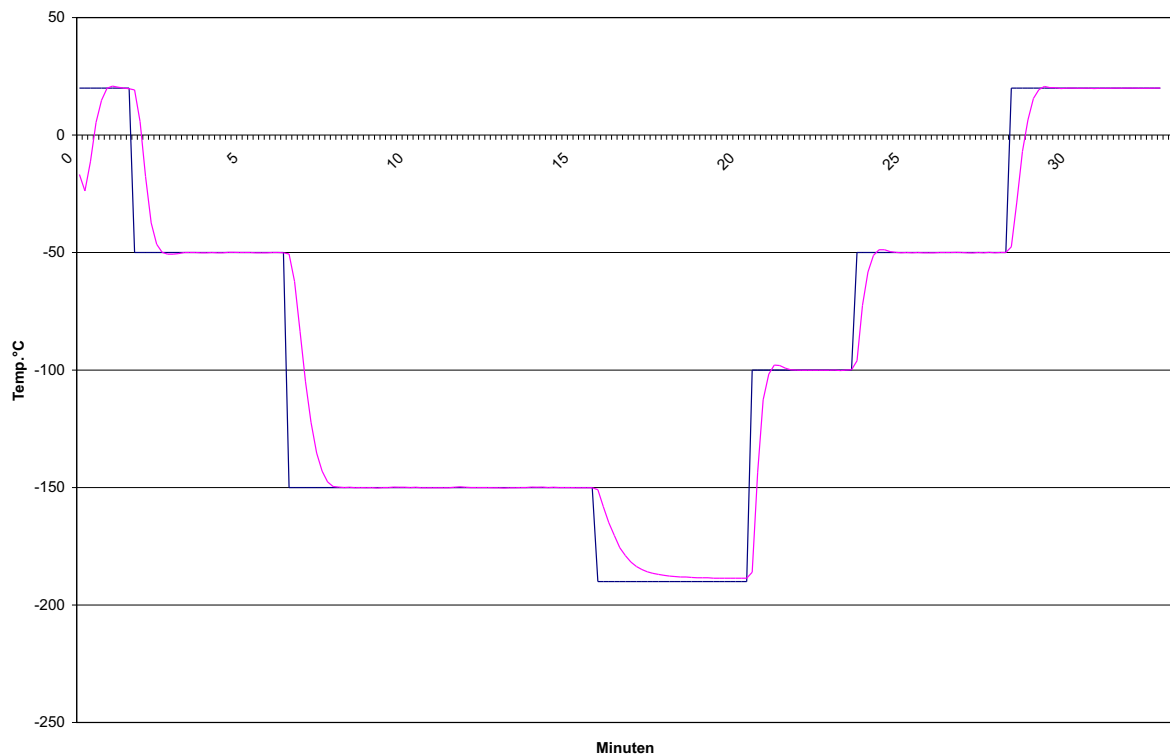# KALTGAS TOOL 2019
for the safety controller SC4/5
Version 4.05.002

Software for controlling a Kaltgas system
Manual

Kaltgas Tool - MANUAL

CONTENTS

Operating Instructions for the Free Sample - Kaltgas Tool 2019 Software

1) Important Warning Information

This software is a free sample and may include errors. It is only made available to customers for testing purposes. KGW-ISOTHERM does not accept any liability for any damages that may arise through any malfunction of the software in connection with a Kaltgas system or any other controller-supported construction.

Therefore, Kaltgas systems must never be operated together with this software without any supervision or technical support.

If any malfunctions should arise when using the software with the safety controller, both the safety controller and the software must be switched off and then restarted. This can also happen if the operator interferes with a running temperature ramp and tries to change this.

2) Installation of the Software and System Requirements

The user friendly software environment allows Kaltgas systems to be controlled easily and conveniently with only a few clicks of a mouse.

Requirements

Data for IBM PC:

Operating systems:	XP, Service Pack 2 Windows 7 or Windows 10
Video RAM:	256 MB
Processor:	At least 1.2 GHz
RAM:	1 GB RAM or higher
Data transfer:	USB (standard RS 232 converter)

Installation

Insert the CD/disk into the appropriate drive and select the file "KaltgasToolSetup."
The following message should appear:
"This will install KGW Kaltgas Tool. Do you wish to continue?"
Confirm this with "Yes."

Now follow the software installation instructions. The program is now installed. This can take a few seconds. If you have an earlier version on your PC, it will automatically be deleted before the new one is installed.

When the installation is complete, you may be asked to restart your PC. We always recommend that you restart your PC after the installation and then start up the software.

3) Technical Structure of the Kaltgas System

The Kaltgas safety controller must be connected to the jet and heater, as well as the temperature sensors (Heater sensor No.2 on plug socket Kaltgas sensor and chamber sensor No.3 on plug socket chamber sensor). The converter is connected to the computer and the safety controller.

