Software Help
TGA Thermostep

Original
English Language

ELTRA
ELEMENTAL ANALYSERS

1   Minimum system requirements

Operation system	Windows XP SP3/Windows 7
Free HDD space	15 Mb[*)]
CPU	Intel Celeron 1 GHz or better
RAM	256 Mb or more

[*)] Additional disk space is required to store analysis data.

Additional software requirements

Before or after installing the software following components have to be installed as well:

* Net Framework (Client Profile) 4.0
* Adobe Acrobat Reader

Please refer to Help\readme.txt file for additional up-to-date information regarding requirements, changes log, known issues and possible workarounds.

2   User interface

User interface consists of windows with controls. In next chapters every window function will be explained.

There are numbers of controls which are used in almost every window:
* Buttons. Press to perform certain action. Buttons are referenced in the text by name (text): Press Ok button. Mouse-over button will display a short help.
* Text. Text can be static or dynamic (when displaying values). Mouse-over will display an additional info. Blinking red text is a sign of an error.
* Check-boxes. Their value can be toggled (checked or unchecked). Mouse-over will display a short help.
* Edit controls. They are used to enter a value. Sometimes contains a drop-down list to display a list of values to choose one from. Or they may only allow choosing (without possibility to type it). Red colored text indicates an error (to example, when entering a number).

🔴 - blinking error sign indicates a wrong action. Mouse over it will display a hint message about what is wrong.

There are 3 types of windows:
* Main window. Cannot be moved or resized. Its position is configurable with special setting in Configuration.
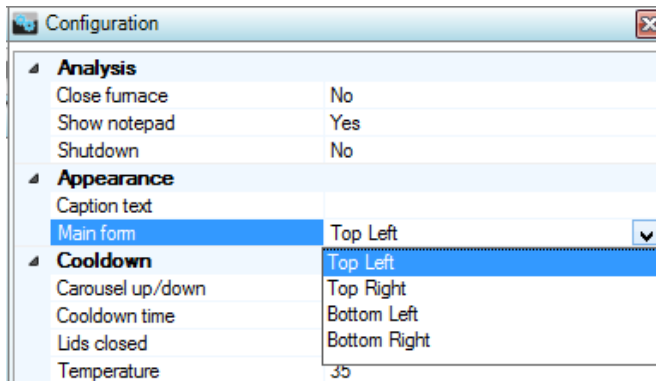
- • Popup window. Will appears on top of other windows. Some of them can be resized.
- • Child window. Layout will store location and size of such windows.

Popup and child windows caption can be double-clicked to maximize window and to restore its size back.

2.1   Login window

This window is the first window that appears when starting software. Its purpose is to determine User rights. It is also used to preconfigure software and to manage accounts.
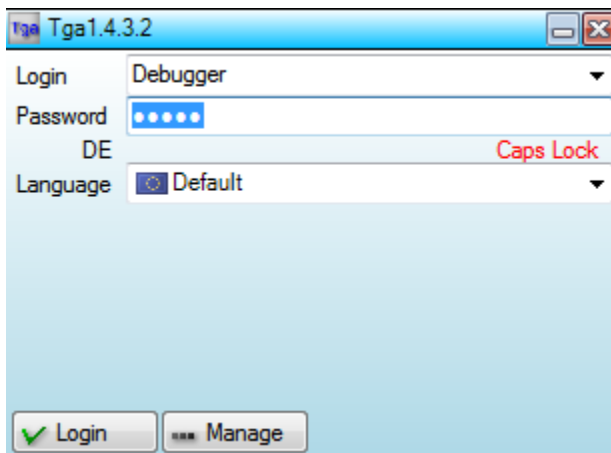
Fig. 1: Login window

Login	Account name
Password	Account password
EN	Current keyboard layout indicator
Caps Lock	Caps Lock status (displayed when ON)
Language	Choose interface language
Login	Continue to working
Manage	Manage accounts and Com ports

Pressing on either of the buttons will check login data first: name and/or password.

Manage

Manage accounts and com-ports.
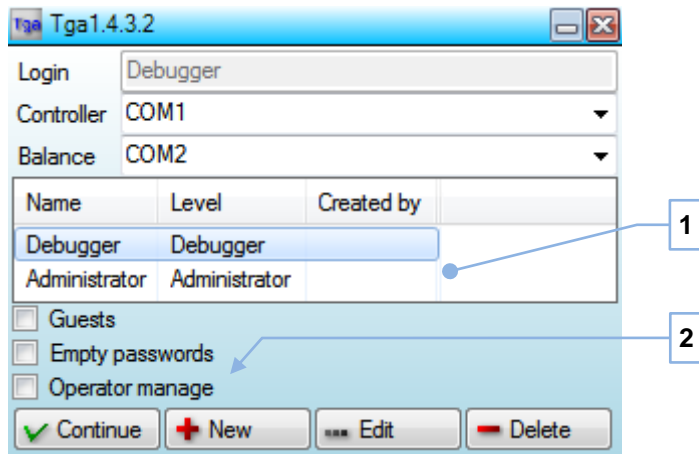
Fig. 2: Manage

Login	Currently logged user name
Controller	Enter or select controller com-port
Balance	Enter or select balance com-port
List (1)	List of accounts
Options (2)	Accounts options
Continue	Continue working
New	Create new account
Edit	Edit selected account (change password)
Delete	Delete selected account

List of accounts contains following information about account: name, level, name of user who created account and date when account was modified last (to example, password changed).
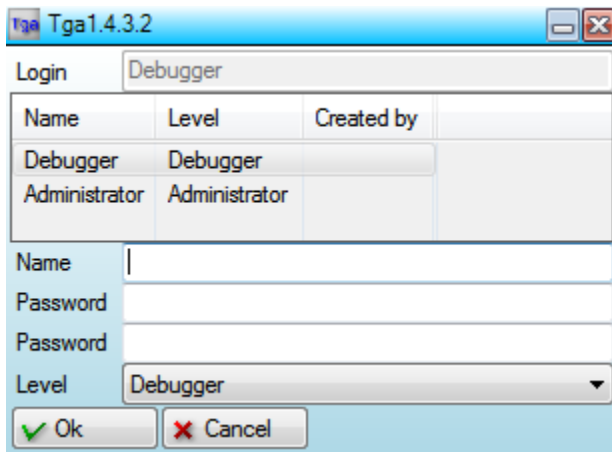
Fig. 3: New account

Name	Unique account name
Password	Password twice
Level	Account level
Ok	Confirm account creation
Cancel	Cancel

How to assign com-ports:
see chapter "**Com-ports**"

2.2 Main window

This window is always on screen. Its main purpose is to open and close child windows.
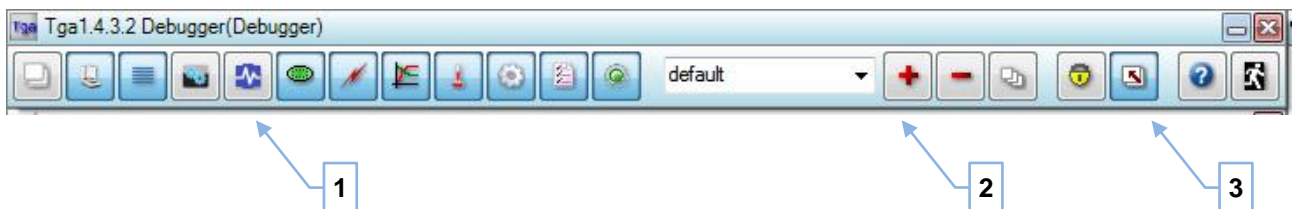
Fig. 4: Main window

1	Child windows
2	Layout
3	Command buttons

Main window is fixed and located in one of the Windows *Desktop* corners. *Main form* Configuration setting allows choosing in which corner and *Caption text* setting let specify additional identification text, appearing in the caption, when needed.

Child windows

Set of toggle buttons to open/close child windows. See following chapters for more info about each window.

Application window   Balance window

Browser window   Configuration window

Crucibles window   Flow window

Graph window   Heater window

Motor window   Results window

Status window

Layout

See Layout for more info.
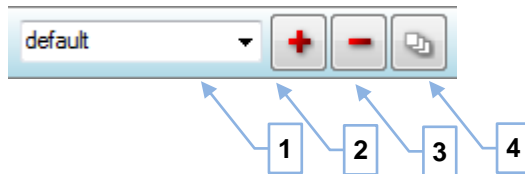
Fig. 5: Layout

1	Layout name. Select from the list to load or type a new name before saving
2	Save current layout under entered name
3	Delete selected layout
4	Arrange (reset) windows

Arranging windows will hide all windows and reset their position. Could be useful before creating a new layout or if some of windows appears outside of desktop working area bounds (to example, after changing display resolution).

Command buttons

Additional commands.
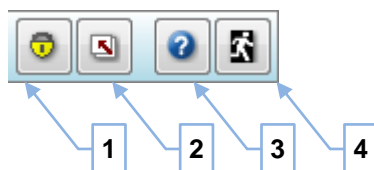
Fig. 6: Command buttons

1	Lock/unlock windows
2	Make all windows on top
3	Display help
4	Exit software

2.2.1 Application window

This window is used to browse, inspect, create and edit Applications.
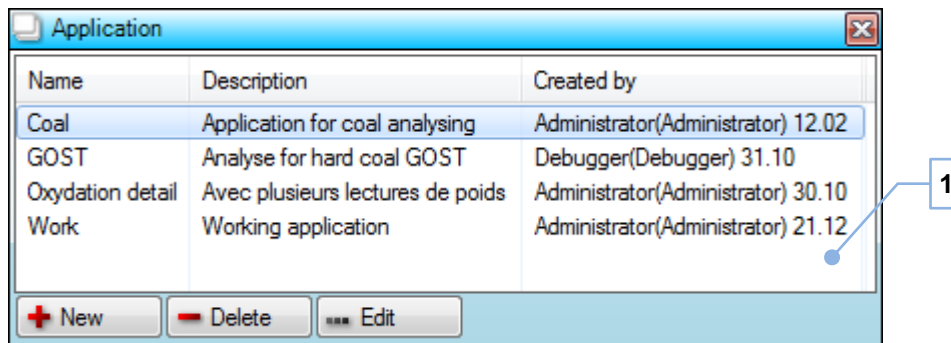
Fig. 7: Application window

List (1)	Application list
New	Create a new application
Delete	Delete selected applications
Edit	Edit selected application

Application list contains following information about application: name, description, name and level of account and date of last modification.

It is possible to select several applications in the list. This is useful when deleting multiple applications at once.

Operator rights are required to make changes (create, edit and delete) to applications. Lower level user can only inspect existing applications. *Inspecting* is editing without possibility to save changes.

General

General settings tab is displayed after clicking New or Edit button.
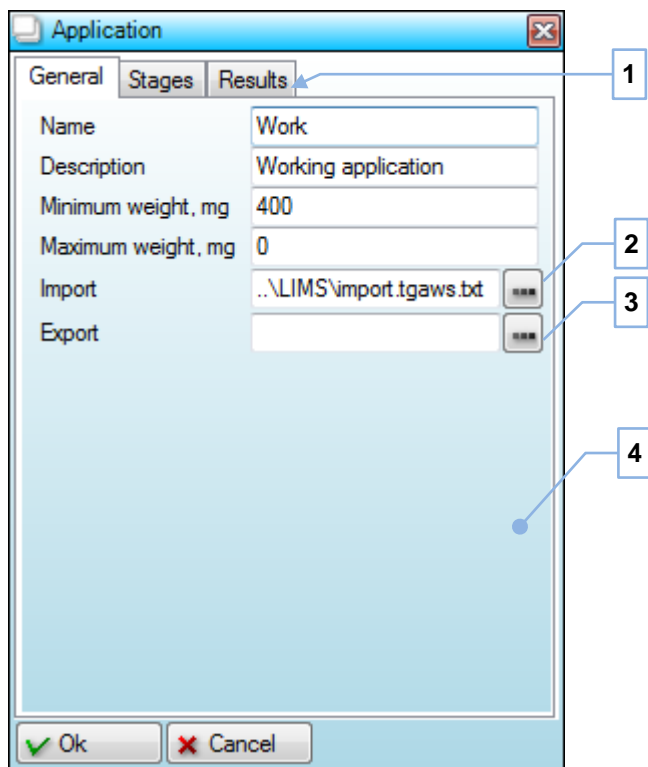
Fig. 8: General settings

Tabs (1)	Selection tabs: general settings, stages and results
Button (2)	Import browse dialog
Button (3)	Export browse dialog
Tab (4)	General settings
Ok	Confirm Application creation/edit
Cancel	Cancel

Stages

Define stages and corresponding settings.
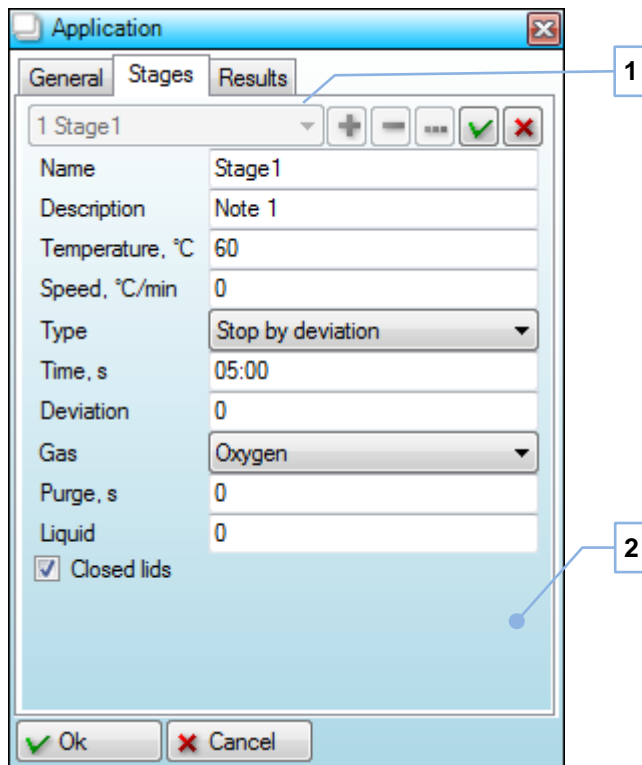
Fig. 9: Stage settings

1	Stage selector
2	Stage settings

Stage selector is used to select, add, edit and delete Application stage.

