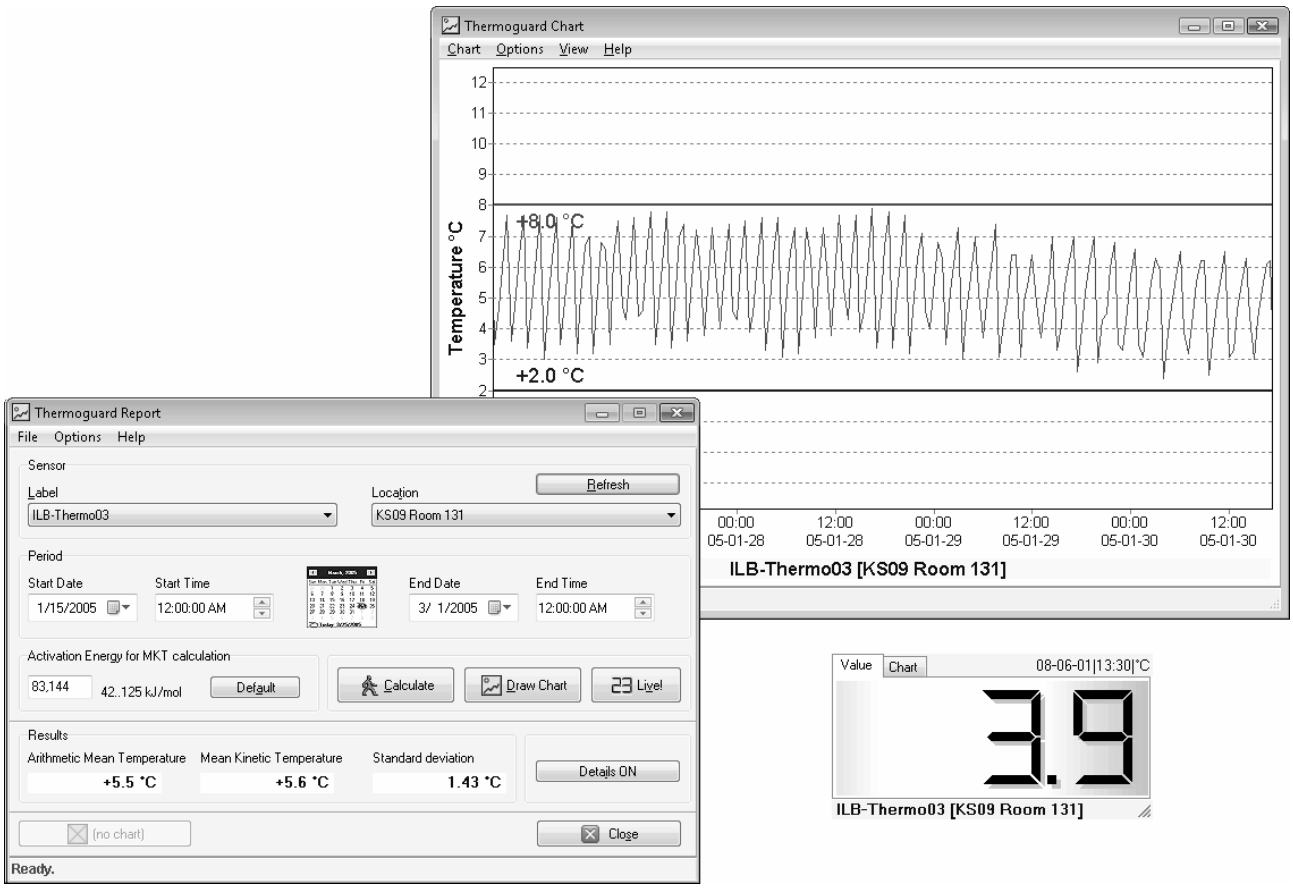
Thermoguard®

Thermoguard Report Version 2.67



Contents

Basics

Thermoguard Report Chart

Thermoguard Report Live!

Appendices

Basics

Overview

Thermoguard Report (abbr. "*TG Report*") is used for analysis and graphic display of data values, which are continuously recorded by the *Thermoguard* main program.

TG Report provides three main functions:

- ***Thermoguard Chart*** draws a chart over a period of time specified by the user from the recorded values of a sensor. *Thermoguard Chart* allows a vast number of possibilities: Navigation, scaling, zooming, three-dimensional display and much more. *Thermoguard Charts* can be printed and saved as a graphic file. An unlimited number of *Thermoguard Chart* windows can be opened at the same time.
  Introduced with version 2.66: The new integrated **Annotation Editor** provides the possibility to add annotations (comments, pictures) directly to a chart.

- ***Thermoguard Live!*** displays the *current* ("last") value of a sensor; either as digital display or as a continuously floating chart. Again, an unlimited number of windows can be opened at the same time. *Thermoguard Live!* window sets can be saved and re-opened. As the Chart windows the *Thermoguard Live!* windows can be scaled to any size; i.e. for presentation purposes.

- Calculating **Mean Arithmetic values** and Standard Deviation of all measured units as well as the Mean Kinetic Temperature (MKT) over any arbitrary period for temperature data additionally.

TG Report can be used as an analysis and visualization program for employees on any workstation computers - independently of other programs of the *Thermoguard* family.

All that *TG Report* requires for access to the recorded data is read-only access to the *Thermoguard* installation and data directory. No write or administrative rights are required for the *Thermoguard* installation and data directory.

This manual is an addition to the *Thermoguard* System Manual.

Installation

Installation types

Two options are available for installing *TG Report*:

- Local installation on the same computer where the main program (TGuard) runs; i.e. for checking data on the part of the *Thermoguard* system administrator
- Installation on one or more workstation computers on the network, e.g. for data visualization through employees

TG Report gleans the information about the number of, label, location, and limits of and other settings for the sensorcontrollers from the INI, LIC and SCX files from the *Thermoguard* data directory. The recorded data (temperature, humidity or any other unit) is read by *TG Report* from this directory (by default) as well (`*.tg` files in subdirectory `\tg`). *TG Report* requires read access to the data directory.

For a local installation the data directory usually is `%ALLUSERSPROFILE%\Thermoguard Data\tg`. Herein `%ALLUSERSPROFILE%` is a system environment variable pointing by default to the following paths:

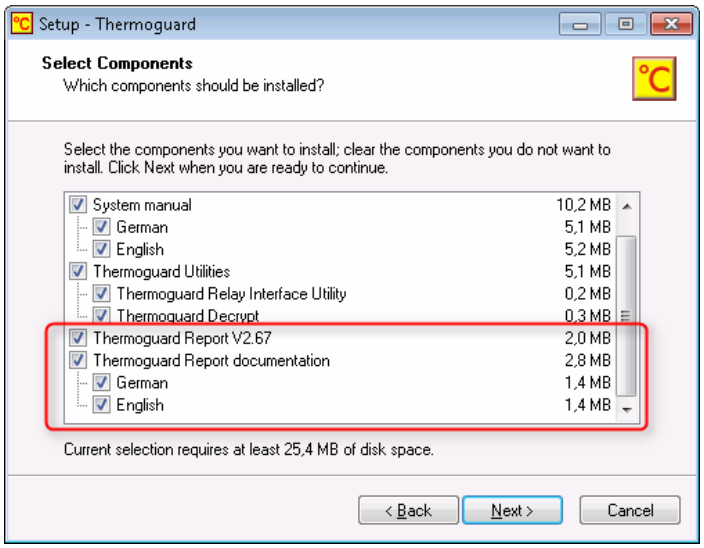
- for Windows XP/Server 2003:
  `C:\Documents and Settings\All Users`
- for Windows Vista/Windows 7/Server 2008(R2):
  `C:\ProgramData`

For a network installation the path to the data directory can be configured in *TG Report*, however.

When installing *TG Report* on a workstation computer on the network, the system administrator should typically create a share of the *Thermoguard* data directory on the network, including read permissions for employees.

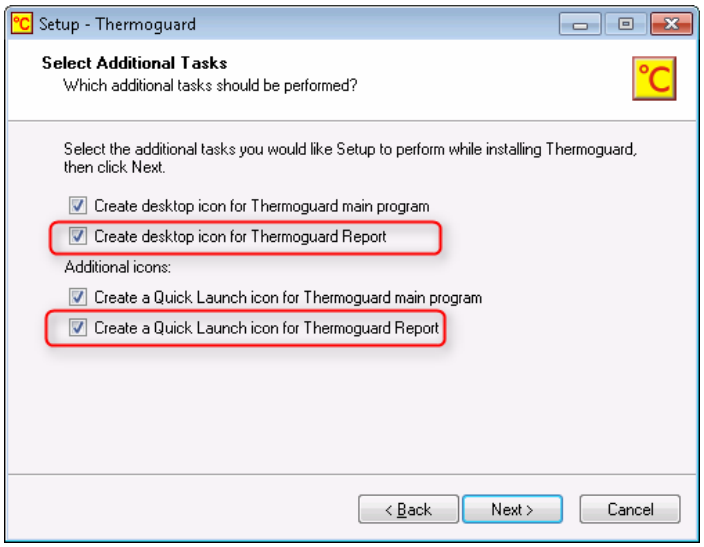
Executing the installation

TG Report is installed as a component of the *Thermoguard* Setup program (`TGuard_nnn.exe`):



TG Report is installed in the `\TGReport` subdirectory of the selected installation directory, i.e. by default in `C:\Program Files\Thermoguard\TGReport`.

For details on the Setup program, please refer to the *Thermoguard* system manual.



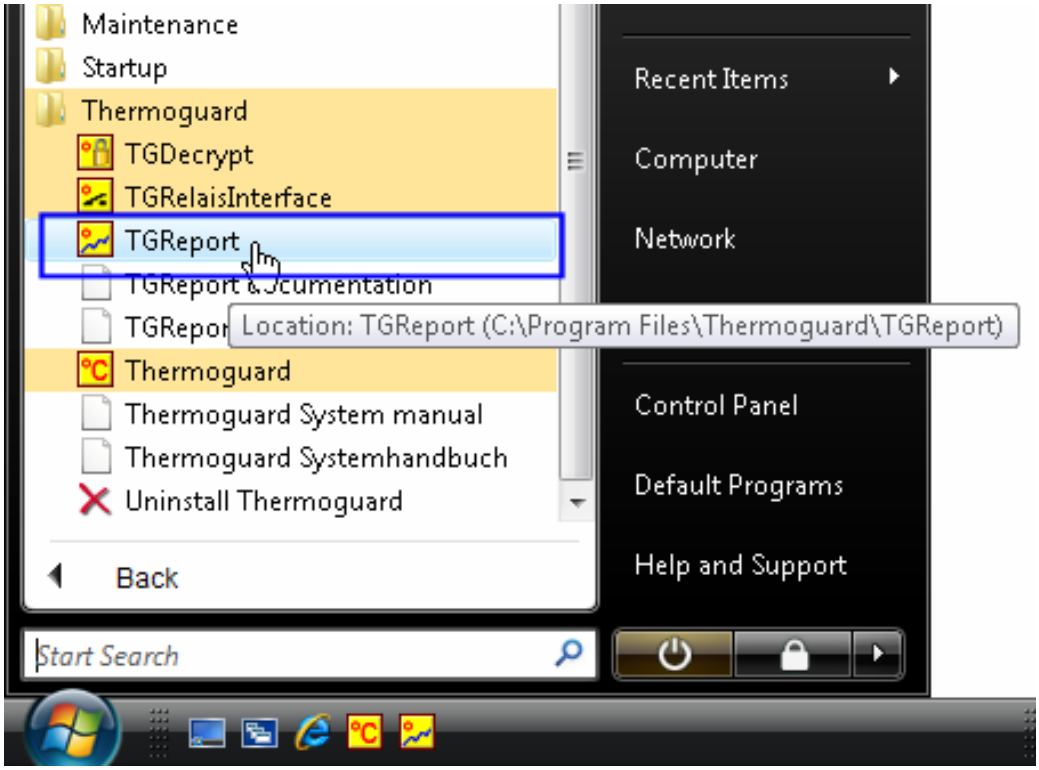
During the installation you can choose whether a desktop shortcut and/or a quick launch entry shall be created.

Note:
In Windows 7 the quick launch bar is not visible by default.

By default both marked options are not *checked.*

Starting Thermoguard Report

Depending on the options selected during setup you can (double) click the *TG Report* icon either on the desktop, in the quicklaunch bar or within the program menu (here shown for Vista, for Windows 7 the quicklaunch bar is not visible by default, for Windows 7 here it is recommended to pin the desktopshortcut to the taskbar):



Of course, *TG Report* can also be started directly by running the program file `C:\Program Files\Thermoguard\TGReport\TGReport.exe`.

Command Line Switches

The program file `TGReport.exe` supports three command line parameters:

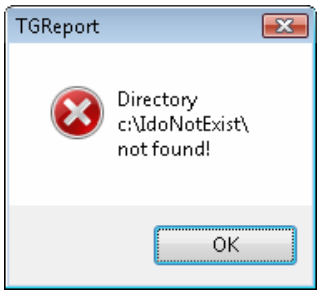
/CfgDataDir:<Directory>

Sample call:
`TGReport.exe /CfgDataDir:"C:\Program Files\Thermoguard\TGReport"`

This switch may specify a different than the default configuration directory (`%ALLUSERSPROFILE%\TGReport Data`). The `TGReport.ini` file is located in this path.