1) Heater = N2-Gas converter
2) Heater sensor / Kaltgas hose
3) Chamber sensor
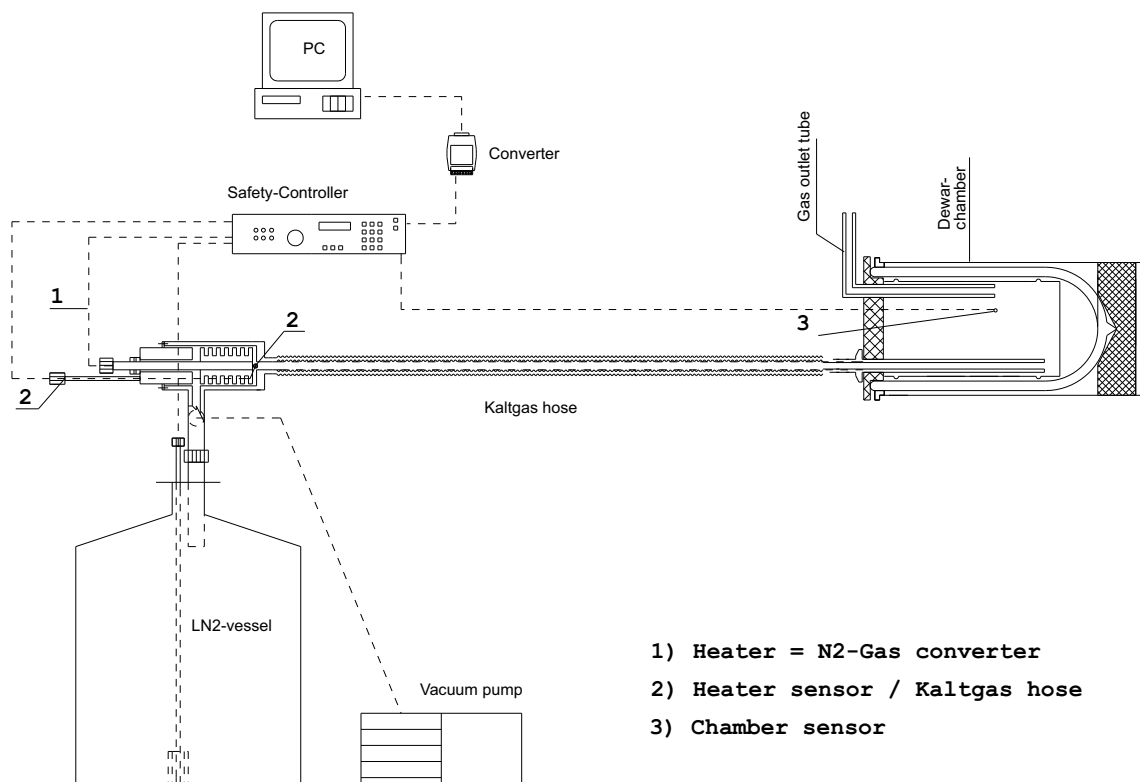
The safety controller is switched on and the jet and heater safety line is activated with a reset.
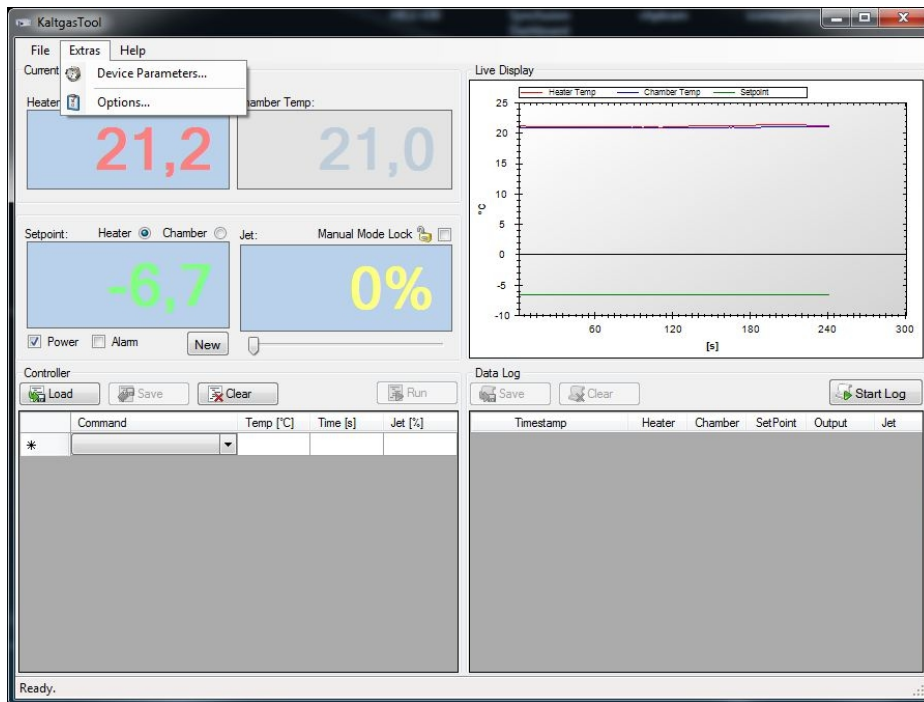The computer can now be switched on and the "Kaltgas Tool" software started up.
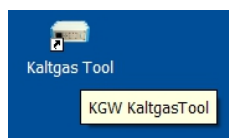
(If this sequence is not followed the program will crash!)

4) Options and Device Settings

The software is running and the "Extras" pull-down menu can be opened.
Than you can open the pull-down menu " Options"

4a)   The following functions must be set in "General Options."

a)   Logging interval (s) = Temperature request time and logging time
                                        in seconds.
b)   Serial interface   = Activate the respective COM interface.

c)   The following functions are fixed settings:
          Unit of time = Temperature request time and logging time in seconds.

d)   Start-up chamber switching point [sec/°C] = Switch over point for the cooling speed
                                                      of the heater sensor to the chamber
                                                      sensor.

The switch over point is defined here at which the software on "start-up chamber" is automatically
switched over from the heater sensor to the chamber sensor. The time/value must be higher with larger
and heavier chambers and correspondingly lower with smaller chambers and lower masses. The standard
value is 60 (in 60 seconds the temperature changes by 1°C).
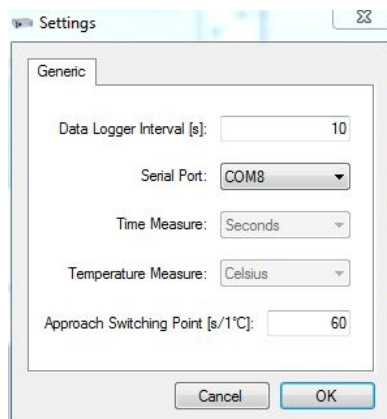
4a) Device Settings