Fig. 10: Selector

1	Drop-down list used to select existing item
2	Create new item
3	Delete selected item
4	Edit selected item
5	Confirm item creation/edit
6	Discard changes

New item will be added to the end of list.

Results

Define results and Formulas
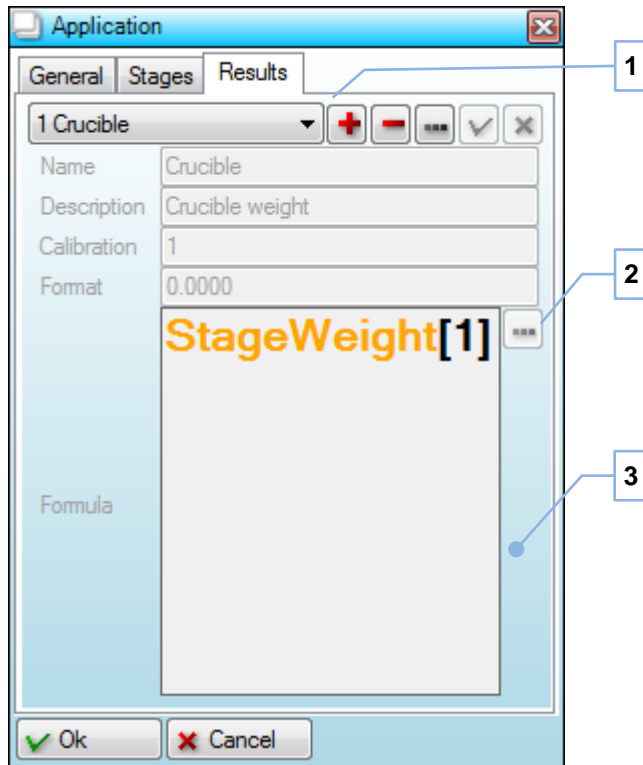
Fig. 11: Result settings

1	Result selector
2	Formula helper
3	Result settings

Result selector has same functionality as stage selector.

Formula helper is a popup menu with predefined variables. It can be used for a quick overview of existing variables or to insert variable into cursor position in the *Formula* field.

2.2.2 Balance window

This window allows seeing internal [Balance](#) display and performing balance calibration.
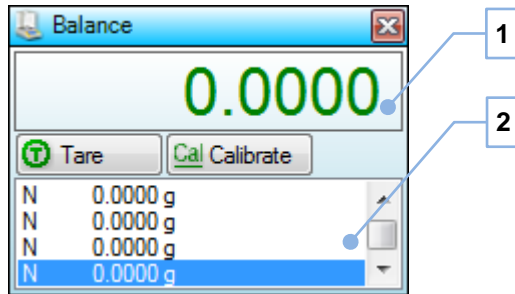
Fig. 12: Balance window

Display (1)	Balance display
Log (2)[*]	Log of balance readings
Tare[*]	Tare balance
Calibrate[*]	Calibrate balance

[*] [Administrator](#) only.

Balance display will show weight or balance status.

Right clicking inside log will display a popup menu.
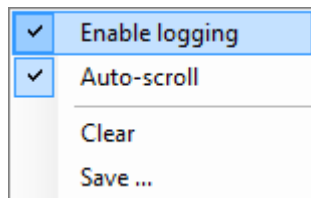
Fig. 13: Log popup menu

Enable logging	Enable logging when checked
Auto-scroll	Automatically scroll down log window when checked
Clear	Clear log
Save	Save log into a log-file

2.2.3 Browser window

This window allows browsing Results obtained earlier.
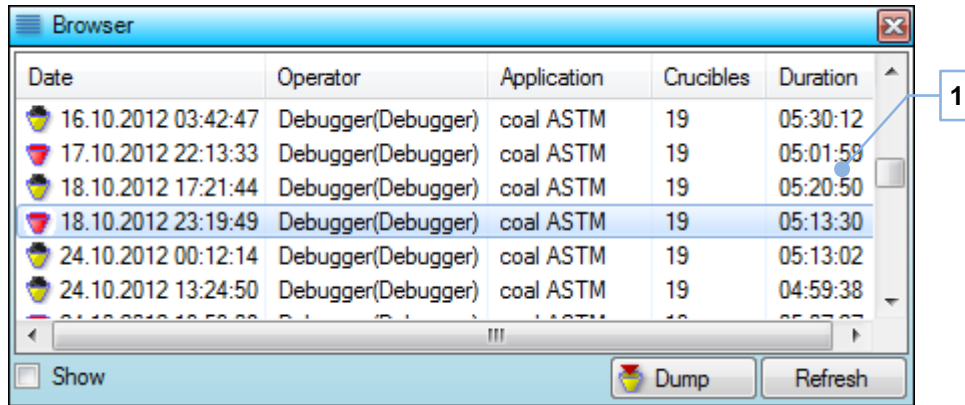
Fig. 14: Browser window

List (1)	List of results
Show	Show selected result
Dump	Dump actual Crucibles data
Refresh	Reload results data

Following info is displayed in the list: status, date of analysis, operator name, operator level, application, total number of crucibles and duration of analysis.

When option *Show* is marked, then selected result will be displayed in Results window and Crucibles window. It is possible to see graphs of this result's crucibles, perform export, assign another application, etc.

2.2.4   Configuration window

This window displays and allows changing Configuration settings.
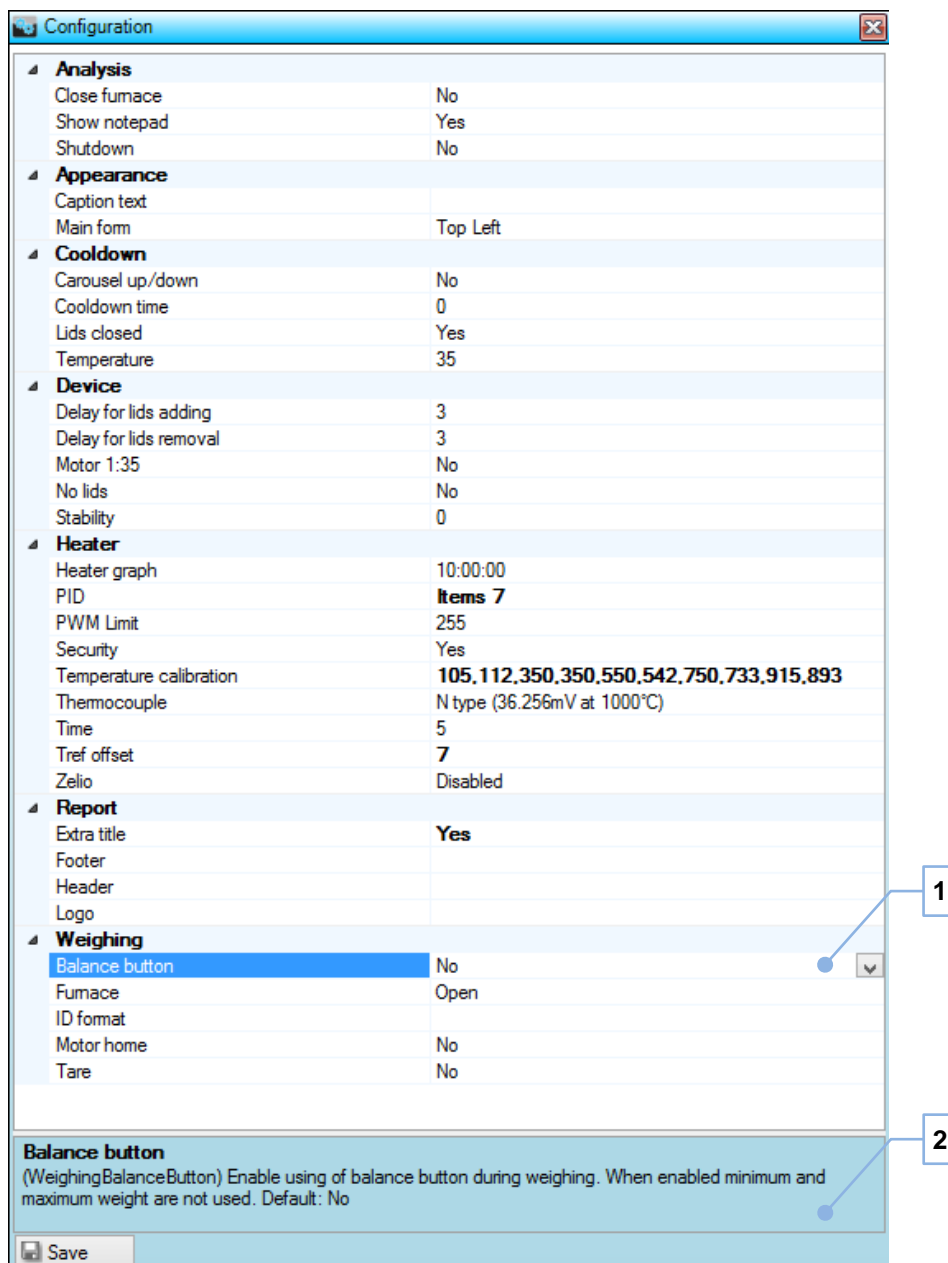
Fig. 15: Configuration window

Settings (1)	List of settings and their values
Description (2)	Description pane
Save	Save changes

Certain settings are not shown to the user without Administrator rights.

Description pane will display helpful info for the selected setting.

Save button will save configuration changes immediately. Normally this automatically happens upon exiting the software. However, in case of unexpected exit from the software (crash, unexpected PC shutdown, etc.), saving will not occur. Thus it makes sense to manually save changes done to the configuration before a long-term operation (such as analysis itself), whenever exit from the software is not planned to be shortly after.

Right-clicking on a setting (or within setting window) will display a popup menu.
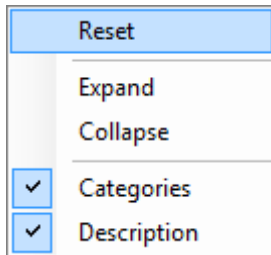
Fig. 16: Settings popup menu.

Reset	Reset currently selected setting into default value
Expand[*]	Expand all categories
Collapse[*]	Collapse all categories
Categories	Show categories when checked, hide otherwise
Description	Show description pane when checked, hide otherwise

[*] Only shown when categories are shown

Hiding categories can be handy option when searching for a setting by its name. In such cases all settings are alphabetically sorted, which may make finding easier.

