

TM3012 Service Manual for tmManager

Revision: 5.01

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1 INTRODUCTION

This service manual is for the producer of a finished stoker system. It is designed to guide the producer of these stokers through the different aspects of adjusting the TM3012 controller to the stoker on which the controller has been installed.

Important notice: This manual describes features that may or may not be legal to use in the country where the controller and stoker is used. The producer of the stoker or the last person to connect to the controller is responsible that the controller and stoker is setup according to the national legislation. Techno-Matic Ltd. is available for help with what is legal or what is not legal in this situation.

Together with this manual comes the tmManager package, which is the tool for adjusting the TM3012 controller, a USB cable type A-B.

To set the parameters in the controller from your computer the package tmManager is required. tmManager is developed by Techno-Matic mainly for the use of producers of the finished stoker who delivers to the end user.

The software files can be updated and Techno-Matic Ltd. is constantly developing and testing the latest software files. This way updates from Techno-Matic Ltd. can easily be handed out resulting in the user not having to reinstall the entire program. The tmManager always comes with the latest software file for controlling stokers and it is therefore recommended always to install the latest version of the software.

We hope that this manual will contribute to the understanding of the way the TM3012 controller works. Still we are open for suggestions for this manual, the controller or the TM3000 product series in general.

2 TMManager

Before starting the tmManager program, connect your PC with the TM3012 by a USB cable type

The tmManager is started by double clicking the icon of the newest software file. The window in Fig. 4 will appear.

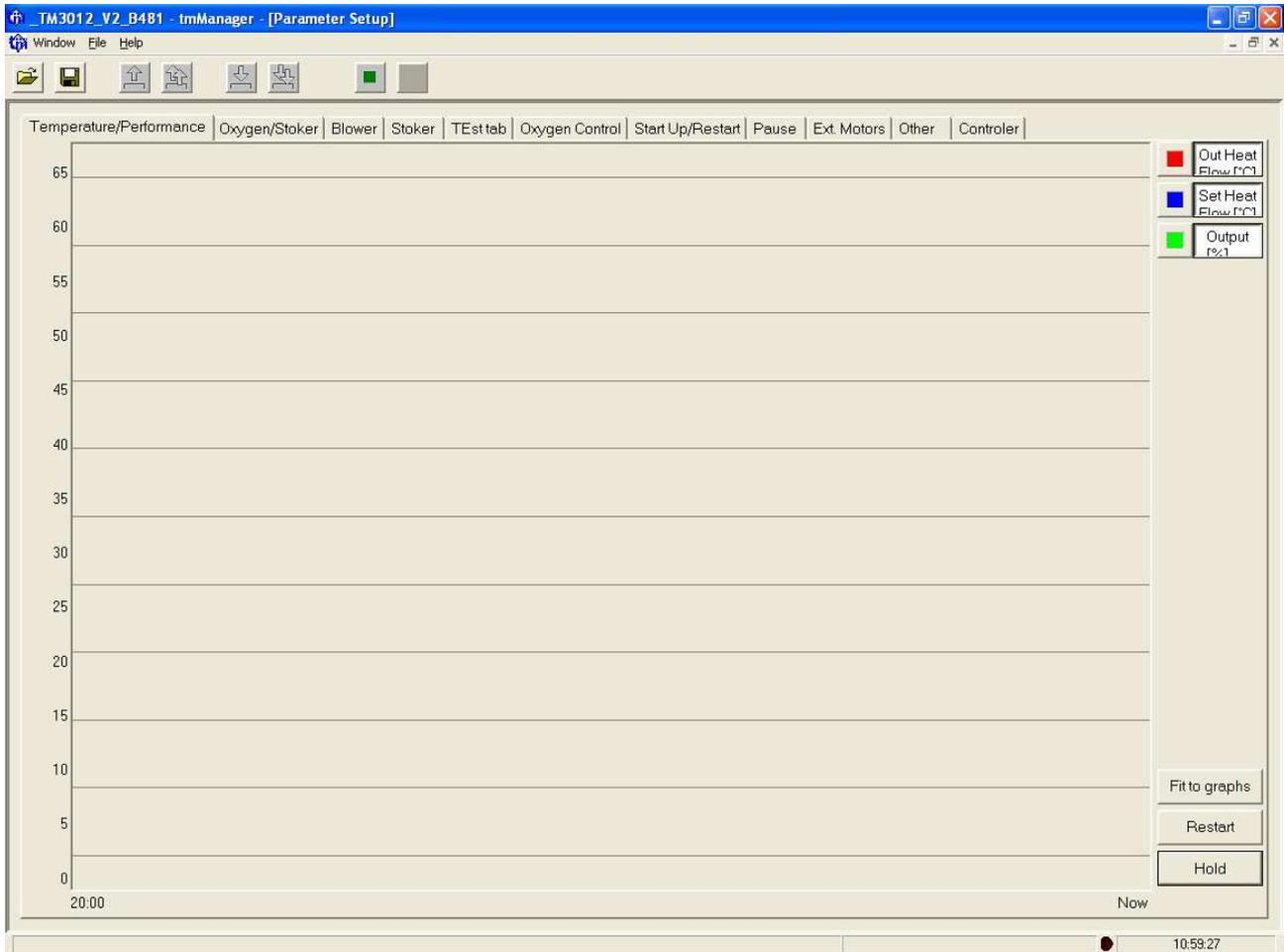


Fig. 4 Starting-up window in tmManager

This section is divided into four sub-sections containing explanations of; general aspects of the user interface, the menu bar, the selectable sheets and recommendations for adjustments.

2.1 GENERAL ASPECTS OF THE USER INTERFACE

When the tmManager is running the user will always see the menu bar on the top of the screen, the status bar on the bottom of the screen, a button bar on the bottom of the screen and the selected window.

The menu bar will be explained in the next section, also explaining the selection of window.

The status bar on the bottom on the screen is displaying the current actions carried out by the program. Here it is possible to see if the program is monitoring the controller, if the program is connected to the controller and current actions ex. connecting at the specified rate. If the program is connected to the controller correctly the light bulb in the bottom right corner of the screen is lit green.

On the button bar on the bottom of the screen it is possible to open a parameter file, to save the parameters in a file, to read parameters from the controller, to write the marked parameter to the controller, to write all parameters to the controller and to turn the monitoring of the controller on and off.

Whenever a monitoring graph is shown it is possible to adjust the graphs to fit the entire screen as well as changing the colours of the graph lines.

The adjustment of the graphs is done by clicking the button "Fit to graph". The graphing can also be frozen or reset. This is done by clicking the correspondent buttons "Hold" and "Reset".

The colours of the graph lines can be changed by clicking the coloured box next to the description on the function of the graph. A colour sheet appears allowing the user to change the colour.

The graph is turned on and off by clicking the description of the function.

OPEN A PARAMETER FILE

To open a file containing parameters, simply click the "Open" button  and the window in Fig. 5 will appear.

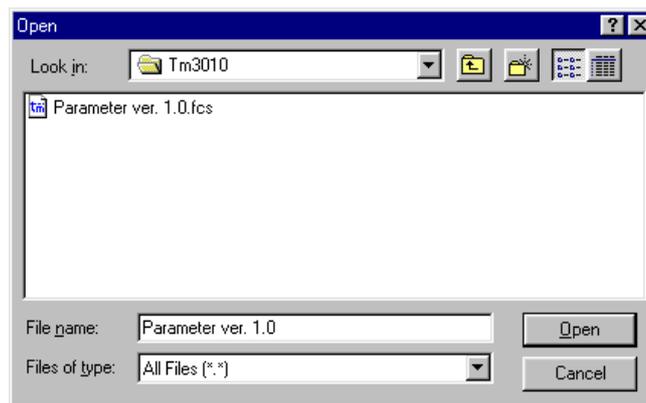


Fig. 5 Showing the "Open"

Click on the file in which the parameters are stored and click "Open". The parameters are now loaded into the program, but not into the controller. See section about writing all parameters to the controller.

SAVE A PARAMETER FILE

After having made adjustments to a parameter file saving is required to load the same parameters to another controller for later purposes.

Simply click the "Save" button .

Note that no "Save" window, allowing the user to specify the location of the saved parameters will occur. To save to a specified location see section about Menu Bar.

The status line is displaying to which location the parameters are saved.

READ THE PARAMETERS STORED IN THE CONTROLLER

To read the parameters stored in the controller click the "Read Controller" button . The status line indicates that the controller is being read and the parameters stored in the controller are being displayed in the sheets.

WRITE ONE PARAMETER TO THE CONTROLLER

To write one parameter to the controller click the “Write” button , press the tabulator key, the space bar or the return key after changing the parameter. Moving the cursor to another parameter will also write the changed parameter to the controller at the click of the mouse. When using the “Write” button the status line is displaying that the parameters are being written.

WRITE ALL PARAMETERS TO THE CONTROLLER

To write all parameters to the controller e.g. after loading parameters from a file simply click the “Write All” . The status line is displaying that the parameters are being written.

MONITORING

The next button on the button bar is the monitoring button . This button works as an on/off button. By clicking the monitoring button, the program starts monitoring the controller and the status line is displaying that the controller is being monitored.

LOGGING

The last button on the button bar is the logging button  (the button is grey  if no file location is specified in “Logging” sheet under the menu “Preferences”). See section “File”. This button also works as an on/off button. By clicking the logging button the program logs the monitored input to a file. With this function the user is able to create a graph just like the graphs shown in the two first sheets, described below only for a longer period of time e.g. over night.

2.2 THE MENU BAR

On the menu bar the following menus are displayed; File, Window and Help. The menu bar is accessible by clicking the menus with the mouse or by pressing the alt key together with the corresponding key underlined in the menu's name. Ex. to access the "File" menu press "Alt" and "f" together.

By pressing the alt key alone the first menu is pressed down in a button-like effect. The user is now able to navigate the menu bar using the arrow keys and the enter key.

FILE

In the menu "File" the following actions are accessible; Open, Save, Save as, Read Controller, Write Controller, Preferences and Exit.

2.2.1.1 Open

The "Open" action works the same way as the "Open" button. See section Open a Parameter File.

2.2.1.2 Save

The "Save" action works the same way as the "Save" button. See section Save a Parameter File.

2.2.1.3 Save as

The "Save as" action works the same way as the "Save" action and the "Save" button but this action allows the user to specify the location to which the parameter file is to be saved. By clicking the "Save as" action the window in Fig. 6 is shown.

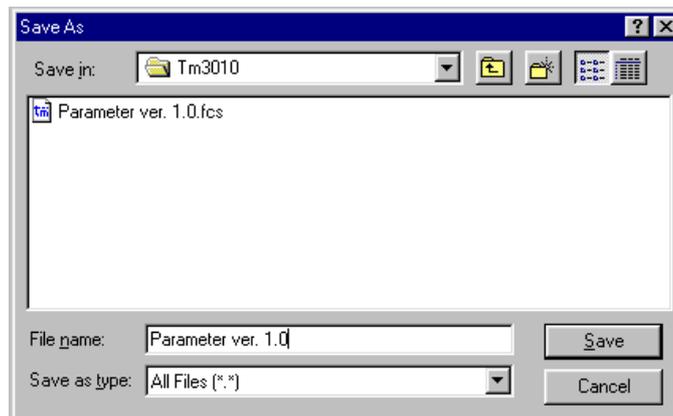


Fig. 6 Showing the "Save as"

Type the desired name for the parameter file or choose an existing file name and click "Save".

2.2.1.4 Read Controller

The "Read Controller" action works the same way as the "Read Controller" button. See section Read the Parameters Stored in the Controller.

2.2.1.5 Write Controller

The "Write Controller" action works the same way as the "Write All" button. See section Write all Parameters to the Controller.

2.2.1.6 Preferences

The "Preferences" action takes the user to the window shown in Fig 7a-e.

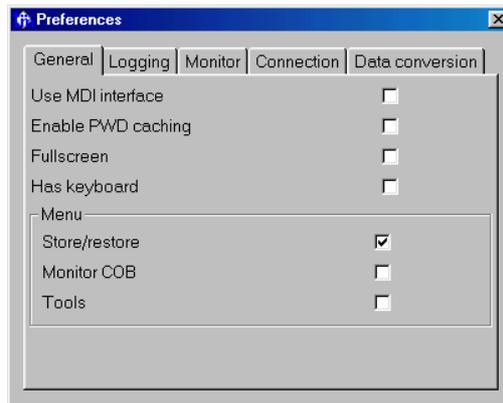


Fig. 7a Showing the window "Preferences" with the sheet "General"

The box "Use MDI interface" allows the user to have more than one window open at the same time.

The box "Full screen" is used to turn on the opportunity to open the tmManager on full screen.

The box "Has Keyboard" is not operational in this version as well as the "Monitor COB" and "Tools" boxes in the frame "Menu".

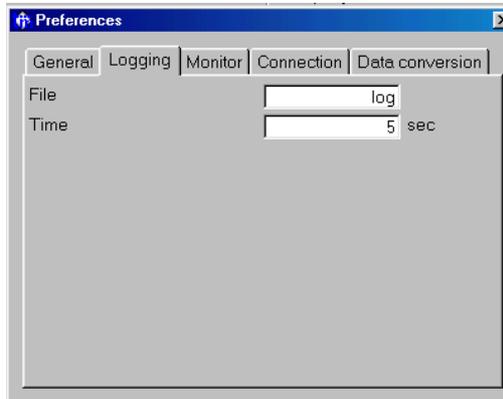


Fig. 7b Showing the window "Preferences" with the sheet "Logging"

The parameter "File" is used to specify a location/name of the logging file. If only the name is specified the program locates the file in the directory where the program is located.

The parameter "Time" is used to set the time interval of the logging on the specified location.

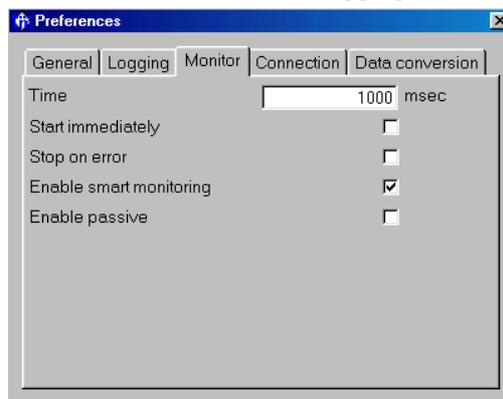


Fig. 7c Showing the window "Preferences" with the sheet "Monitor"

The parameter "Time" is used to specify the time interval of the monitoring of the controller. Monitoring is only enabled when the monitoring button is clicked. See section "Monitoring"

The box "Start immediately" is used to start the monitoring when the program is started.

The box "Stop on error" is used to stop the monitoring when an error occurs.

The box “Enable smart monitoring” is allowing the user to monitor only the parameters that can be seen in the presently open window. Shifting to another window will result in monitoring of the new opened window next time the time interval “Time” is initiated.

The box “Enable passive” is not operational in this version.

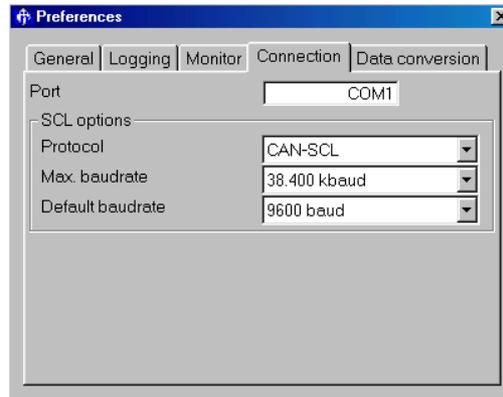


Fig. 7d Showing the window “Preferences” with the sheet “Connection”

The parameter “Port” is used to set the port of which the program tmManager communicates with the controller.

The frame “SCL options” is used to set the settings of the connection.

The parameter “Protocol” selects the type of protocol for communication with the controller.

The parameter “Max. baud rate” sets the maximum communication rate between the program and the controller.

The Parameter “Default baud rate” sets the default communication rate between the program and the controller.

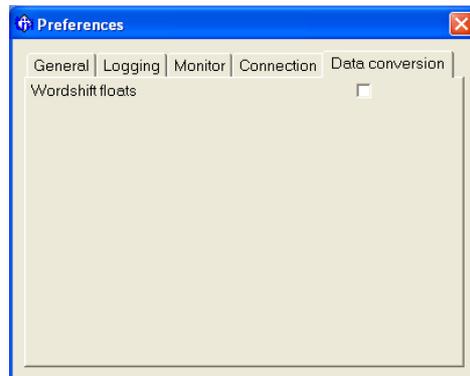


Fig. 7e Showing the window “Preferences” with the sheet “Data conversion”

The box “Wordshift floats” is used to shift the bits in floating point/values. It is a must that this parameter is **not** ticked.

2.3 THE PARAMETER SETUP SHEETS

This section of the manual is divided into some subsections, each dealing with the different sheets. In each section the different parameters is explained and recommendations for the settings are given.