The "Extras" pull-down menu is opened.
The menu item "Device settings" is opened.
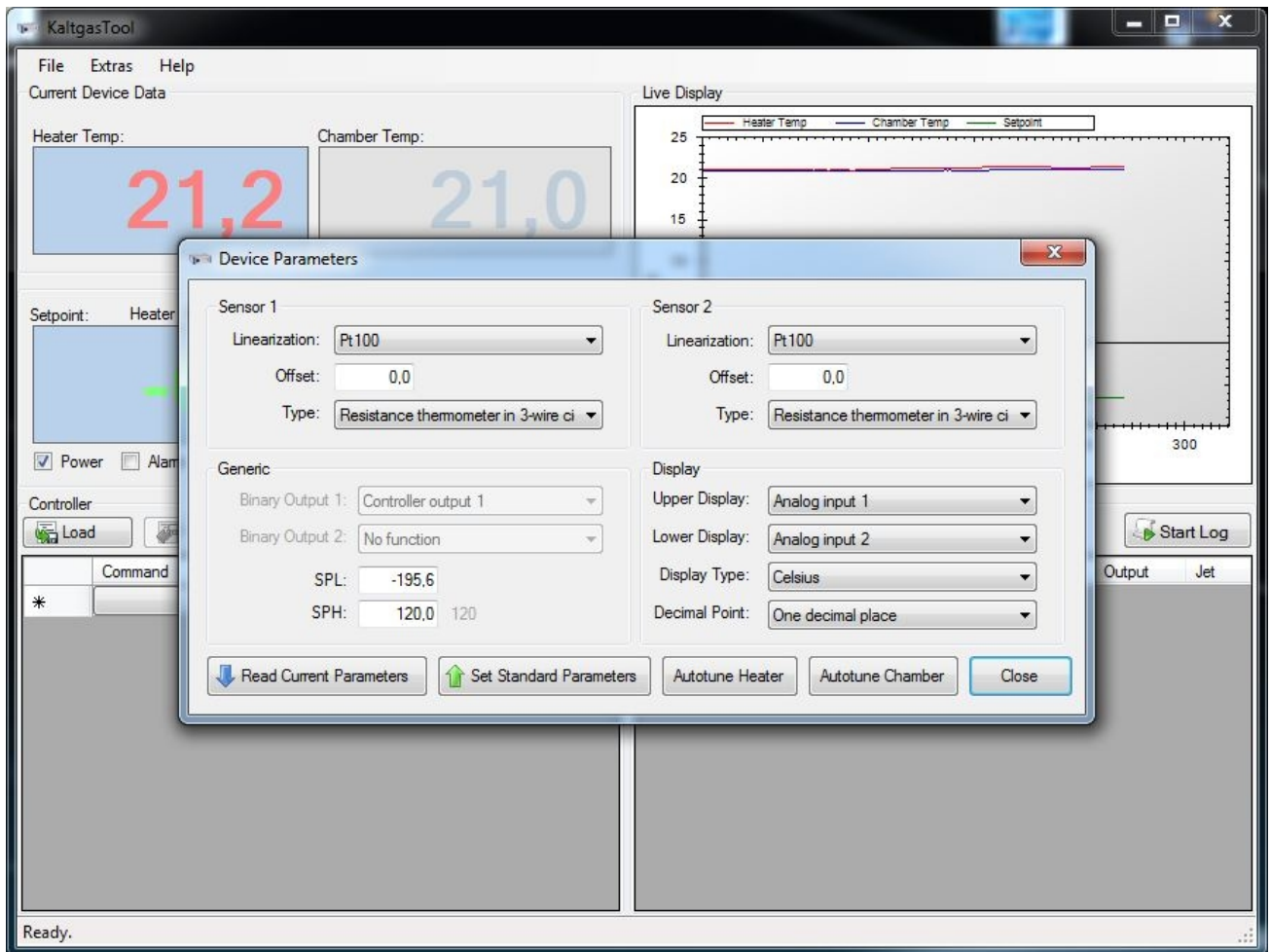
The software supplied has a standard parameter device setting. This enables the user to operate the software with the Kaltgas system immediately without having to make any changes himself.

The factory-set device settings are adjusted to the Kaltgas system that is supplied and, in most cases, require no additional adjustments.

If you have changed the factory-set parameters on the Kaltgas system, you can quickly and easily reset them to the "standard default settings." Click on "Standard parameter settings" and you will then have the default settings again. Any customer-specific adjustments to the device settings and the control parameters will be lost in this process.

4b) Device Settings

Analogue input 1   **(KGW standard settings are written in red)**

Linearisation   **=**   **PT 100** (Other Linear or NiCr-Ni K setting ranges)

Offset   **=**   **0.0** (Sensor temperature deviations can be entered)

Sensor type   **=**   **PT 100 resistance thermometer in a three-wire circuit**
                  (No function or K-type thermocouple)

General   **(KGW standard settings are written in red)**

Binary output 1 **=**   **First controller output (KGW standard settings)**

Binary output 2 **=**   **No function (KGW standard settings)**

Start of set point **=**   e.g. **–195.6°C** (Limit for the lowest temperature that
                              can be set manually on the controller)

End of set point   **=**   e.g. **+120°C** (Limit for the highest temperature that
                            is factory-set on the controller)

Analogue input 2 (factory-set standard settings)

Linearisation   **=**   **PT 100** (Other Linear or NiCr-Ni K setting ranges)

Offset   **=**   **0.0** (Enter sensor temperature deviation)

Sensor type   **=**   **PT 100 resistance thermometer in a three-wire circuit**
                  (No function or K-type thermocouple)

Device Parameters	⌷ ⊠

Sensor 1
- Linearization: Pt100
- Offset: 0,0
- Type: Resistance thermometer in 3-wire ci ▼

Sensor 2
- Linearization: Pt100
- Offset: 0,0
- Type: Resistance thermometer in 3-wire ci ▼

Generic
- Binary Output 1: Controller output 1
- Binary Output 2: No function
- SPL: -195,6
- SPH: 120,0   120

Display
- Upper Display: Analog input 1 ▼
- Lower Display: Analog input 2 ▼
- Display Type: Celsius ▼
- Decimal Point: One decimal place ▼

[⬇ Read Current Parameters] [⬆ Set Standard Parameters] [Autotune Heater] [Autotune Chamber] [Close]

Display (KGW standard settings)

Upper display = **Analogue input 1 (Kaltgas heater sensor hose)**
(Other setting ranges with no function and current set point)

Lower display = **Analogue input 2 (Chamber sensor)**
(Other setting ranges with no function and current set point)

Decimal point = **One digit after the decimal point** (Other setting ranges: no digit after ^
the decimal point and two digits after the decimal   point)

Read current parameters = **Manually adjusted control parameters are
transferred to the controller.**

Set standard parameters = **Reset the controller to its standard factory-set
parameters.**

Autotune heater = **Autotune heater is used to establish the control parameters
of the cold gas hose.**

Autotune chamber = **Autotune chamber is used to establish the control
parameters of the temperature chamber used.**

Close = **Exit the device settings.**

5) Autotuning of the Heater and Chamber Sensors

Autotune is used to establish the control parameters of a Kaltgas system. The respective control parameters need to be established and saved depending on the temperature and specific mass of the Kaltgas system or chamber. This means that the heater sensor requires different control parameters to the chamber sensor.

Autotune Heater = **KGW generally uses Autotune heater to establish and set the respective Kaltgas systems during test runs prior to shipping them.**

Autotune Chamber = **If a Kaltgas system is supplied with a chamber, the Autotune function is normally also undertaken during test runs.**

(If the Kaltgas system is supplied without a chamber and the customer uses the Kaltgas system with a chamber, the respective chamber must be autotuned.)