Notes:

- This is *not* the configuration path of the *Thermoguard* main program.
- If the path is invalid *TG Report* is aborted with an error message:



- The `TGReport.ini` file is not yet present after a new installation. It will be created the first time the program is terminated.

/tgl:<filename>

Sample call:
`TGReport.exe /tgl:"%ALLUSERSPROFILE\TGReport Data\My windows"`

A previously saved *Live*! windows set can be specified. This possibility is described in the section *Thermoguard Report Live!* in detail.

Remember to enclose paths containing spaces in quotes.

Note:
The *Live!* windows which were active at program termination are automatically restored on startup. Therefore the former switch **`/1`** has become obsolete now.

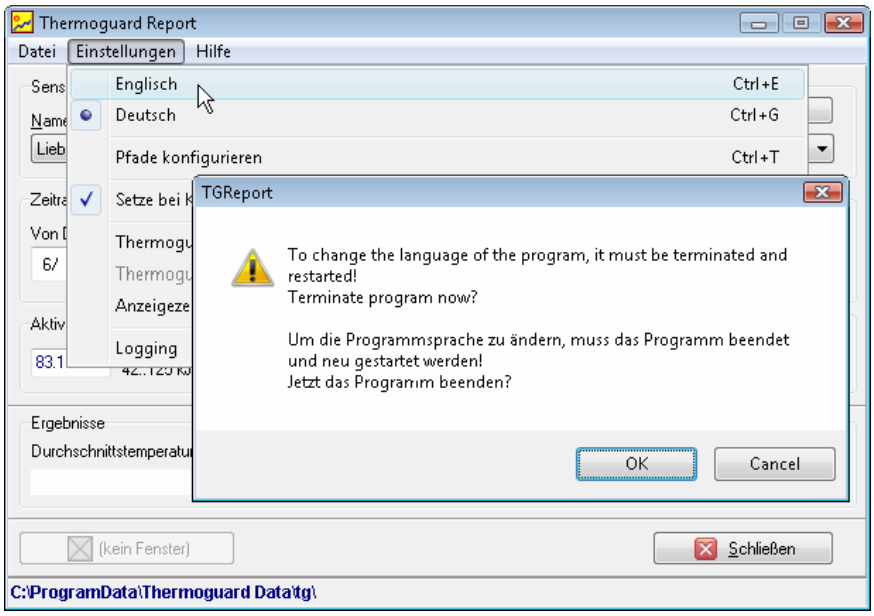
/h

Hides the main window after program start automatically (if at least one *Live*! window was active at program termination).

All three switches can be combined; their order is not important.

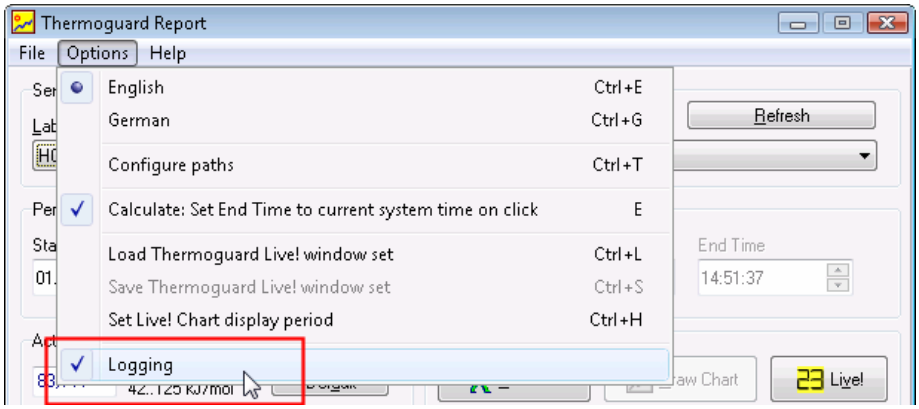
Program Language

The program language can be set to either English or German. To change it from German to English use the menu item "Einstellungen" => "Englisch" as shown below.
In order for the change to take effect, the program must be restarted.



Logging

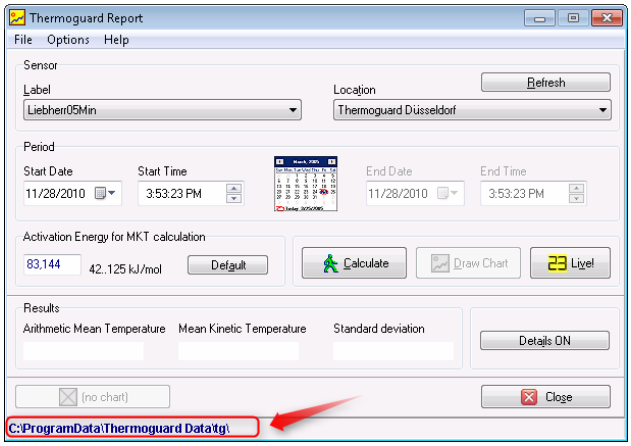
Menu item "Logging" activates or stops Logging for *Thermoguard Report* (introduced V2.63):



20 log files à 2MB will be written. If the 20th file exceeds 2 MB the oldest file will be overwritten. Thus a maximum of 40MB free disk space is needed for log files. Files will be created in the subdirectory `\log` of the configuration path, i.e. by default this is `%ALLUSERSPROFILE%\TGReport Data\tg\log`. The current log file is always named `TGReport.log`, the other files are named `TGReport00xx.log`.

Path Settings

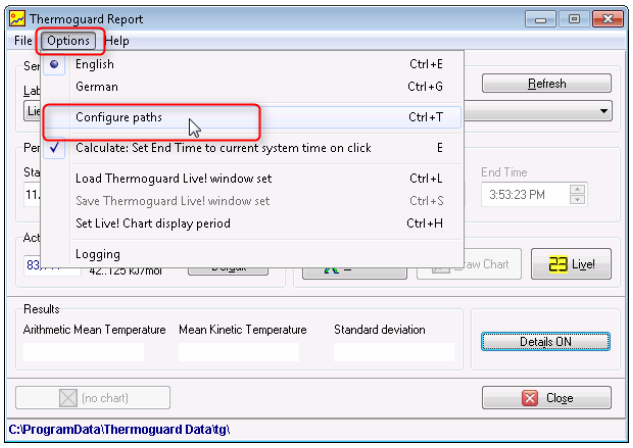
After starting, the *TG Report* Main Window opens:



Configuration and data path for accessing the sensor configuration and data

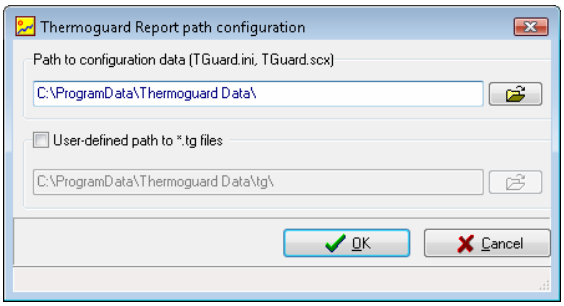
TG Report will search the `TGuard.ini` file in the default configuration path of a Thermoguard installation (`%ALLUSERSPROFILE%\Thermoguard Data`) if it is installed onto the same computer as the *Thermoguard* main program. It then reads the path to the `*.tg` files from this file.

Settings are saved to the `TGReport.ini` file and will be used again on next start.

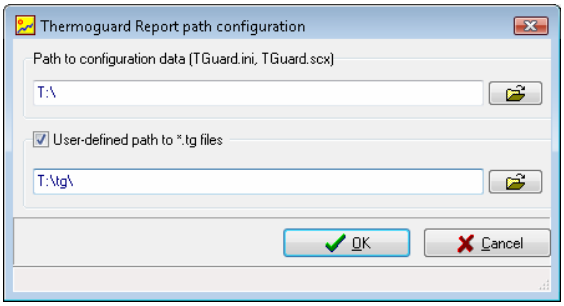


Setting the configuration and data path manually

Settings for the path to the main program's configuration files and to the `*.tg` files may be set manually once by the user, e.g. in case *TG Report* does *not* reside on the same computer as the main program.
Use menu item "Options" => "Configure paths".



If the path to configuration data of the main program is changed, the path to the `*.tg` files is read from the `TGuard.ini` file which resides in the configuration path and the path is displayed in the lower field automatically.
However, the `*.tg` path can be set individually too. The input field will be enabled as soon as the checkbox "User-defined path to *.tg files" is checked. If unchecked, immediately the `*.tg` path is read from the `TGuard.ini` file again and set.

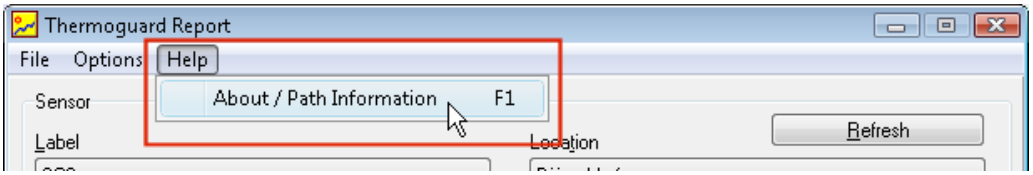


In the example shown on the left a read only share has been established on the main program's configuration directory and mapped as drive `T:`.

Note:
Shares ("UNC" notation) can also be used, e.g. `\\PC01\TGData`. However, drive mappings usually provide better performance.

Information about used paths

An information window displays the current paths used by *TG Report*. It can be called via key F1 or menu item "Help" => "About / Path Information":



==>

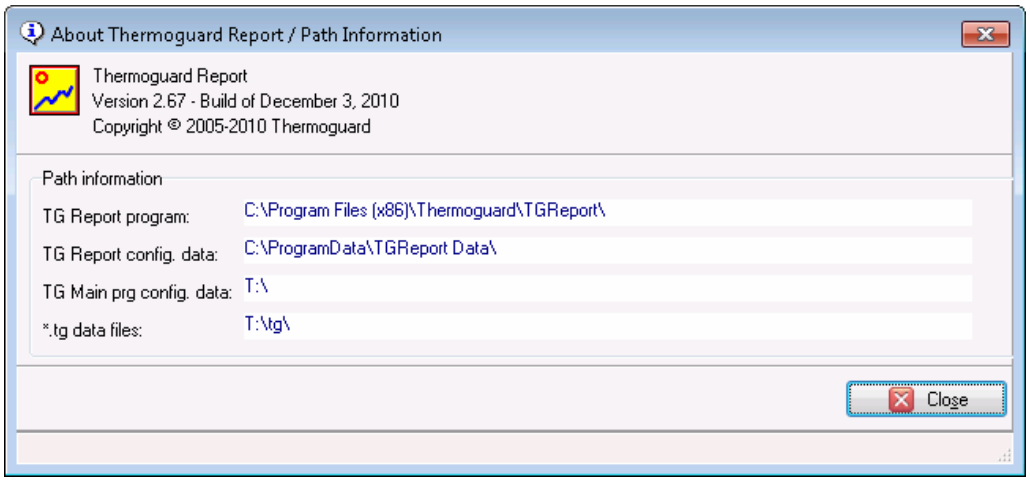
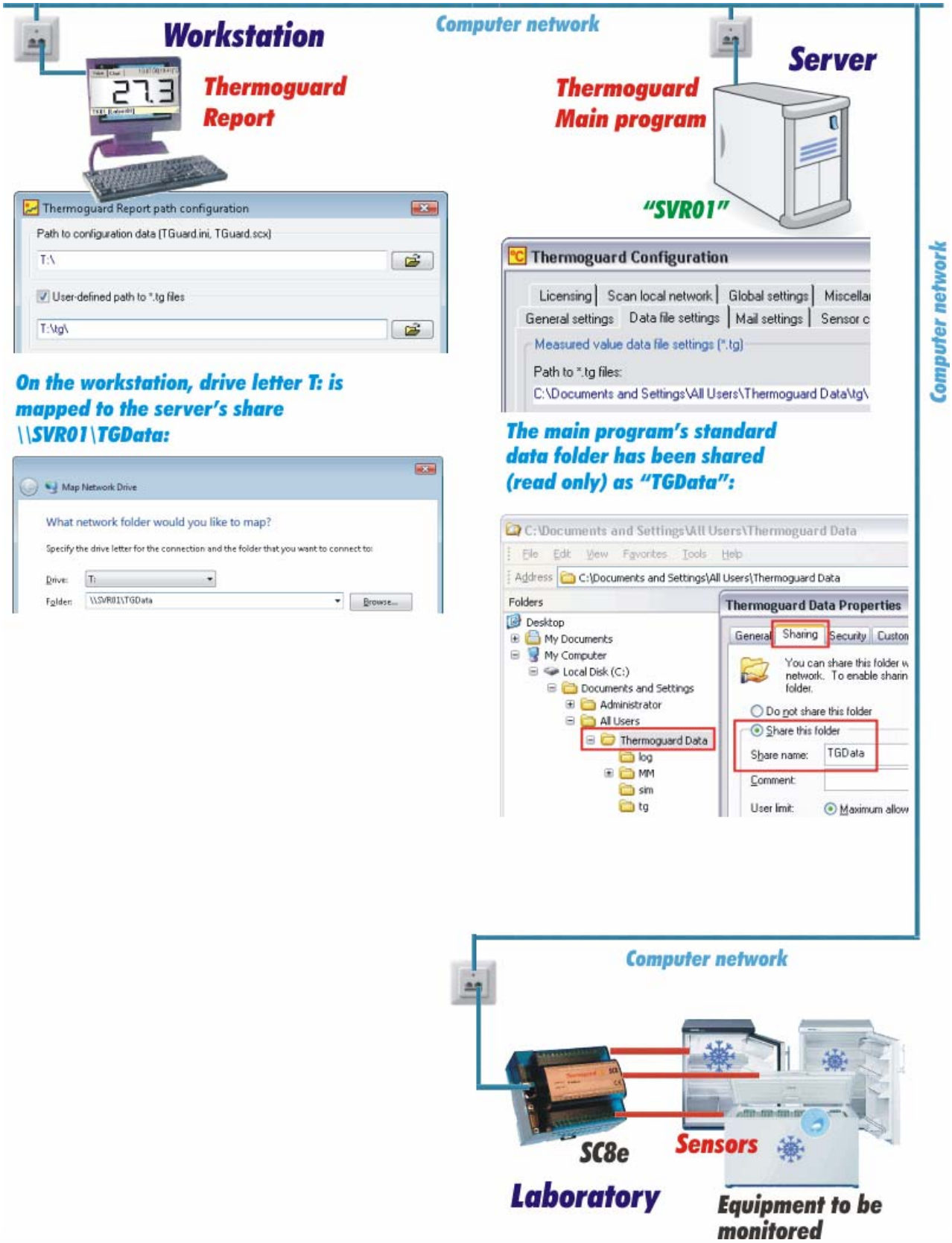
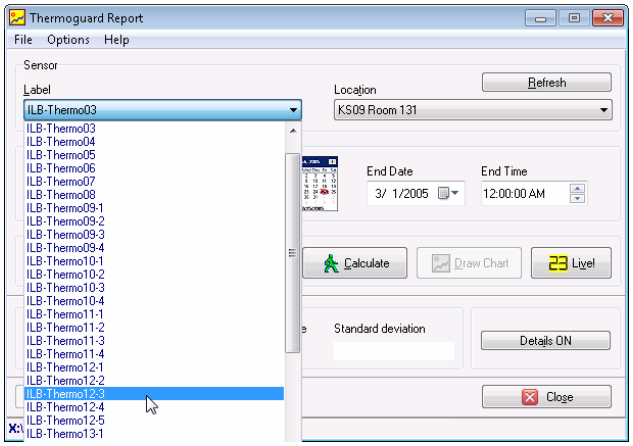