2.2.5   Controller window

This window is used to manually control instrument and observe Communications.
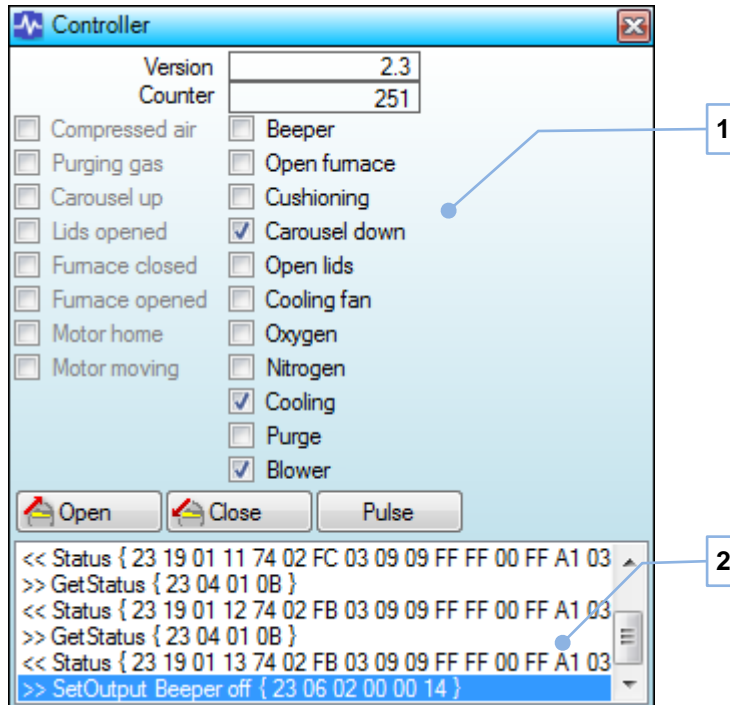
Fig. 17: Controller window

Version	Protocol version
Counter	Incremental counter
Signals (1)[*]	Digital inputs and outputs
Open[*]	Open furnace
Close[*]	Close furnace
Pulse[*]	Send cushioning pulse
Log (2)[*]	Communications log

[*] Administrator only.

Digital outputs can be directly set by clicking. Clicking set output will unset it.

Opening and closing furnace is a timed operation. Therefore automatic software operation must be paused in Flow window.

A confirmation is shown when trying to open the hot furnace.

Right-clicking inside the log will display popup menu.
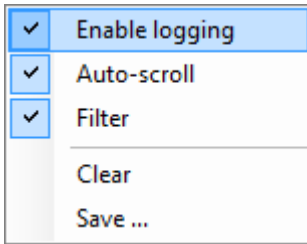
Fig. 18: Log popup menu

Enable logging	Enable logging when checked
Auto-scroll	Automatically scroll down log window when checked
Filter	Enable filtering when checked
Clear	Clear log
Save	Save log into a log-file

Filter will remove status commands from the log, which occurs every half seconds. In this case it is easier to see other commands.

2.2.6 Crucibles window

This window will display information about Crucibles inside the furnace. But main purpose of this window is to introduce crucibles during weighing Phase.
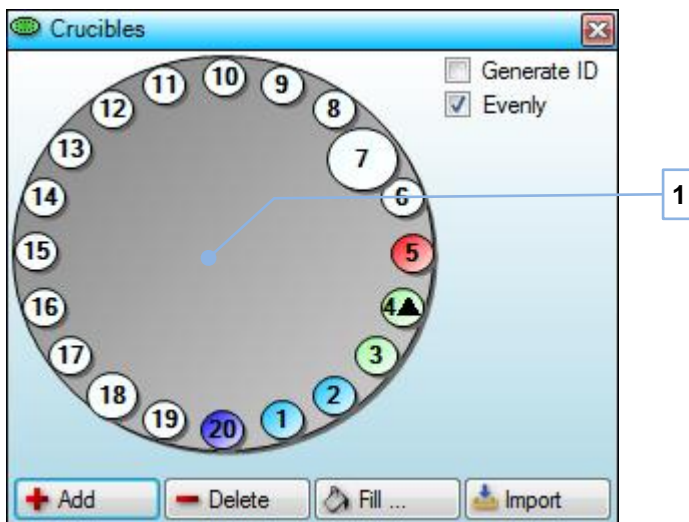
Fig. 19: Crucibles window

Generate ID	Automatically generate ID for new crucibles when checked
Evenly	Spread new crucibles evenly within free space when checked
Carousel (1)	Carousel with crucibles
Add	Add empty crucible
Delete	Delete empty crucible
Fill	Add specified number of empty crucibles
Import	Import crucibles

Click on any crucible to select it. Click inside carousel area to unselect.

Buttons Add and Delete will perform differently, depending on the selection. If there is a selected crucible, then adding or deleting will attempt to use it. Without selection, adding will try to add a new empty crucible into the next available position which is free and deleting will delete last added empty crucible.

To delete non-empty crucible select its position first.

Rectangle at the bottom of carousel is a balance position. It will disappears if carousel is not aligned (current position is unknown).

Carousel will rotate clockwise.

Crucibles statuses:

Big	Selected crucible
White	No crucible
Light blue	Empty crucible (with known or unknown weight)
Light green	Crucible with sample
Dark blue	Reference crucible with unknown weight
Dark green	Reference crucible with known weight
Red	Junked crucible
▲	Stable crucible

Crucible is marked as stable during stage with stability end condition.

Fig. 20: Ignore unstable crucible

Ignore button will appears during stage with stability end condition. It is used to ignore unstable crucibles and continue analysis. It is relatively save feature to use, so there is no warning or confirmation. Ignored crucibles weights are continue being taken until the end of the stage and

the last one is taken as stage result. Still it has to be used with the precaution, as ignoring all crucibles at once will prematurely end the stage, producing wrong results.

2.2.7   Flow window

This window will display program flow during different Stages.
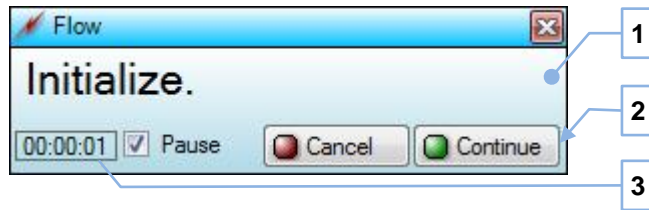
Fig. 21: Flow window

Info (1)	Information text
Buttons (2)	Buttons
Pause[*)]	Pause automatic program flow when checked
Time (3)	Flow step time

[*)] Administrator only.

Blinking red information text means error.

Buttons will appears whenever a user input is required or allowed, at certain moments during automatic program flow.

It's important to pause the flow before attempting manual control of the instrument, otherwise manual and automatic control may conflict with each other. To example: opening furnace manually in Controller window, while flow is at step trying to close it.

2.2.8 Graph window

This window shows various graphics for selected in <u>Results window</u> <u>Crucibles</u>.
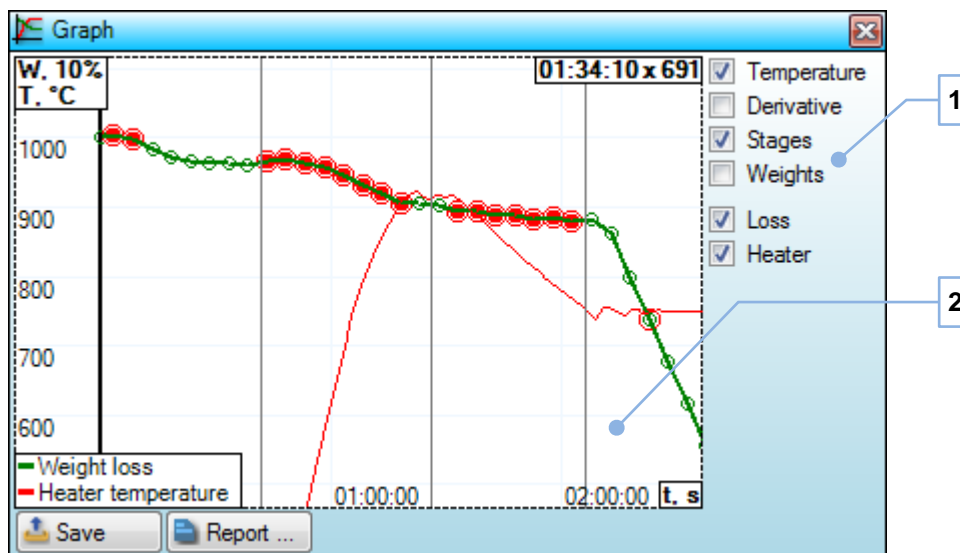
Fig. 22: Graph window

Options (1)	Options to adjust graph
Graph (2)	<u>Graph</u> area
Save	Save graph as a log-file
Report	Generate report

Options:

Temperature	Show temperature graph when checked
Derivative	Show first derivative graph when checked
Stages	Show stage lines when checked
Weights	Show weight lines when checked
Loss	Display weight loss graph when checked
Heater	Display heater temperature when checked

Graph area content

- Weight graph. Sample weights graph. With *Loss* option checked, a graph of sample weights related to initial sample weight will be displayed. Mouse-over any point of the graph for detailed info about this point.
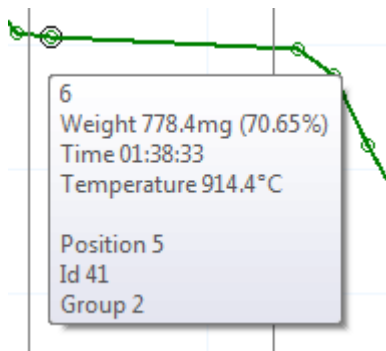
Fig. 23: Point info

- Temperature graph. Graph is shown if option *Temperature* is checked. Option *Heater* will toggle between displaying smooth graph of furnace temperature (checked) and temperature points gathered together with crucible (unchecked).
- First derivative graph. Graph is shown if option *Derivative* is checked.
- Stage lines. Lines are displayed if option *Stages* is checked. Vertical black lines show the time, when a specific stage finished. Mouse-over the point of crossing with zero for detailed info about this stage.
- Weight lines. Lines are displayed if option *Weights* is checked. Horizontal lines show the sample weight at the end of each stage. Mouse-over the point of crossing with zero for detailed info about this weigh.

Points

	Stable weight
	Stable weight, balance purging is ON
	Unstable weight
	Unstable weight, balance purging is ON
	Stage/weight info

2.2.9 Heater window

This window displays information about the Heater.
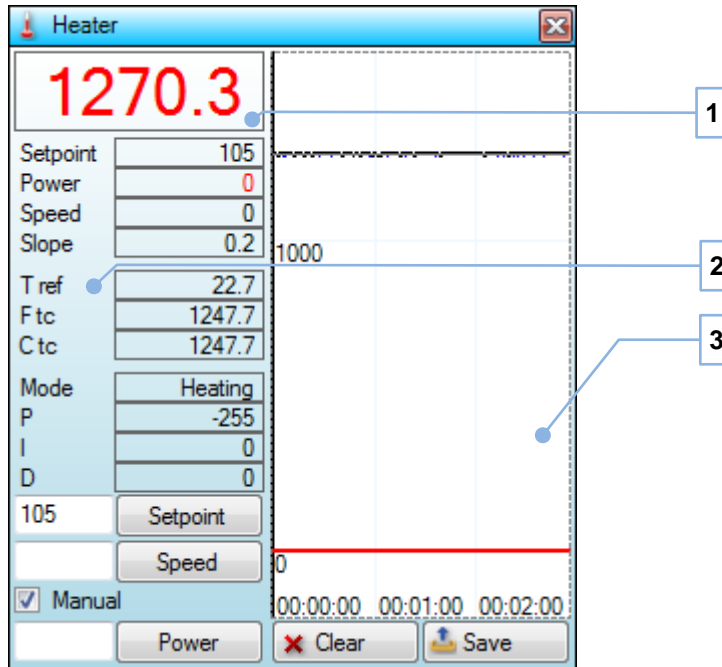
Fig. 24: Heater window

Temperature (1)	Current average temperature
Info (2)	Additional info
Graph(3)[*]	Temperature Graph
Setpoint[*]	Override setpoint
Speed[*]	Override speed of heating
Manual[*]	Enable manual mode
Power[*]	Set heater power directly, in manual mode only
Clear[*]	Clear graph
Save[*]	Save graph as a log-file

[*] Administrator only.

Setting setpoint or speed of heating will override values of automatic control. To override heater power manual mode has to be activated first.

Manual mode will disable heater PID regulation and security (overheating protection and furnace status monitoring). A special warning will be given when entering this mode.

Graph maximum time can be set with *Heater graph* Configuration setting.

Info

Various information of temperature regulation is displayed.

Setpoint	Current setpoint, °C
Power	Current power
Speed	Current speed of heating, °C/min
Slope	Actual slope (speed of heating), °C/min
Tref	Thermo-reference temperature, °C
F tc	Furnace thermocouple temperature, °C
C tc	Coil thermocouple temperature, °C
Mode	Heating/regulating
P	PID P value
I	PID I value
D	PID D value

Mouse-over some of values will display additional info: voltages, instant (non-averaged) value, slope, current PID parameters, etc.