Conducting an "Autotune" of the heater and chamber sensors

Autotune Heater

First of all, a set point temperature is determined, e.g.-80°C. This is entered manually. This can be done by clicking the "NEW" icon and entering the value –80°C. This establishes the required set point. Then the jet is set to the required percentage value using the slider control, generally the value is 50 % (optimum). If a green hook is visible in the "Power" field, the jet and heater filaments have power and the system starts to work. Now open the "Extras" drop-down window and go into "Device settings." Click on the "Autotune heater" icon and then close the "Device settings" window. The control parameters are automatically established. A "Tune" icon flashes on the temperature controller of the safety controller. Whilst this icon is flashing, the control parameters are being established for this temperature with the specified cold gas power. Once this process has finished, the system adjusts itself to the preset value, e.g. –80°C, + /- 0.2°C.
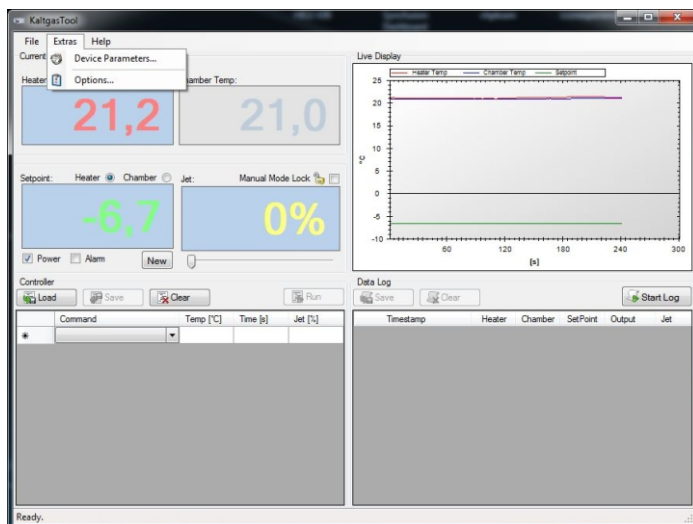
Autotune Heater

Then the above-mentioned process is carried out with the chamber sensor in the chamber that is to be used.

First of all, a set point temperature is determined, e.g.-80°C. This is entered manually. This can be done by clicking the "NEW" icon and entering the value –80°C. This establishes the required set point. Then the jet is set to the required percentage value using the slider control, the jet and heater filaments have power in the majority of cases and the system starts to work. Now open the "Extras" drop-down window and go into "Device settings." Click on the "Autotune chamber" icon and then close the "Device settings" window. The control parameters are automatically established. A "Tune" icon flashes on the temperature controller of the safety controller. Whilst this icon is flashing, the control parameters are being established for this temperature with the specified cold gas power. Once this process has finished, the system adjusts itself to the preset value, e.g. –80°C, + /- 0.2°C.
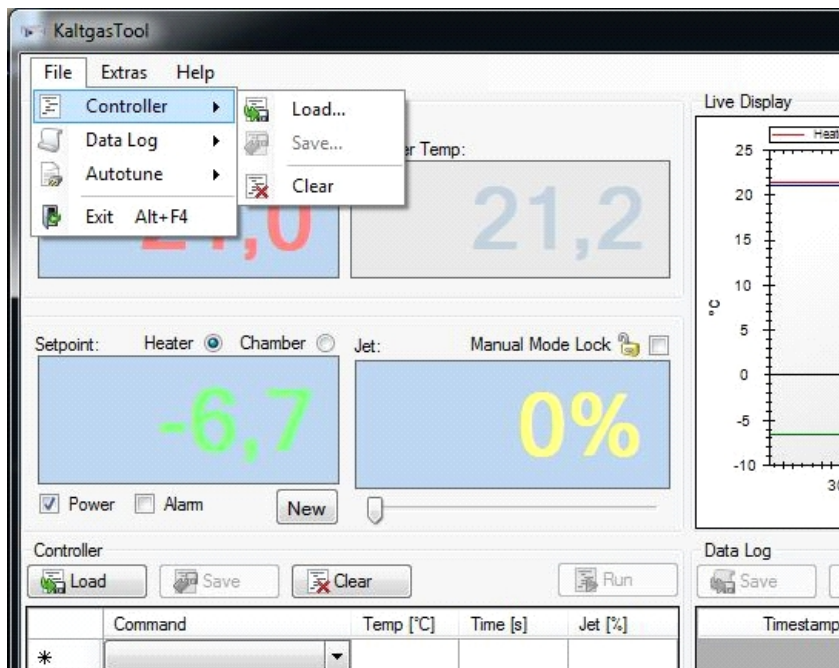
Caution

When using the chamber sensor as a control system, the temperature of the heater sensor drops dramatically. This is a completely normal control process.
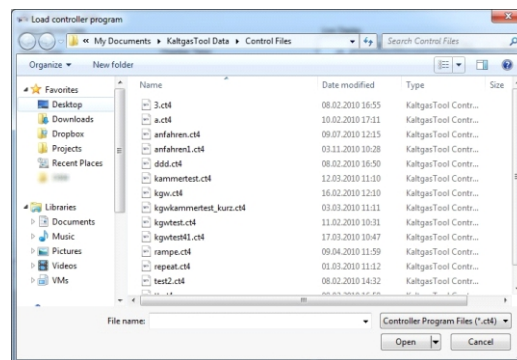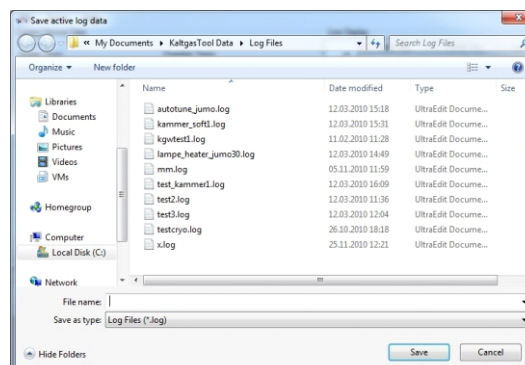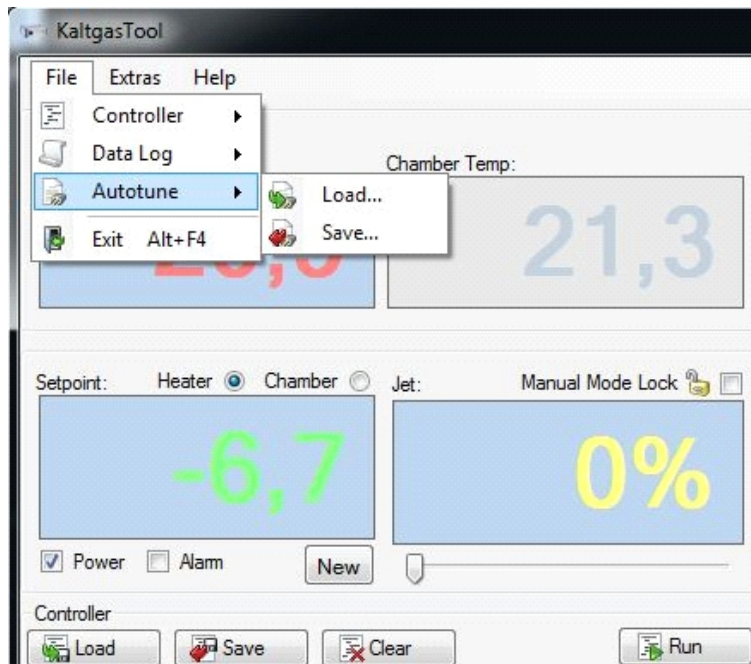
6) Kaltgas Tool Menu - "File"