Illustration: Example of a typical Installation Scenario



Choosing a Sensor

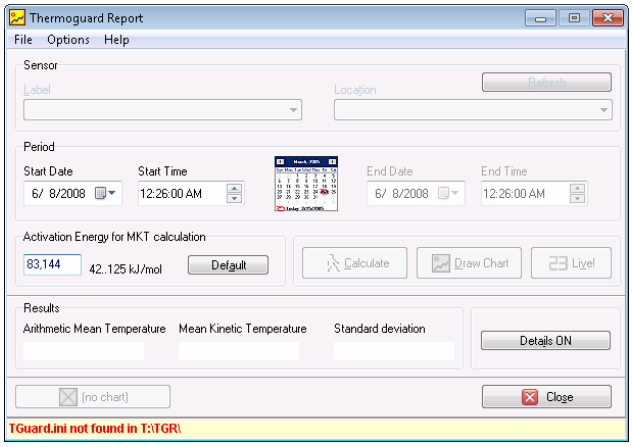
All functions of *TG Report* (Mean Calculation, Chart or *Live!* Display) are executed for a given sensor.



Selecting a sensor by selecting its label or location

When the path to the configuration data is specified correctly, the sensors can be selected using their label or location.

The "Refresh" button allows refreshing the selection display at any time to display reconfigured (e.g. new limits) sensors, for example.



If no sensor is shown in the fields "Label" or "Location", the configuration path setting might not be correct. Please check the path settings as described above.

Tip:
If a path's length should exceed the width of the status bar at the bottom of the window, move the mouse over the status bar. Then the complete path will be shown as a tool tip.

After a sensor has been selected, either of the following functions can be executed:

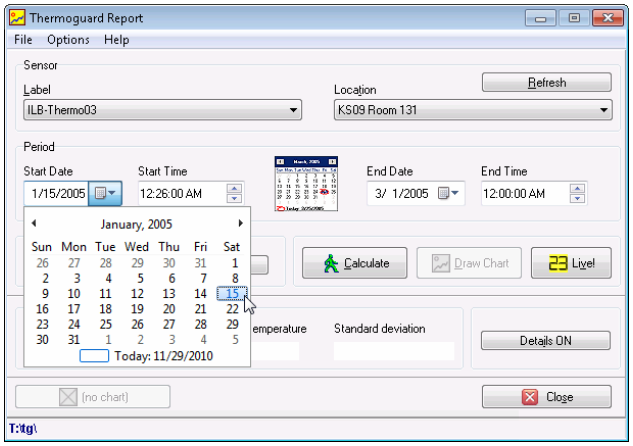
- Button "Draw Chart" => Static chart ("*Thermoguard Report Chart*"):
  First you must click on the "Calculate" button. After calculating, the "Draw Chart" button is enabled.
- Button "Live!" => Display of the current value ("*Thermoguard Report Live!*"):
  To open a *Live!* window, there is no need to click "Calculate" first. *Live*! is enabled if at leas one sensor is shown under "Label" respectively "Location".

You may open as much *Chart* and *Live*! windows for the very same sensor as you like.

Thermoguard Report Chart

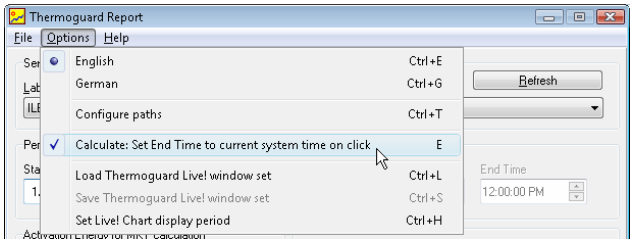
Selecting a Period of Time for drawing a Chart

To draw a Chart for a selected sensor, the start and end date and time must be selected first:



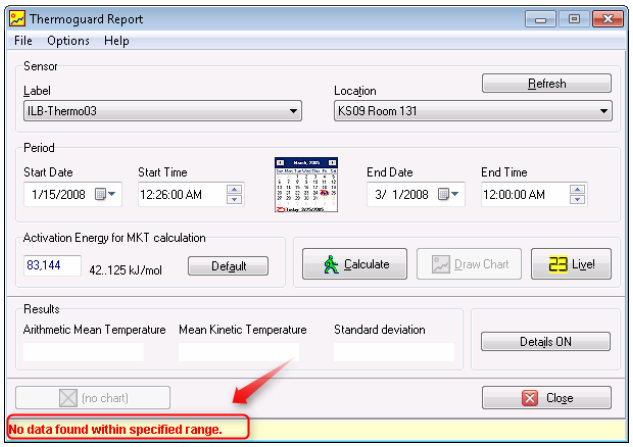
Selecting the start and end date

The selection fields for the calendar date and time ("Start Date"/"Start Time" and "End Date"/"End Time") enable limiting the period for the desired analysis accurately by seconds.



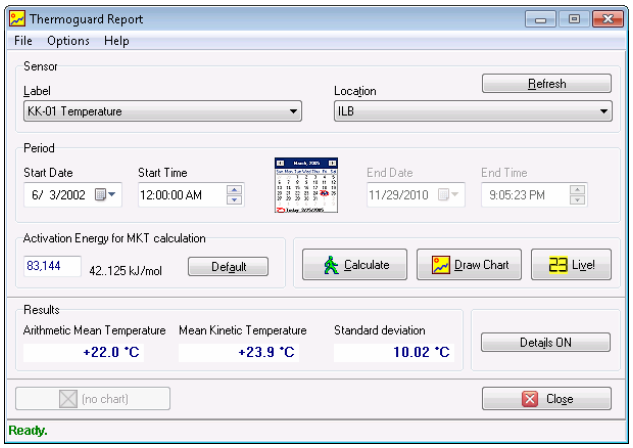
The "Calculate: Set End Time to current system time on click" option will always automatically set the current system date as the end time once you click "Calculate".
This option is checked by default after a new installation.

Note: You can invoke this function directly by pressing the keyboard key "E".

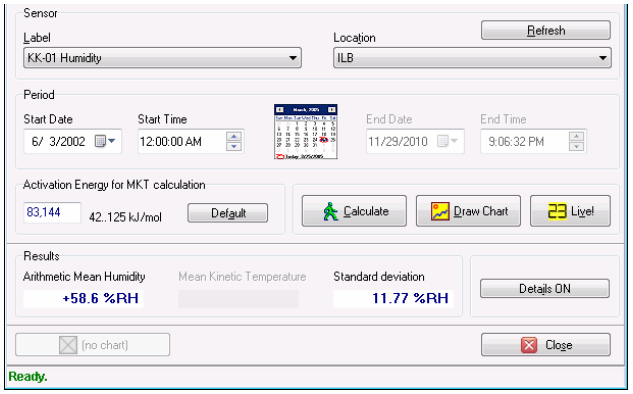


If no data can be found in the data directory for the selected period, *TG Report* will send you a message in the status bar: "*No data found within specified range*" or "*Nothing to do!*".

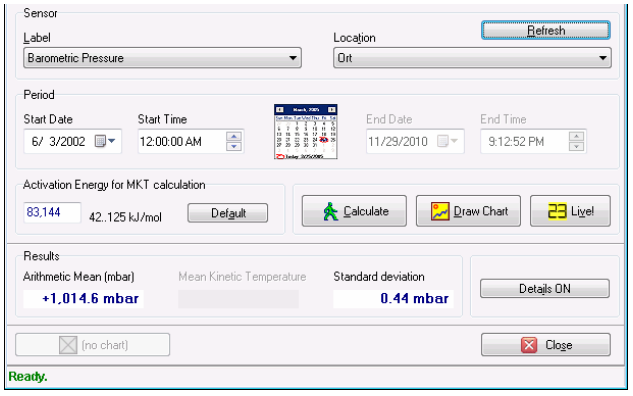
"Calculate" and "Details"



Example for temperature data [°C]



Example for humidity data [%RH]



Example for barometric pressure [mbar]

"Calculate"

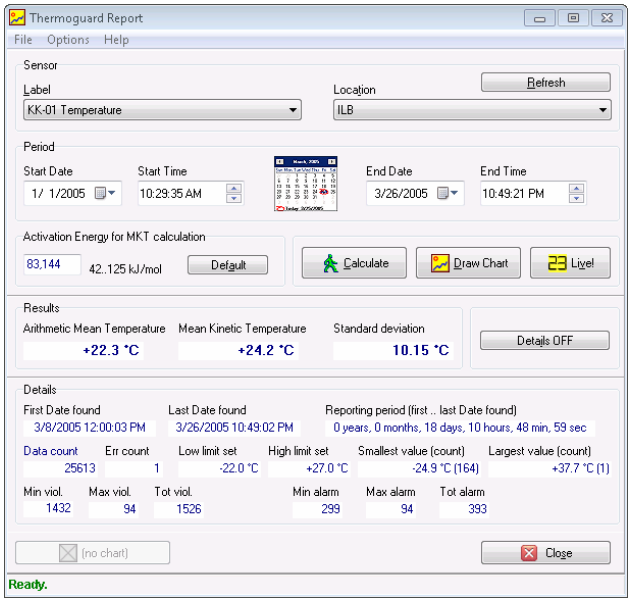
By clicking "Calculate", the data is retrieved and the arithmetic mean ("Arithmetic Mean Temperature/Humidity *or* [Unit]") as well as the Standard deviation is calculated. Additionally - if the sensor's unit is Temperature - the Mean Kinetic Temperature (MKT) for the selected period is calculated and displayed.
See Appendices A3 and A4 for mathematical background.

For an accurate calculation of the mean kinetic temperature, the exact value of the activation energy ΔH of the monitored pharmaceutical substance, to be determined calorimetrically, can be entered in the "Activation Energy ..." field. If the value is unknown usually a default value of 83.144 kJ/mol is used which can be set any time by clicking the "Default" button.

For other units than Temperature (Relative Humidity or any other unit recorded by an AC2nn device, for example barometric pressure in mbar), the Mean Kinetic Temperature can not be calculated. Only the Arithmetic Mean and the Standard deviation are displayed.