2.2.10 Motor window

This window is used to see the status and manually control the Motor, rotating carousel with crucibles.
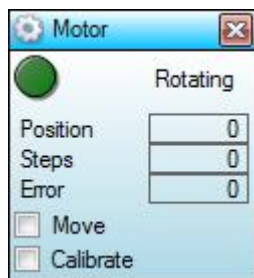
Fig. 25: Motor window

Rotating	Blinks when motor is rotating carousel
Position	Crucible position [0-20], 0 – unknown, 20 – reference
Steps	Motor steps
Error	Extra steps after full turn
Move	Show/hide motor move controls
Calibrate	Show/hide motor calibration controls

Move

There are manual commands to the motor.
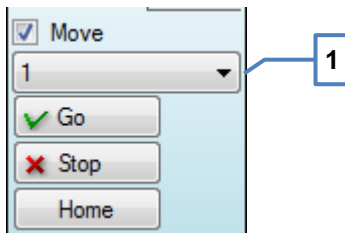
Fig. 26: Motor move

Position (1)	Select crucible position [1-20]
Go	Rotate to selected crucible position
Stop	Stop motor and reset current crucible position
Home	Reset and rotate to the first crucible position

Calibrate

Perform motor home position calibration.
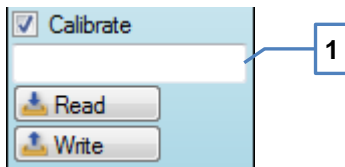
Fig. 27: Motor calibrate

Factor (1)	Calibration factor
Read	Read and display calibration factor from EEPROM
Write	Write entered calibration factor into EEPROM

2.2.11 Results window

This window displays Crucibles related data: status, position, ID, group, weight and calculated Application results.
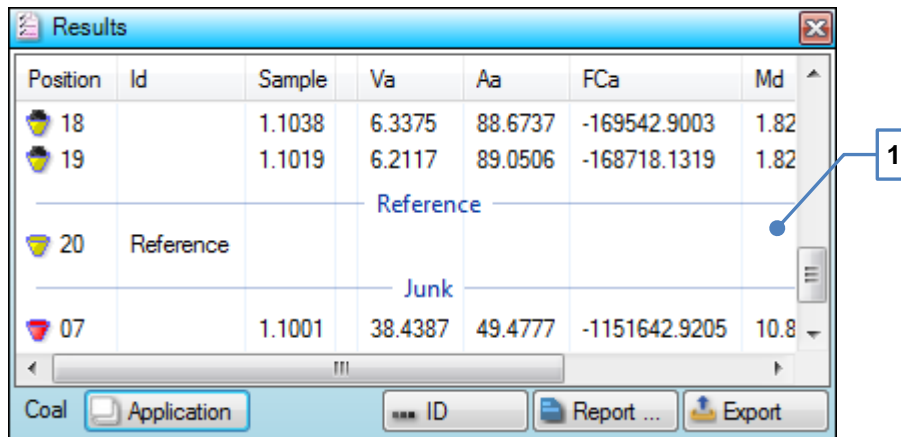
Fig. 28: Results window

List (1)	List of crucibles
Application	Select application
ID	Change selected crucible ID
Report	Generate report
Export	Perform Export

Double-clicking or pressing Enter while crucible list is focused will display Edit ID window for the selected crucible, similar to pressing ID button.

Selected (one or many) crucibles graphs will be displayed in the Graph window.

Clicking on a group will select all crucibles in that group. Hold Control when clicking to add the whole group to selection.

2.2.12 Status window

This window is a device status monitor. Balance and instrument Communications are monitored here.
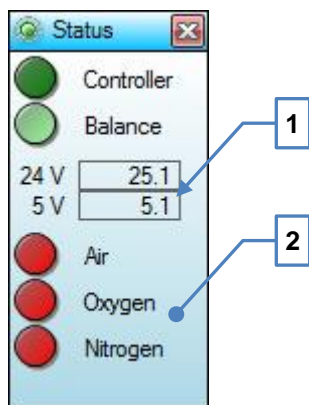
Fig. 29: Status window

Controller	Instrument communications status
Balance	Balance communications status
Test points (1)	On-board test points voltages
Gases (2)	Active gases status

During analysis Phase different gases will be activated. Only currently active gases status is displayed.

Green value is ok, **red** is not. Blinking occurs when new data are received.

2.3 Edit ID window

This window is used to edit Crucible ID in the Results window.
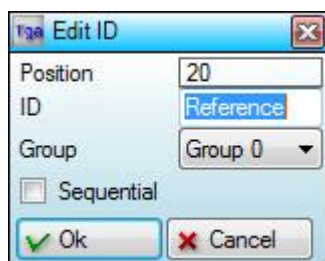
Fig. 30: Edit ID window

Position	Crucible position (not editable)
ID	Crucible ID
Group	Group [0-9]
Sequential	Enable sequential numbering
Ok	Confirm changes
Cancel	Cancel

Pressing Enter is similar to pressing Ok button.

2.4 PID window

This window allows manipulating *PID* ranges in Configuration, which are used for Heater temperature regulation.
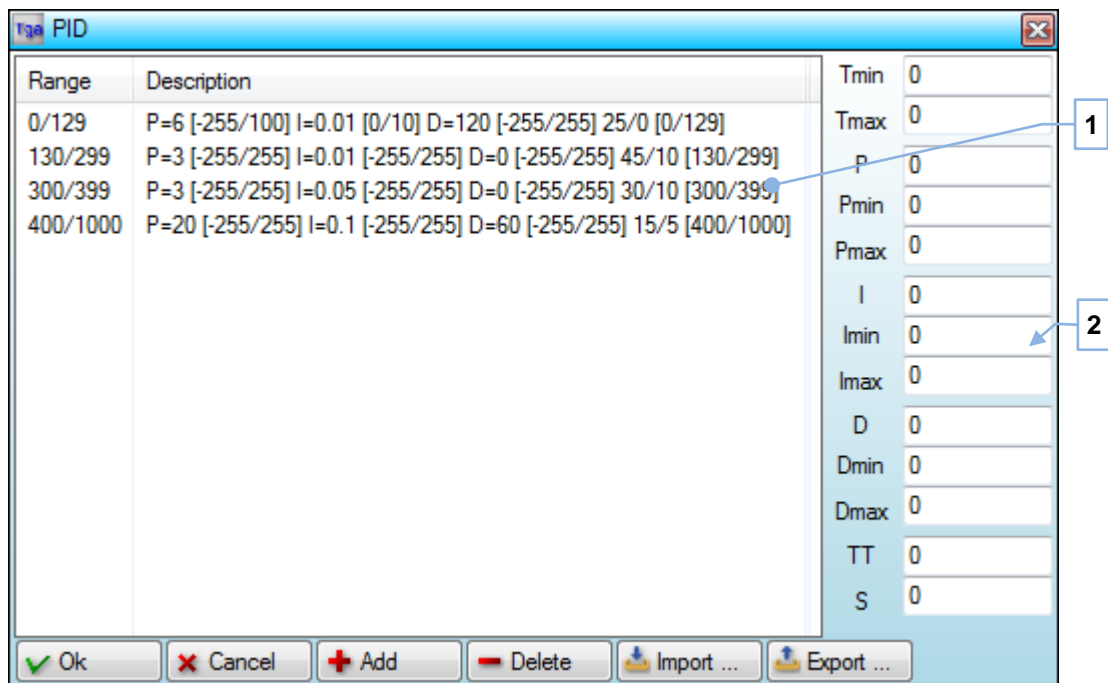
Fig. 31: PID window

List (1)	List of PID ranges and their corresponding factors
Factors (2)	Selected range factors
Ok	Confirm changes and close window
Cancel	Discard changes and close window
Add	Add range to the list
Delete	Delete selected PID range from the list
Import	Import PID list
Export	Export PID list

Factors are used for PID regulation when setpoint temperature falls between *Tmin* and *Tmax* range values.

If ranges are overlapping, then they are first sorted by the range average and then the first one that matches for a given setpoint will be used.

Pressing Escape key is identical to clicking Cancel button.

When any factor is changed, then button Ok become disabled. This should remind to the user to press Add button after entering new range or editing existing one.

Pressing Add button will replace an existing range (with the same *Tmin* and *Tmax*), otherwise a new range will be added to the list at corresponding position.

Multiple ranges can be selected and deleted at once.

3   How to use

3.1   Application

Application contains settings which are subject to change from analysis to analysis. The purpose is to separate them from software/instrument Configuration and allow easily switch between them.

Application settings are split into categories: general settings, stages and results.

General

General settings define import, export and weighing parameters.

Name	Application name
Description	Application description
Minimum weight	Minimum sample weight in mg
Maximum weight	Maximum sample weight in mg. Set 0 to disable
Import	Import definition file
Export	Export definition file

Application *Name* is a file name. It cannot contain some of special characters. If file with this name already exists, the confirmation window will be shown, prompting to overwrite existing file.

Use *Description* field to describing application: purpose, corresponding norm, etc. It can be any long and contain any character.

Minimum and maximum weight will define a valid sample weight range to be used during weighing Phase for an automatic weight confirmation.

Stages

Stage settings define physical conditions of the instrument during analysis Phase.

Name	Stage name
Description	Stage description
Temperature	Setpoint temperature in °C
Speed	Speed of heating in °C/min
Type	Stage type
Time[*)	Stage time in seconds
Deviation[*)	Deviation
Stability[*)	Stability
Gas	Selected gas: none, oxygen, nitrogen
Purge	Balance purging time in seconds
Liquid[*)	Liquid deviation
Closed lids	If checked lids are closed during this stage

[*) Will be shown depending on the selected stage type.

Stop by maximum time

This stage is finished when specified *Time*, counted after reaching setpoint, is expired.

Stage result is the last weight before stage ends.
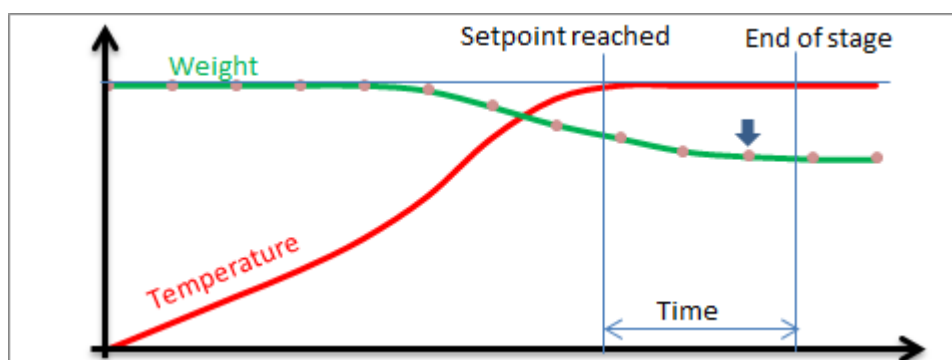
Fig. 32: Stop by maximum time

Stop by time

This stage is finished when specified *Time*, counted after reaching setpoint, is expired and additionally one more weight for all crucibles is taken.

The software will interpolate sample weight at specified time to obtain stage result.
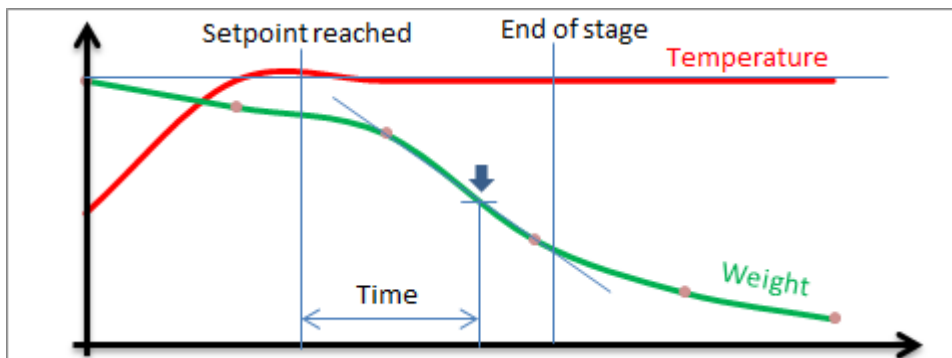
Fig. 33:Stop by time

Stop by deviation

During this stage, after reaching setpoint, software awaits for all crucibles to pass *Deviation* check. When all crucibles has passed deviation check or specified *Time* is expired (specifying zero will disable this) stage is finished.