File

Control program. = Any temperature programs that have been created can be called up and saved. (Programname .ct4)

Protocol. = Data protocols can be called up and saved. (Protocolname . log)

Kaltgas Tool Menu - "File - Autotune"

Display window

| Autotune | = Autotune values that have been established can be loaded and saved. (Autotune .ca4)

Different control parameters may be required to operate a Kaltgas system at a stable temperature depending on the size, thermal mass, performance data of the Kaltgas system, temperature or design. The user can set any recorded control parameters in "File – Autotune," depending of the type of system, and call them up as required. These are then immediately transferred to the temperature sensor so that they work with these specific control parameters.
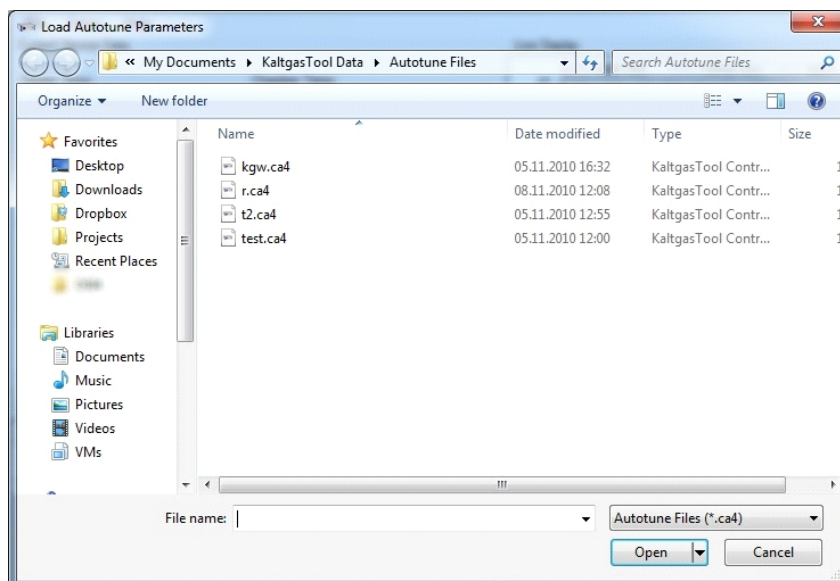
Kaltgas Tool Menu - Screen Display
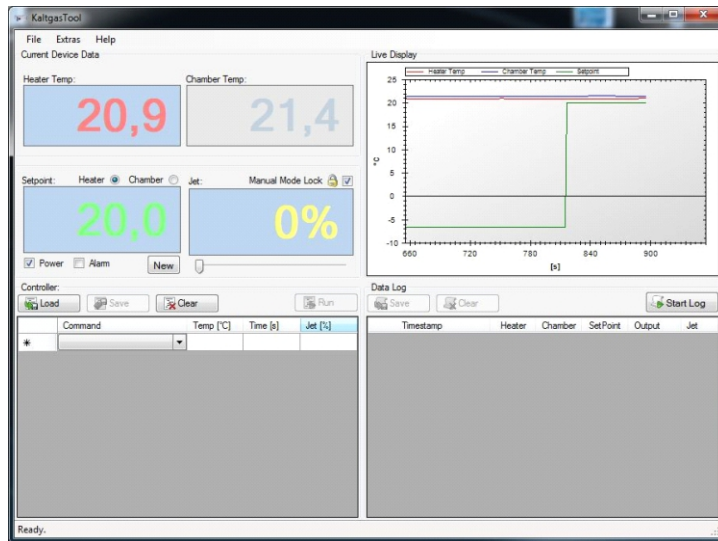
Display window

Heater Temp. = **Current controller temperature** (Heater Sensor cold gas hose)

**Chamber Temp.** = **Current display temperature** (Chamber sensor)

Set point = **Current set point**
The set point display comes from the program ramp or by manual entry via the NEW" input window)

Jet = **Current jet capacity in %**
(The jet capacity comes from the program ramp or by manual entry either directly on the display or via the sliders below it)

Block manual operation = **Indicates if the manually adjustable jet on the safety controller is active or blocked.**

Power = **Jet and heater output on the safety controller can be switched on or off.**

Alarm = **Activated alarm relay can be switched off manually.**
Alarm becomes active by stopping a control program
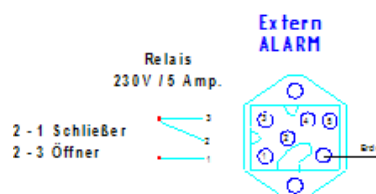
Pin configuration on the back of the safety controller.

Edit program ramp on the main screen

Load =   **load the program ramp**

Save   = **Save program ramp at**
       "My documents / Kaltgas Tool Data / Control Files**."**