After reading the data and calculating the mean values through the "Calculate" button, the "Draw Chart" button for graphic display of the data will be enabled.

Note:
If the sensor is configured as "Switch", all three outputs fields under "Results" are grayed out.



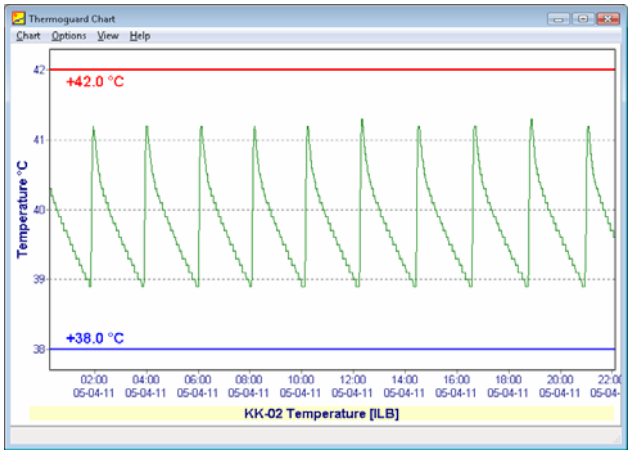
"Details ON/OFF"

The "Details ON" or "Details OFF" button allows showing or hiding the details for the measurements within the selected period.

- Start/end and length of period
- Number of data items, errors, low and high alarm limits as well as minimum and maximum values. The numbers put in brackets indicate how often the lowest or highest value occurred within the period specified.
- Number of exceeded limits as well as number of triggered alarms, separated into Min/Max and Total (=Min + Max) numbers.

The "Details ON/OFF" function is available within the *Chart* window also, which is described in the next chapter.

The Chart Window ("*Thermoguard Chart*")

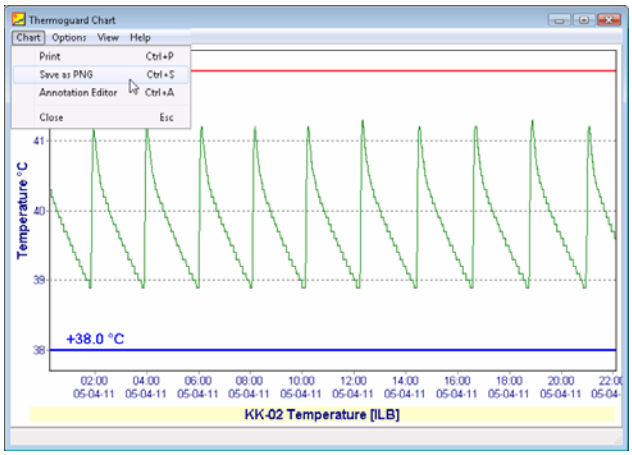


Thermoguard Chart

The "Draw Chart" button lets you open a window containing a graphic display of the measured data. When opening the chart window, all data of the selected period will be displayed.

Vertical alignment depends on the minimum/maximum values set for a sensor.

Any number of chart windows, e.g. for various sensors or periods, can be opened at the same time.



*Via the Chart menu you can invoke the **Annotation Editor** (or directly by pressing Strg+a). See separate chapter.*

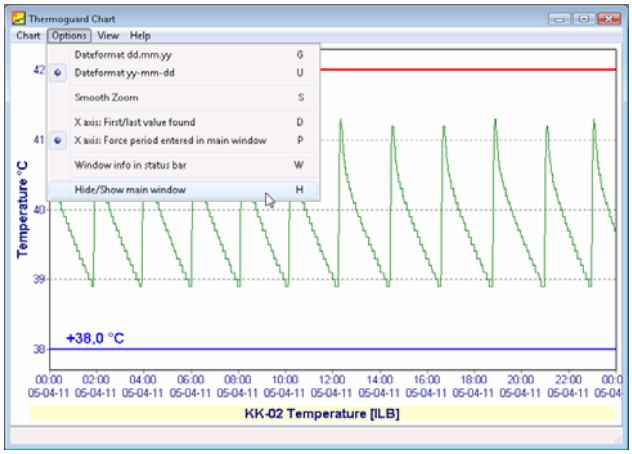
"Chart" Menu: Printing and Saving the graphic

The "Print" item allows printing the currently displayed graphic. You may use Strg+p alternatively.

The size of the printed graphic depends on the currently set window dimensions. In order to achieve maximum print quality you therefore should maximize the window before printing.

The "Save as PNG" (Strg+s) item allows saving the currently displayed graphic in "Portable Network Graphics PNG" format for usage with other programs.
Possibly displayed details (via "View" menu => Details on/off) are printed (respectively saved to file), too. The window frame will be ignored though.

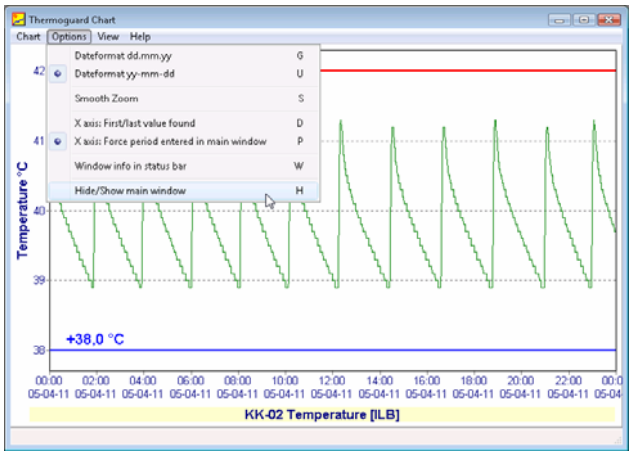
Notice that the size of the saved graphic depends on the currently set window dimensions.



"Options" Menu:

"Dateformat ..." items: Toggles the date format which is used for labeling the chart's time axis.

"Hide/Show main window" allows to fade out the main window in case it is not needed or "disturbing" (e.g. when a permanent control scenario using several *Thermoguard Live!* windows at the same time is active).

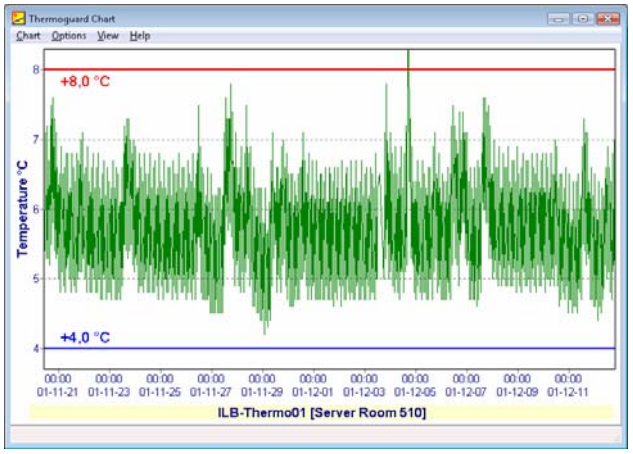


"Options" Menu continued

"X axis: First/last value found"
or
"X axis: Force period entered in main window"

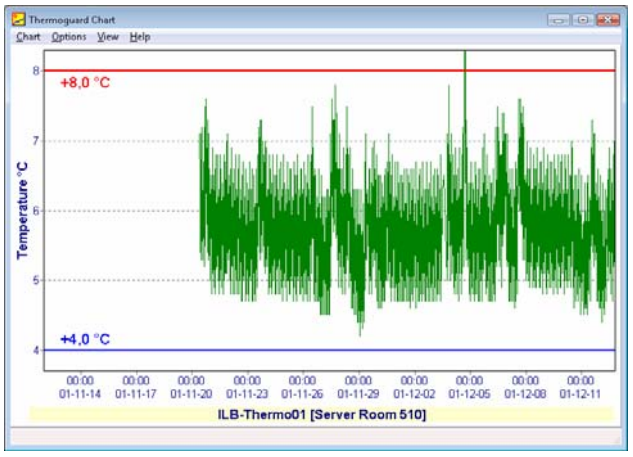
When selecting the second of these options the output only differs compared to the first if no data had been recorded for the sensor at the beginning and/or at the end of the period selected in the main window. In this case the affected period is left "blank".

The following sample illustrates the result:



The selected Start Date is November 11, 2001.
However, the first available value has been recorded not before November 20, 2001.

Using option
"X axis: First/last value found"
the display period starts with the Date of the first measured value. The resulting chart looks as shown left.



Using option
"X axis: Force period entered in main window "
the complete period as selected in the main window is displayed including dates with no data. I.e. the "empty" period from November 11 until November 20 is also shown as blank space at the beginning of the chart when the window opens.
Now, the resulting chart looks as shown left.

Selecting this option makes sense if you want to compare charts for different sensors and for one of them no data is available at the start or end of the desired display period. A "manual" adjustment would be very inconvenient here.

Note that the setting of this X axis option also affects the "Reset chart display" function of the "View" menu.

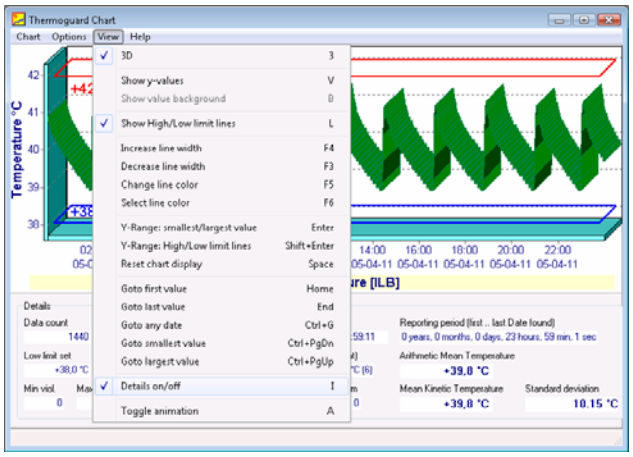
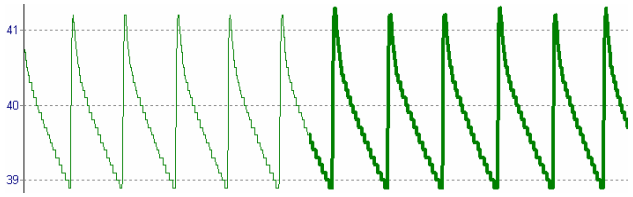


Chart window using 3D mode and details



*Key F4 increases the **line width**, F3 decreases it.*

*F5 sets one of 8 preset colors for the **line color**.*
F6 opens a dialog where you can pick any color. However, if the selected color is "too yellowish" (reserved for FAIL) or to bright, an error message is displayed. Then, you must select a different color.

"View" Menu:

"Show High/Low limit lines" allows hiding the red and blue high and low alarm limit lines.

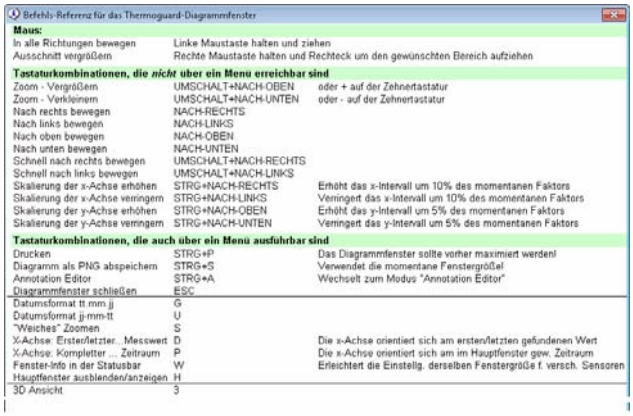
Always the alarm limits currently set in the *Thermoguard* main program are displayed.

The "Details on/off" item (or the [i] key) allows showing or hiding measurement details within the selected period as in the main window.

"Y-Range: smallest/largest value": By pressing the ENTER key, the y-axis is adjusted to the smallest and largest y values present in the current section.
"Y-Range: High/Low limit lines": By pressing Shift+ENTER, the y-axis scaling is based on the the values of the alarm limit lines.

"Reset chart display": The SPACE bar restores the display used on initially opening the chart window.

The other items are self-explanatory.



(image section only)

"Help" Menu:
Thermoguard Chart Window Command Reference

Opens a table containing all mouse and keyboard shortcuts for customizing and modifying the graphic display.

We recommend that you try all listed key and mouse options to get a feeling for the optimum "navigation"/view of the displayed graphic.

Additionally, functions for variable scaling of the x- and y-axis and for zooming in and zooming out are available.