The standard parameters are continuously tested on our own test stokers to ensure the best possible burning process of the fuel. The newest settings are delivered with this packet and labelled Parameters. These settings can differ from the recommended settings in this manual. Use the settings delivered with this manual on disk as a guideline.

TEMPERATURE/PERFORMANCE

The first sheet shown in Fig. 12 is showing the temperature of the outgoing heat flow, the set heat flow and the output on the performance.

The purpose of this sheet is only information and no parameters can be changed in this sheet.

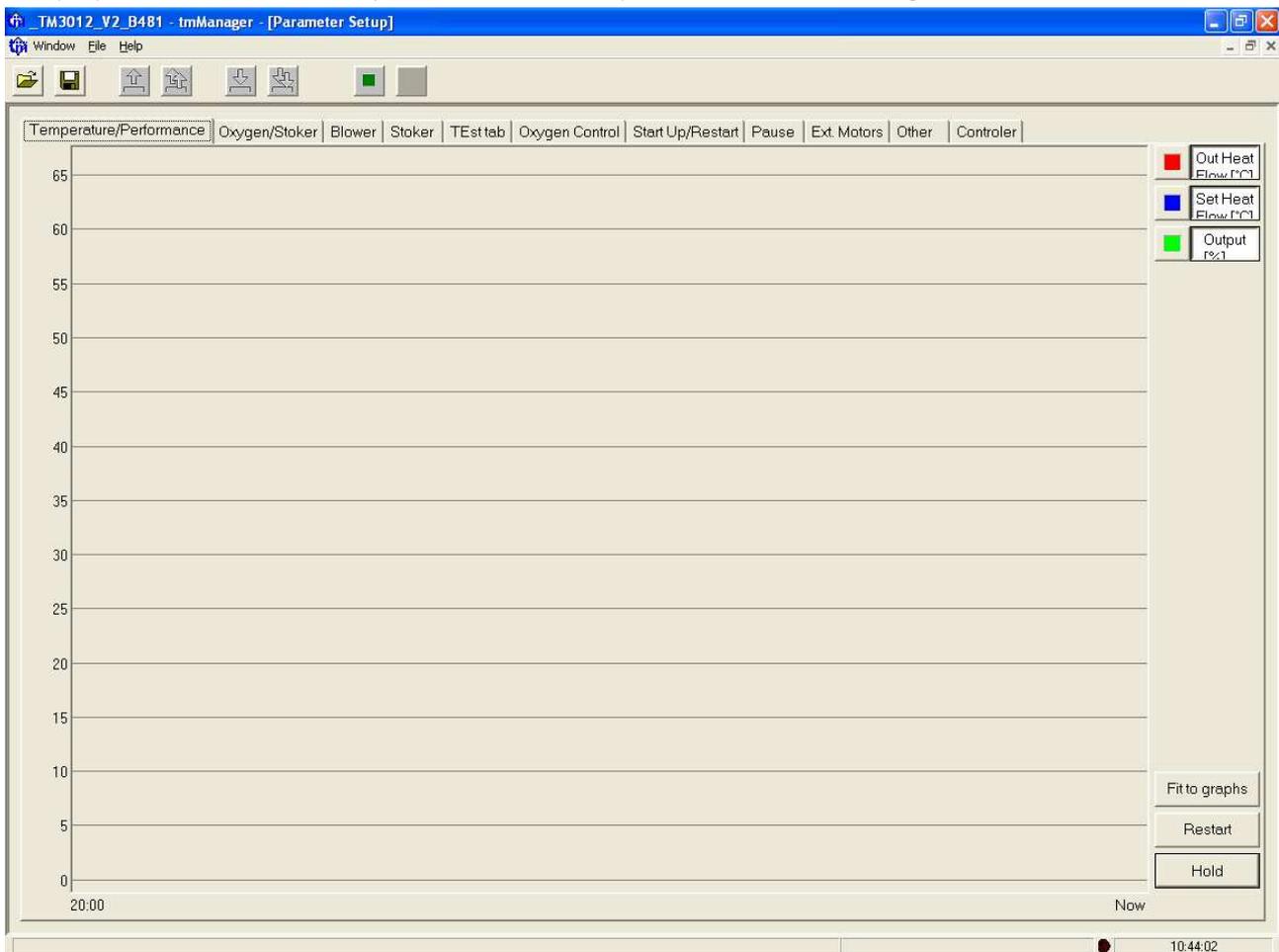


Fig. 12 Sheet "Temperature/Performance"

OXYGEN/STOKER

The second sheet shown in Fig. 13 is divided into two diagrams. The one on the left is showing the desired oxygen level and the actual oxygen level. The diagram on the right is showing the movement of the stoker. The purpose of this sheet is only information and no parameters can be changed in this sheet.

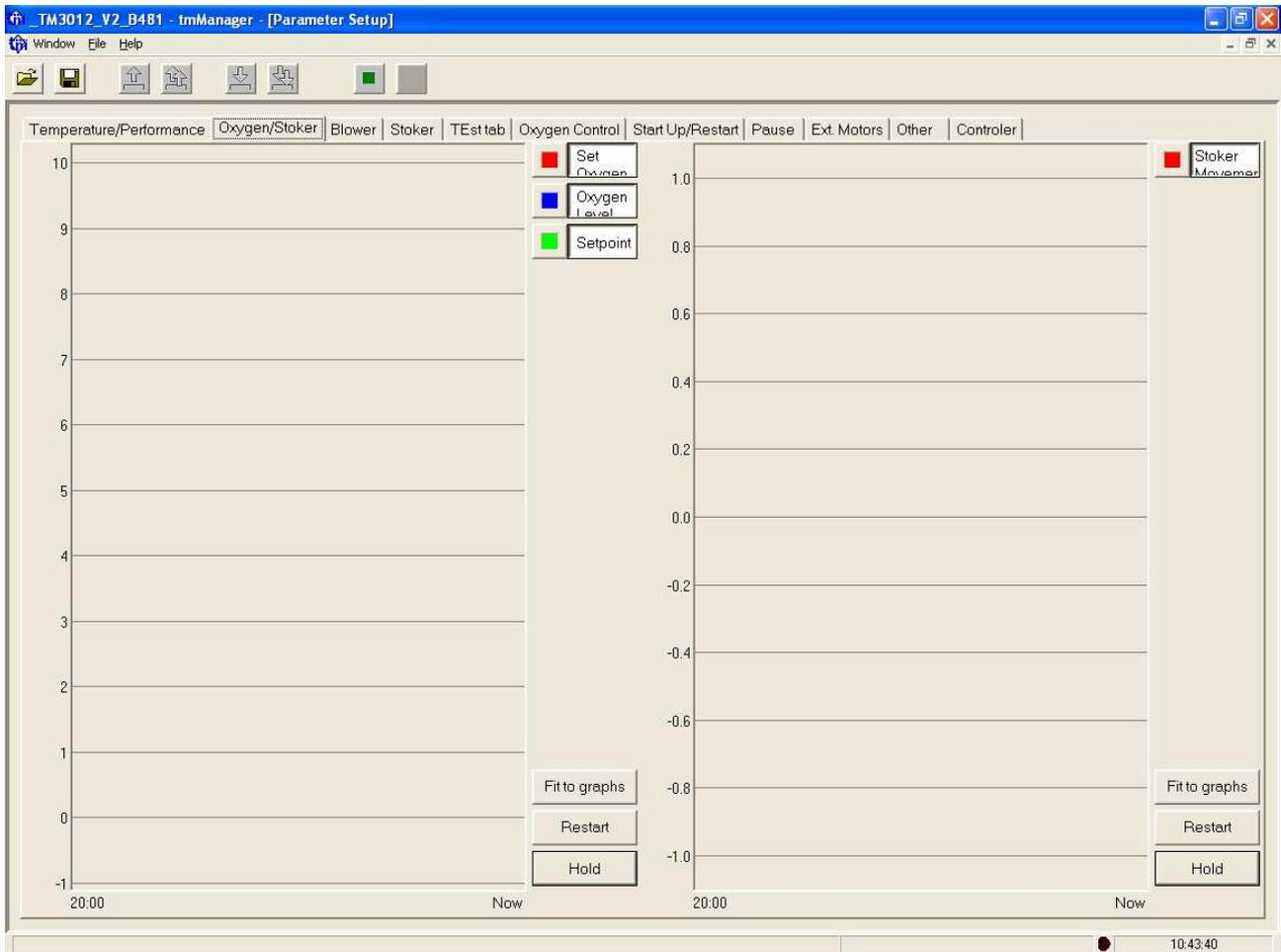


Fig. 13 Sheet "Oxygen/Stoker"

BLOWER

The third sheet, shown in Fig. 15 displays the settings of the blower. The parameters for the blower can be adjusted in this sheet. The sheet has a diagram used to set the profile of the blower.

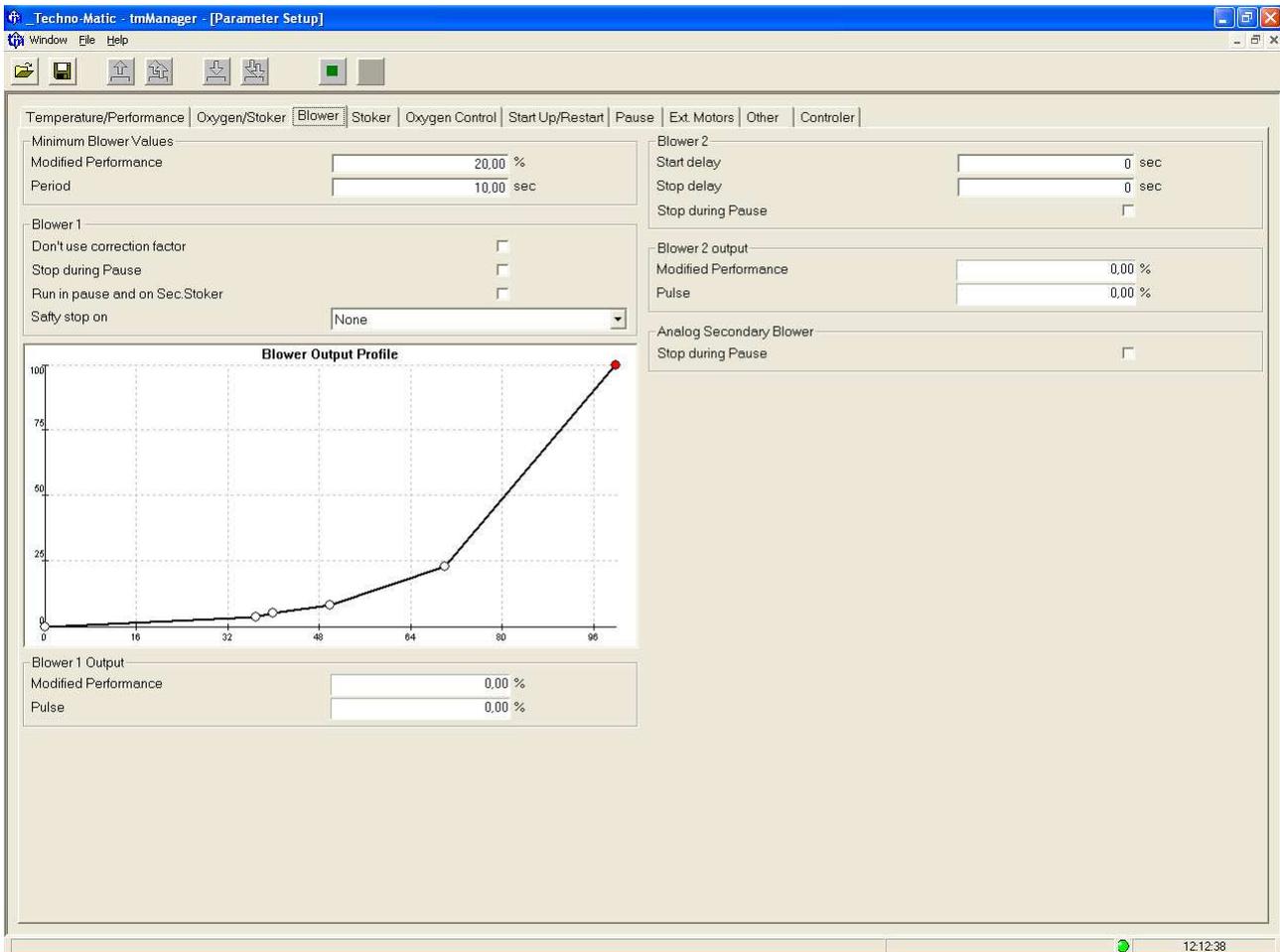


Fig. 15 Sheet "Blower"

2.3.1.1 Minimum Blower Values

The Blower Values are set according to the different types of blowers. The output of the blower is regulated by switching the power to the blower on and off in different intervals.

The "Modified Performance" parameter determines the minimum output of the blower.

It is recommended that this parameter is set at 20%.

The "Period" parameter sets the interval of the ignition of the blower.

It is recommended that this parameter is set at 10 sec.

The blower can be "safety stopped" by choosing a function, e.g. Filling tank or Refill2

2.3.1.2 Blower 1

The blower 1 setup includes the possibility of bypassing the characteristics (blower output profile) of the blower. To do this, click Don't use correction factor. You may also choose to have the blower to stop when the controller is in pause state.

If the blower shall run during the first part of the pause, the "Run in pause and on sec. Stoker" shall be ticked.

2.3.1.3 Blower 2

The blower 2 frame contains general setup when second blower is being used. Blower 2 is initiated relatively to blower 1 start and stop. Start delay is the time between blower 1 start and blower 2 start. Stop delay is the time between blower 1 stop and blower 2 stop. You may also choose to have blower 2 not operating when the controller is in pause state.

Analog secondary Blower

The analog output secondary blower can be completely stopped during pause by tipping the "Stop during pause"

Blower Output Profile

The profile of the blower output can be altered/set by double clicking one of the circles in the diagram. The following window shown in Fig. 16 appears.

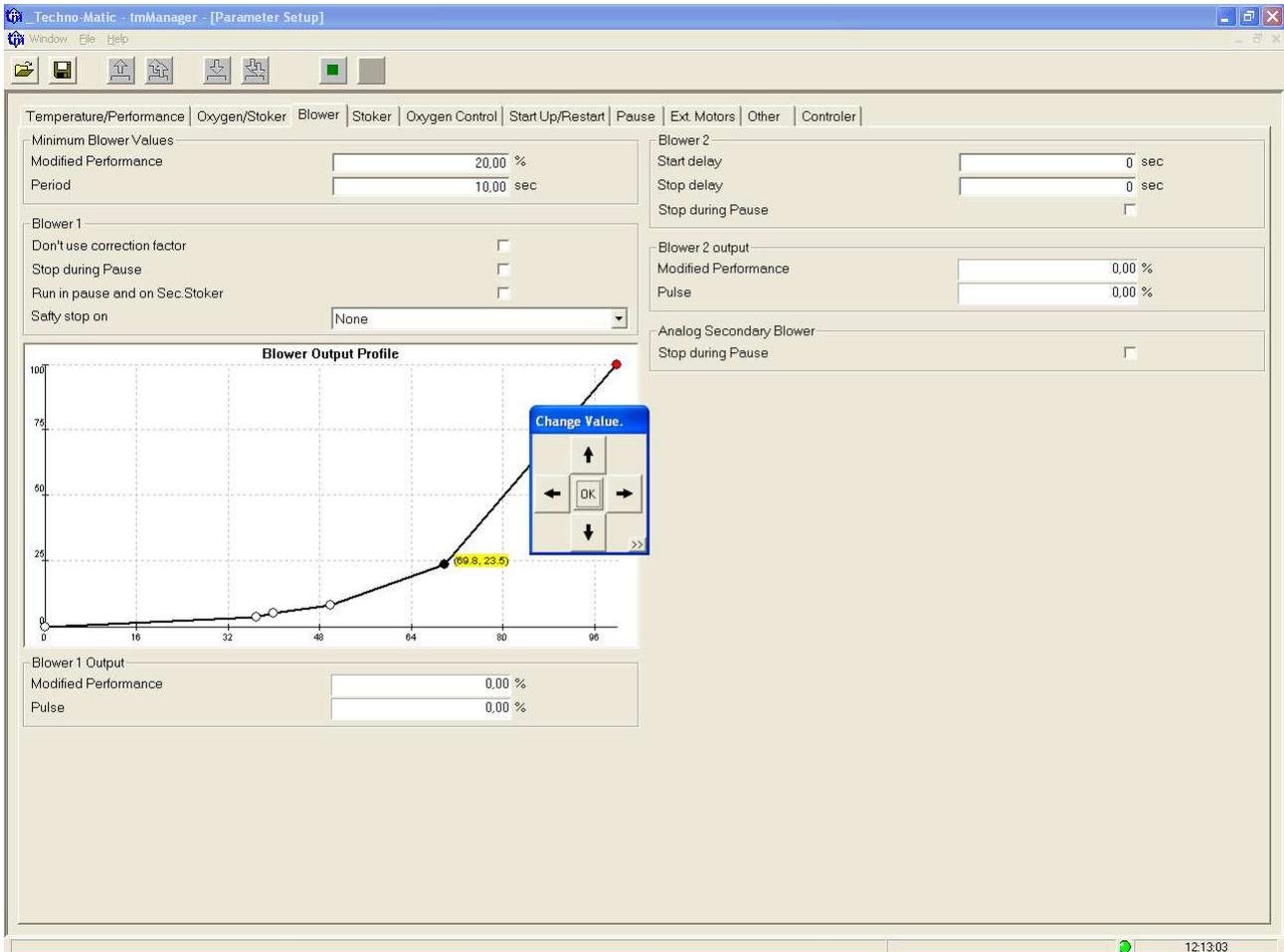


Fig. 16 Change Value in the Sheet "Blower"

By clicking the arrow in the desired direction the point moves. When the right point is achieved click "OK". The point selected can also be moved by dragging (clicking and holding) the point to the preferred location.