Deviation check is performed only if there are 2 stable weights in row. When balance is purged, until setpoint is reached and specified *Purge* time is expired, received weight is usually unstable. In most cases deviation check can be passed after balance purging is off (see *Liquid* option explanation below).

Deviation formula is

$$1 - \frac{W_i}{W_{w-1}} < Deviation$$

where: W_i is sample weight, W_{i-1} is previous sample weight.

Stage result is the last weight before stage ends.
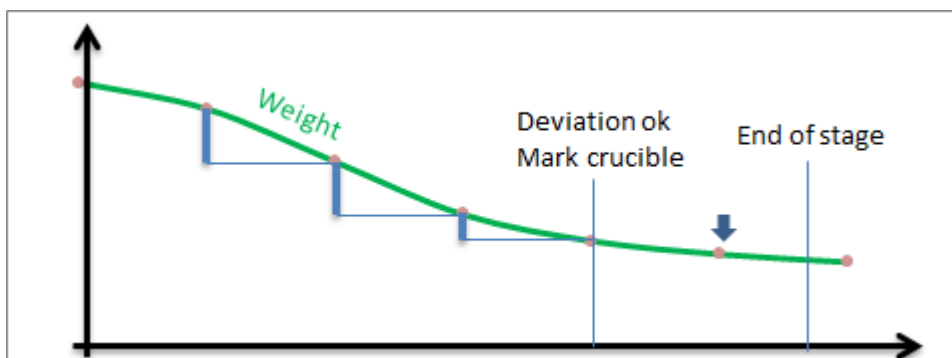
Fig. 34: Stop by deviation

Marked crucibles can be seen in Crucibles window during analysis Phase.

Stop by stability

This stage is similar to stop by deviation, but instead of deviation all crucibles have to pass *Stability* check. Stability specified as an absolute difference between 2 consecutive stable sample weights.

Balance purge and liquids

Before reaching setpoint and for the *Purge* time, if specified, after that the balance purging is on. To prevent balance contamination is it important to ensure that the majority of sample weight loss (to example, moisture) occurs when balance purge is on.

During stop by deviation or stop by stability stage, *Liquid* setting can be used to specify unstable sample weights deviation or stability, to prolong balance purging for as long as necessary for samples to stop losing weight too rapidly.

Liquid deviation or stability is checked after setpoint is reached and *Purge* time is expired. If set to 0, liquid check is disabled. Otherwise, after all crucibles have liquid check passed, balance purging will be stopped and normal stage stop conditions (deviation or stability) continues, to determine when to finish the stage.

Results

Result is an expression, which can use stage-based analysis data in Formulas to calculate a value of interest.

Name	Result name
Description	Result description
Calibration	Calibration factor to multiply result
Format	Format to display result value
Formula	Expression to calculate result

Create application

It is necessary sometimes to change certain application settings (to example, minimum sample weight). While it is easy to do, often it is better to create a new "specialized" application and either call it specifically or provide in the description a reason of application creation.

To create a new application:
1. Login as Operator.(Debugger)
2. Press New button in Application window.

It is also possible to take existing application as a "base". For this select "base" application in the list and press Edit button. Make sure to change application *Name* first in *General* tab, so that "base" application will not get overwritten.

3. Fill all necessary fields.
4. Add stages and results.
5. Press Ok button when finished.

Edit application

Any existing application can be edited.

To edit application:
1. Login as Operator.
2. Select application in Application window.
3. Press Edit button.
4. Edit application.
5. Press Ok button when finished.

Delete application

Unused and old applications can be deleted.

To delete application:
1. Login as Operator.
2. Select one or more applications in Application window.
3. Press Delete button and confirm.

Select current application

Application should be selected at the beginning of weighing Phase. It is possible to change current application until analysis phase starts. Because application can be edited at any time (Application window is not blocked during analysis) it is important to decide whenever to apply changes done to the application for current analysis or not. A special warning will be given when editing already selected application.

To select application:
1. Click Application button in Results window. Popup menu with the list of available application will appears.
2. Select needed application name from the list.

Currently selected for analysis application is marked.

When mouse is over menu item with application name, corresponding description will appears shortly.

Add stage

New stage will be added after existing stages.

To add stage:
1. Create or edit application.
2. Switch to tab *Stages*.
3. Click button to add new stage (in stage selector).
4. Fill all necessary fields.
5. Click confirm button (in stage selector).

Edit stage

Only existing stages can be edited. If there are none – add stage first.

To edit stage:
1. Create or edit application.
2. Switch to tab *Stages.*
3. Select stage (in stage selector).
4. Click button to edit stage (in stage selector).
5. Carry out necessary changes.
6. Click confirm button (in stage selector).

Delete stage

Any existing stage can be deleted.

To delete existing stage:
1. Create or edit application.
2. Switch to tab *Stages.*
3. Select stage (in stage selector).
4. Click button to delete stage (in stage selector).
5. Confirm.

Add result

New result will be added after existing results.

To add result:
1. Create or edit application.
2. Switch to tab *Results.*
3. Click button to add new result (in result selector).
4. Fill all necessary fields.
5. Click confirm button (in result selector).

Edit result

Only existing results can be edited. If there are none – add result first.

To edit result:
1. Create or edit application.
2. Switch to tab *Results.*
3. Select result (in result selector).
4. Click button to edit result (in result selector).
5. Carry out necessary changes.
6. Click confirm button (in result selector).

Delete result

An existing result can be deleted.

To delete existing result:
1. Create or edit application.
2. Switch to tab *Results.*
3. Select result (in result selector).
4. Click button to delete result (in result selector).

5. Confirm.

Technical info

Applications are saved in Settings*.app files.

3.2 Balance

Balance status can be seen in the Status window and Balance window.

Balance should be programmed. Please refer to the balance manual regarding procedure of balance programming. Below are typical settings.

911[*)]	Reset to factory settings
113	Unstable ambient conditions (adapt filter)
517	9600 bod (baud rate)
542	Hardware (handshake mode)
613	Automatic without stability (printing mode)

[*)] This is recommended step to do at the beginning of balance programming.

Internal balances are represented by either balance or weigh cell. In last case, programming factors is not possible, unless external keyboard is available.

It is possible to adjust balance stability without reprogramming by using *Stability* Configuration setting.

Balance calibration

Calibration of the balance is essential to ensure that correct weight is read.

To perform balance calibration:

1. Ensure that software is in the weighing mode: furnace is cold, Crucibles window buttons to add crucibles are visible, Flow window is waiting for user action (waiting for a button to be pressed).

Alternatively, as Administrator, it is possible to perform calibration at some other moment: pause the flow, manually open furnace, etc.

2. Remove lid and crucibles carousels.
3. Replace massive ceramic balance pedestal with light-weighted plastic one.

Depending on the instrument, this step may be skipped or even balance shaft without the pedestal used.

4. Press Tare button in the Balance window.
5. Press Calibrate button.
6. Wait for the message PLACE CALIBRATION WEIGHT.
7. Place calibration weight on the balance pedestal.
8. Wait until message CALIBRATING will disappears.
9. Return instrument into normal conditions: put balance pedestal and carousels back.

Do not forget to tare balance before un-pausing the flow as administrator.

Balance statuses:

0.0000	Stable weight
0.0000	Unstable weight
	Receiving blank text from the balance
NOT READY	Receiving STAT
ERROR	Receiving STAT for too long
OFFLINE	Offline
CALIBRATION IS STARTED	Starting calibration
PLACE CALIBRATION WEIGHT	Prompt to put calibration weight
CALIBRATING…	Calibration is in progress
CALIBRATION IS FINISHED	Calibration is finished

3.3   Communications

Communications can be monitored in the Controller window, Motor related – in the Motor window, Balance related – in the Balance window, Heater related – in the Heater window.

Status window adds to it, representing status in the compact view.

Digital inputs and outputs

Digital inputs represent sensors and all sort of digital detectors. Digital outputs control valves or switch on/off certain electronics.

Cooling fan output is protected. It can only be set if *Furnace closed* input is set.

Open furnace output is protected. It can only be reset if *Cooling fan* output is reset.

Disconnect

Upon disconnection detection, if there are no communications from PC for 5 seconds, following will occurs in the device:

- Heater power off.
- Oxygen and nitrogen off.
- Motor stop and reset.
- Counter reset to 0.

3.4   Com-ports

Controller and Balance both are required com-ports to operate. Therefore minimum 2 com-ports should be present in the PC.

Assigning com-ports

Assigning proper com-ports is not an easy task, but it has to be carried once, before the instrument can run.

- Device is connected with the PC, main switch in position 1

- Firstly you have to identify which COM-Port or USB-Port (TGA-PCB V3.x) is connected at your PC.

- Go to device manager (1) and browse for the available COM & LTP ports.
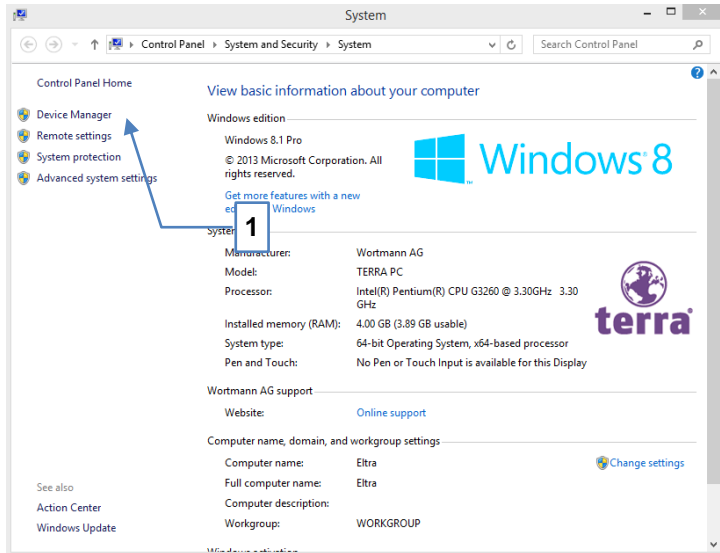
- Identify the corresponding ports/when USB is connected (TGA-PCB V 3.x it will be shown under the COM-ports
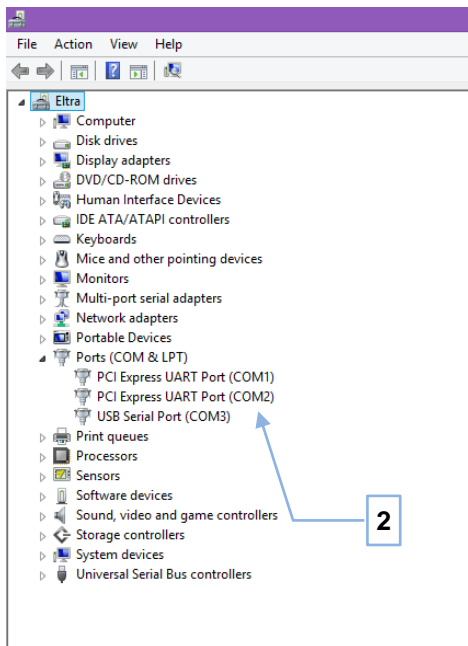
- Start TGA software