Most important mouse functions:

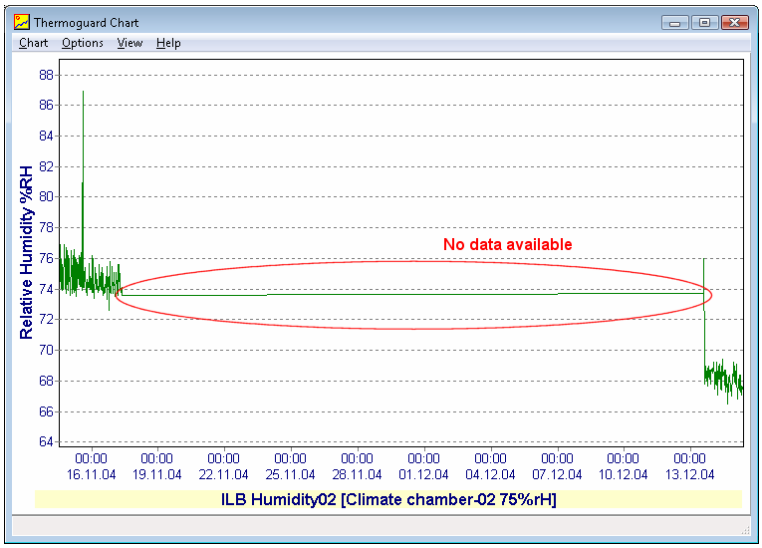
- Hold the left mouse button while moving the mouse to move the window contents horizontally or vertically.
- Hold the right mouse button to select a frame to enlarge ("Zoom").

Additional Information about the Chart Window

- You can open as many *Chart* windows as you want; even for the same sensor.

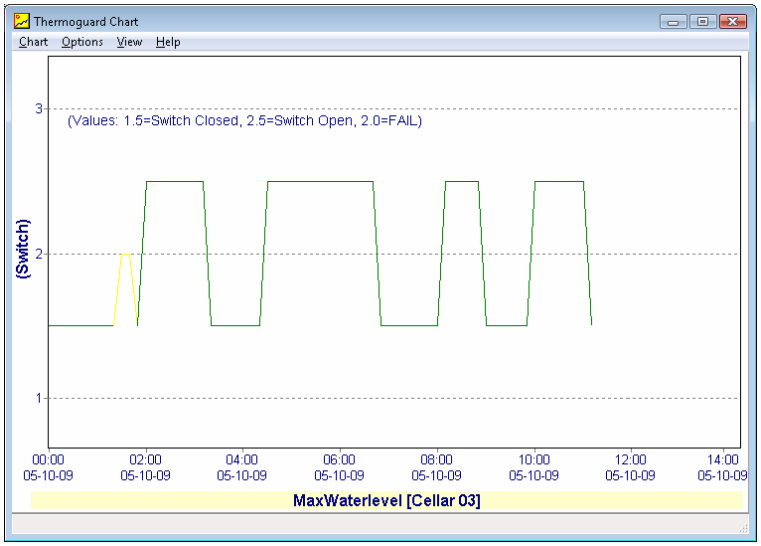
- The settings from the last *Chart* windows closed are stored in the configuration file `TG-Report.ini` under the section `[TfrmChart]`. These settings are re-used next time, when a Chart window is opened again. These settings are not stored for each sensor individually (which does the *Live*! function).

- Display of missing data:



Missing data are represented by a continuous line and may not be recognized easily, as shown in the example!

- Display if a sensor is configured as "Switch"
- Line color for "FAIL":

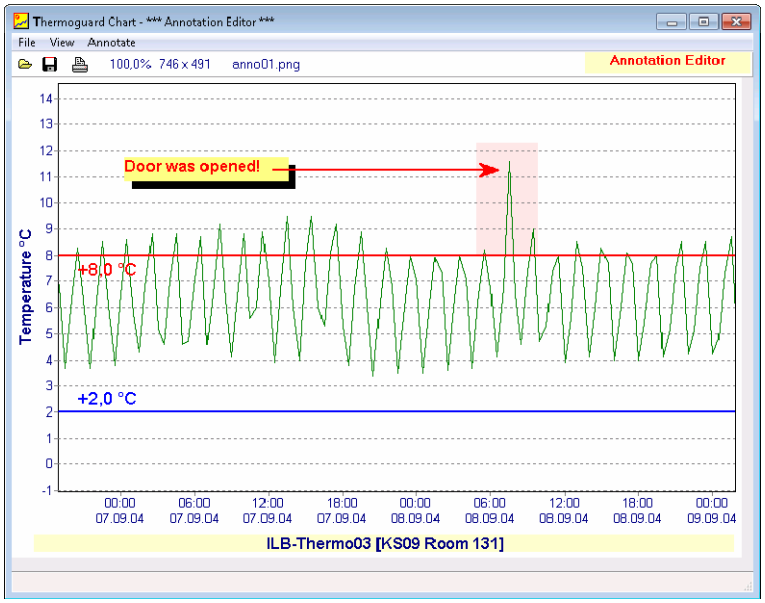


A sensor used with the "Switch" function shows a special On/Off chart (the "Switch" function is described in the *Thermoguard* System Manual).

Data lines with the entry FAIL instead of real values are represented with a yellow line from the last real data point before to the next real data point.

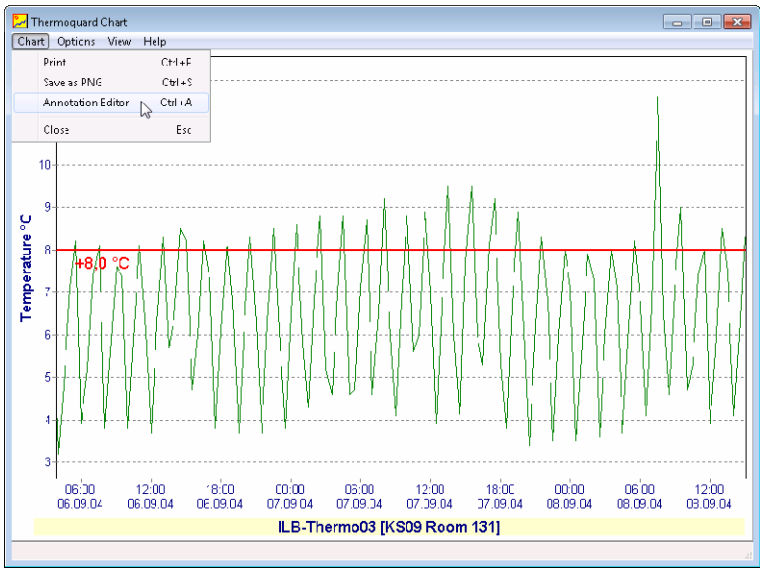
The Annotation Editor

An "Annotation" is a graphical note which can be added to a *Thermoguard* chart and printed out or saved together with the chart. An annotation can be used to emphasize certain areas of a chart or to comment values violating the set limits exceptionally.
By adding a transparent annotation of type "image" it is even possible to superimpose two different value curves.



Example of commenting a chart using the Annotation Editor.

Here, three annotations of type "Note", "Image" and "Rectangle" were added.



Starting the Annotation Editor:
The Annotation Editor is invoked via the *Thermoguard* chart window's "Chart" menu. Alternatively you may use keyboard shortcut Ctrl+a directly.

As for printing and saving a chart the following applies:

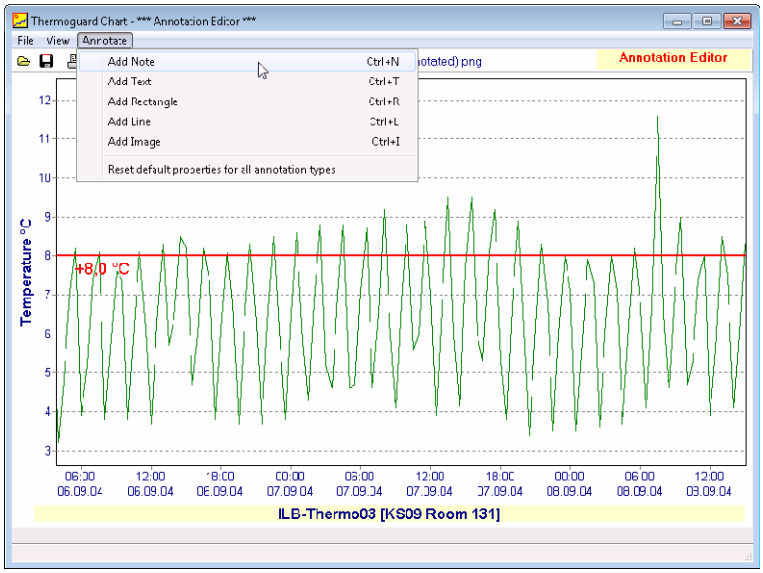
The size of the annotated graphic depends on the currently set window dimensions.
In order to achieve maximum quality of the resulting graphic (respectively its printout) you therefore should maximize the window before annotating the chart.

The Annotation Editor receives the current section of a chart as a static "snapshot" from the chart window. This means that after invoking the Annotation Editor the functionality of the chart window (e.g. shifting or zooming the curve) is no longer available. Thus, carefully set all desired characteristics of the chart to be annotated before entering the Annotation Editor Mode.

Basic Annotation Editor behavior:
You can add as many annotations as you want to a chart graphic. As long as you do not save the annotated chart, you are able to edit any of the annotations (e.g. move it, change its dimension or other properties or delete it).

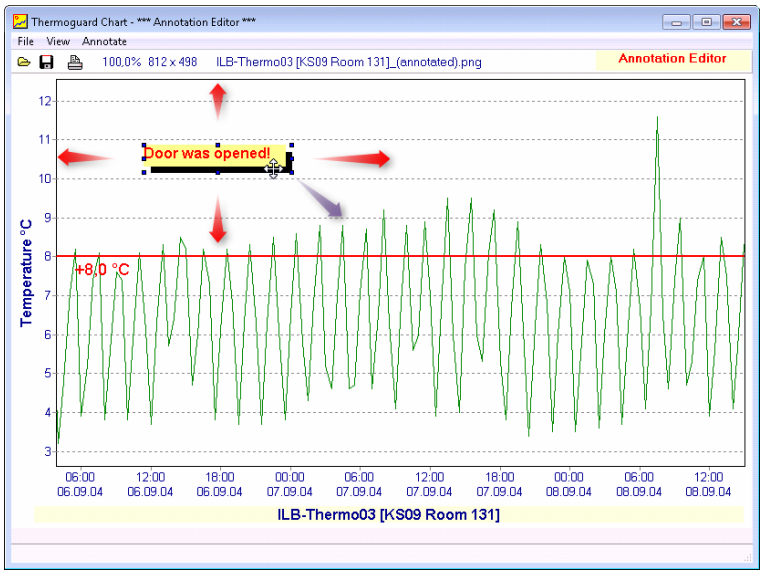
On saving the annotated chart, all annotations are "burned" into the graphic and can no longer be edited afterwards!

However, you may add further annotations after saving the graphic in addition to the already "burned in" annotations.



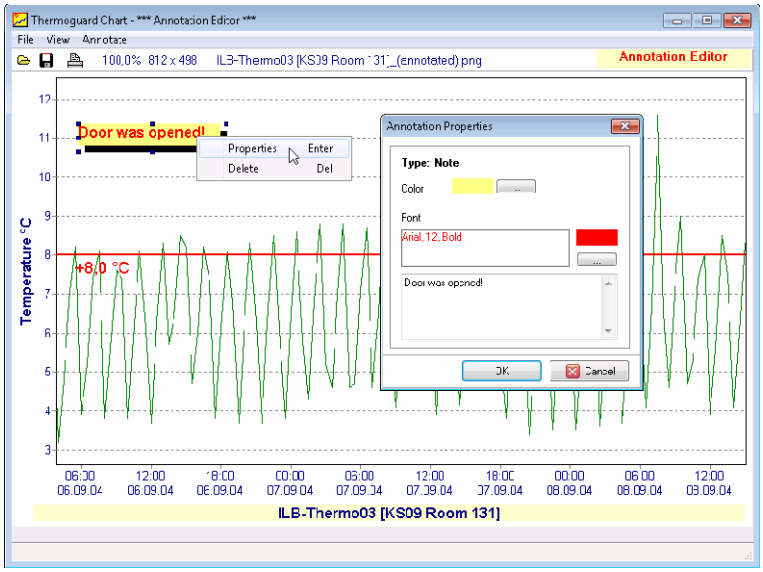
Adding an annotation:
There are 5 different types of annotations which may be selected via the "Annotate" menu or directly using the corresponding keyboard shortcuts (see screenshot shown on the left):

- Note
- Text
- Rectangle
- Line
- Image



An annotation (here of type Note) will always be positioned in the upper left corner of the chart and can be moved after being inserted. To move the annotation either use the mouse (click the annotation and hold the left mouse button while moving the mouse) or alternatively by pressing the cursor keys (Shift key+cursor key for faster movement).

By dragging the annotation at its markers its size can be changed.