2.3.1.4 Blower 1 Output

The Blower 1 Output displays the modified output of the performance of blower 1 used for following the characteristics of the blower.

The "Modified Performance" displays the modified output of the performance of the stoker, which is a derived value from the "Output" in the frame "Performance Regulator" in the sheet "Regulators". This value is used for controlling the blower.

The "Pulse" displays the pulse output of blower 1. Together with the "Modified Performance" described above it forms the pair of coordinates in the diagram above there the "Modified Performance" derives the "Pulse".

2.3.1.5 Blower 2 Output

The Blower 2 Output displays the modified output of the performance of blower 2 used for following the characteristics of the blower.

The "Modified Performance" displays the modified output of the performance of the stoker, which is a derived value from the "Output" in the frame "Performance Regulator" in the sheet "Regulators". This value is used for controlling the blower.

The "Pulse" displays the pulse output of blower 2. Together with the "Modified Performance" described above it forms the pair of coordinates in the diagram above there the "Modified Performance" derives the "Pulse".

STOKER

The fourth sheet shown in Fig. 17 displays the settings of the stoker. The parameters in this sheet are used to set the performance of the stoker.

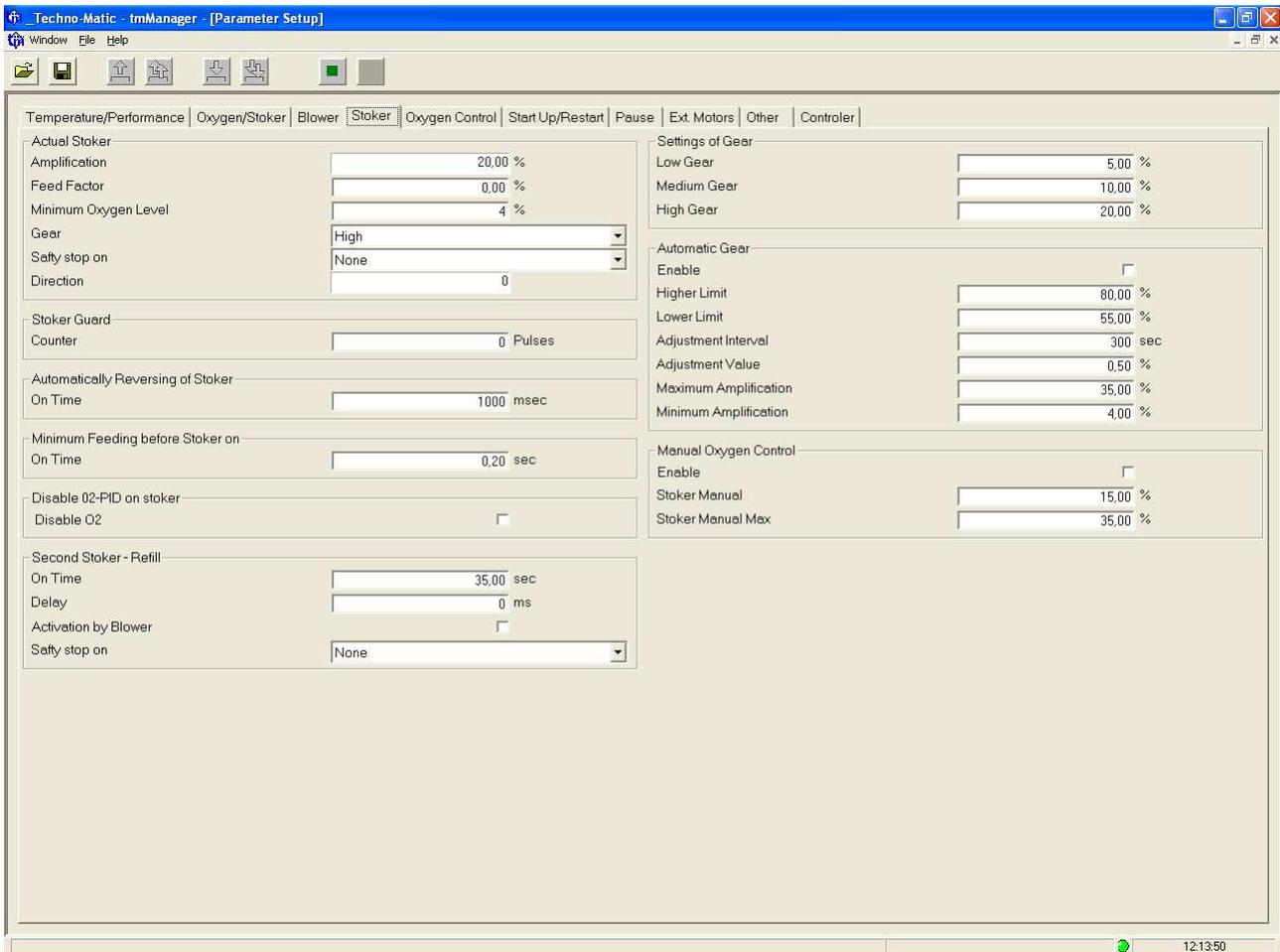


Fig. 17 Sheet "Stoker"

2.3.1.6 Actual Stoker

The frame "Actual Stoker" is used to set when the stoker is to operate.

The "Amplification" parameter is the amplification from the actual gear selected or the generated amplification from the automatic gear if this is turned on.

The "Feed Factor" parameter is displaying a product derived from the outputs of the regulators in sheet "Regulators" and the "Amplification".

The "Minimum Oxygen Level" parameter is used to set the minimum level of oxygen before stopping the stoker feeding.

It is recommended that this parameter is set to 4%.

The "Gear" parameter is used to preset the choice of gear. The value of this parameter is used when the controller is not able to select the gear itself or in the case of the Automatic Gear is disabled.

If the automatic gear is enabled the controller displays the "Gear" with values which is closest to the values of the current situation.

It is recommended that the value of this parameter is set to "Medium".

The "Safety stop on" is used to stop the stoker in a number of situations where it is recommended or necessary regarding safety.

2.3.1.7 Manual Oxygen Control

The frame Manual Oxygen Control is used to control the stoker by the use of manual oxygen control.

The box "Enable" is used to turn the manual control of oxygen on and off. When the box is ticked the manual control of oxygen is enabled and the automatic control is not functioning.

It is recommended that the box "Enabled" is not ticked.

The settings of the parameter in "Stoker manual" is used when the box "Enabled" is ticked.

The parameter "Stoker Manual" is used to set the "Output" for the "Oxygen Regulator" in the sheet "Regulator". The output of the "Oxygen Regulator" is then substituted by the value specified in "Stoker Manual".

It is recommended that this parameter is set to 70%.

It is recommended to set the parameter "Stoker Manual – Max." to 80%.

2.3.1.8 Stoker Guard

The parameter "Counter" displays the number of pulses detected from the inductive sensor located on the stoker shaft.

2.3.1.9 Automatically Reversing of Stoker

The parameter "On Time" is used to reverse the stoker in case the fuel gets stuck and blocks the stoker. The parameter is ignited by the Stoker Guard and reverses the stoker in the set time.

It is recommended that this parameter is set to 2 sec.

2.3.1.10 Minimum Feeding before Stoker on

The parameter "On Time" is used to set the minimum time interval for the stoker when it is to run. If the calculated on time is less than "On Time" the stoker will not run unless the bimetal sensor has detected a backfire. In case the stoker has detected a backfire the stoker runs no matter the specified value in "On Time".

It is recommended that this parameter is set to 0,2 sec.

2.3.1.11 Disable O2-PID to stoker

On large scale boilers it can be useful to let the stoker just follow the Primary Fan, and then let the Secondary fan control the Oxygen% in the Flue gas.

2.3.1.12 Settings of Gear

The box "Enable Alternative" switches off the values specified in "Low Gear", "Medium Gear" and "High Gear" when the controller operates in pause mode or one of the manual modes. See section "Alternative Gear Settings".

The parameters "Low Gear", "Medium Gear" and "High Gear" are adjusting the ratio of the gears in accordance to the time "Ts" from the frame "Oxygen Regulator" in sheet "Regulator". Note that these parameters do not change the RPM of the stoker but only the time interval in which it is running.

The parameters are highly dependent of the actual gearing of the stoker. No recommendations are given.

2.3.1.13 Automatic Gear

The frame "Automatic Gear" is setting the parameters for the automatic gearshift.

The box "Enable" is used to turn the Automatic Gear on and off. When the box is ticked the Automatic Gear is functioning.

The parameter "Higher Limit" sets an upper limit for the output in the frame "Oxygen Regulator" in the sheet "Regulator". When this limit has been succeeded in the period of time given in "Adjustment Interval" the controller adds the "Adjustment Value" multiplied by the ratio between the "Ts" from the frame "Oxygen Regulator" in sheet "Regulator" and "Adjustment Interval" to the "Stoker Amplification" which derives a change up in gears.

It is recommended that this parameter is set to 80%.

The parameter "Lower Limit" sets a lower limit for the output in the frame "Oxygen Regulator" in the sheet "Regulator". When this limit has been succeeded in the period of time given in "Adjustment Interval" the controller subtracts the "Adjustment Value" multiplied by the ratio between the "Ts" from the frame "Oxygen Regulator" in sheet "Regulator" and "Adjustment Interval" from the "Stoker Amplification" which derives a change down in gears.

It is recommended that this parameter is set to 55%.

The "Adjustment Interval" is used to set the period of time in which the limits have to be succeeded.

It is recommended that this parameter is set to 300 sec.

The "Adjustment Value" is used to adjust the aggressiveness of the gearshift.

It is recommended that this parameter is set to 5%. Too high a value will result in a double gearshift.

The parameter "Maximum Amplification" and "Minimum Amplification" are used to set the limits for the amplification when a gearshift is up.

These values should be set at respectively 70% and 4%.

2.3.1.14 Second Stoker - Refill

The Second Stoker - Refill is used if a second stoker is attached to the system (used on large stokers). The parameter adjusts the time interval of the second stoker starting on ignition of the main stoker.

The parameter "On Time" is used to adjust the time interval of how long the second stoker is to run after the main stoker has stopped. The second stoker is ignited by the main stoker and runs parallel to the main stoker.

This parameter is dependent on the actual gearing of the second stoker. No recommendations are given.

The box "Activation by Blower" is used to turn the second stoker on when the blower is ignited. When the box is ticked the second stoker starts running on the ignition of the blower and continues running in the time interval specified in "On Time".

It is recommended that this box not is ticked as a standard.

The parameter "Delay" adjusts the delay from the main stoker is activated to the second stoker starts. This delay is used to ensure that the two stokers do not start exactly at the same time with the extra start current drawn simultaneously on both outputs. It is possible to operate with larger engines if a delay of for instance 500 ms is used.

As a standard it is recommended to use a delay of 0 ms.

OXYGEN CONTROL

The sixth sheet, shown in Fig. 18 is used to control the oxygen levels. The sheet is divided into three diagrams and one frame.

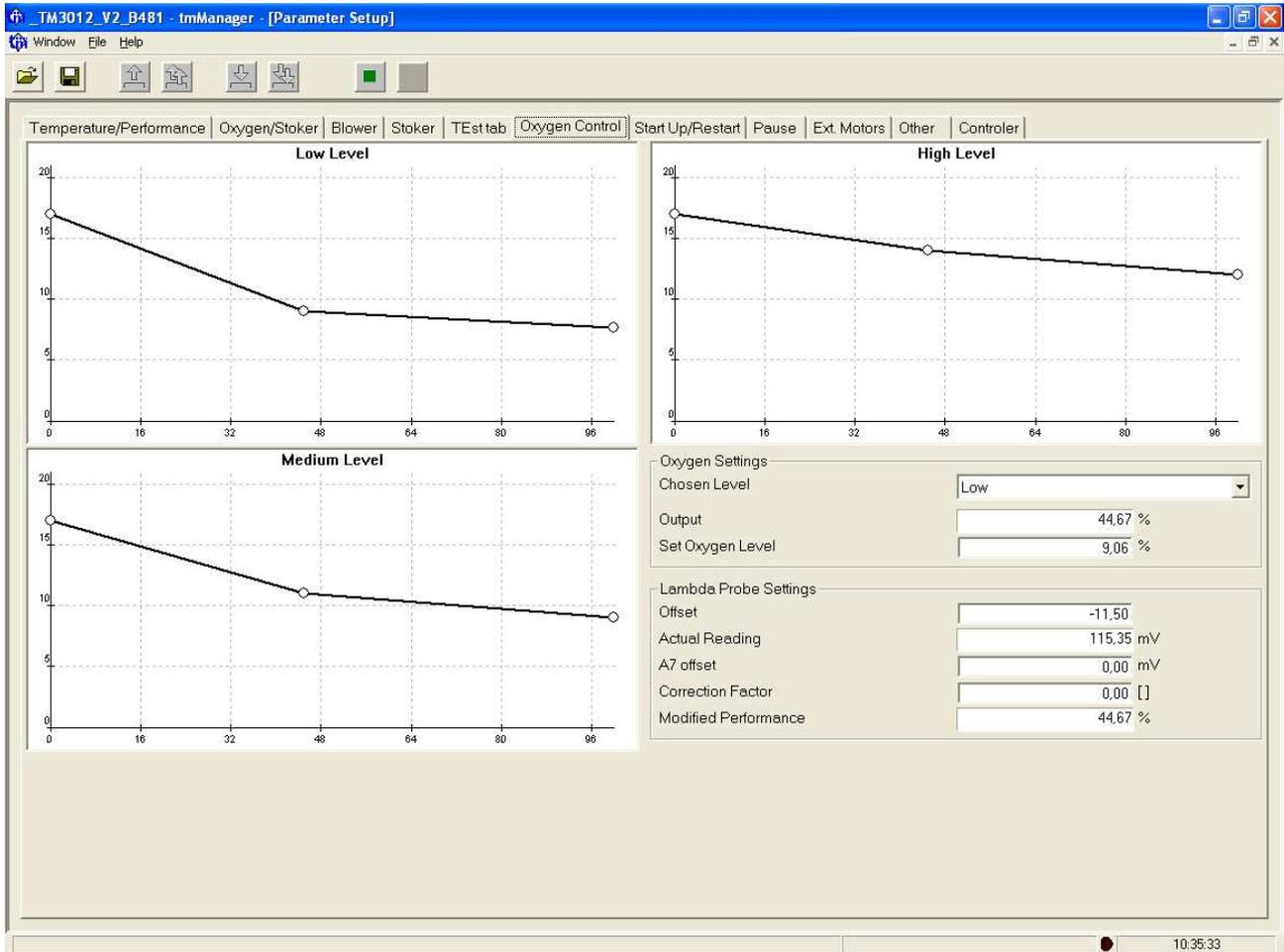


Fig. 18 Sheet "Oxygen Control"

2.3.1.15 Low, Medium and High Level

The three diagrams displays the three levels of oxygen, which can be chosen. The choice of oxygen level is not done automatically because it depends on the fuel used.

The levels' profiles are set/changed by double clicking the small circles in each diagram. The window shown in Fig. 19 will appear.