- Introduce the corresponding password

- Click to "Manage" button (3)
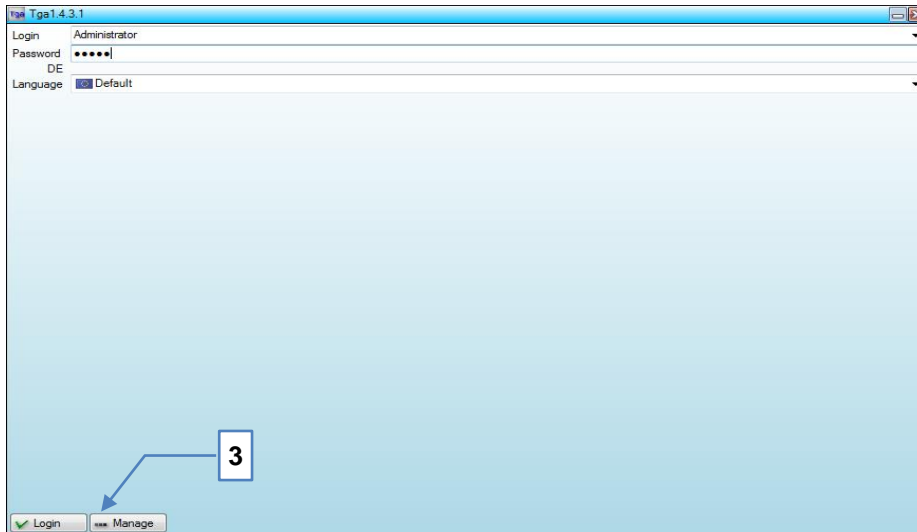
- Introduce the corresponding ports and click continue (4)
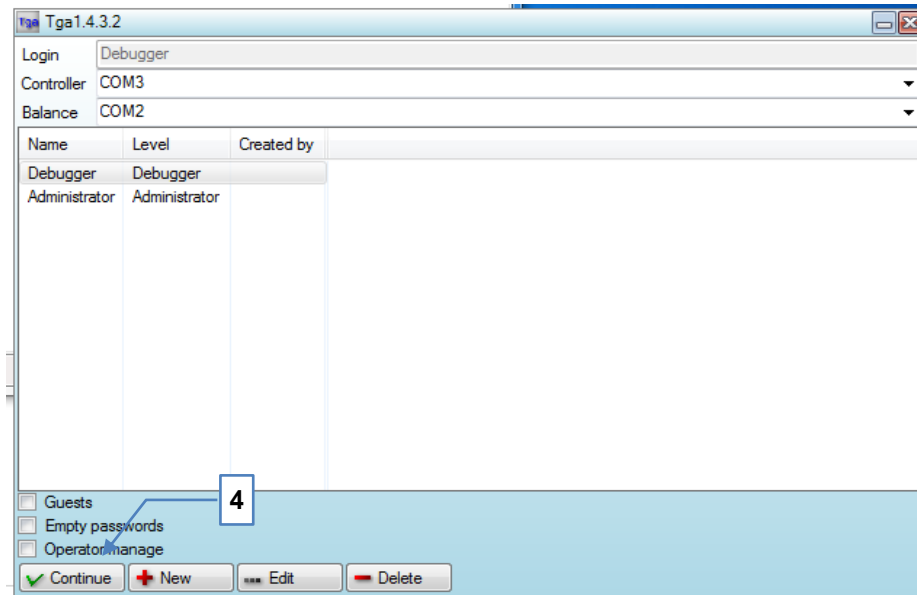
- If connection is established the lights will blink green in the <u>Status</u> window.
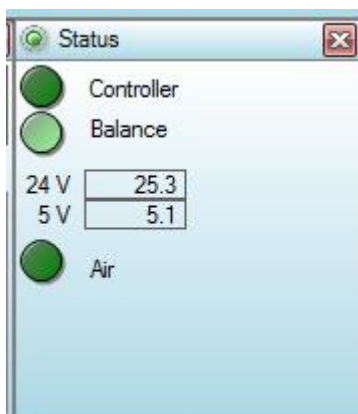
- When it's still not connected, the light is red blinking and the procedure have to be repeated by selecting the next identified COM-port, until the right ports are assigned.
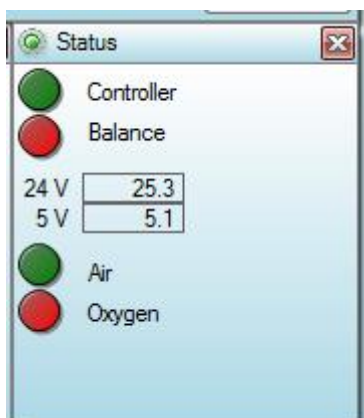
3.5   Configuration

Configuration settings can be seen and edited in the Configuration window.

Some of settings are Administrator only. Those are marked here with the [A].

Analysis

Settings related to analysis.

- *Close furnace*. Furnace will be closed at the end of cooling Phase after analysis is finished.
- *Show notepad*. At the end of each analysis text report is created and saved. This option makes this file to be automatically opened in the Windows *Notepad*.
- *Shutdown*. If set, then after current analysis, at the beginning of weighing phase, software will switch PC off.

Appearance

Appearance settings.

- *Caption text*. Define additional text for the Main window. This is intended for the use on a PC controlling several devices simultaneously. It can only be done by several running software, installed into different folders. Each software main window can then have different caption text, for easier instrument identification.
- *Main form*. Main window location, it can be located in one of four corners, by choice. It is essential for multi-furnaces-single-PC operation.

Cooldown

Settings related to a cooling Phase.

- *Carousel up/down*. During cooling down carousel will slowly rotate. This option will add moving carousel up after rotation and then down after another rotation, which could be useful to prevent stacking.

- *Cooldown time*. There is an additional cooling after furnace thermocouple reports low temperature – stabilization. Stabilization is used to wait until heat accumulated inside furnace block escapes completely. This setting will define stabilization time.
- *Lids closed*. During cooling furnace will be opened completely at some point and lids carousel will be moved up (to speed up cooling). However, when cooling blower will come up, then sample leftovers may get blown out of the crucibles. This setting will keep lids closed, to prevent this.
- *Temperature*. Cooling will continue until furnace temperature is less than the specified.

Device

Device specific settings.

- *Delay for lids adding*. This setting is applicable for instruments without lids carousel. When adding lids furnace will be half-opened and user have to place lids on top of all crucibles. This setting will define a delay which is applied between rotating from one crucible position to another.
- *Delay for lids removal*. This setting is applicable for instruments without lids carousel. When removing lids furnace will be half-opened and user have to remove lids from all crucibles. This setting will define a delay which is applied between rotating from one crucible position to another.
- *Motor 1:35* [A]. Used for rotating carousel. It has to be set for the instruments with 1:35 motor gear transmission (by default 1:40 steps are used).
- *No lids* [A]. This setting has to be set for instruments without lid carousel. If any of Application stages has set closed lids, then there will be a prompt to confirm furnace opening/closing during analysis to add/remove lids directly on top of crucibles.
- *Stability* [A]. Set to change balance stability. By default it is set to 0, which means do not change balance stability. If value is set to 1 to 4, then a special command to change balance stability will be sent each time when balance is tare. Higher number means more unstable conditions.

Heater

Settings related to heater temperature regulation.

- *Heater graph* [A]. Maximum time to keep heater graphs in the memory. When time is expired graphs will begin shifting content: first points will be deleted after adding new points to the end.
- *PID* [A]. This is an array of PID ranges. PID window is shown to edit this setting.
- *PWM Limit*[A]: Limit pwm maximum, default setting is 255.
- *Security* [A]. Enable or disable heater security and logging altogether.
- *Temperature calibration* [A]. Furnace thermocouple multipoint temperature calibration. Keep empty for no calibration or specify pair of values delimited with comma, semicolon or space, where first value is what you see and second is what must be.
- *Thermocouple* [A]. Select furnace and coil (if present) thermocouple type.
- *Time* [A]. PID averaging time. PID regulation uses average furnace temperature to avoid rapid heater power changes due to a noise. This setting will define averaging time.
- *Tref offset* [A]. When reading environmental temperature Tref, used to calculate actual temperature inside the furnace, there is a certain offset, caused by electronics. This setting allows removing this offset and obtaining accurate Tref.
- *Zelio*[A]: Enable Zelio tempertur controller. Default setting is disabled.

Report

Text- and pdf-report related settings.

- *Extra tittle*. Add extra tittle information into text report about used Application and some of configuration settings.
- *Footer*. Specify a text-file to add its content to the end of text report.
- *Header*. Specify a text file to add its content at the beginning of text report.
- *Logo*. Specify an image-file to add as a logo picture into pdf-reports. If this value is blank, then default (Eltra) logo is used.

Weighing

Settings applicable during weighing Phase.

- *Balance button*. If set, balance button will be displayed, when waiting for a sample. In this case Application minimum and maximum weights are ignored.
- *Furnace*. Define a furnace state during weighing phase: open or close (FCM).
- *ID format*. Specify format of generated ID.
- *Motor home*. If this setting is set, then carousel will be rotated to position 1 before opening the furnace.
- *Tare*. If this setting is set, then FCM will demand a stable balance weight when adding sample. Otherwise, unstable weight is accepted.

3.6 Crucibles

Crucibles on the carousel are shown in the Crucibles window. When observing crucibles in the Results window, it is possible to recognize crucible status and determine its type and condition by the group. Browser window displays the worst status.

Crucible statuses:

	Unknown crucible weight (not weighed yet)
	Empty crucible
	Crucible with the sample
	Junked crucible
*)	Bad crucible
*)	Dump

*) In the Browser window only

Junked crucible is an unstable crucible, when during analysis there was at least once a moment, then balance can't read a stable crucible weight.

If after certain time balance weight is unstable, then software will move carousel up/down in order to align crucible vertically, if it is touching carousel. If weight is not stabilized, then there will be an attempt of realigning carousel, by making a full carousel turn, in order to fix any possible alignment issues. If weight is still unstable, then crucible is marked as a junk.

Junked crucible not necessary means that result of this crucible is bad. It is just an indicator to the user.

Bad crucibles status means that either of two: result file was corrupted or edited manually.

Dump stands for manually saved at some moment crucibles state. It can be before, during or after analysis.

Crucibles belong to groups. Group0 is a default group for newly added crucibles. When some of crucibles belong to one group, other than default group, then their statistic (average value and standard deviation) is calculated and printed in the reports.

Add blank crucible

It is possible to add crucibles one by one into the next available position, select a position manually to add crucible or add many crucibles at once (fill carousel).

To add crucibles one by one:
1.   Ensure it's a weighing Phase, Flow window should wait for user action.
2.   Press Add button in the Crucibles window.

Select wanted position before clicking Add button if necessary. Unselect to let positions to be selected automatically.

If *Evenly* option is marked, then new crucible will be added into a middle of biggest sequence of empty spaces.

To fill carousel:
1.   Ensure it's a weighing Phase, Flow window should wait for user action.
2.   Press Fill button and select how many crucibles to add.

After adding blank crucibles:
1.   Press Weighing button in the Flow window to start weighing of blank crucibles.
2.   Put crucibles on the corresponding position inside the furnace.

The easiest is to fill carousel with blank crucibles at the beginning of weighing Phase. But it is also possible to add blank crucible at the balance, when software rotates the carousel and lifts it down.

3.   Enter id and assign a group for crucibles using Results window.

This can be done even in the middle of analysis Phase.

Delete crucible

Exceeding crucibles can be removed from the carousel during weighing Phase.

To delete crucible:
1.   Select crucible in the Crucibles window.
2.   Press Delete button.

Pressing Delete button without selection will delete last added blank crucible, to example, after filling more crucibles than needed.

If crucible is not empty (contains sample), then deleting this crucible required selection and confirmation.

3.7 Export

After analysis is finished Results are saved. They can be further exported, if export is enabled.

To enable export:
1.   Create export definition file.
2.   Assign path to this file as *Export* for an Application.
3.   Data will be exported at the end of analysis Phase.

Only existing crucibles data will be exported.

Export definition file is a special text file containing configuration for the export and definition info: which data and how to export it. This file can be created from a scratch or, preferably, existing LIMS\export.definition.txt file can be copied under a new name and modified.

Export definition file consists of lines where any line can be either empty, a comment (begins from semicolon) or contain a definition.

Definitions

Definitions are case-insensitive (unless specified otherwise) and their format is PARAMETER=VALUE. Definition with default value can be omitted in case, if default value is what is needed.

DESTINATION=FILE

Configures LIMS export to work with the file.

Mandatory definition and should be always present.

PATH=path

Specify full path of the exporting file. Path can contain {0} to use current date/time and {1} to use FILENAME parameter from the Import. See http://msdn.microsoft.com/en-us/library/26etazsy(VS.80).aspx for information about formatting.

OPENWITH=open

Specify external program used to open exported file. Can be an exe-file, batch-file or windows alias (to example, Notepad). The program first parameter will be a full path of exported file.

Default (blank – do not open with): OPENWITH=

TEXT=text

Output specified text into exported file. Text can contain character escapes to insert special characters. See http://msdn.microsoft.com/en-us/library/4edbef7e.aspx for more information.

VAR=value

Insert specified value into exported file.

Possible values:

DATETIME	Current date and time
USERNAME	User name
USERLEVEL	User level
APPNAME	Application name
APPNOTE	Application description
RESULTNAME result	Name of specified Formula result number
ID crucible[*]	Specified crucible ID
CRUCIBLE crucible[*]	Specified crucible weight
SAMPLE crucible[*]	Sample weight of specified crucible
LID crucible[*]	Lid weight of specified crucible
ATTRIBUTE x crucible[*]	Import attribute x=1..9 of specified crucible
RESULT crucible[*] result	Value of specified crucible result number

[*] Crucible number [1-20]

FORMAT=format
Specify custom format for output of the next variable. Default format is used to output variables.
Default value: FORMAT={0}

Examples

See folder LIMS\ for examples.