 Delete = **Delete progam ramp data.**

Start / Stop = **Start or stop program ramp.**

Edit program ramp in the menu
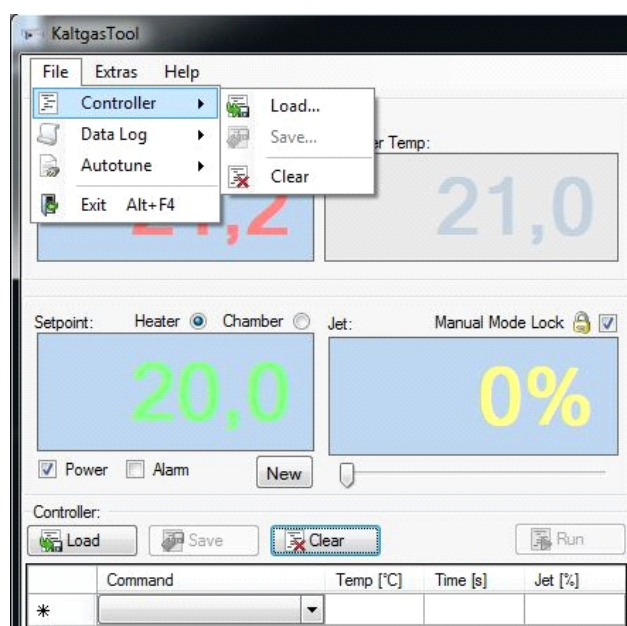
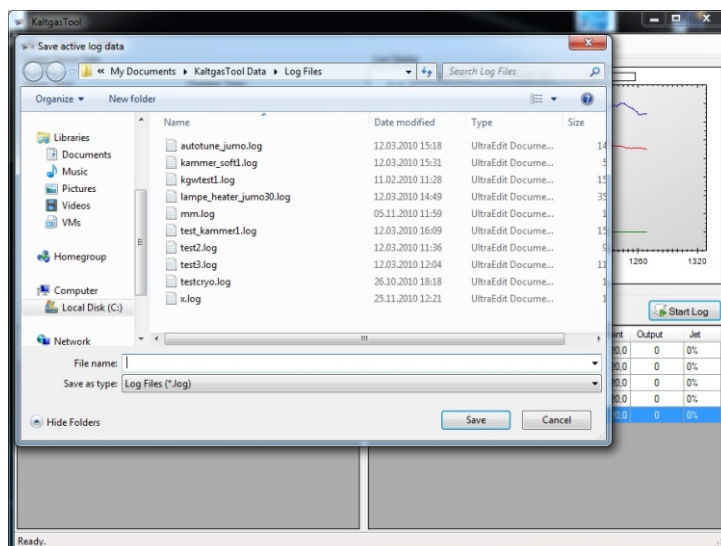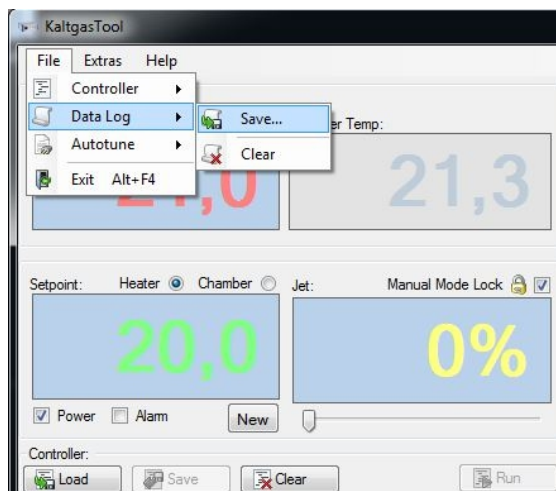# Edit protocol on the main screen

Save = **Save logged data at**
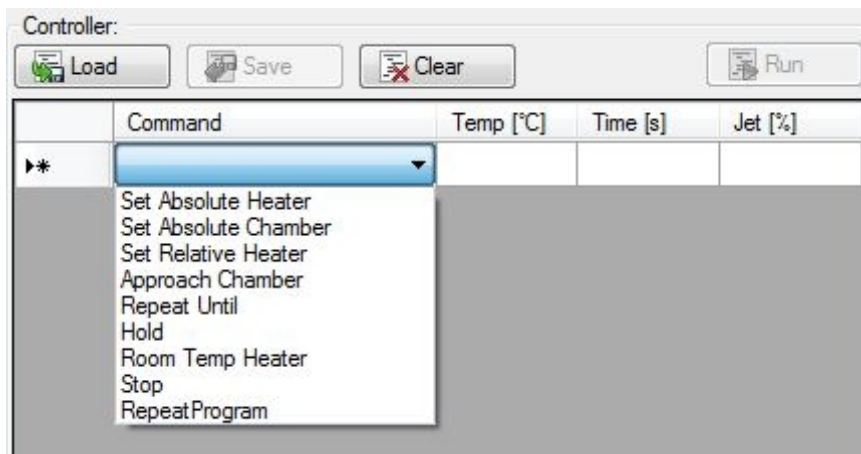   **"My documents / Kaltgas Tool Data / Log Files."**

 Delete = **Delete logged data.**

Start / Stop = Start or stop logging program.

Edit protocol program in the menu

7) Explanation of Instructions on Controlling the Ramps

Important information

(The heating speed of 5°C per 60 seconds must not be exceeded!)

(There is no limit on the cooling speed when cooling the stream of gas)

| **Set Absolute Heater** | Sets the heater to the required temperature |

| **Set Absolute Chamber** | Sets the chamber to the required temperature |

Set Relative Heater Sets the temperature of the heater in regular increments up or down by the given temperature difference.
Proceed with the Repeat Until command so that the heater determines when the target temperature has been reached! (e.g. temp.: 5°C and time: 60 sec., the temperature is increased in +5°C increments every 60 seconds.)

Start-up chamber This function starts up the chamber and adjusts it to a preset temperature. When approaching the chamber temperature, the software automatically switches over from the heater sensor to the chamber sensor. This switchover point is regulated by the switchover point in "Options - Start-up chamber switching point [sec/°C]." The standard value is 60. The value can be lower if a chamber has a lower thermal mass and higher with a chamber that has a larger thermal mass.
The preset values in the program:

Temperature   Time   Jet

are only used as a control system when the chamber temperature is reached.

Start-up chamber   **Sample ramp**

	Command		Temp [°C]	Time [s]	Jet [%]
	Set Absolute Heater	▼	20	300	50
	Set Absolute Heater	▼	-30	1800	50
	Approach Chamber	▼	-100	1200	50
	Hold	▼		600	50
	Set Absolute Heater	▼	-80	400	40
	Set Absolute Heater	▼	-50	300	49
	Set Absolute Heater	▼	-30	300	40
	Room Temp Heater	▼			40
▶	Stop	▼			
✳		▼			
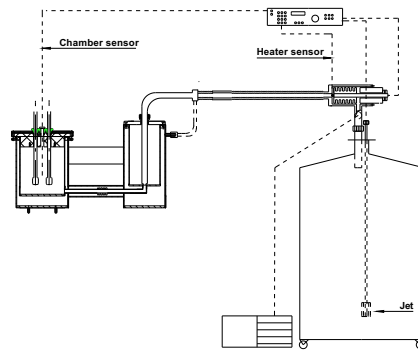
TG-LS-H with chamber controlling by a corresponding Dewar chamber