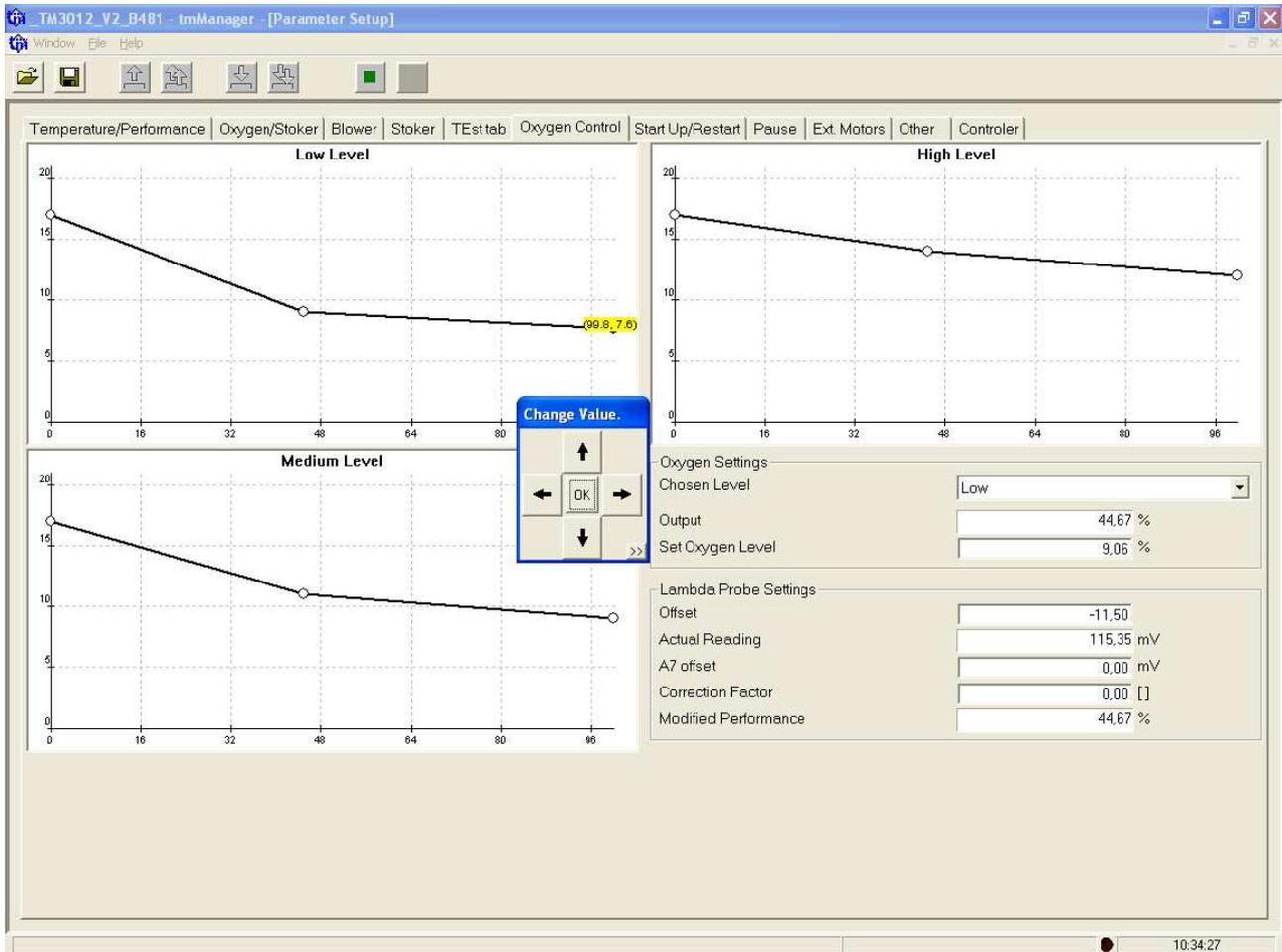


Fig. 19 Change Values in Sheet "Oxygen Control"

Clicking the arrow in the desired direction moves the point. When the right position is achieved click "OK". The point selected can also be moved by dragging (clicking and holding) the point to the preferred location.

2.3.1.16 Oxygen Settings

The frame Oxygen Settings is used to adjust the settings for the lambda probe and the desired level of oxygen.

The parameter "Chosen Level" is used to choose the desired oxygen level. To select a level click the curtain button to the right at this parameter. Click the desired level.

It is recommended to start at the medium level.

The two parameters "Output" and "Set Oxygen Level" are used to display the present selected pair of coordinates in the chosen oxygen level.

2.3.1.17 Lambda Probe Settings

The parameter "Offset" shows the actual value of the calibration of the lambda probe.

The parameter "Actual Reading" is displaying the actual reading from the lambda probe. This parameter is mainly used to check the functionality of the probe.

A7 offset. Only by special occasions this parameter can be set different from 0.00

The "Correction Factor" adjusts a damping effect.

It is recommended to set the parameter at a value of 0 as a start.

The parameter "Modified Performance" displays the modified performance after the correction factor.

START UP/RESTART

The seventh sheet, show in Fig. 20 is used to set the parameters for starting and restarting the stoker. The sheet is divided into four frames.

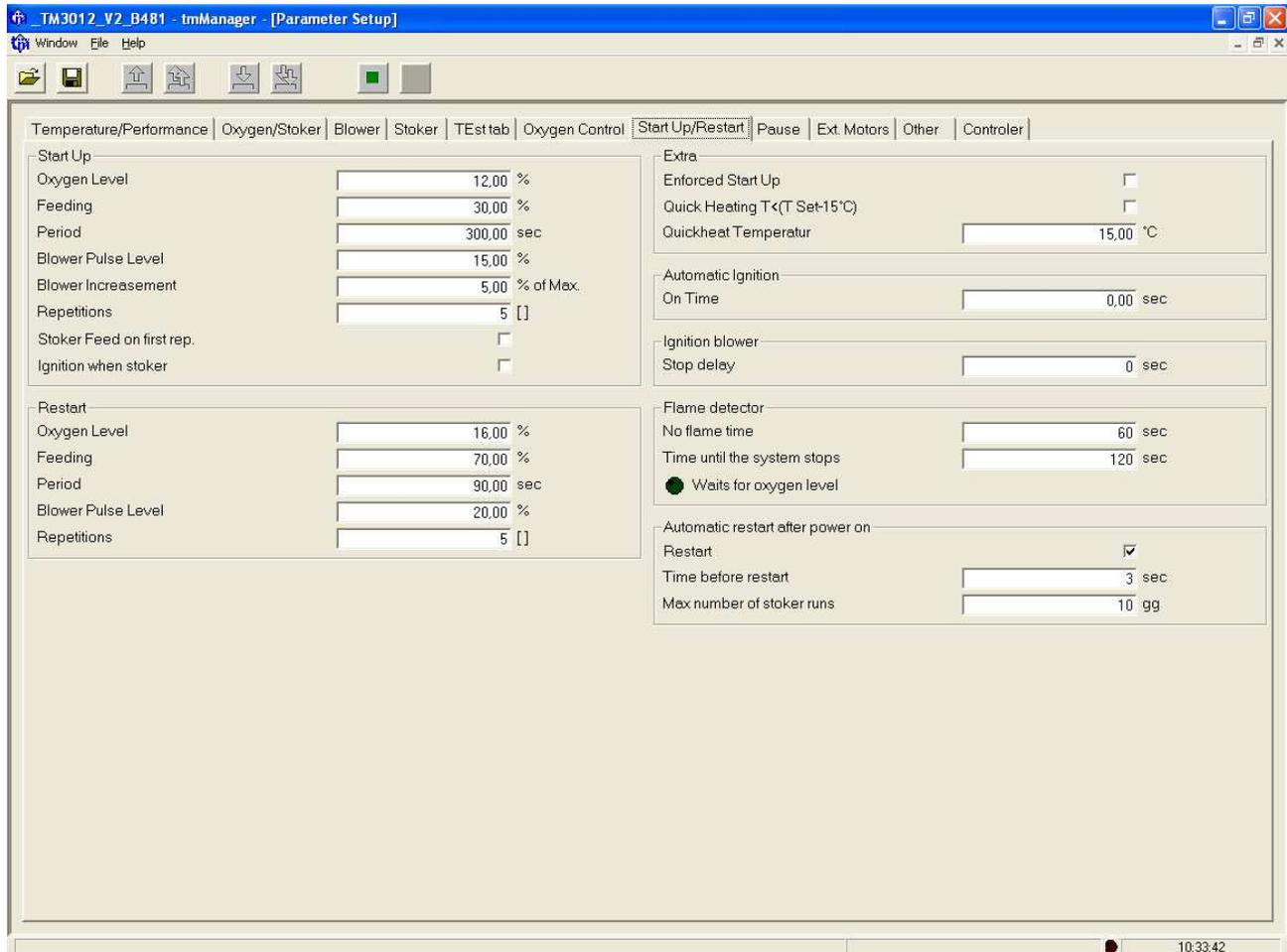


Fig. 20 Sheet "Start Up/Restart"

2.3.1.18 Start Up

The frame Start Up is used to set the parameters for starting the stoker.

The parameter "Oxygen Level" is used to set the maximum level of oxygen detected before changing the program mode from "Manual Start – Waiting" to "Automatic".

It is recommended to set this parameter at 12% since the level of oxygen in the air normally is around 21%.

The parameter "Feeding" is used to set the level of feeding of the "Period" by the stoker during start up.

It is recommended that this parameter is set at 30% feeding during start up. This parameter will change internally to 100% when the running conditions changes to "Automatic".

The parameter "Period" is used to set the start up period. This is the period of time that the controller waits until the next repetition.

It is recommended that this parameter is set to 300 sec.

The parameter "Blower Pulse Level" is used to set the level at which the blower starts.

It is recommended that this parameter is set at 15%.

The parameter "Blower Increasement" is adjusting the increasement of the blower (in correspondence with maximum performance of the blower) for each repetition.

It is recommended that this parameter is set at 5%.

The parameter "Repetitions" is setting the number of repetitions of the "Period".

It is recommended that this parameter is set at 5.

When the number for repetitions is reached and the "Oxygen Level" has not decreased below the set value, the controller generates the error "Start Up/Restart Failure".

2.3.1.19 Restart

The frame Restart is used to set the parameters for restarting the stoker.

The parameter "Oxygen Level" is used to set the maximum level of oxygen detected before changing the program mode from "Pause" to "Automatic".

It is recommended to set this parameter at 16%.

The parameter "Feeding" is used to set the level of feeding of the "Period" by the stoker during start up.

It is recommended that this parameter is set at 30% feeding during restart.

The parameter "Period" is used to set the start up period. This is the period of time that the controller waits until the next repetition.

It is recommended that this parameter is set to 90 sec.

The parameter "Blower Pulse Level" is used to set the level at which the blower starts.

It is recommended that this parameter is set at 20%.

The parameter "Repetitions" is setting the number of repetitions of the "Period".

It is recommended that this parameter is set at 5.

When the number for repetitions is reached and the "Oxygen Level" has not decreased below the set value the controller generates the error "Start Up/Restart Failure":

2.3.1.20 Extra

The frame Extra is used to adjust some extra features.

The parameter "Enforced Start Up" forces the controller to stay in the "Start Up" and enter normal mode after only one full repetition. This function is not generating an error even though the oxygen level specified in the parameter "Oxygen Level" in the frame "Start Up" has not been succeeded.

The box "Quick Heating" turns on and off the possibility to increase the stoker performance if the temperature is more than the Quickheat Temperature below the set temperature. If the box is ticked the function Quick Heating is turned on resulting in the controller increases the performance to 100% until the temperature is less than Quickheat Temperature below the set temperature.

2.3.1.21 Automatic Ignition

The frame Automatic Ignition is used if an automatic ignition system is attached to the stoker.

The box "On Time" adjusts the time interval of which the ignition system is to run. The controller automatically engages this function each time a new repetition is started during "Start Up" or "Restart".

If an automatic ignition system is attached it is recommended that this parameter is set to 35 sec. Note that this value is depending on the type of ignition system. If no ignition system is attached the value should be set to 0 sec.

The recommended setting for this frame is based on an electrical ignition system using a hot air blower.

2.3.1.22 Ignition blower

The frame Ignition blower contains the settings for an optional ignition blower on the ignition system. The parameter Stop delay is the time from the ignition system stops (because fire has been detected) to the ignition blower stops.

2.3.1.23 Flame sensor

The flame sensor senses if there is fire in the material in the boiler. The No flame time is the time where the signal is absent in automatic (normal) state before the system initiates a start up (with ignition) of the system. When a No flame has been detected, the controller will wait for the oxygen level to drop below the start up oxygen level. This situation is indicated by the lamp labelled Waiting for oxygen level. In this situation, the oxygen will rise above this level or the flame sensor will go on again.

The parameter Time until the system stops determines the time the controller has from initiating a start up till it has to be correctly started. If this is not met, the system will issue a fault because it is not able to ignite the system automatically.

2.3.1.24 Automatic Restart After Power On

The system is capable of restarting the system automatically after power on. This is used in areas where power supply is unstable and short breaks in the power may occur. **Check, if the country where the system operates allows automatic startup!**

By ticking the “Restart” box restart is enable in the system and will occur, if power is lost when the system the system was in a state different from “Stop”. The operation is similar to that of pressing the Start button after power on.

The parameter “Time before restart” adjust the seconds to wait from power on to start of the system. This ensures that the system does not restart before the power has shown to be stable.

It is recommended to set this parameter to 30 seconds.

The parameter “Max number of stoker run” sets the total number of times the stoker is run before startup failure occurs. The count is kept during power off and therefore accumulates the amount of material fed to the system without successful start of the system. This keeps the stoker from filling the burner when there is no fire because power has been lost too long and there is no ignition system. Setting the parameter to 0 disables the count and the stoker will continue filling material to the burner as long as possible.

This parameter is normally set to 0.

PAUSE

The eight sheet Pause, shown in Fig. 21 is used to adjust the settings for pause mode. The sheet is divided into three frames.

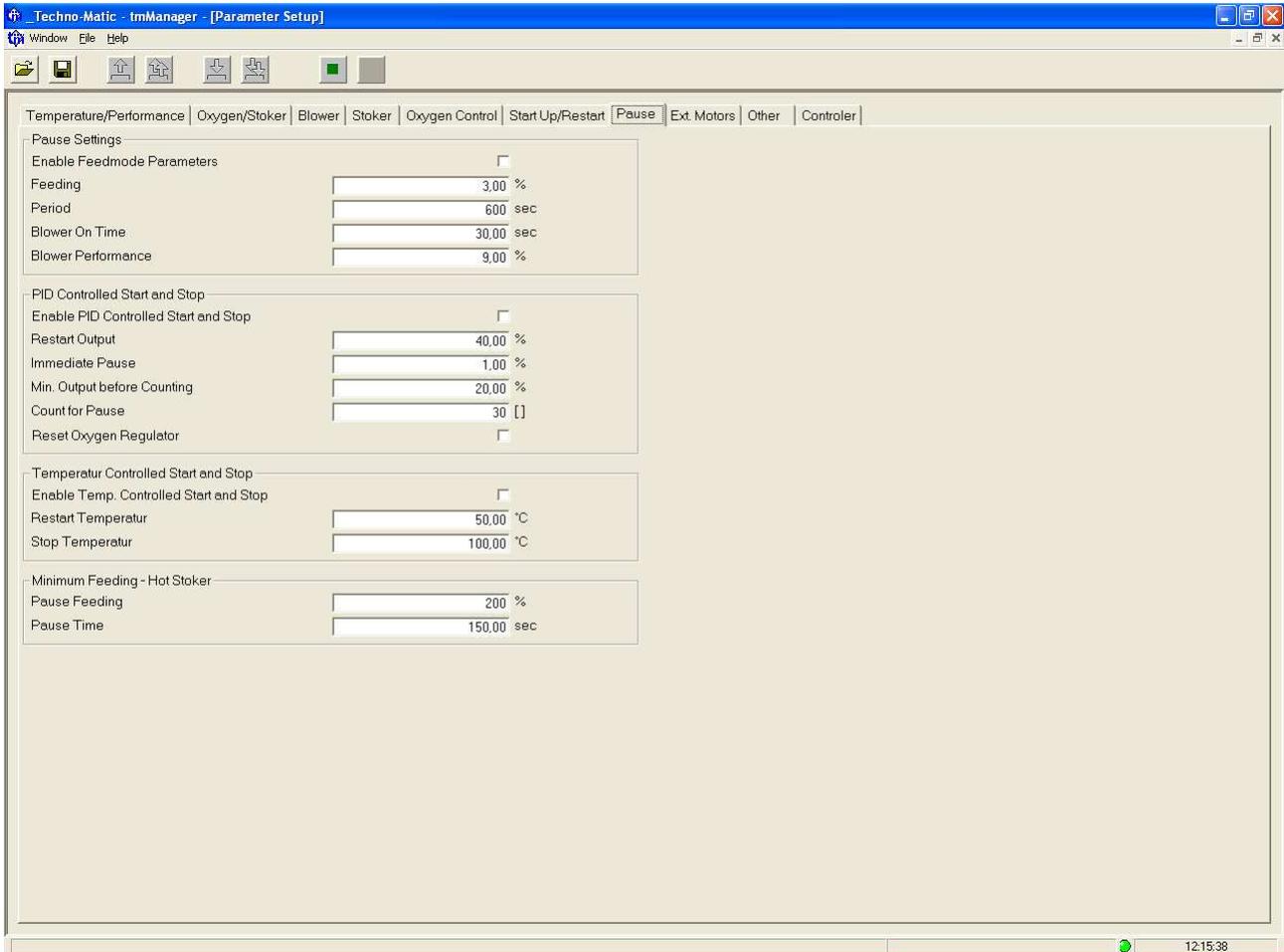


Fig. 21 Sheet "Pause"

2.3.1.25 Pause Settings

The frame Pause Settings is used to set the parameters for running in pause mode.