The basic example of exporting CSV-file containing first and 20th crucible id and first result:

DESTINATION=FILE
PATH=c:\temp\export{0:yyyyMMHHmm}.csv
VAR=ID 1
FORMAT=;{0:0.0000};
VAR=RESULT 1 1
VAR=ID 2
FORMAT=;{0:0.0000};
VAR=RESULT 1 2

3.8 Formulas

Formulas are comprehensive system build around CodeDom. Instead of using hardcoded formulas, software allows to write custom expression to calculate needed results.

Expression has to be written in C# language. It is possible to call standard functions, to example, using Math class (see http://msdn.microsoft.com/en-us/library/system.math_members(v=vs.90).aspx).

Analysis data are accessible in the expression by using specially provided variables. To example, *SampleWeight* variable is initial sample weight.

Formulas are created and edited in the Application window.

Pay attention to the result order. Formula of Application result with lower number is calculated earlier. Formulas of result with the higher numbers can then access calculation result or the formulas with the lower number. To example, calculating moisture first allows to use moisture result in the formulas of dry and wet ash later.

If formula result can't be calculated (due to a mistake in the formula or because data are not yet available, to example, when formula needs last stage sample weight, while first stage is running), then it is not displayed in the Results window. In reports, however, this value is represented as a NaN (not a number).

Variables

A complete list of analysis variables is given here. *Synonym* is an old variable name, which is kept for compatibility reasons, but is not advised to use in the new formulas. *Index* is a number inside brackets, which correspond to a number of item in the array.

SampleWeight
Initial sample weight (g).
Synonym: X[0].

EmptyCrucibleWeight
Initial empty crucible weight (g).
Synonym: A.

LidWeight
Initial lid weight (g).
Synonym: B.

ReferenceWeight
Initial reference crucible weight (g).
Synonym: C.

ReferenceLidWeight
Initial reference crucible lid weight (g).
Synonym: D.

StageWeight[ ]
Sample weight (g) at the end of corresponding stage.
Synonym: X[ ].

Blank[ ]
Reference crucible weight change (g) at the end of corresponding stage.
Synonym: Y[ ].

Result[ ]
Other formula calculation result. Index is a number of Application result, containing formula.
Synonym: R[ ].

Examples

Here are some of examples of formulas with the explanation.

EmptyCrucibleWeight
Very basic formula, to output empty crucible weight.

(SampleWeight – StageWeight[1]) / SampleWeight * 100
Output sample weight loss (%) after first stage.

Math.Abs(Result[1] / SampleWeight)
Output absolute value of first result divided by initial sample weight.

((StageWeight[1] – Blank[1]) – (StageWeight[2] – Blank[2])) / SampleWeight * 100
Real formula for calculating volatiles (%). First stage is moisture, second is volatiles. Formula uses blank correction.

3.9 Graph

Graph is a special control used to display information in a form of plots, points and lines. Mouse-over graph area to make following graph elements visible: ort names, ort units, hint and mouse position coordinates (in graph units).

Graph control appears in the Graph window and Heater window.

Auto-zoom mode

By default graph is in auto-zoom mode, trying to zoom content to fit all available area. In this mode zoom occurs every time, when content gets updated.

In manual mode, after dragging or zooming graph with mouse, zoom and offset is not changed. This could be useful to investigate same area of different graphs or to inspect certain area only, while content is updated.

Solid graph border stands for auto-zoom and stroked – for manual mode.

Press middle mouse button or LM + RM simultaneously to enable graph auto-zoom mode.

Navigation

Dragging graph with LM pressed will change offset and move viewport window.

Use mouse wheel to zoom graph vertically. Hold down Shift key while using mouse wheel to zoom graph horizontally. Window has to be active for mouse wheel to work, click inside graph area if window is inactive (if wheels aren't working).

Dragging graph with RM pressed is an alternative way to zoom graph (to example, with the mouse without wheel).

3.10 Heater

Heater is a unit responsible for furnace temperature regulation. All immediate values of heater can be seen in the Heater window.

Software uses PID regulation to reach setpoint temperature and to hold it.

Setting up PID for the first time

When running software for the first time, a special warning is given during initialization Phase, because *PID* Configuration setting initially is blank.

To setup PID:
1. Login as Administrator.
2. In the Configuration window click edit button for *PID* setting, Edit PID_window will appears.
3. Click Import button and select proper PID set for the instrument.
4. Confirm with Ok button.
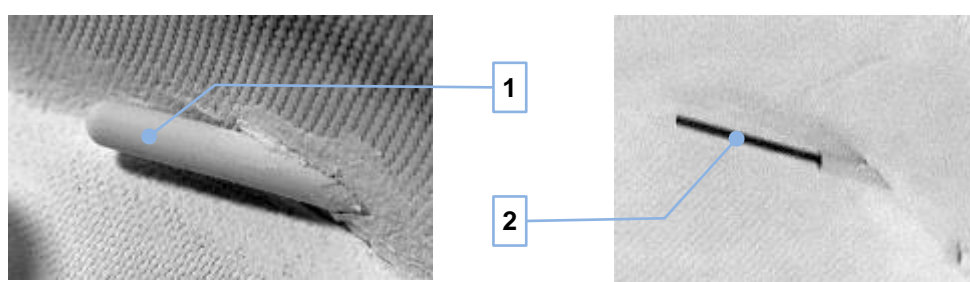
Fig. 35: Old and default thermocouple

| 1 | Old (capsulated) thermocouple, use old.pid |
| 2 | Default thermocouple, use default.pid |

PID regulation

The PID regulator is tuned in a way that would overshoot the set point. This results in a very quick heating up phase. Since overshoot is not allowed and desired, the special procedure takes place.

Setpoint is initially set to be (setpoint – threshold) value, this is called heating phase. When this temperature is reached, there will be an expected overshoot. Threshold must be chosen in a way to be equal or slightly higher than the overshoot. After that software will wait until heating slope become small enough (less than specified value). As soon as this happens, a new setpoint will be set, this time equal to the setpoint value itself, and regulating phase will start.

Switching from regulating to heating will occurs automatically, whenever setpoint is two times of threshold higher, than the actual temperature.
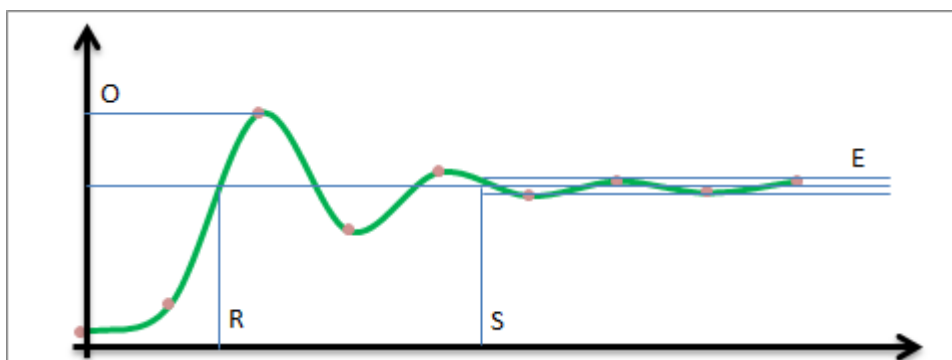
Fig. 36: PID regulation

Increase factor	Rise time R	Overshoot O	Settling time S	Error E
P	-	+		-
I	-	+	+	0
D		-	-	

Factors

There could be multiple ranges (with overlaps if necessary). Each range can have following factors.

Tmin / Tmax	Range temperatures
P / Pmax / Pmin	P – proportional factor and its limits
I / Imin / Imax	I – integral factor and its limits
D / Dmin / Dmin	D – differential factor and its limits
TT	Threshold temperature
S	Slope, speed of heating

There is a guaranteed overshoot, to reduce it following solution is used: initially regulator is trying to reach setpoint minus threshold temperature. Switch to real setpoint occurs after that and additionally after slope become less than specified. Threshold and slope has to be chosen experimentally to compensate overshoot and at the same time without delaying reaching setpoint.

Security

There are certain features to ensure the safety of heating process.

Hard limiter ensures that power is reset to 0, if temperature of heating elements is too high (over 1080°C).

Soft limiter will ensure that heating elements are not rapidly switched on/off by hard limiter, when near maximum allowed temperature. For this software will scale PID power: the close it comes to 1080°C, the lower it become. At some point the power will become too low for the heating to continue.

During operation software will continuously checking furnace and heaters temperature. Whenever a dangerous condition is detected, a special window will appears on screen with detailed message about what is wrong and acoustic signal will be given to the user. Power will be turned off automatically during such event.

Messages

During operation following messages may appears (accompanied by acoustic signals):

Furnace thermocouple is disconnected!	Furnace temperature > 1200°C
Coil thermocouple is disconnected!	Coil temperature > 1200°C
Overheating! Switch off the furnace immediately!	Coil temperature > 1080°C
Coil temperature is not increasing!	Heating, but coil temperature is not rising fast enough
Coil temperature is not decreasing!	Cooling, but coil temperature is not decreasing fast enough
Furnace temperature is not increasing!	Heating, but furnace temperature is not increasing fast enough
Furnace temperature is not decreasing!	Cooling, but furnace temperature is not decreasing fast enough
Coil temperature is lower than furnace temperature!	Coil temperature < furnace temperature

When message appears, heater power will be reset to 0. This is indicated by red color of power in Heater window. If analysis is in the progress, it may has to be terminated.

During analysis Phase, heater security logging will occur. The log file is normally overwritten at the beginning of analysis. If security triggers a message, then this log file will be saved, allowing investigate closely what happens with heater during analysis.

3.11 ID

After introducing blank crucibles into a system it is necessary to specify ID for each of them. This part can be speed up if auto-generated IDs are used.

There are 2 different features: blank crucible ID format and sequential numbering. It is even possible to use them both simultaneously.

Sequential numbering

It is a special feature to automatically increment number at the end of crucible ID in a series of crucibles.

When *Sequential* option is marked in the Edit id window, then pressing Ok button will increment a number at the end of current crucible ID before closing the window. Whenever window is opened again, the *ID* will remain (normally it is updated with the crucible ID), allowing simply click OK button again, giving another crucible same ID with incremented number.

Sequential numbering can be used when adding crucibles for even faster crucible introduction:
1.   Add one blank crucible.

2. Enable *Generate ID* option in the <u>Crucibles window</u>.

Make sure option *ID format* in the <u>Configuration</u> is blank or it will take precedence over sequential numbering.

3. In the <u>Results window</u> double click on that crucible to edit id.
4. Enter ID, mark *Sequential* option, confirm by pressing Ok button.
5. When adding blank crucibles further, their ID will be initially the last auto-incremented value.

Generate ID

By default, newly added crucible has blank ID. When *Generate ID* option is marked, then added crucibles will have auto-generated ID.

To use this feature:
1. Define wished *ID format* in the <u>Configuration</u>.
2. Mark *Generate ID* option.
3. Add new crucibles. They will have ID generated.

Format is a normal text with following optional parameters:

{0}	Current date and time
{1}	Crucible position [1-20]
{2}	Last ID from <u>Edit ID window</u>

Examples:

Format ID	Output
Aaa {0:dd.MM.yyyy HH:mm:ss}	Aaa 26.11.2013 12:12:01
Crucible{1}	Crucible1, Crucible2, etc.
Test{0:MMdd}{1}{2}	Test11261SomeId, Test11262SomeId, etc.

See <u>http://msdn.microsoft.com/en-us/library/26etazsy(VS.80).aspx</u> for more info about formatting.

3.12 Import

There is a possibility to import crucibles data from outside. Data can be prepared earlier in a special file by using TgaWS, manually (text file) or by using some other software/automation system.

To use import:
1 Create import definition file.
2. Assign path to this file as *Import* for an <u>Application</u>.
3. During weighing <u>Phase</u> click Import button in the <u>Crucibles window</u>.
4. Select file with prepared crucibles data. Data will be imported.

If crucible at specified position is already exists, then only data, which is present in the file, will replace existing crucible data. It is possible, to example, to allocate crucibles manually, add sample, read sample weight and then import only crucibles IDs.

Import definition file is a special text file containing configuration for the import and definition info: which data is available and how to read it. This file can be created from a scratch or, preferably, existing LIMS\import.definition.txt file can be copied under a new name and modified.

Import definition file consists of lines where any line can be either empty, a comment (begins from semicolon) or contain a definition.

Definitions

Definitions are case-insensitive (unless specified otherwise) and their format is PARAMETER=VALUE. Definition with default value can be omitted in case, if default value is what is needed.

SOURCE=FILE

Configures LIMS import to work with the file.

Mandatory definition and should be always present.