Editing an annotation's properties:
Always, first click the annotation you want to edit (=> the "markers" show up).
Then, choose one of the following three alternative possibilities to enter the properties dialog:

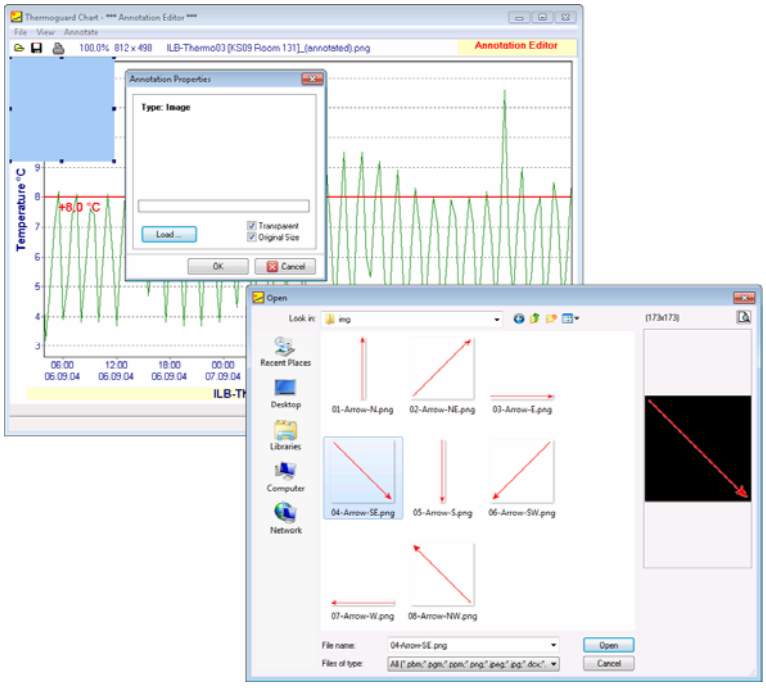
- The "Annotate" menu shows two additional items "Properties" and "Delete". Select "Properties".

or

- Right click the marked annotation and select "Properties" from the context menu (this method is shown on the left).

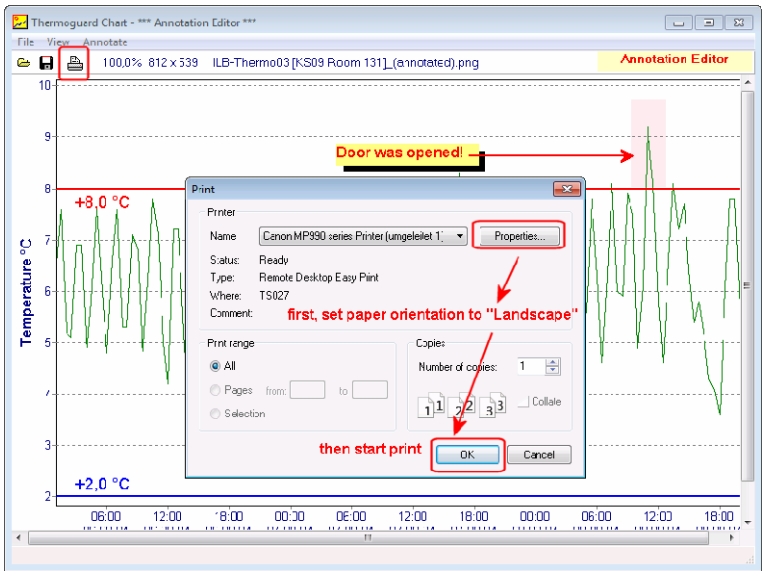
or

- Just press the "Enter" key.



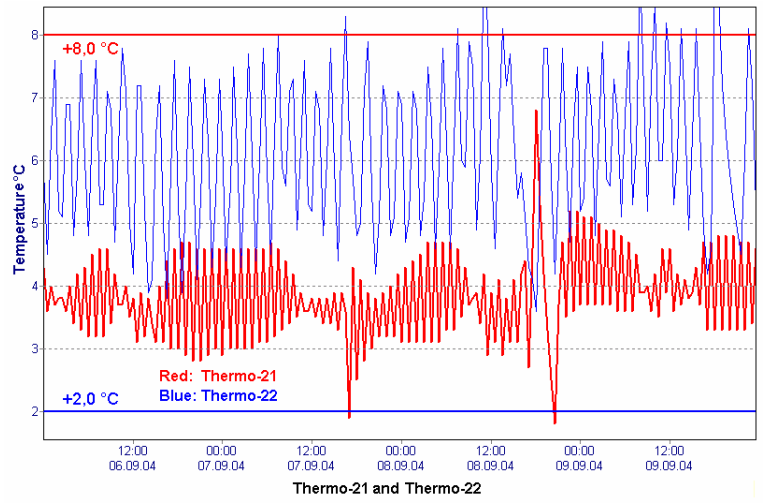
Annotation of type "Image":
After clicking "Load" you can select any graphics file and add it to your chart. A typical scenario is to add your company logo.

In the directory `%ALLUSERSPROFILE%\TGReport Data\img` the installation provides 8 different red arrows which may be used for image annotations as well (shown on the left).



Notes on printing out the annotated graphic:
In most cases the printer's page orientation setting should be set to "Landscape" before starting the printout (see screenshot shown on the left).

Before printing out an annotated chart it is *not* mandatory to save it first. However pay attention to the fact, that the markers of a selected annotation will be included in the printout. To prevent this click shortly on the background to revoke the selection-markers before printout.



Two combined temperature curves using the Annotation Editor

Combining two charts:
As a requirement the two charts you want to superimpose should be equal regarding the measured unit, the time period, the low/high limits and should be saved using the same x/y scaling. This is mandatory for a congruent combination of the two charts.
First, save both charts from within the chart window. In the example shown on the left, different line colors were set and the line width was increased for "Thermo-21".
Call the Annotation Editor from one of the chart windows and insert the previously saved other chart file as a transparent "Image" annotation. An "Image" annotation is always positioned at the very top left corner. Hence, if the above mentioned requirements are met, a congruent match of the two curves will be achieved.
Afterwards you may add further annotations. In the example a legend was added using two text type annotations. The original yellow subtitle line was covered by a non-transparent white rectangle annotation and finally the new black subtitle was placed (again of type "Text").

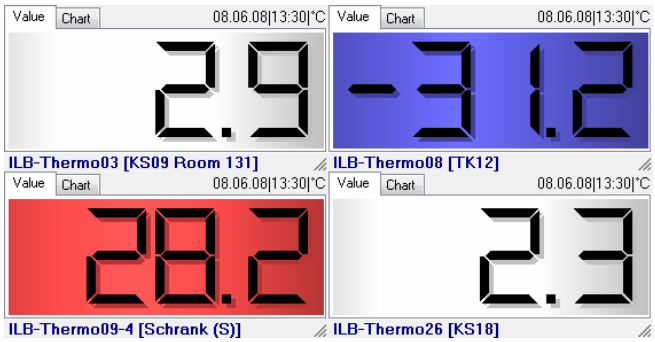
Reset default properties for all annotation types ("Annotate" menu):
All properties (except the position) of an annotation type are saved to the configuration file `TGReport.ini` in section `[TfrmAnnoProp]` and are re-applied after terminating and restarting the program.
Via menu item "Reset default properties for all annotation types" this `[TfrmAnnoProp]` section will be deleted from the configuration file completely. Annotation type's factory settings will be set on adding an annotation after this function has been executed.

Thermoguard Report Live!

Principle

The *Thermoguard* main program collects and stores all sensor data automatically, whereas *TG Report* is able to calculate and show them with the *Live!* function near real time.

A *TG Report Live!* window reads all 1.5 seconds the last measured value from the last `*.tg` file and shows it as free scalable digital display or as a continuously drawn chart.



TG Live! windows set for 4 different sensors

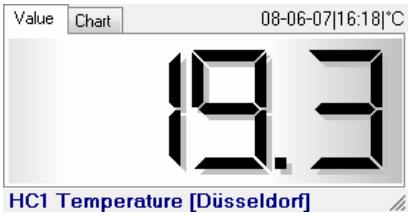
Several *TG Report Live!* windows can be opened and arranged at the same time.

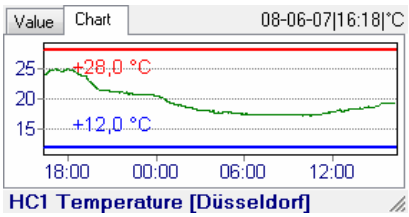
TG Live! shown on a Plasma display

The windows size depends only on the display size and resolution.

Running *Thermoguard Live!*

A *TG Report Live!* window is opened for the selected sensor showing the current value using the "Live!" button of the main window.

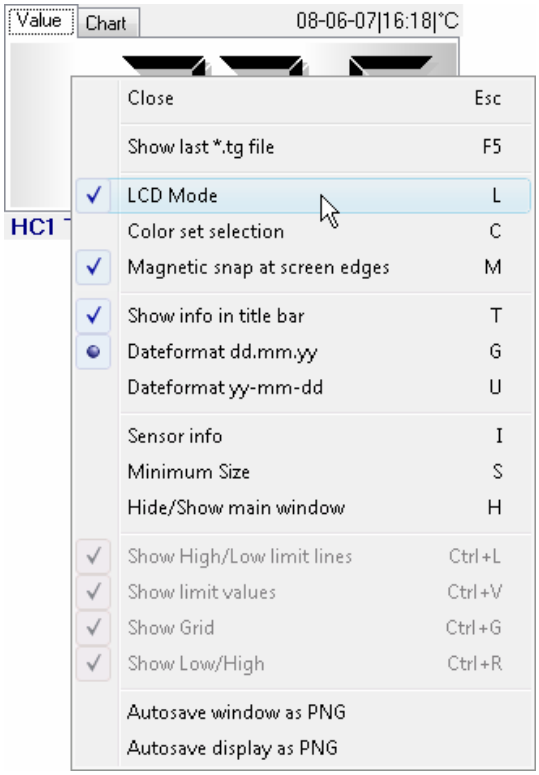




Thermoguard Live! Value and Chart

Two register cards can be selected: Value and Chart. Value shows the recorded data as numeric value, while Chart opens a separate window with a continuously drawn chart. The displayed period can be user defined from 1..24 hours.

Several Value and Chart windows for several sensors can be opened and arranged at the same time.



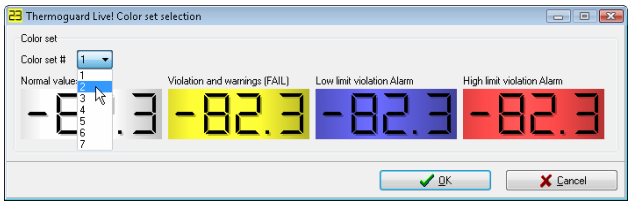
Context menu for "Value" Mode

The "Non-LCD Mode" includes the unit

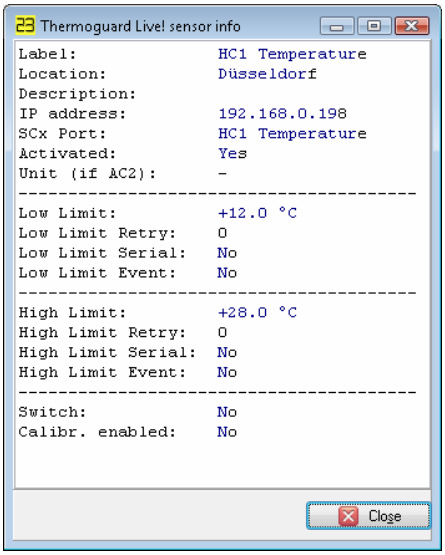
Live! Options for Value Mode

A click with the right mouse button within the *Live!* Value window shows the options menu:

- "Show last *.tg file": Opens the last saved file with the sensor data
- "LCD Mode": Shows either a window using LCD style or a proportional font style. The latter ("Non-LCD Mode") shows the physical unit and sign ("+") too, if appropriate.
- "Color set selection ": Allows the selection of at least seven different "Color Sets" for showing the LCD window.
- "Magnetic snap at screen edges": Switches the "Border Snap" function On and Off.
- "Show info in title bar": Shows or hides the current Date and the physical unit of the data shown at the upper border of the window.
- "Date format ...": Toggles between European and U.S. format of Date in the title border.
- "Sensor Info": Shows information for the selected sensor and its settings in a separate window
- "Minimum Size": Minimizes the window to the smallest supported size
- "Hide/Show main window": Hides or restores the *TG Report* main window



Color set selection dialog



Sensor information window

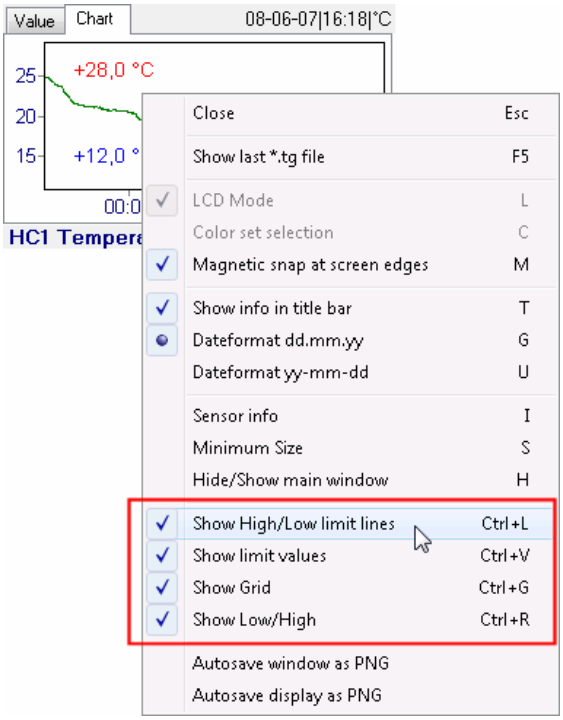
- "Autosave window as PNG ": If this item is checked, every time the contents of the *Live!* window changes, a *.png graphic file of the whole *Live!* window will be saved automatically to the *Thermoguard Report* configuration path.
  This is by default `%ALLUSERSPROFILE%\ TGReport Data`. Here, `%ALLUSERSPROFILE%` is a system environment variable pointing by default to the following paths:
  For Windows XP/Server 2003:
  `C:\Documents and Settings \All Users`
  For Windows Vista/Windows 7/Server 2008(R2):
  `C:\ProgramData`
  The scheme for the filename is:
  `TGLive_[Label]__[Location]__[Mode]_w.png`
  Here, [Mode] is = "crt" for Non-LCD Mode and " lcd" for LCD Mode. Special characters, spaces and characters which are invalid for filenames are replaced by "_". So there will be no problems when uploading the files to a (UNIX) web server.