The parameter "Feeding" adjusts the percentage of the "Period" when in pause mode.

It is recommended that this parameter is set to 3%.

The parameter "Period" adjusts the time interval of the "Pause" mode.

It is recommended that this parameter is set to 600 sec.

The parameter "Blower On Time" is setting the time interval of the blower during the "Period".

It is recommended that this parameter is adjusted to 30 sec.

The parameter "Blower Performance" is setting the performance of the blower during the "Blower On Time"

It is recommended that this parameter is set to 9 %.

2.3.1.26 Start and Stop

The frame Start and Stop is adjusting the settings for starting and stopping the pause mode of the controller. The parameter "Restart Output" is used to adjust the performance when the controller is to enter normal mode by restarting from pause.

It is recommended that this parameter is set to 40%.

The parameter "Immediately Pause" is adjusting when to enter "Pause" mode immediately.

It is recommended that this parameter is set to 1% and not higher than the specified value in the parameter "Restart Output".

The parameter "Min. Output before Counting" is used together with the "Count for Pause" to adjust when the controller is to enter "Pause" mode.

It is recommended to set this parameter to 20%.

The parameter "Count for Pause" is used to set the number of counts where the "Min. Output before Counting" has to be fulfilled before entering "Pause" mode.

It is recommended that this parameter is set to 30.

If the "Min. Output before Counting" is fulfilled in the number for counts set in "Count for Pause" the controller enters "Pause" mode until the "Minimum Modified Output" succeeded the specified value. When the value specified in the "Minimum Modified Output" is succeeded the controller restarts with the value specified in "Restart Output" until the controller enters "Automatic" mode. To see conditions for entering "Automatic" mode see section "Restart".

The box "Reset Oxygen Regulator" is used the reset the oxygen regulator when the controller enters pause mode.

2.3.1.27 Temperatur controlled start and stop

As an alternative to the standard parameters for changing from "run mode" to pause, it is possible to chose temperatures. This setting is mostly used when the heating unit has a buffer tank to accumulate the hot water.

The stop temperature has then to be sat some degrees lower than the set temperature (5°C) The start temperature

is then sat 15 til 25°C under the stop temperature. It will prevent often starts and stops.

2.3.1.28 Minimum Feeding – Hot Stoker

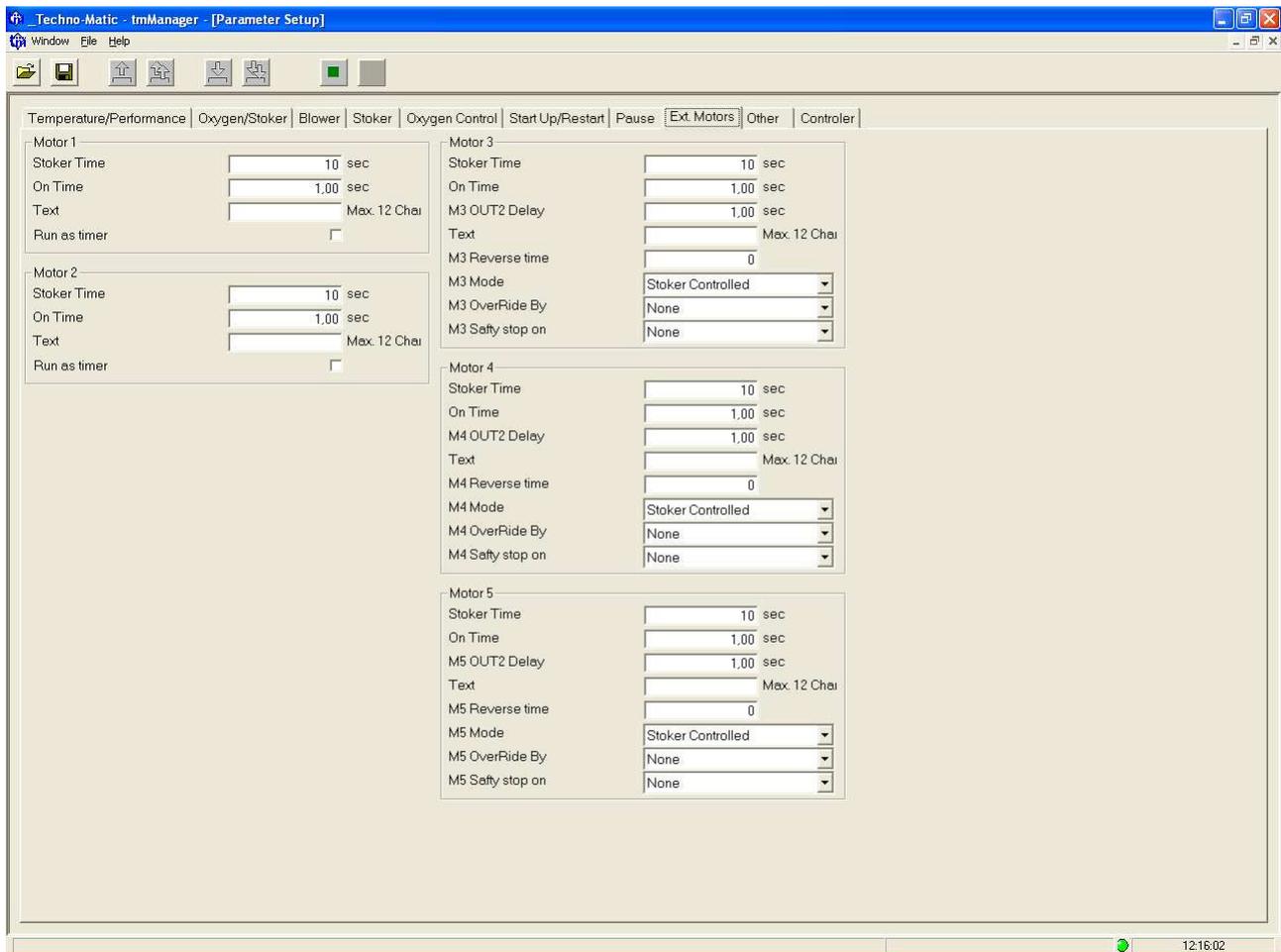
The frame "Minimum Feeding – Hot Stoker" is used when the bimetal sensor detects a backfire and the controller is in "Pause" mode.

The parameter "Pause Feeding" sets the percentage of the normal feeding when in "Pause" mode and a backfire is detected.

It is recommended that this parameter is set to 200%.

The parameter "Pause Time" is adjusting the "Period" in the frame "Pause Settings" in case of hot stoker is detected. This parameter ensures a minimum period of the specified value.

EXT MOTORS



2.3.1.29 Motor 1

The frame Motor 1 is used to set the parameters for an extra motor for e.g. removing ashes.

The parameter "Stoker Time" is used to set the summarised number of seconds the main stoker has to run before Motor 1 ignites. The summarising function is reset every time Motor 1 runs.

The parameter "Run Time" adjusts the number of seconds Motor 1 runs when ignited.

The box "Run as timer" sets Motor 1 to run independent from the main stoker with "Stoker Time" as the off period and "Run Time" as the on period.

These parameters are very dependent of the purpose for which they are used. Therefore no recommendations are given.

The parameter "Text" is used to display a written text describing the purpose of Motor 1. If no text is entered the program writes "Motor 1".

2.3.1.30 Motor 2

The functions of the parameters in the frame Motor 2 are the same as for Motor 1. See subsection above.

2.3.1.31 Motor 3, 4 and 5 (Here just called Motor3, as they are all tree similar)

Motor 3, 4 and 5 is for the same purpose as Motor 1 and Motor 2. Only they have more possibilities of setting the working modes.

M3 Out2 Delay:

The output M3 out2 will follow the Motor 2 output, but will keep running in this time after Motor3 has stopped.

M3 Mode: The output can work in various modes, as the Motor 1, activation by the stoker screw or by a timer. Furthermore By one of the other motors. Notice, the settings is not blocked to set input from its own output.

Text:

The function can be named with a name of max. 12 characters.

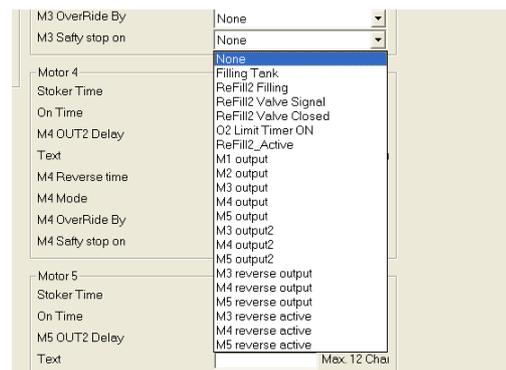
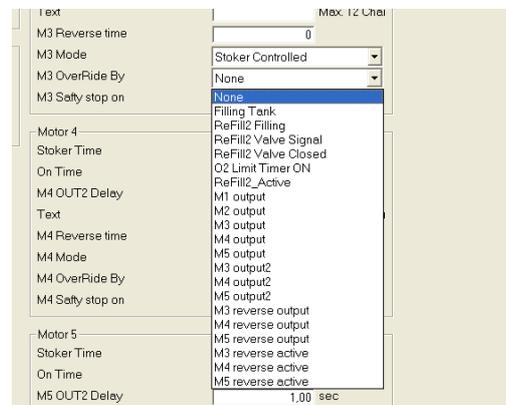
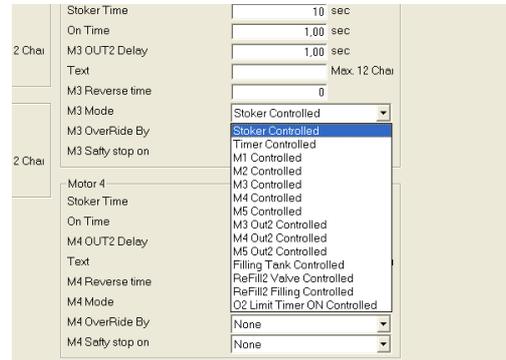
M3 override By:

By setting e.g. Refill2 Filling here the Motor 3 will run constantly when the Refill2 Filling is running. An example: A situation where Motor 3 is used as control for a Stirrer motor. When refilling the Stirrer runs constantly.

M3 safety stop on:

By setting e.g. Refill2 Valve Closed here the motor3 will stop when there is no signal to the input. Also if the setting is Refill2 Filling, the motor3 will stop when the Refill2 Filling output is active.

Notice! The "M3 Safety stop on" overrides the "M3 Override by"



OTHER

The sheet Other, shown in Fig. 24 is used to display and set other extra settings.

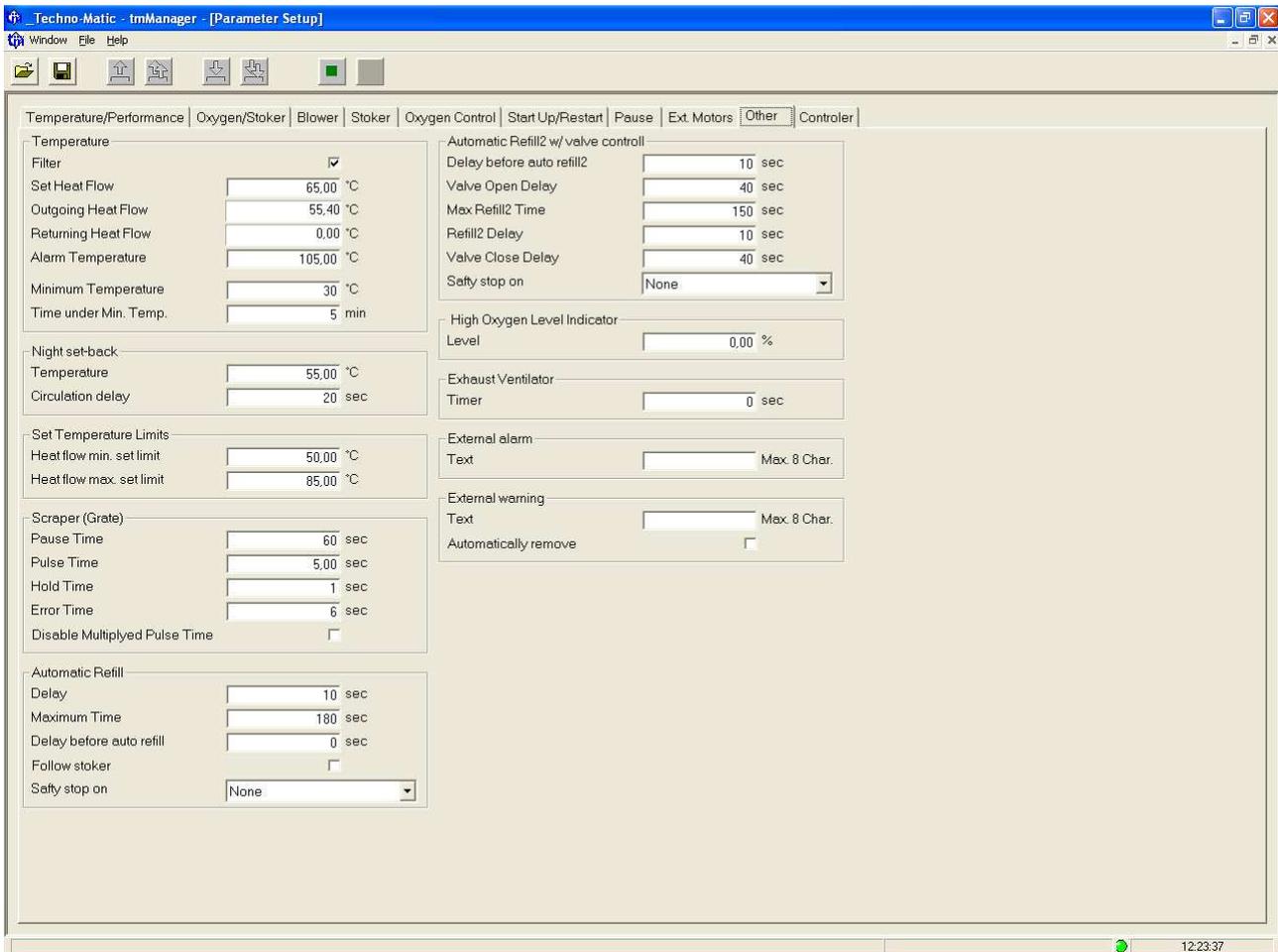


Fig. 24 Sheet "Other"

2.3.1.32 Temperature

The frame Temperature is used to set the parameters regarding the temperature for the heated element.

The box "Filter" is used to set if filtering on the temperature readings is to be used.

It is recommended to use the filter.

The parameter "Set Heat Flow" is used to adjust the temperature of the desired outgoing heated element (usually water). This parameter can also be set from the controller menu.

The parameter "Outgoing Heat Flow" displays the actual temperature of the outgoing heated element.

The parameter "Returning Heat Flow" displays the actual temperature of the returning heated element if a thermometer is installed in the return flow.

The parameter "Temperature Alarm" is used to set the alarm temperature preventing e.g. an explosion due to overheated water.

It is recommended that this parameter is set to 95 degrees Celsius.

The parameter "Minimum Temperature" is used to set the minimum temperature preventing e.g. that the boiler is filled with fuel. This is especially important if oxygen control is disabled, under normal circumstances, a high oxygen % will stop the system.

It is recommended that this parameter is set between 30 and 50°C. **Notice:** If the smoke temperature is measured, this temperature is automatically used as "Min Temp." and the setting is then recommended between 0 and 10°C

The parameter "Time under Min.Temp" is used to set the a time before the min. temperature stops the system. It is recommended that this parameter is set between 5 and 20 min.

2.3.1.33 Night temperature

The frame Night temperature is used to setup the operation when the night temperature input is set. The parameter Temperature is the new operating temperature used and the parameter circulation delay is the time from initiating a of night temperature to halt of the circulation pump if this output is being used.

2.3.1.34 Temperature limits

Here is entered the limits for adjusting the temperature. For normal atmospheric pressure water boilers the parameters are set to: Low = 50⁰C and High = 85⁰C

2.3.1.35 Exhaust Ventilator

If an exhaust ventilator is mounted on the chimney the parameter "Timer" is used to set the time for starting the ventilator before any other motor .

It is recommended that this parameter is set to 10 – 60 sec.

2.3.1.36 Automatic Refill

The frame Automatic Refill is used the set the parameters for an automatic refilling stoker.

The parameter "Delay" sets the delay time for the automatic refilling feeder to start feeding after the input e.g. from a sensor located in the tank.

The parameter "Maximum Time" is used to set the time interval for which the automatically refilling feeder runs.