PATH=path

Specify a path to folder to be opened, when selecting a file for an import.

Default value (empty): PATH=

FILENAME=filename

Specify a file name, which can be used to generate file name in the Export definition file.

Default value (empty): FILENAME=

POINT=point

Specify a decimal point separator character. This is useful when importing file containing numbers with different, than neutral culture, decimal point separator.

Default value (dot): POINT=.

CSV=separator

Specify field separator if importing CSV-file.

Default value (semicolon): CSV=;

GO=value

Command to change current reading position.

Possible values:

NEXTLINE	Go to the next line
SKIP number	Skip specified number of characters

VAR=value position [length] [options]

Read specified value into specified crucible position, with optional length and options. Position is in the range from 1 to 20 (20 is reference crucible). If length is not specified, then it's 0 by default. If length is 0, then it's CSV-file. When options have to be specified, specify 0 explicitly. Double quotation mark character " can be specified as an option to unquote CSV-file value.

Possible values:

ID	Crucible (sample) ID
CRUCIBLE	Crucible weight
SAMPLE	Sample weight
LID	Lid weight
ATTRIBUTEx	User-defined text, x=1..9, used to pass to the [Export](#)

Examples

See folder LIMS\ for examples.

The basic example for importing CSV-file containing first crucible id, crucible weight and sample weight is here:

SOURCE=FILE
VAR=ID 1
VAR=CRUCIBLE 1
VAR=SAMPLE 1

3.13 Install

Software can be installed by using single setup file or by using installation CD.

Single setup file

To install software, simply run setup file and follow instructions of the setup wizard.

Install from CD

CD contains same setup file. It's extended with predefined folders next to exe-file. Each folder can contain additional data, used by installer.

SetupTgaXXXX.exe	Setup file, XXXX - version
Applications*.app	Application files[*)]
Components*.*	Components that are necessary in order to run the software: net framework installation, acrobat reader, etc.
Helps*.*	Help files[*)]
Languages*.txt	Translation files[*)]
Layouts*.lay	Layouts[*)]
Settings*.*	Other files[*)]

[*)] Will be copied during installation.

Some of components have to be installed manually or even downloaded separately. Installer will only check most common cases.

Installer will overwrite existing files when copying files from CD. Thus a precaution must be taken when reinstalling software by using installation CD! Creating backup before doing anything unusual is always a good idea.

3.14 Layout

The arrangement of child windows, their positions, sizes and visibilities, is called *Layout*. It is possible to create several layouts and then easily switch between them when needed.

It is possible to lock windows by using special button in Main window. When windows are locked, their locations and sizes cannot be changed. Only switching layouts and opening/closing windows will work.

Save layout

It makes sense to have layouts for different screen resolutions, different operators and different purposes: for weighing, to carry out analysis, to observe results, etc.

To save layout:
1.	Arrange windows as needed.

Arrange means change windows locations and size. Layout will save locations and sizes of currently closed (invisible) windows too.

2.	Enter layout name in the edit control of layout section of Main window.

If layout with this name is already exists, it will get silently overwritten.

3.	Press button to save layout.

Select layout

Selecting (loading) layout is fairly simple process.

To select layout:
1.	Open drop down list in in layout section of Main window.
2.	Select layout. It will be loaded and all child windows will get arranged accordingly.

Delete layout

It is easy to create many layouts and it is also easy to delete them.

To delete layout:
1.	Load layout first.
2.	Press button to delete layout in the Main window.

Technical info

Layouts are saved in Settings*.lay files.

3.15 Motor

Motor is rotating crucibles and lids carousels. Actual carousel positioning can be observed in the Crucibles window.

Rotate manualy

Motor is considered rotating (or busy) after command to rotate, until specified crucible position is reached. This, however, doesn't necessary means that there will be an actual rotation.

To rotate motor:
1. Login as Administrator.
2. Mark *Pause* in the Flow window.
3. Mark *Move* option in the Motor window.
4. Select crucible position and click Go button
5. Wait until motor finish rotation.

Motor rotation can only occur if *Furnace closed* input is set.

Motor stuck block is a special feature to prevent possible damage to the instrument. If motor moving sensor doesn't change for a certain number of steps, then motor rotation will be blocked. Instead of actual rotation, a high-pitch beeper made sound can be heard. This condition can be only reset by removing power from the instrument.

Too high or too low *Error* value could indicate a mechanical or electrical/electronic problem.

Calibrate

Motor home position calibration is necessary to ensure accurate crucible positioning on the balance pedestal.

To calibrate motor home position:
1. Login as Administrator.
2. Mark *Pause* in the Flow window.
3. Mark *Calibrate* option in the Motor window.
4. Enter 1 into calibration field and press Write button.
5. Click Home button.
6. Wait until motor finish rotation.
7. Note the balance pedestal position. It should be between two crucible positions.
8. Mechanically re-adjust carousel position if necessary.
9. Repeat from step 5 until balance pedestal position is ok.
10. Enter 800 (in case of 1:35 motor transmission use 700) and press Write button.
11. Click Home button.
12. Wait until motor finish rotation.
13. Note the balance pedestal position. It should be perfectly under crucible position.
14. Change calibration value slightly (increase or decrease by 10-50 steps) and repeat from step 10 until balance pedestal position is ok.

3.16 Phases

Software operation is split into several phases. Certain actions are available only during specific phases. To example, adding and deleting crucibles is restricted to weighing phase only.

Current phase and step (operation) can be seen in the Flow window.

Ordered list of phases:

- *Initialization*. During this phase software will check the device to ensure that it is capable to perform analysis. There are also additional checks related to the software configuration.
- *Cooling*. Furnace will be cooled down and stabilized if necessary.
- *Weighing*. Phase to gather all data needed to carry out analysis: selecting application, crucibles, lids and sample weighing.
- *Analysis*. Cycle through defined in the selected Application stages.
- *Finish*. Saving results and moving to the cooling phase.

Cycle time is a time between servicing same crucible. It includes carousel rotating, obtaining crucibles weights and some extra operations.

FCM

FCM (furnace closed mode) is a mode when sample weights are obtained with closed furnace during weighing phase.

Due to thermo-buoyancy effect balance reading with and without closed furnace will differ. It may be necessary to obtain initial crucible and sample weights with closed furnace, before calculating results. This however doesn't compensate temperature error.

This mode is enabled if *Furnace* Configuration setting is set to close.

During FCM, sample weights are not saved when sample is put inside crucibles. Instead crucibles are marked as non-empty. Then furnace will be closed and software will obtain sample weights.

3.17 Results

Results word is used to define either Formulas calculation result or an analysis result. In this chapter analysis result is described.

Analysis result is a state and values of all crucibles at the end of analysis, saved together with application and some extra data.

Saved results can be browsed and selected for preview in the Browser window.

Dump

Dump is a special feature, which can be used to save current crucibles data (before, during or after analysis Phase). This can be useful in case if analysis has to be terminated, but already obtained results would be nice to save.

Press button Dump in the Browser window to save a dump.

Technical info

Results are saved into Results*.result files.

It is possible to identify result by its file name. It has format yyMMddHHmmss, which makes it possible to manually delete or copy needed result.

3.18 Translation

Software localization system allows the user to supplement text-file with all the text, that appears in the software, translated into any language. This can be done by anybody, even by inexperienced person (for at least some sort of translation into the unsupported language). Default language is English, but it can be improved further, to example, to have clear British (UK) and USA (US) variants.

Translations are located inside Lng\ folder.

To translate software into any language

1. Start software.
2. Choose language.
3. Exit software.

File translate.txt will be created based on the selected language. If default language was selected, then translate.txt will contains English text. If, to example, Italian was selected, then it will be in Italian.

Missing translation will always be taken from the default (English) language and it is commented by default!

4. Rename translate.txt.

Please use ISO 3166-2 standard (http://en.wikipedia.org/wiki/ISO_3166-2) to name it. To example: ru.txt is for Russian translation, pl.txt is for Polish, etc. It is possible to use longer names (to example, to identify subcultures). In such case first two letters will be used to determine the language. To example: ru-mytranslation.txt or ukupdated.txt are acceptable names. If software cannot recognize the language, then file will still be selectable in the software as an unknown language.

Please avoid using reserved file names: translate.txt itself, default.txt and current.txt.

5. Translate/update translation.

File is in the Unicode format. It can be edited by any text editor that supports Unicode (to example, *Notepad* in *Microsoft Windows*) and consists of lines.

Format of each line with translation is id=text:

Msg.Config.CooldownTime	=Cooldown time
Msg.Config.CooldownTimeHelp	=Define cooldown time (s) to let accumulated heat to escape from the furnace insulation block.
Msg.Config.CoupleType	=Thermocouple
Msg.Config.CoupleTypeHelp	=Thermocouple type.

The part after equal sign = is the text to be translated. The left part (id) should not be changed; it can be used to identify the place in the software, where this text is used.

Lines, starting with hash symbol #, are comments. Empty lines or lines without equal sign = are ignored.

6. Start software and check translation.
7. If translation has to be updated – proceed from step 4.

Tips and tricks

Text may contain sequences of characters which have special purpose.

New line. If there is backslash with letter n: \n, then when this text is displayed, then the text after that sequence is moved to a new line. For some languages (Chinese, Japan, etc.) it may be a wise choice to remove that sequence if translated text fits perfectly into one line. Otherwise just keep it and translate the rest.

Parameter. If there are round brackets with number inside: {0} or {2:0.000}, then this sequence will be substituted with the real value. Do not remove or change that sequence, only modify the rest of the text.

Sometimes, for simplicity reasons, certain terms may be included into translation too. They should not be translated, if they are used in the software in unchanged form.

In certain places translated text should remain short. This is true for the text that appears on the buttons, next to field to enter value, etc. Usually there are other possibilities to provide user with necessary info, apart from giving a button name which will make button size of half-screen. Look for id containing Tooltip or Help, those are specially dedicated to give more detailed explanation. Use abbreviation if necessary or try to give a button other text based on what it does.

3.19 User rights

User is a person who has an account. *Account* is a combination of login name and password. User is logged when he enters his proper login and password in the Login window. *User rights* represent a level of access given to the user, according to his account level.

Account levels:

Debugger	Full access and extra logging
Administrator	High level of access
Operator	Restricted (no manual control, safe settings)
Laborer	Most restricted (cannot manage, cannot modify applications)
Guest	Special (same as Laborer)

Additionally to accounts there are special account options, enabling certain features. Those can only be set when logged as administrator.

Account options:

Guests	Allow guest accounts
Empty passwords	Allow empty passwords
Operator manage	Allow operator account level to manage accounts

Guest account is a special mode of software operation. By providing a name (without password) everybody can login as a guest (lowest account level).

Login as

When saying "login as administrator", "administrator setting" or "administrator only", it means that point of interest is protected from accessing by inexperienced person and thus required a user to login with account with corresponding level or higher.

To login as:
1.   Start software. Login window will appears.
2.   Enter login name and password for the user with the corresponding level or higher.
3.   Confirm with either Login or Manage button.

Create new account

After installing software there are only 2 default accounts created: Administrator and Debugger. Therefore it is necessary to create accounts for users with lower level of access to restrict them from using features, which can only be carried out by experienced personal. Another reason to create accounts could be necessity to separate and identify different user's results.

To create a new account:
1.   Login as administrator (use Manage button).
2.   Click New button.
3.   Enter unique account name, same password twice and choose account level.
4.   Confirm by clicking Ok button.

It is possible to create account when logged as operator when "Operator manage" is enabled.

It is only possible to create account with the same or lower level than currently logged user.

Change password

Changing password may be necessary if user forgot his password. There is no way to see current passwords, but it is possible to set a new password.

To change password:
1.   Login as administrator (use Manage button).
2.   Select account in the list and click Edit button.
3.   Enter new password twice and confirm by clicking Ok button.

It is possible to change password when logged as operator when "Operator manage" is enabled.

It is only possible to change password of accounts with the same or lower level than currently logged user.

Delete account

It is possible to delete old and unused accounts.

To delete account password:
1.   Login as administrator (use Manage button).
2.   Select account in the list and click Delete button. Confirm.

It is possible to delete accounts when logged as operator when "Operator manage" is enabled.

It is only possible to delete accounts with the same or lower level than currently logged user.

Technical info

Account data (accounts and options) are saved in the Settings\users.dat file. The content of this file is encoded.

When software is unable to find this file, a new file will be created with default settings. Thus it is advisable to keep master passwords (passwords from default accounts) in the secret and instead change passwords or create another administrator account (account with administrator rights).

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ELEMENTAL ANALYSERS

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