boiler, as the lambda probe must not be exposed to impacts. Further the burning of pressure-creosoted wood, wood with rests of paint, silicone or certain types of plastic will reduce the life of the lambda probe considerably.

22 IGNITION SEQUENCE

The diagram below describes the ignition sequence used.