The parameter "Delay before auto refill" sets the number of seconds the refilling feeder is delayed after the input becomes active. This feature allows the use of only one sensor in the tank.

These parameters should be adjusted so that the tank always is filled at the same rate as the main stoker uses the fuel. Hence the volume per time used by the main stoker should be the same as the volume supplied by the refilling stoker.

2.3.1.37 Automatic refill w. valve control

This is basically the Automatic refill with an additional output added (Refill Valve). When the signal (signals) for refill is not present, the valve first opens in the "Valve open delay", then the "Refill2 Filling" output runs until the Refill signal again is present + the Refill2 delay. After waiting the Valve close delay time, the valve closes again. The time "Valve open delay", is also the maximum time the valve is allowed to use to close. If the fuel is running from the external fuel bin by it selves, the output "Refill2 Filling" output has not necessary to be set, just the Valve output has to be used. ("Valve" can also be a sector sluice, here the times is set lower, typically "Valve open delay" = 2 sec. and "Valve close delay" =3-5 sec.)

2.3.1.38 High Oxygen Level Indicator

The frame "High Oxygen Level Indicator" is used to set the value for an external alarm indicating that the specified level of oxygen has be reached usually used to indicate that the fire is dying/dead.

It is recommended to set this parameter at 20%.

2.3.1.39 External Alarm

The frame External alarm sets the text displayed by the system when an external alarm is detected. The text can be up to 8 characters long.

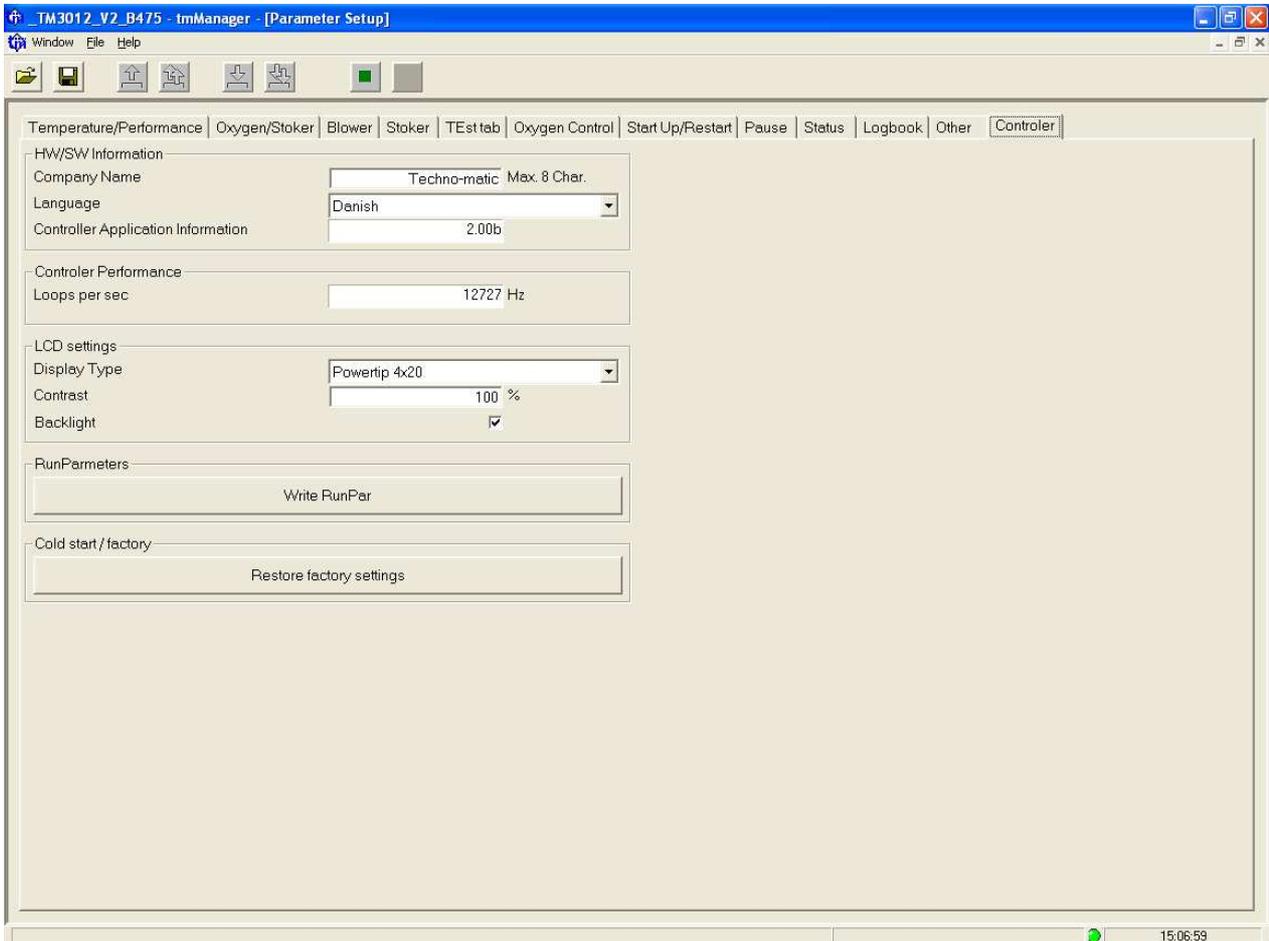
2.3.1.40 External Warning

The frame External warning sets the text displayed by the system when an external warning is detected. The text can be up to 8 characters long.

Clicking the box "Automatically remove" makes the system automatically remove the warning when the corresponding input goes Off. Otherwise, the user has to press Esc to make the warning disappear.

CONTROLLER

The sheet Controller shows additional setups.



2.3.1.41 HW/SW Information

The frame Hardware/Software Information is used to type and display the basic information about the program, the controller and the producer of the finished product.

The parameter “Company Name” can be used to type in the name of the company for the finished product.

The parameter “Language” allows the user to set the desirable language in the display in the controller. Select between Danish, English and German.

The parameter “Controller Application Information” is displaying the version of the software used with the controller.

2.3.1.42 Controller Performance

The frame Controller Performance is used to display the actual performance of the controller.

The parameter “Loops per sec” displays the number of times the entire program is carried out per second.

2.3.1.43 Lcd Settings

If display does not show the right “symbols”, then change the display type.

The contrast can be set between 0 and 100%. If the screen is blank the contrast might have been set too low.

Backlight. The backlight can be turned on or off.

2.3.1.44 Write RunPar.

Saves all parameters in the controllers memory. If the parameters isn't saved and the power is turned off, the controller will return to previous settings.

2.3.1.45 Restore factory Settings

Will delete the actual saved setup and return to the hard coded settings.

2.4 THE REGULATOR SHEETS

PERFORMANCE REGULATORS

The third sheet shown in Fig. 14 displays the settings of the regulator. The regulator in the controller can be adjusted by altering the parameters in this sheet. The sheet is divided into two frames containing the parameters for the performance and the oxygen, respectively.

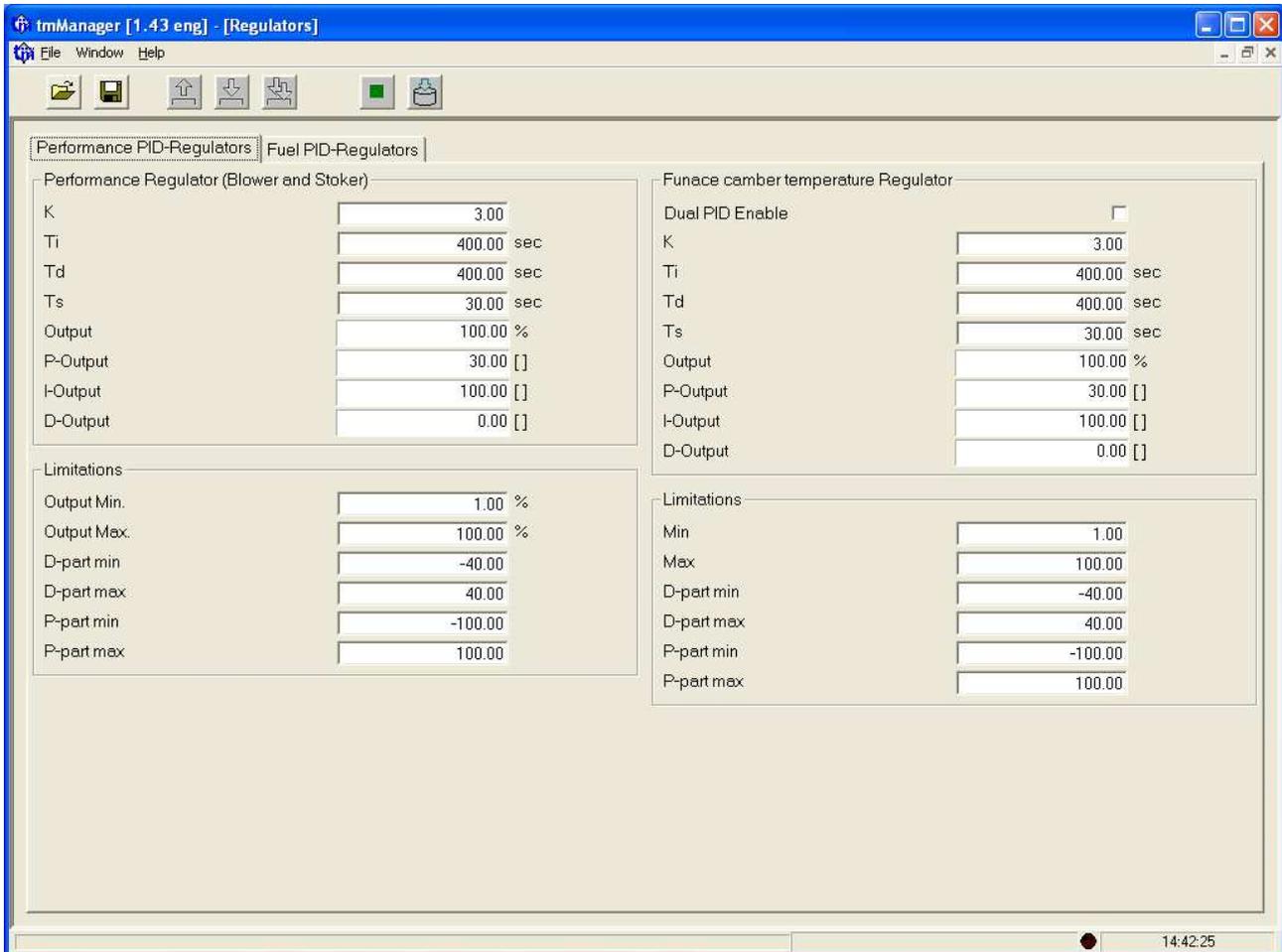


Fig. 14 Sheet "Performance Regulators"

2.4.1.1 Performance Regulator (Blower and Stoker)

The "K" parameter adjusts the aggressiveness of the performance of the stoker on the basis of the set temperature. The greater a "K" parameter the greater a difference between the actual performance of the blower and the stoker and the desired performance. The "K" parameter is multiplied with "Ti" and "Td" and thereby adjusts the aggressiveness of the regulator.

It is recommended to set the "K" parameter at a value of 3 as a start.

The "Ti" parameter adjusts the time of how often the regulator integrates total.

It is recommended to set the "Ti" parameter at a value of 400 sec. as a start.

The "Td" parameter adjusts the time of how often the regulator differentiate total.

It is recommended to set the "Td" parameter at a value of 400 sec. as a start.

The "Ts" parameter adjusts how often the regulator regulates on the actual temperature compared to the set temperature.

A too low parameter results in the temperature not having time to change. It is therefore recommended to set the "Ts" parameter at a value of 30 sec. as a start.

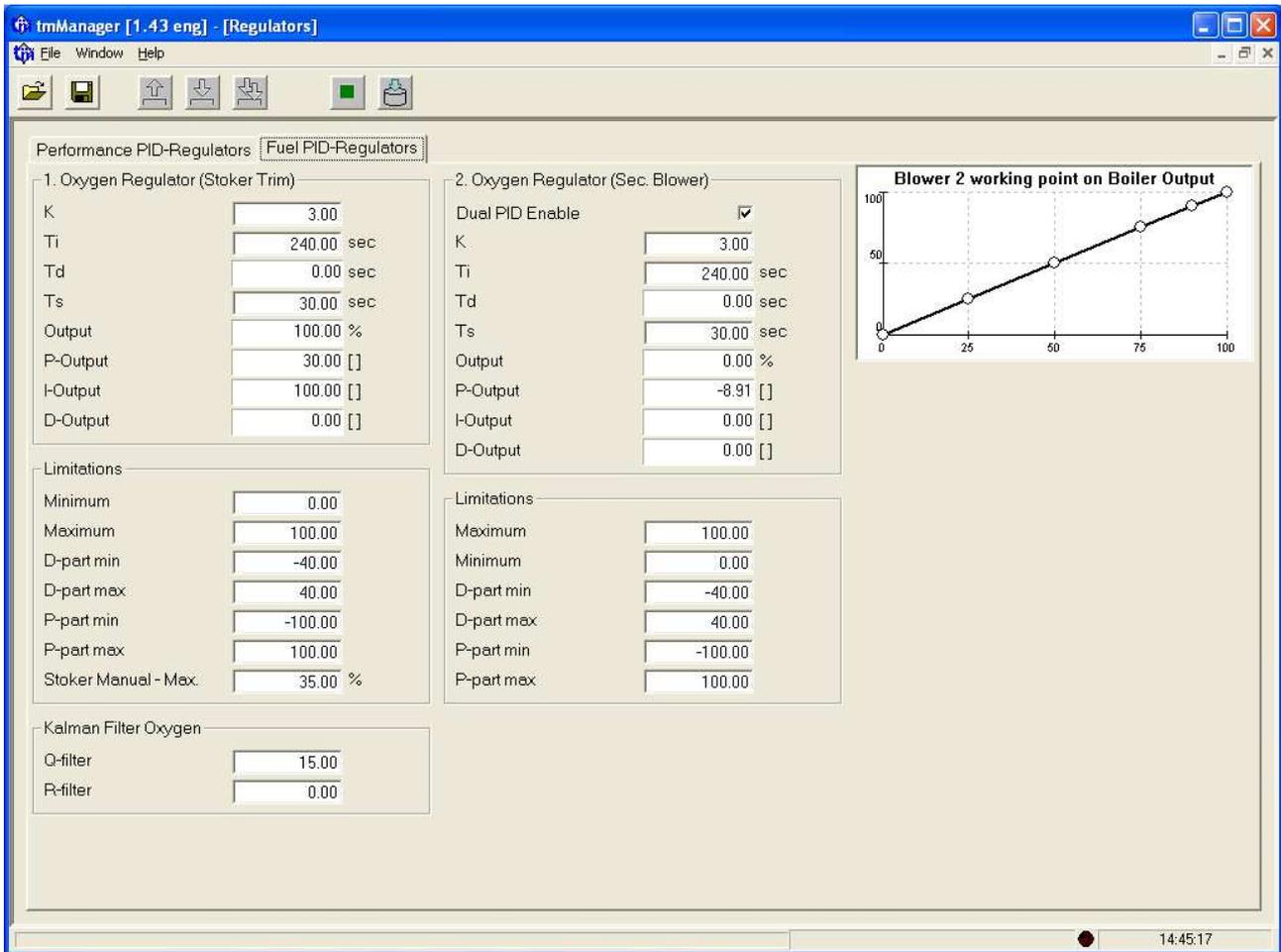
The "Output" displays the actual performance output of the stoker. This value can also be read in the display on the controller.

The “P-Output”, “I-Output” and the “D-Output” displays the corresponding outputs from the PID regulator. These outputs derive the “Output”. For additional information regarding PID regulators see general literature about regulators.

2.4.1.2 Furnace chamber temperature Regulator

When dual PID is enabled the furnace temperature regulator will reduce the output from the Performance regulator, if the furnace temperature rises above the set temperature.

OXYGEN REGULATORS



2.4.1.3 Oxygen Regulator (Stoker Trim)

The “K” parameter adjusts the aggressiveness of the stoker on the basis of the reading from the lambda probe. The greater a “K” parameter the greater a difference between the actual performance of the blower and the desired performance but also the slower a performance of the controller.

It is recommended to set the “K” parameter at a value of 3 as a start.

The “Ti” parameter adjusts the time of how often the regulator integrates total

It is recommended to set the “Ti” parameter at a value of 240 sec. as a start.

The “Ts” parameter adjusts the time of how often the regulator regulates the correction of the set oxygen level compared to the actual oxygen level. The time interval specified in this parameter also adjusts the time interval of how often the stoker is to turn.

A too low parameter results in the temperature does not have time to change. It is therefore recommended to set the “Ts” parameter at a value of 30 sec. as a start.

The “Output” displays the actual output of the blower. The monitored output should not be greater than 70% at 100% performance of the stoker, see section Recommendations for Adjustments.