Minuten
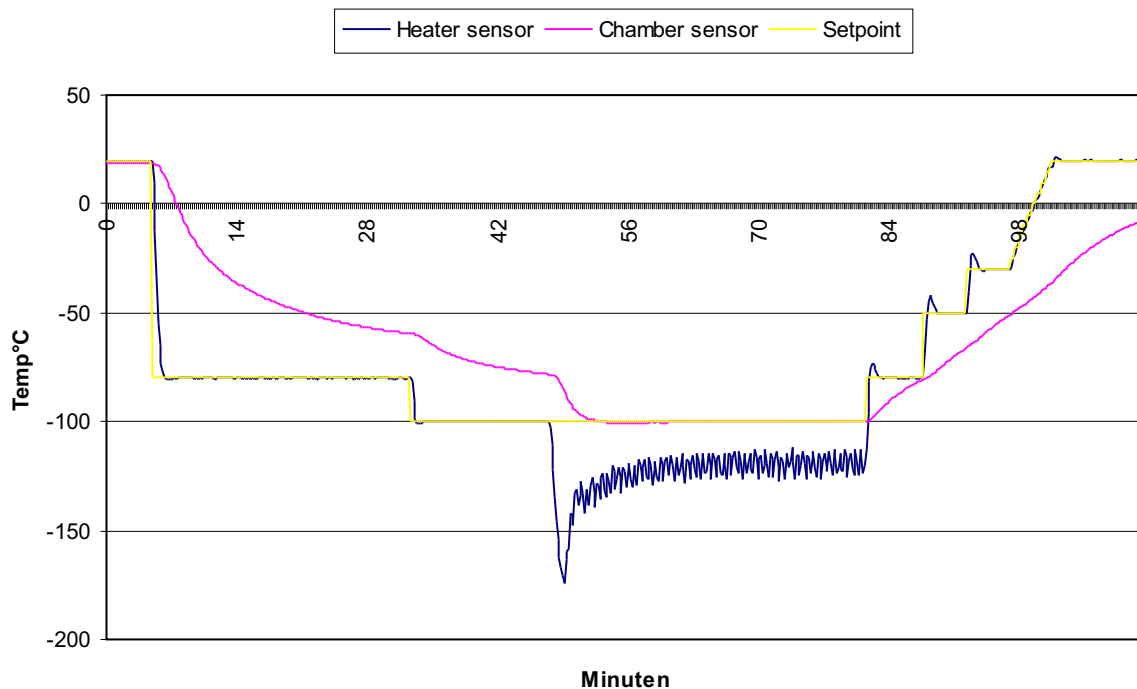
Repeat Until   The target temperature that should be reached at a constant change in temperature is entered here.
            Set Relative Heater

Hold   The hold command maintains the preset temperature for the specified time period.

Room Temperature Heater   The current temperature is increased in 5°C increments every 60 seconds to achieve the room temperature.
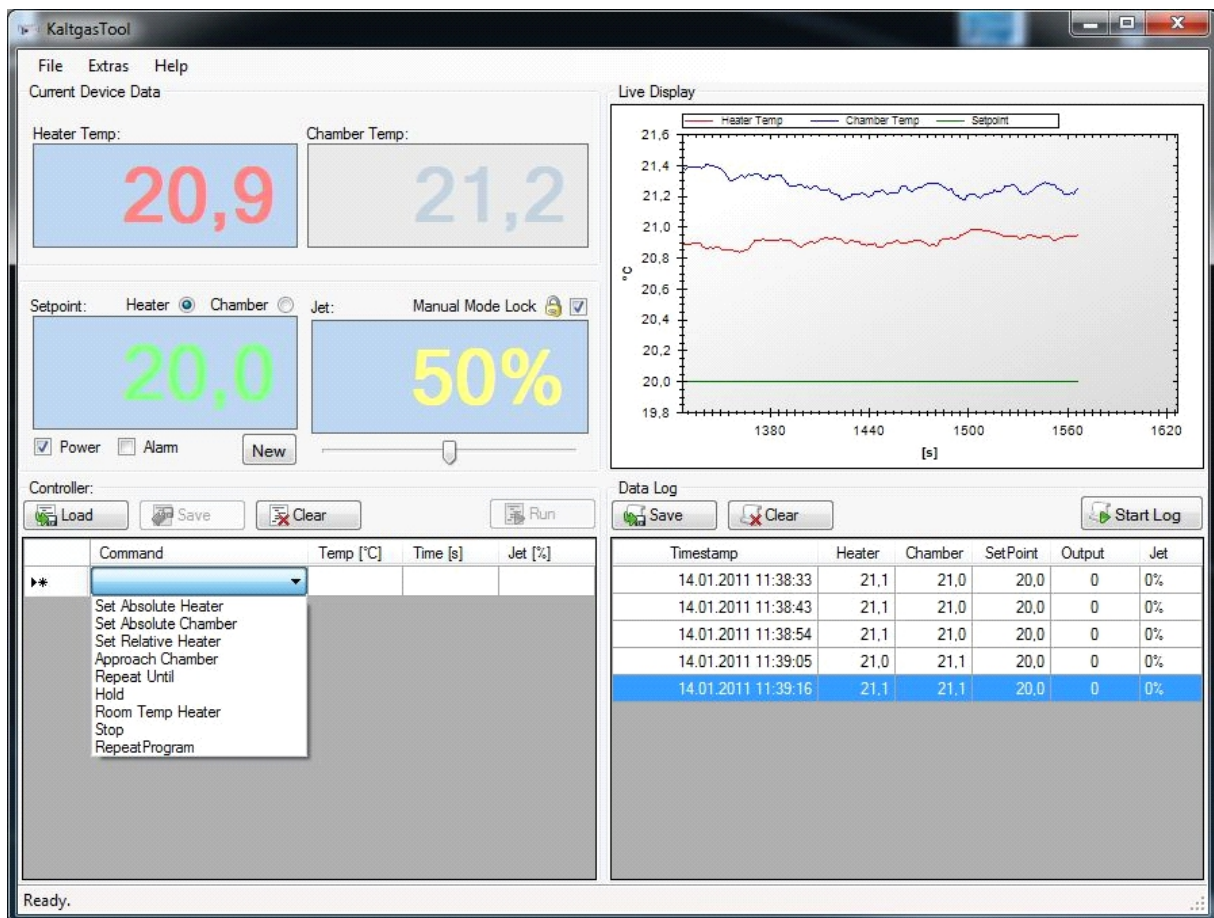
Stop   This stops the control program.