- "Autosave display as PNG": As before, but just the display without the surrounding window frame is saved. Filename scheme's suffix is "d" instead of "w":
  `TGLive_[Name]__[Ort]__[modus]_d.png`

  The saved files may be uploaded to a website on a regular basis using a FTP scheduler program. If implementing such a scenario, remember to set the dimensions within the HTML code of the website to the exact ones of the according *Live!* windows.

  There are four types of graphic files possible:
  * Whole window, LCD Mode
  * Display only, LCD Mode
  * Whole window, Non-LCD Mode
  * Display only, Non-LCD Mode

  At least 2 *Live!* windows must be active for the same sensor (1x LCD, 1x Non-LCD, both "Autosave..." options checked) to get 4 different files e.g. with these sample filenames:
  `TGLive_MySens__D_sseldorf__lcd_w.png`
  `TGLive_MySens__D_sseldorf__lcd_d.png`
  `TGLive_MySens__D_sseldorf__crt_w.png`
  `TGLive_MySens__D_sseldorf__crt_d.png`

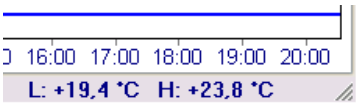


Context menu for "Chart" mode

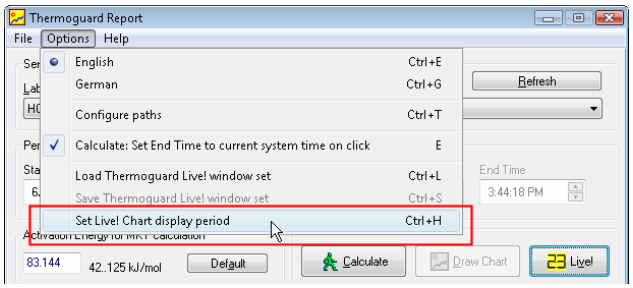
Live! Options for Chart Mode

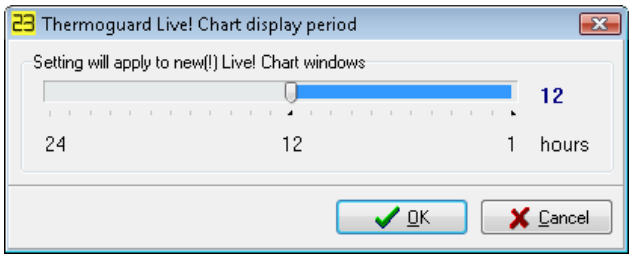
A click with the right mouse button within the *Chart* window shows the options menu:
Four additional items are enabled which are not available in *Value* mode:

- "Show High/Low limit lines": Show or hide high (red) and low (blue) limit value lines
- "Show limit values": Shows or hide the numerical values of the upper and lower limit.
- "Show Grid": Show or hide grid lines.
- "Show Low/High: In the statusbar at the bottom of the window the Lowest and Highest value of the currently displayed period are shown ("Peaks") using the format L:[Value] H:[Value]; an example:



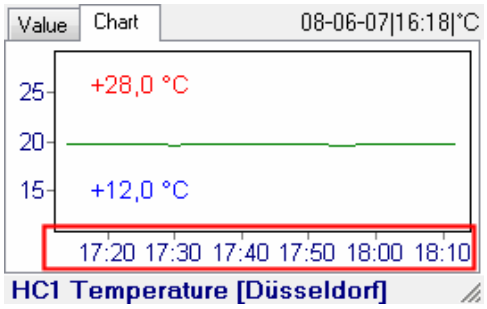
"L:" means "Low", "H:" meand "High"



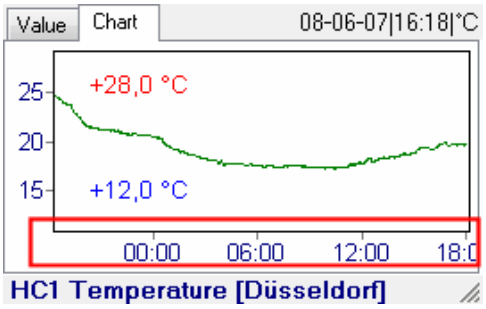


Options for the *Live!* Chart Mode in the *TG Report* Main Window

- "Options" menu:
  "Set Live! Chart display period":
  Sets the time interval of the *Live! Chart* Display between 1 and 24 hours. Default setting is 12 hours.
  A new setting takes effect for all *new Live!* windows.

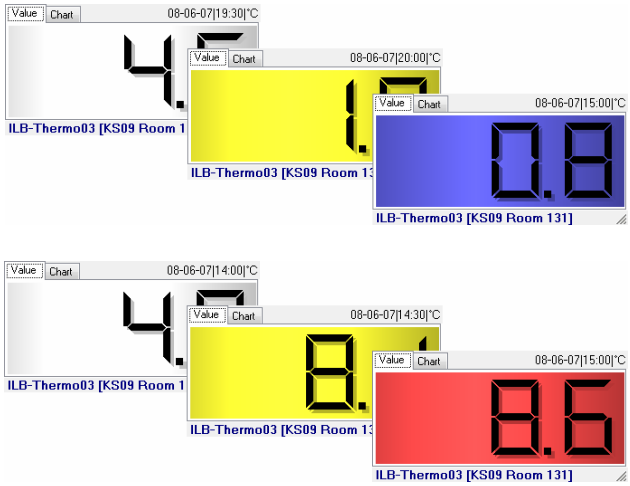


Period = 1 hour



Period = 24 hours

Alarm Visualization in *Value* Mode



Alarms Colors

(here using color set #1)

TG Report Live! shows current violations of the lower or upper limits with different colors.

A simple violation of the lower or upper limit without matching the alarm trials counter is shown as "pre alarm" in yellow color.

Matching the alarm trials counter with the next violation of the lower or upper limit will be shown in blue or red color.

The next value between the lower and upper limit (i.e. within the "valid range") will be shown in white color again.

If the value for alarm trials is set to "0", any value exceeding the lower or upper limit will be shown immediately in blue or red color.

TG Report Live! accumulates no alarm states. The digital display shows always the last value and its status color. If the status color is normal (again), the display gives no information if, when and why an alarm might have occurred!

How *Thermoguard Live!* alarm colors are assigned to *Thermoguard* alarm states

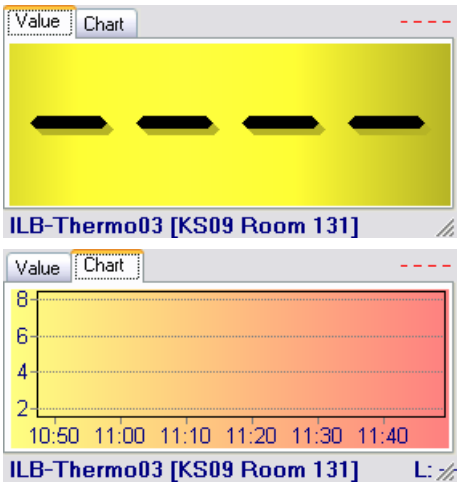
TG Live! does not use the sensor limit settings from the `TGuard.scx` file. Instead, the information from the corresponding sensor's `*.tg` file are used solely.

Examples:

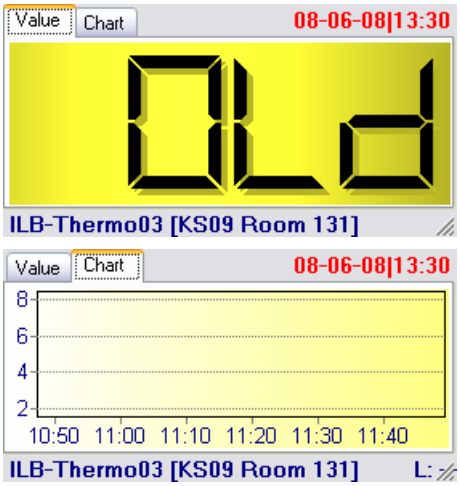
*.tg file				*TGLive!* Display:
07.06.2008	08:30:00	-21.3		white
07.06.2008	09:00:00	-21.4		white
07.06.2008	09:30:00	-5.8	1/1+	yellow
07.06.2008	10:00:00	-10.2	2/1+ A+	red
07.06.2008	10:30:00	-11.9	1/1+	yellow
07.06.2008	11:00:00	-12.6		white
07.06.2008	11:30:00	-13.2		white
07.06.2008	12:00:00	-31.0	1/1-	yellow
07.06.2008	12:30:00	-31.2	2/1- A-	blue

If no trial is configured for a sensor (sensor configuration in the main program), *TG Live!* will never show a window with yellow background for this sensor in *Value* mode.

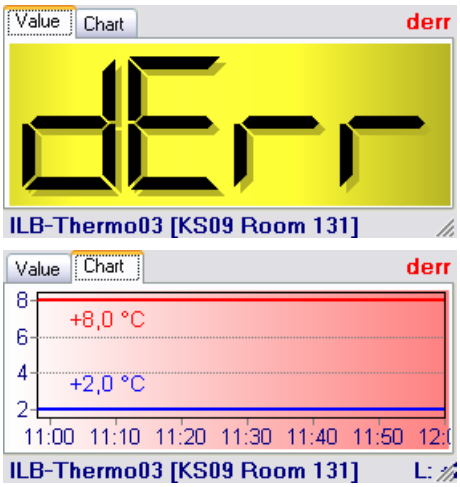
Error Messages, their visualization and Causes



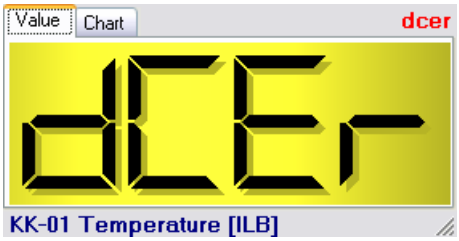
- **Error "- - - -":**
  No data could be read
  Possible reasons:
  * There are no data for this sensor polled and stored until now (no *.tg file exists for this sensor yet)
  * File access denied (*.tg file is locked)
  * An empty line at the end of the corresponding *.tg file.
  In the window headline "----" will blink in red color, when this error message occurs. Blinking will even occur, when the option "Show info in title bar" is disabled.
  In Chart mode, the background shows a yellow-red blinking gradient.

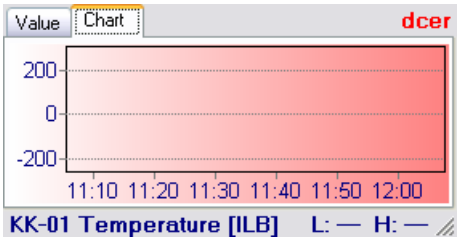


- **Error " Old":**
  The value is outdated
  Reason: The difference between the values time and date and current system time and date exceeds the polling time interval. This error message can only occur, when the polling interval is set to "Every n minutes"!
  Date and time in the window headline will blink in red color, when this error message occurs. Blinking will even occur, when the option "Show info in title bar" is disabled.
  In Chart mode, the background shows a white-yellow blinking gradient.

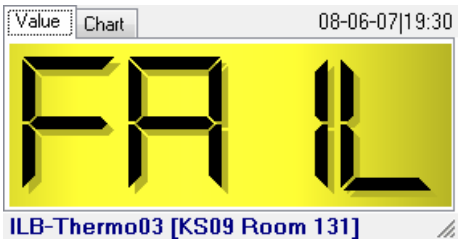


- **Error "dErr":**
  Data are not complete or faulty (Data Error)
  Possible reasons:
  Data are manipulated intentionally or by mistake; or there might be read/write errors. E.g.: There must be at least one tab character within any line of a *.tg file. Missing this tab character will cause a Data Error.
  In the window headline "derr" will blink in red color, when this error message occurs. Blinking will even occur, when the option "Show info in title bar" is disabled.
  In Chart mode, the background shows a white-red blinking gradient.