The “P-Output”, “I-Output” and the “D-Output” displays the corresponding outputs from the PID regulator. These outputs derive the “Output”.

2.4.1.4 Oxygen Regulator (Sec. Blower)

When dual PID is enabled the secondary fan is to be controlled by an analogue output.

“The Blower 2 working point on boiler output” graph controls the set point to the regulator according to the actual output. Is e.g. more secondary air wanted in the lower output end, the graph then has to be set higher in the lower output (The left side)

2.5 THE INPUT SHEETS

The “Inputs” action selects the inputs window shown in Fig. 8a-b.

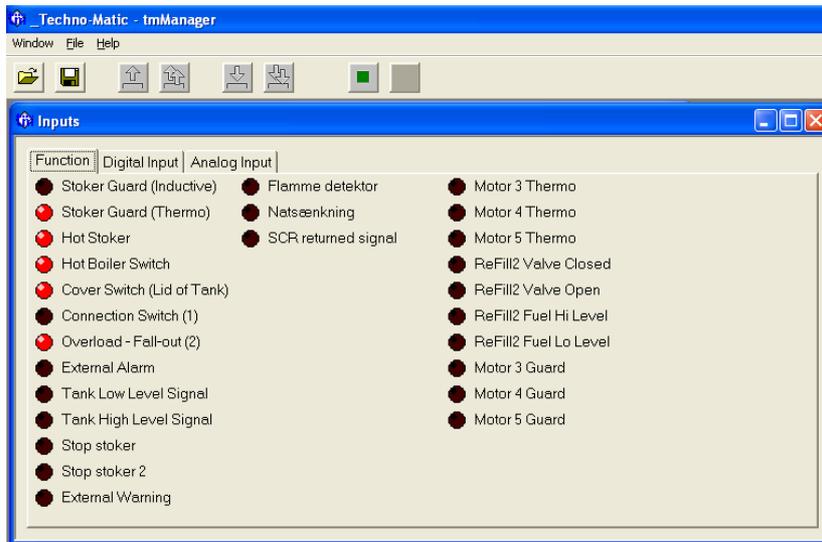


Fig. 8a Showing the “Input” window sheet “Function”

In the window showed in Fig. 8a the function of the different inputs are displayed. If the light bulb next to the description of the input is lit, the controller has an input on the corresponding input terminal set in the sheet “Input” indicating e.g. if the cover switch is giving signal that the cover is open.

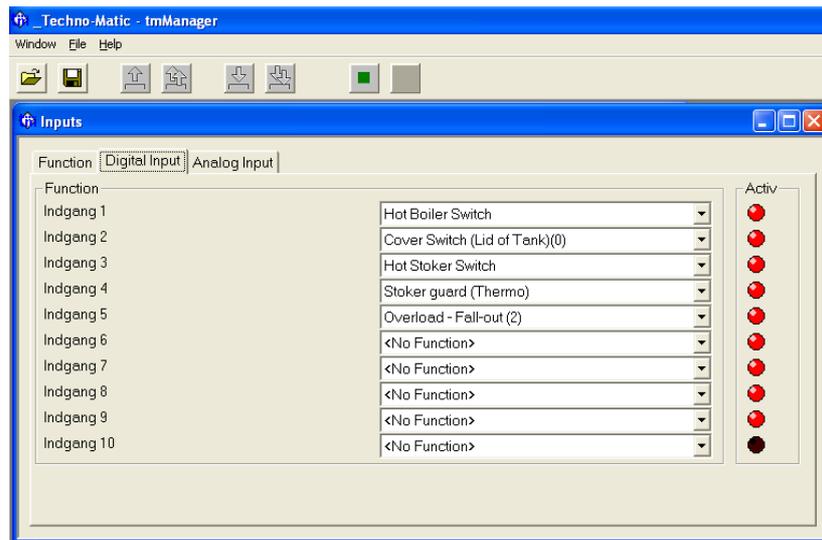


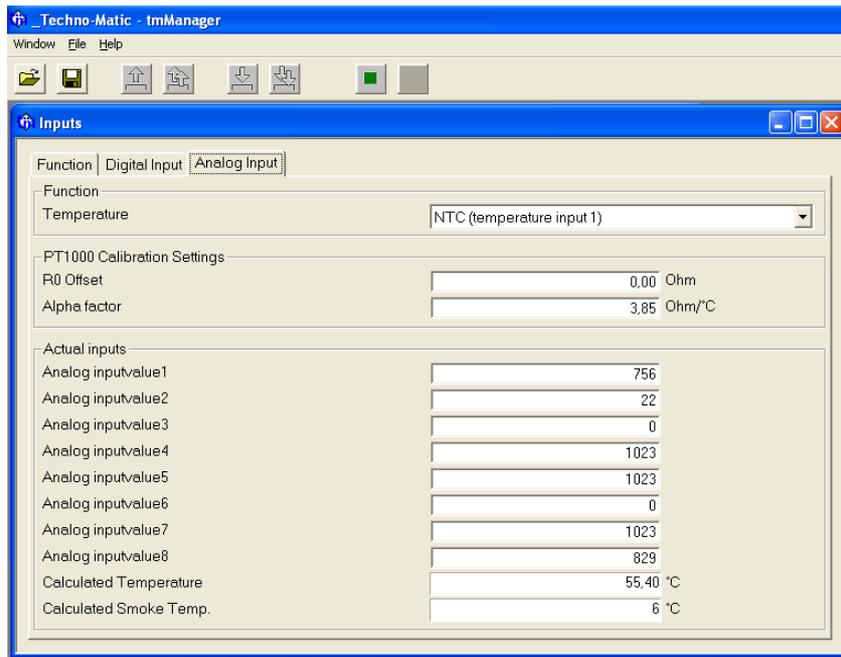
Fig. 8b Showing the “Input” window sheet “Input”

The window showed in Fig. 8b is displaying the connections between the actual inputs and what the user wishes it to correspond with.

To change the function on the actual input, click the curtain button to the right in the description box. A curtain drops down displaying the different possible functions allowed for the chosen input. Note that some functions cannot be changed and the same function cannot be selected twice. If attempting to change an unchangeable function or selecting a function that has already been selected the program will display a warning box describing that the parameter cannot be changed.

Note that input 7 and 8 is detected but since no functions have been selected for these inputs it is only the “Cover Switch”, assigned to input 2 and “Connection Switch” assigned to input 5 in “Input”, that is indicating the inputs in sheet “Function”.

In the frame Activ the actual inputs are displayed. The light bulbs next to the labelled input indicate if an input is detected or not, by being lit.



2.5.1.1 Analog inputs

The analog input 1 or 2 can be chosen as boiler temperature input. Input 1 is for a "NTC" sensor, and the input 2 is for a "PT1000".

When the PT1000 is chosen, it is possible to set an offset to compensate for differences in sensors and length of wires.

The offset is set by measuring the water temperature, and compares it with the displayed temperature. Set the offset higher or lower until the 2 temperature measurements show the same value.

The Alpha factor should never be changed when using a PT1000 from Techno-Matic A/S.

2.6 THE OUTPUT SHEETS

The “Outputs” action selects the output window shown in Fig. 9a-c.

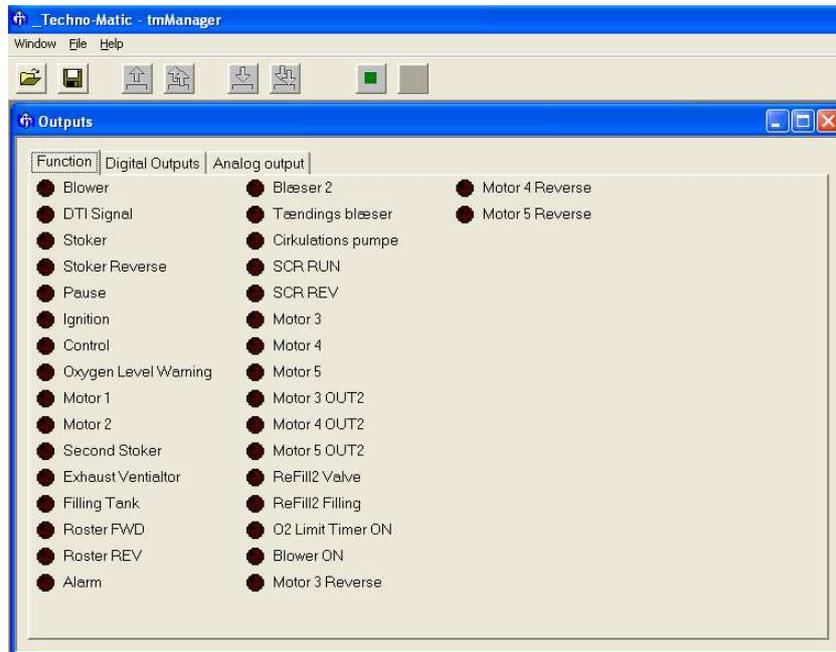


Fig. 9a Showing the “Output” window sheet “Function”

In the window showed in Fig. 9a the function of the different outputs are displayed. If the light bulb next to the description of the output is lit, the controller has an output on the corresponding output terminal set in the sheet “Settings” indicating e.g. if the stoker is given signal.

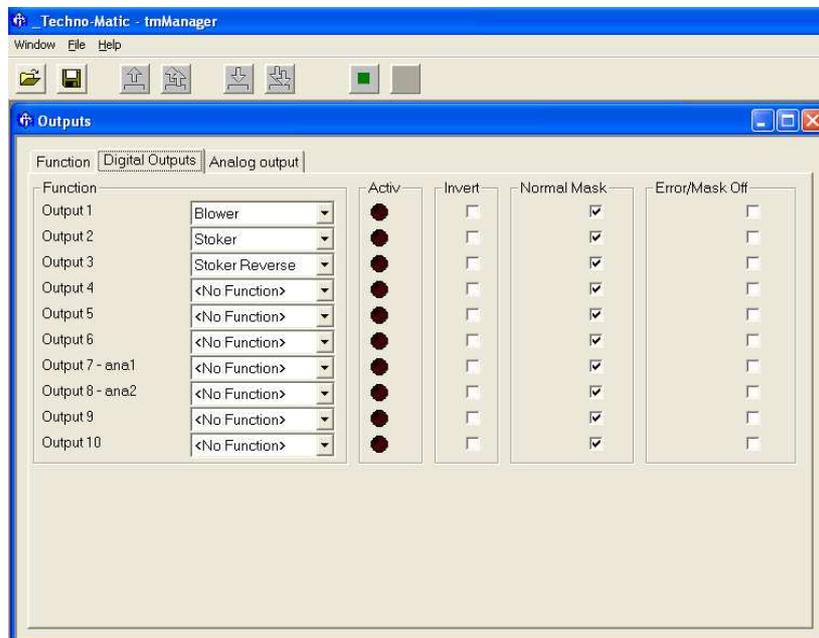


Fig. 9b Showing the “Output” window sheet “Outputs”

The window showed in Fig. 9b is displaying the connections between the actual outputs and what the user wishes it to correspond with.

To change the function on the actual input, click the curtain button to the right in the description box. A curtain drops down displaying the different possible functions allowed for the chosen input. Note that some functions cannot be changed and the same function cannot be selected twice. If attempting to change an unchangeable function or selecting a function that has already been selected the program will display a warning box describing that the parameter cannot be changed.

The frame Activ displays the state of the actual outputs. The light bulbs next to the labelled output indicate if an output is detected or not, by being lit.

The frame Invert displays the invertings. If a box is ticked, the corresponding output is inverted, that is On becomes Off and Off becomes On. The settings does not affect the output readings in frame Activ. They only affect the actual output on the hardware. As a standard all these settings are Off.

The frame "Normal Mask" is used to set the mask of the outputs in normal mode.

The Frame "Error/Mask Off" is used to set the mask of the outputs in off mode.

If a box is ticked in the frame "Normal Mask" and the corresponding box not is ticked in the frame "Alarm/Mask Off" it will result in the output being blocked when the controller is entering off mode.

In the window shown in Fig. 9b it is only output 10 that is allowed active during an alarm.

2.6.1.1 Analog output.

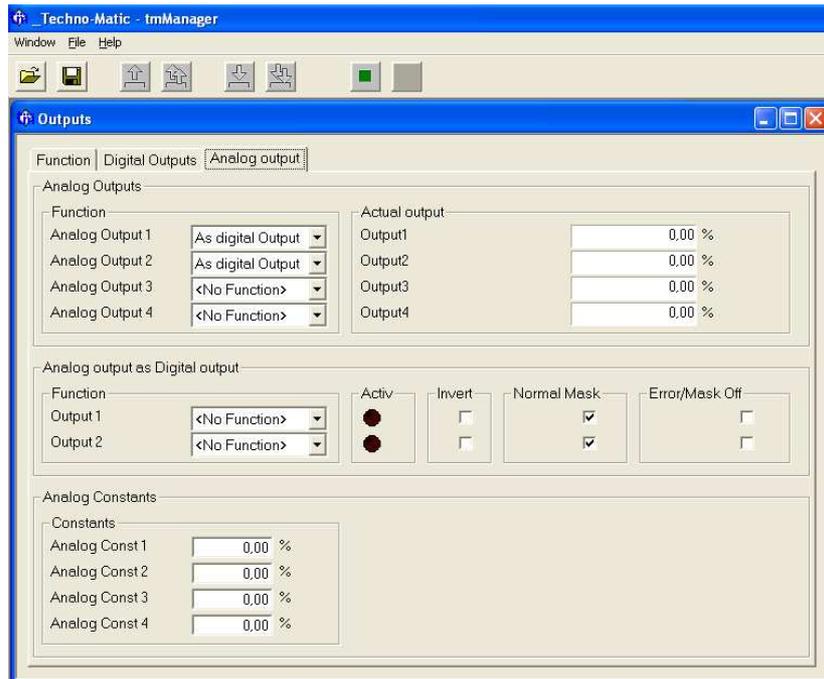


Fig. 9c Showing the “Analog output” window sheet “Outputs”

The window showed in Fig. 9c is displaying the connections between the actual outputs and what the user wishes it to correspond with.

To change the function on the actual input, click the curtain button to the right in the description box. A curtain drops down displaying the different possible functions allowed for the chosen input. The frame Activ displays the state of the actual outputs. The light bulbs next to the labelled output indicate if an output is detected or not, by being lit.

The frame “actual output” displays the actual analog output in % (0% = 0V, 100% = 10V)

The frame Invert displays the invertings. If a box is ticked, the corresponding output is inverted, that is On becomes Off and Off becomes On. The settings does not affect the output readings in frame Activ. They only affect the actual output on the hardware. As a standard all these settings are Off.

The frame “Normal Mask” is used to set the mask of the outputs in normal mode.

The Frame “Error/Mask Off” is used to set the mask of the outputs in off mode.

If a box is ticked in the frame “Normal Mask” and the corresponding box not is ticked in the frame “Alarm/Mask Off” it will result in the output being blocked when the controller is entering off mode.

Notice: Max output for analog output is 50mA.

2.7 THE STATUS SHEETS

STATUS

This sheet, shown in Fig. 22 is used to display errors, warnings and the program status. The sheet is divided into three frames.

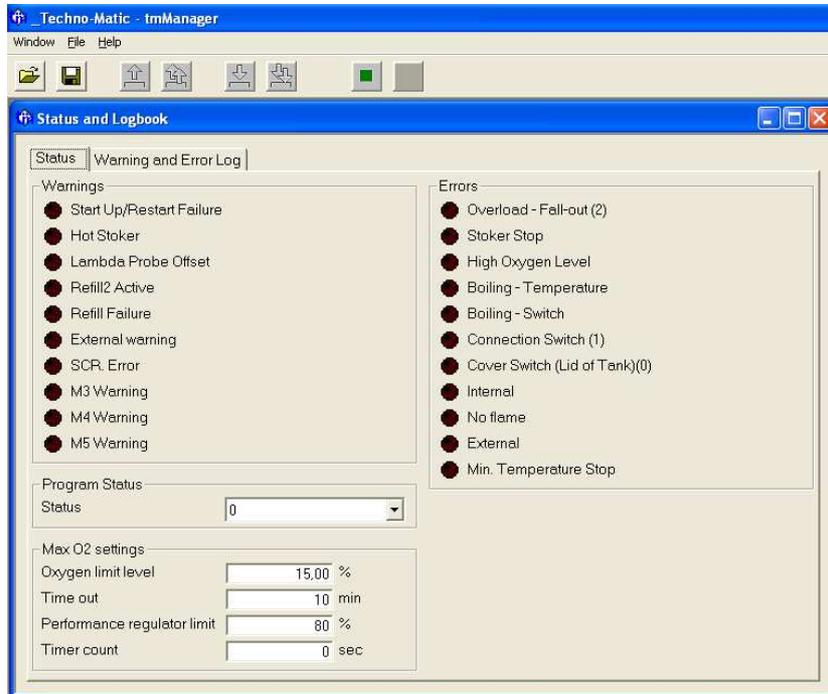


Fig. 22 Sheet "Status"

2.7.1.1 Errors

The frame Errors displays all errors generated by the controller. If an error occurs the light bulb next to the description of the error is lit in red. The controller switches into "Off" mode and is awaiting a correction of the error. After correcting the error the controller has to be reset. Push "Stop" on the controller followed by "Start"

2.7.1.2 Warnings

The frame Warnings displays all the warnings generated by the controller. As well as for the errors the light bulb next to the warning lights up in red when a warning occurs. Unlike the errors the controller does not enter off mode when a warning occurs. Instead it corrects the warning itself to continue in "Automatic" mode. The light bulb next to the warning will only indicate that a warning has occurred until the controller has corrected the warning, or it has been deleted by the customer by pressing the "Left arrow".