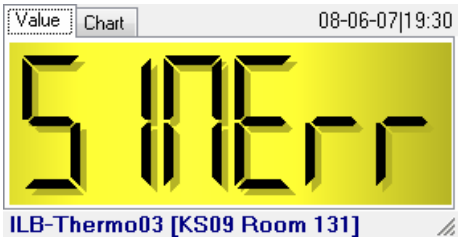




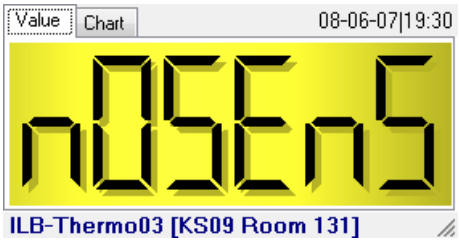
- **Error "dcEr":**
  Decryption error during decoding the encrypted data
  Possible reason:
  Data are manipulated intentionally.
  In the window headline "dcerr" will blink in red color, when this error message occurs. Blinking will even occur, when the option "Show info in title bar" is disabled.
  In Chart mode, the background shows a white-red blinking gradient.



- **Error "FAIL":**
  No value could be polled for this sensor ("Alarm on Fail")
  Possible reasons:
  There might be a network or power failure, license error etc. For more reasons, please see the *Thermoguard* System Manual.
  You may press F5 to load the corresponding *.tg file into your text editor; then take a look at the last entry to get more detailed information, e.g. "FAIL (NO DATA received)".
  No special visualization in Chart Mode, but note these paragraphs: Display of missing data and Line color for "FAIL".



- **Error "SimErr":**
  Error in simulation mode
  Possible reasons:
  The simulation file could not be found or contains an invalid line (see *Thermoguard* System Manual).
  No special visualization in Chart Mode, but note these paragraphs: Display of missing data.



- **Error "NoSens":**
  Sensor missing.
  Possible reasons:
  Sensor missing, cable disrupted etc.
  No special visualization in Chart Mode, but note these paragraphs: Display of missing data.

Live! Window Sets

Autosave of the last settings per Sensor to TGReport.ini
All *Live!* window settings of an individual sensor are stored in a separate section of the file `TGReport.ini` when closing. These settings are re-used, when this sensor windows is opened next time. Sample sections from `TGReport.ini`:

```
[HC1 Temperature-LIVE!]
Settings=0,997,283,145,1,0,1,1,1,1,1,1,1,0,0,R1,R2,R3,R4,R5
[HC1 Humidity-LIVE!]
Settings=421,997,283,168,1,1,1,1,1,1,1,0,0,0,0R1,R2,R3,R4,R5
```

Autosave of the last window configuration when closing *TG Report* to TGReport.tgl
When closing *TG Report*, the last active *Live!* window setting is always saved in the file `TGReport.tgl`. If the file exists it will be overwritten.
The `TGReport.tgl` file is always read at program start; therefore the last active configuration will be restored.
If there is no *Live!* window when closing the program, no `TGReport.tgl` file at all will be created (no one with a size of 0 byte either).

The settings of *all Live!* windows are stored in a `*.tgl` file - i.e. even settings for multiple windows for the very same sensor. Sample lines from a `*.tgl` file:

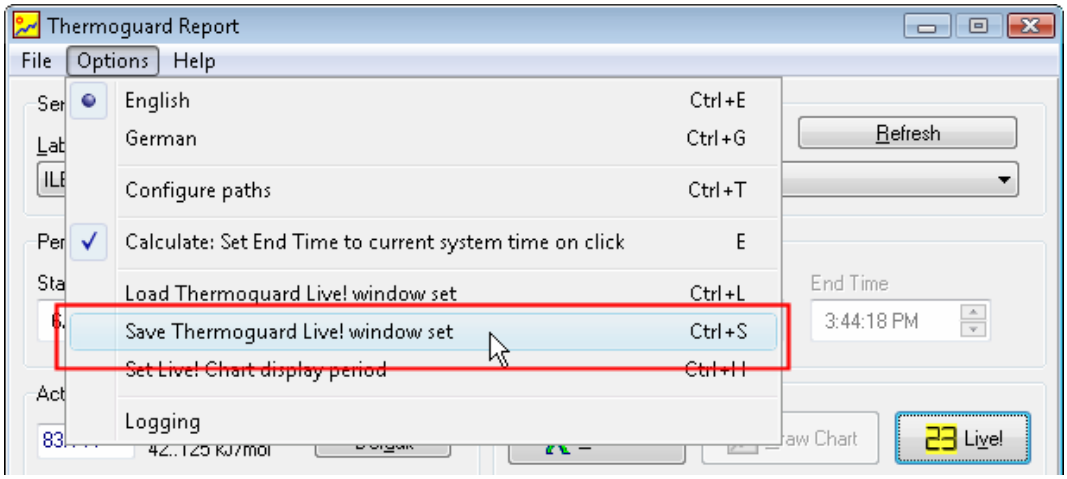
```
ILB-Thermo03,63,99,283,145,1,0,1,1,1,1,1,1,1,0,0,R1,R2,R3,R4,R5
ILB-Thermo03,63,382,283,145,1,1,1,1,1,1,1,1,1,0,0,R1,R2,R3,R4,R5
ILB-Thermo09-4,224,102,283,145,1,0,1,1,1,1,1,1,1,0,0,R1,R2,R3,R4,R5
ILB-Thermo09-4,224,385,283,145,1,1,1,1,1,1,1,1,1,0,0,R1,R2,R3,R4,R5
```

In this example for each of the two sensors a value *as well as a* chart *window were opened.*

=>

Saving and loading of complete window sets with a dedicated name

Using the menu options "Save/Load Thermoguard Live! window set" of the *TG Report* main window, all current *Live!* windows and their settings can be saved and loaded using a dedicated name of your choice:



If a *Live!* window set is to be opened and one or more *Live!* windows are already active, a request for closing of these windows will show up.

If you do *not* close the existing windows while loading the very same set again, the windows are stacked exactly on top of each other!

The number of actual opened windows is shown in the button for closing all charts in the main window:

The shown number refers to all opened *TG Report* windows; including all *Live!* and all static *Chart* windows.

Using the command line switch **`/tgl:<Filename>`**, a previously saved `*.tgl` file is opened automatically (possibly via a desktop shortcut). Example:

`C:\Program Files\Thermoguard\TGReport\TGReport.exe /tgl:Climatic_Chambers`

If no file extension is entered, `.tgl` is set automatically.
If not path is entered (like in the example above), the default path `%ALLUSERSPROFILE%\TGReport Data` is set automatically. If the *.tgl file should reside in a different path, the path can be included in the parameter after `/tgl:`.

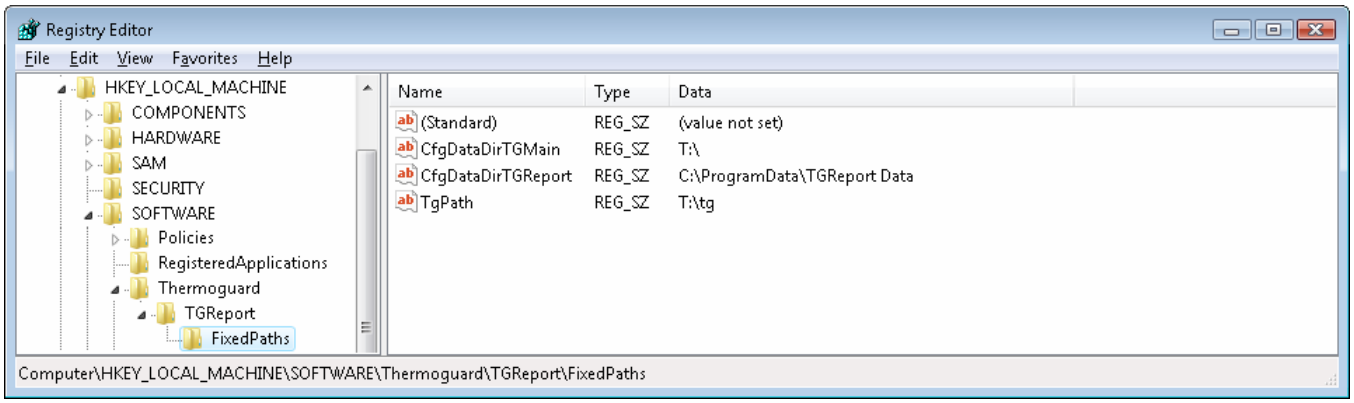
The corresponding entry for a sensor within the saved settings is ignored, when the sensor does no longer exist. If at least no corresponding sensor is existing, "nothing" will happen while opening a `*.tgl` file with such orphaned entries.

A1: For Administrators: Configure fixed Path Presets

There is the possibility for an administrator to preset fixed *TG Report* paths by creating the following registry entries manually:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Thermoguard\TGReport\FixedPaths]
CfgDataDirTGReport=[Path]
CfgDataDirTGMain  =[Path]
TgPath            =[Path]
```

In the example shown below, the *TG Report* configuration path is the default setting (here for Windows Vista) whereas the configuration path of the main program as well as the *.tg path had been set to a network drive `T:`, which is mapped to a readonly network share:



A standard user can not alter this paths, because:

- He has no write access to `HKEY_LOCAL_MACHINE`
- The menu item "Options" => "Configure paths" is not present any longer
- The command line switch `/CfgDataDir:<Directory>` has no effect.

Setting fixed paths prevents data manipulation or the possibility that a user alters the important base path settings for *TG Report* intentionally or unintentionally.
Note that the option to display all current path setting using "Help" menu => "About / Path Information" is *not* suppressed.

A2: Freeware Program "allSnap"

The option "Magnetic snap at screen edges" for a *TG Report Live!* window drags the window to the screens edge. However, if several Live! windows are open it often is desirable that the windows will **snap to each other** as they are aligned as well.

Such a feature is provided by the free software "allSnap", which can be downloaded here: http://www.allsnap.org/

It is also located on the *Thermoguard* CD in directory `\Weitere Software\allSnap`.

A3: Arithmetic and Mean kinetic Temperature

The arithmetic mean temperature in an observation period is a simple measure for thermal pressure on stored products. The durability of a product is directly dependent on the thermal pressure.

Like most chemical processes, the speed of aging processes in organic matter such as foodstuff or pharmaceuticals is not linear in line with the temperature, though, but follows an exponential function. Higher temperatures in a particular period have an exponentially over-proportional influence on lower temperature during the same period.

Even short-term rise in temperature, which may be due to technical disruptions, must therefore not be neglected, and cannot be offset against the corresponding lower temperature within the same period of time.

When calculating the "mean temperature", the higher temperatures must be weighed exponentially. Given this insight, as early as 1971, J. D. Haynes deduced a "mean kinetic temperature" from the gas equation by S. Arrhenius under the title "Worldwide Virtual Temperatures for Product Stability Testing" (Sci. Vol. 60, 927- 929, June 1971).

Today MKT is defined by the United States Pharmacopoeia USP in the chapter on *"pharmaceutical dosage forms"* as *"single calculated temperature at which the total amount of degradation over a particular period is equal to the sum of the individual degradations that would occur at various temperatures"*.

So MKT is a degraded temperature that would expose a chemical compound to the same thermal pressure as a series of higher and lower temperatures. In technical notation, the formula for calculating the mean kinetic temperature for a particular chemical compound or pharmaceutical substance of a product is:

$$MKT = (-\Delta H/R)/ln\{(SUM(exp(-\Delta H/R \cdot T_n))))/n\}$$

or, in algebraic notation:

$$MKT = \frac{\frac{-\Delta H}{R}}{\ln\left\{\frac{\sum_{i=1}^{n} e^{\left(\frac{-\Delta H}{R \cdot T_n}\right)}}{n}\right\}}$$

The abbreviations have the following meaning:

MKT	Mean Kinetic Temperature, calculated as the absolute temperature in Kelvin
ΔH	Activation energy of the chemical compound or the pharmaceutical substance, in kJ/mol
R	Universal gas constant (0,0083144 kJ/molK)
T_n	Absolute temperature during period n, measured in Kelvin
SUM	Sum for n periods
n	Total number of all measured absolute temperature values over the observation period of i=1 to n
ln	Natural logarithm
exp	Exponential function for basis e (2,71828)

The activation energy of a chemical compound can be determined in exact terms by Differential Scanning Calorimetry (DSC). For many pharmaceutical substances, this is in the 42-125 kJ/mol range. For simplicity's sake, though, the activation energy is frequently not determined but defined as equal to a mean value of 83.144 kJ/mol.

In regular storage conditions without fluctuations or extreme temperatures, the arithmetic mean temperature and the mean kinetic temperature match. Thus using a mean value of 83.144 kJ/mol for activation energy is enough for comparing both values for estimating the influence of peak temperatures.

A4: Standard deviation

Thermoguard Report estimates the **standard deviation based on a sample** (ignoring "values" which do not represent regular values - like "error" etc.).
It equals the Microsoft Excel function STDEV.S (Excel 2010, former versions = STDEVS).
A result is not displayed if there is only one single value in the selected time period.

The following formula is used:

$$\sqrt{\frac{\sum (x-\bar{x})^2}{(n-1)}}$$

where *x* is the sample arithmetic mean temperature (displayed in the first output field of the "Results"-frame) of the values and *n* is the "sample size" (i.e. the number of regular values which were measured in the selected time period).