2.7.1.3 Program Status

The frame Program Status displays the current mode of the program. The same information can also be read of the display on the controller. In "Off" mode the error causing the controller to stop is displayed instead of "Off". The errors are all labelled "E" followed by the error number. A short text is describing the error.

LOGBOOK

The sheet, shown in Fig. 23 is displaying the logging of errors and warnings. The sheet is divided into three frames containing errors and warnings. Errors and warnings are displayed descending with the latest first.

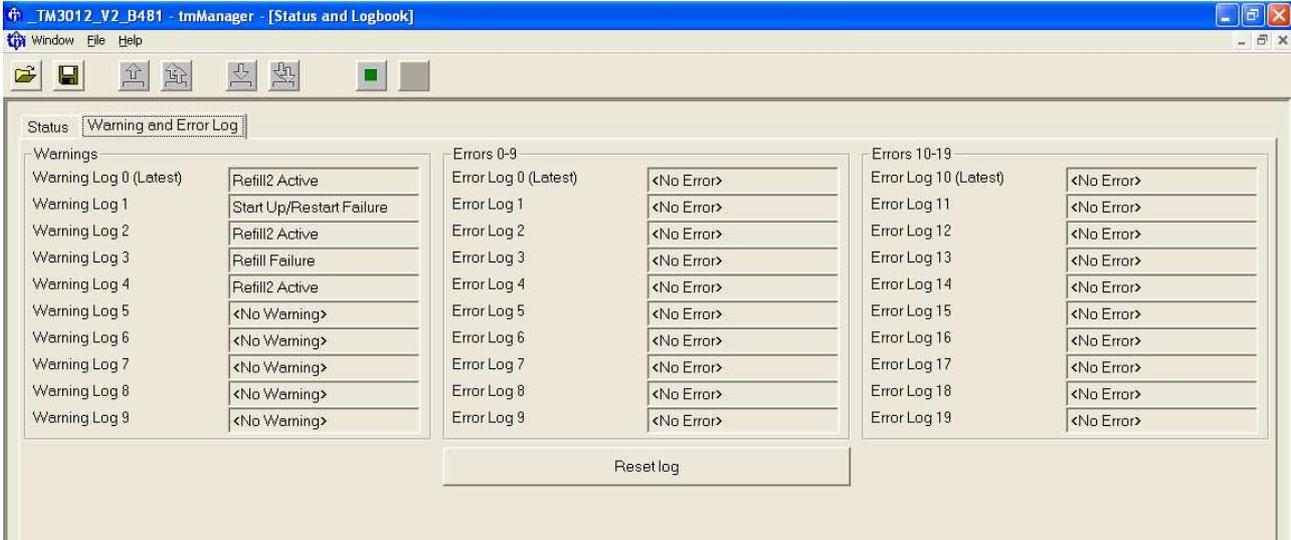


Fig. 23 Sheet "Logbook"

The button Reset log is used to reset the contents of the logbook at when needed.

2.8 RECOMMENDATIONS FOR ADJUSTMENTS

This section of the manual takes the user through a manual adjustment of all relevant parameters - step by step. To gain the best result of this adjustment and the burning process it is recommended that this instruction is precisely followed.

Before starting please load the standard parameters from the delivered "Parameter File". This is done as described in the section Open a Parameter File. In the following section it is only the parameters that are affected by the individual type of stoker, which are changed.

ADJUSTMENT OF THE LAMBDA PROBE

To adjust the lambda probe place the probe in free air but not in a draft that allows the probe to cool down too much. The reading is read off in the parameter "Lambda Probe Reading" and typed into the parameter "Offset" in the sheet "Oxygen Control".

ADJUSTMENT OF THE BLOWER

Most blowers are fitted with a valve like device usually controlling the inlet air. This valve has to be adjusted once and for all.

To adjust this valve it is necessary to ignite the stoker and increase the Outgoing Heat Flow so much that the Modified Output of the stoker reaches 100%. The Modified Output can be read off the display on the controller, in the parameter in "Modified Output" in the sheet "Oxygen Control" and "Modified Output" in the frame "Performance Regulator" in the sheet "Regulators". When the performance has reached 100% the "Output" of the Oxygen Regulator should stabilise on 70%. Then turn the valve on the blower until it is 100% open. Take a quick look at the flame. If the blower causes the fuel to be blown out of the stoker head close the blower valve a bit and wait a few minutes before repeating the procedure from looking at the flame. The result should be that the blower adds maximum air to the burning process without blowing the fuel out of the stoker head.

OXYGEN LEVEL

The oxygen level chosen must be set to fit the kind of fuel used. If e.g. wet fuel is used the oxygen level needed is higher. To adjust the level of oxygen the stoker needs to run for at least 20 min. Turn to the sheet "Oxygen/Stoker" and view the graphs of the "Set Oxygen Level" and "Oxygen Level". If the "Set Oxygen Level" is below the "Oxygen Level" change the chosen oxygen level in the sheet "Oxygen Control" one step up from e.g. "Low" to "Medium". View the graphs for at least 20 min. and repeat the procedure if the graphs do not follow each other, sometimes crossing each other. If "Oxygen Level" is above "Set Oxygen Level" the procedure above must be repeated only with a change in level down. It is recommended that the "Oxygen Level" is below "Set Oxygen Level" if the user is not able to adjust this. The controller will enter off mode if "Oxygen Level" is above "Set Oxygen Level" for more than 20 min. in the entire time interval.

The oxygen level chosen can also be changed from the controller menu.

STOKER FEEDING

The feeding speed of the feeding mechanism must be adjusted as well. This speed is dependent on the size of the feeding mechanism of the stoker, the gear ratio for the feeding mechanism and the rotational speed of the motor powering the feeding mechanism. The feeding speed is adjusted in "Settings of gear" in the sheet "Stoker". We recommend using a low gear for wood pellets and other fuels with a high calorific value in relation to the volume. High gear must be used for e.g. shavings/cuttings and other fuels with a low calorific value in relation to the volume. Medium gear must be used for e.g. chips and other fuels with a medium calorific value in relation to the volume.

In order to adjust the gears, it is necessary to light a fire in the stoker with fuel for the actual gear and wait for the performance to reach 100% (will be shown in the display). If the oxygen percentage is too high now or too low, the %-value of the gear must be changed in small steps. At the same time you must watch the oxygen regulator. You must aim to reach an oxygen regulator output of between 60% and 80%.

When the oxygen-% is close to the actual set point (See the sheet Oxygen/Stoker) and the fuel is being burned without any unburned material being pushed out of the burner, and the amount of heat to be expected is being produced, you can assume that the gear setting is correct.

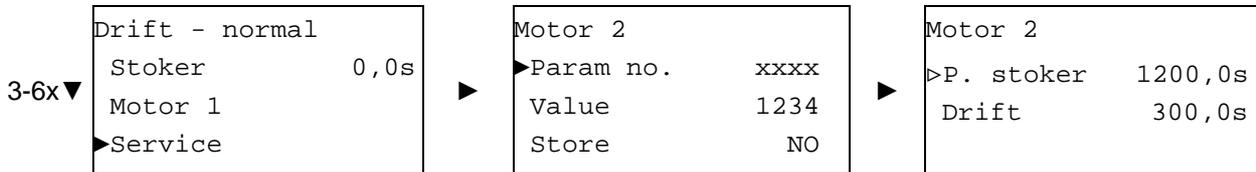
Further fine adjustments can be relevant, if you want your stoker tested at one of the existing test institutions in the EC.

START UP/RESTART

If the controller keeps coming up with the error "Start Up/Restart Failure" try to monitor the controller in these two situations personally and note what causes the controller to generate the error. E.g. if the fuel is of bad quality the oxygen level required to enter "Automatic" mode can be adjusted up. The oxygen level can be read of in the sheet "Oxygen/Stoker". If the graph displaying the actual oxygen level is jiggling up and down too much and just not crossing the required level of oxygen to enter "Automatic" mode, the "Period" in the sheet "Start Up/Restart" can be adjusted a little down e.g. adjusting the "Feeding" up accordingly resulting in the same volume per time feed into the burning head.

2.9 PARAMETER LIST

The access to the service parameters is possible by activating the "Service menu". This menu will be visible if the "Left arrow", "Up arrow" and "F" while the Power to the controller is turned on.



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BLOWER SHEET

- Param nr= 26 : Blower Out Min (The output will never go lower than this entered %)
- Param nr= 132 : Blower Period (The time between each start of "Blower pulse")
- Param nr= 66 : Blower2StartDelay (Delay between blower1 start, to blower2 starts up)
- Param nr= 68 : Blower2StopDelay (From blower1 stop to blower2 also stop can be entered this delay)

STOKER SHEET:

- Param nr= 45 : Stoker Oxygen Limit (below this oxygen% the stoker screw stops)
- Param nr= 320 : Auto Reverse Time (Value in ms.)
- Param nr= 44 : Stoker On Time Minimum (If the time is below this time the stoker stops completely)
- Param nr= 59 : Stoker2 On Time (The stoker2 will be running this time after no. 1 is stopped)
- Param nr= 60 : Stoker2 Delay Time (Stoker2 starts with this delay after stoker1)
- Param nr= 1537 : StokerGain_0 (Gear setting in % for the Low gear)
- Param nr= 1553 : StokerGain_1 (Gear setting in % for the Medium gear)
- Param nr= 1569 : StokerGain_2 (Gear setting in % for the High gear)
- Param nr= 289 : Stoker Gain High limit (Please see chapter 2.3.1.13 for details)
- Param nr= 290 : Stoker Gain Low limit (Please see chapter 2.3.1.13 for details)
- Param nr= 291 : Stoker Gain Ad Time (Please see chapter 2.3.1.13 for details)
- Param nr= 292 : Stoker Gain Ad Value (Please see chapter 2.3.1.13 for details)
- Param nr= 293 : Stoker Gain Max (Please see chapter 2.3.1.13 for details)
- Param nr= 294 : Stoker Gain Min (Please see chapter 2.3.1.13 for details)
- Param nr= 305 : Stoker Manual Factor (Please see chapter 2.3.1.13 for details)

OXYGEN CONTROL SHEET:

- Param nr= 130 : Lambda Offset (The lambda probe's calibration value. In mV. by 21% oxygen)
Param nr= 1792 : Voltage4 (Actual reading in mV.)
Param nr= 1793 : Voltage4 Offset (Calibration value for the hardware)
Param nr= 29 : Blower Oxygen Gain (A factor different from zero will change the blower(s) performance)
Param nr= 30 : Modified Output ()

STARTUP/RESTART SHEET

Startup (These settings is only active when the "START" is pressed)

- Param nr= 789 : Oxygen Start Limit (Below this oxygen% the state changes from StartUp to Run mode)
Param nr= 800 : Start Feed Percentage (The start pulse for the stoker screw in each "start try")
Param nr= 785 : Start Time (Time for each "start try")
Param nr= 787 : Blower Power Start (Blower performance in the first "Start try")
Param nr= 790 : Blower Power Incensement (The blower's performance will be increased by each retry)
Param nr= 788 : Start Retries (How many retries is allowed)

Restart (These settings is active when the controller leaves the pause state)

- Param nr= 533 : Oxygen Start Limit (Below this oxygen% the state changes from Restart to Run mode)
Param nr= 544 : Start Feed Percentage (The start pulse for the stoker screw in each "start try")
Param nr= 529 : Start Time (Time for each "start try")
Param nr= 531 : Blower Power Start (Blower performance in the first "Start try")
Param nr= 532 : Start Retries (How many retries is allowed)

Automatic ignition

- Param nr= 530 : Start Time Ignition (If an output is set to Ignition here must be entered an amount of sec.)

Ignition blower

- Param nr= 75 : Ignition Blower Stop Delay (If a output is set as Ignition blower, it can cool down the ignition in this delay.)

Auutomatic restart after power on

- Param nr= 534 : Auto Start Time (The delay between the power is back and till the controller starts up)
Param nr= 535 : Auto Start Max Retry (No. of "Start retries allowed, before the controller stops)

PAUSE

- Param nr= 283 : Pause Feed Percentage (The amount of fuel provided in each pause feeding)
Param nr= 275 : Pause Wait period (Time between each pause feeding)
Param nr= 276 : Pause Blower On time (The number seconds the blower shall run by each pause feeding)
Param nr= 277 : Pause Blower performance (Blower performance in pause mode)

Start and stop

Param nr= 27 : Restart Output (When the output is = or > this percent, the controller will change from pause to restart)

Param nr= 21 : Immediate Pause (If the output goes as low as this in 2 "counts" the controller will go directly into Pause. 1 "count" = The performance regulator's Sampling time, usually 30 sec.)

Param nr= 282 : Min. Output before pause (If the output comes below this percent in the time, parameter 281 says, the controller will change state from "Running" to "Pause")

Param nr= 281 : Count for Pause

Hot stoker

Param nr= 278 : Feeding "Hot stoker" (100% = normal pause feeding)

Param nr= 280 : Pause time between "Hot stoker" feeding

OTHER

Param nr= 135 : Alarm Temperature (Software "Boiler overheat")

Minimum temperature. (If smoke temp. is enabled, the "min temp" is act water temp + Param. 96 value)

Param nr= 96 : Minimum Temperature

Param nr= 97 : Time Under Min Temp.

Night –set back

Param nr= 80 : Night temperature set point (When a lower (higher) temperature is wanted in a certain part of the day/night, this temperature can be set here. An input must be set as "Night set back" in order to enable the function. When the D-in has signal the "Night temperature is enabled.")

Param nr= 81 : Circulation pump delay (An addition to the input an output can be named "Circulating pump". When the controller changes its state to Pause, the pump will stop when this delay is passed.)

Scraper

Param nr= 1392 : Pause time (The controller will accumulate the stokers pulse times, and when it reaches this time the scraper will run forward in the Pulse time)

Param nr= 1393 : Pulse time (This is the shortest time the scraper will move forward. It can either move this time by every move, or the settings can say: first move = Pulse time*1, 2nd = Pulse time*2, and finally 3rd = Pulse time*3)

Param nr= 1394 : Hold time between forward and reverse

Param nr= 1395 : Error time (If the "scraper returned" switch is not activated within this time + the move time, from the reverse signal begins, the controller will stop the scraper and give a warning in the display)

Refill

Param nr= 1664 : Fill Delay (Delay from the "Tank high level" comes on and the controller stops the refill)

Param nr= 1665 : Fill Time Max (Maximum refill time. If the "Tank high level" signal is not returned before this time from the refilling is started, the controller will stop the refill output and show a warning in the display)

Param nr= 1666 : Delay before refill (The time from the "Tank low level" (or "Tank high level" if only one input is used) to the refill output is activated.)

High oxygen indicator.

Param nr= 49 : Oxygen level (Blower1 stops below this level if blower2 is set as output)

Exhaust ventilator

Param nr= 48 : Chimney Fan Time (The Chimney fan will always start in this time before anything else, and also stop after all other motors are stopped.)

REGULATORS

Performance regulator

Param nr= 16 : PID K

Param nr= 17 : PID Ti

Param nr= 18 : PID Td

Param nr= 19 : PID Ts

Param nr= 23 : P Part Output (P-Part Output only for reading)

Param nr= 24 : I Part Output (I-Part Output only for reading)

Param nr= 25 : D Part Output (D-Part Output only for reading)

Param nr= 20 : Regulator Max output

Param nr= 21 : Regulator Min output

Param nr= 560 : D part Min

Param nr= 561 : D part Max

Param nr= 562 : P part Min

Param nr= 563 : P part Max

Oxygen regulator

Param nr= 32 : PID K

Param nr= 33 : PID Ti

Param nr= 34 : PID Td

Param nr= 35 : PID Ts

Param nr= 39 : P Part Output (P-Part Output only for reading)

Param nr= 40 : I Part Output (I-Part Output only for reading)

Param nr= 41 : D Part Output (D-Part Output only for reading)

Param nr= 36 : Regulator Max output

Param nr= 37 : Regulator Min output

Param nr= 576 : D part Min

Param nr= 577 : D part Max

Param nr= 578 : P part Min

Param nr= 579 : P part Max