Repeat Program   No time is entered under "time," instead the number of times that the control program should be consecutively repeated is entered.

8) Ramp Program - Example

Command	Temp(°C)	Time	Jet %
Set Absolute Heater	-50	300	50
(Fixed temperature value)			
Set Absolute Chamber	-50	300	50
(The control sensor is switched over to the chamber sensor)			
Set Relative Heater	-1	5	50
(Change in temperature in °C per second)			
Repeat Until	-100	(No input)	(No input)
(is used after "set relative")			

Caution: always stay 1°C below the maximum temperature in terms of positive temperatures, eg. max. temperature limit of +100°C, program command "repeat until" +99°C.

Hold	(No input)	300	50
(Holding time for the temperature)			

Room Temperature Heater (The system is automatically increased by 5°C increments every minute from the current temperature until 20°C is achieved)

Stop (The system is switched off and the alarm relay is connected)

8) Ramp Program

Set Absolute Heater	20	300	50
Set Absolute Heater	-50	600	80
Set Absolute Heater	-100	600	80
Set Absolute Heater	-90	60	80
Set Absolute Heater	-80	60	50
Set Absolute Heater	-70	60	50
Set Relative Heater	5	60	50
Repeat Until	20		50
Set Absolute Heater	20	300	50
Set Relative Heater	5	60	50
Repeat Until	100		50
Set Absolute Heater	100	200	50
Repeat Until	5	60	50
Set Absolute Heater	120	600	50
Repeat Until	-5	60	50
Set Absolute Heater	70		50
Room Temp. Heater			50
Stop			

Sample ramp
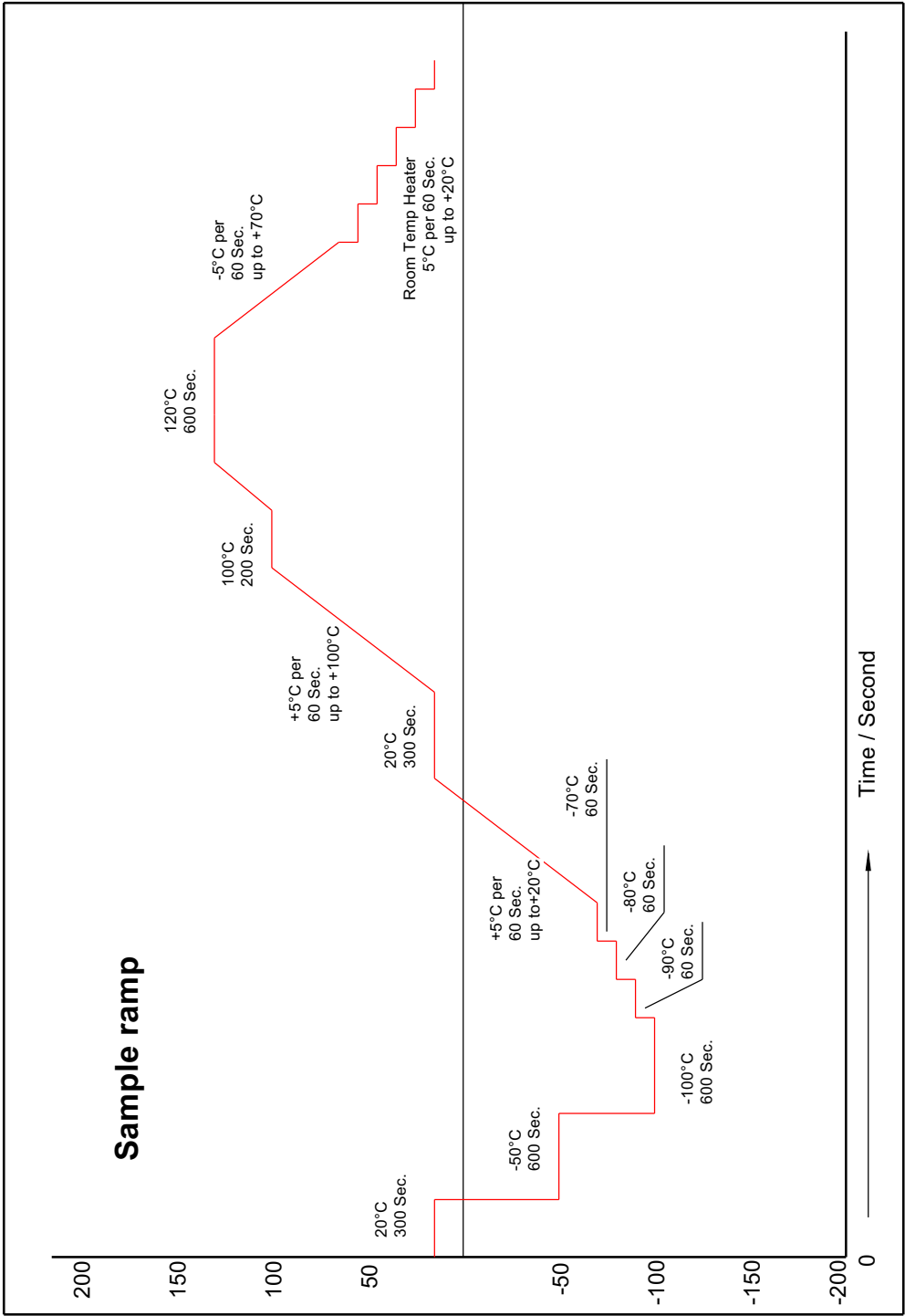
!! Important information for creating a temperature ramp!!

A)

There is no limit on the cooling speed when cooling the stream of gas.

!! Caution !!

When heating up the stream of gas, the heating speed of 5°C per 60 seconds measured on the heater sensor must not be exceeded. The Kaltgas system can be damaged at higher heating speeds. The heat exchanger (heater) could be damaged significantly if there are any large temperature differences between the stream of gas and the preset temperature.

B)

If you want to adjust the chamber to a specific temperature (e.g. -40°C), first increase the cold gas stream to approx. 10°C on the chamber temperature with the heater sensor. Then switch over to the chamber sensor and the system regulates the Kaltgas system to the preset temperature in the chamber. If you then want to change the chamber temperature, switch over to the heater sensor and increase the next temperature with the cold gas stream until you reach approx. 10°C on the required chamber temperature. Then switch back to the chamber sensor.

!! Caution !!

The chamber control system can only be used for a defined temperature. Try never to adjust the chamber controller directly to several temperature points.

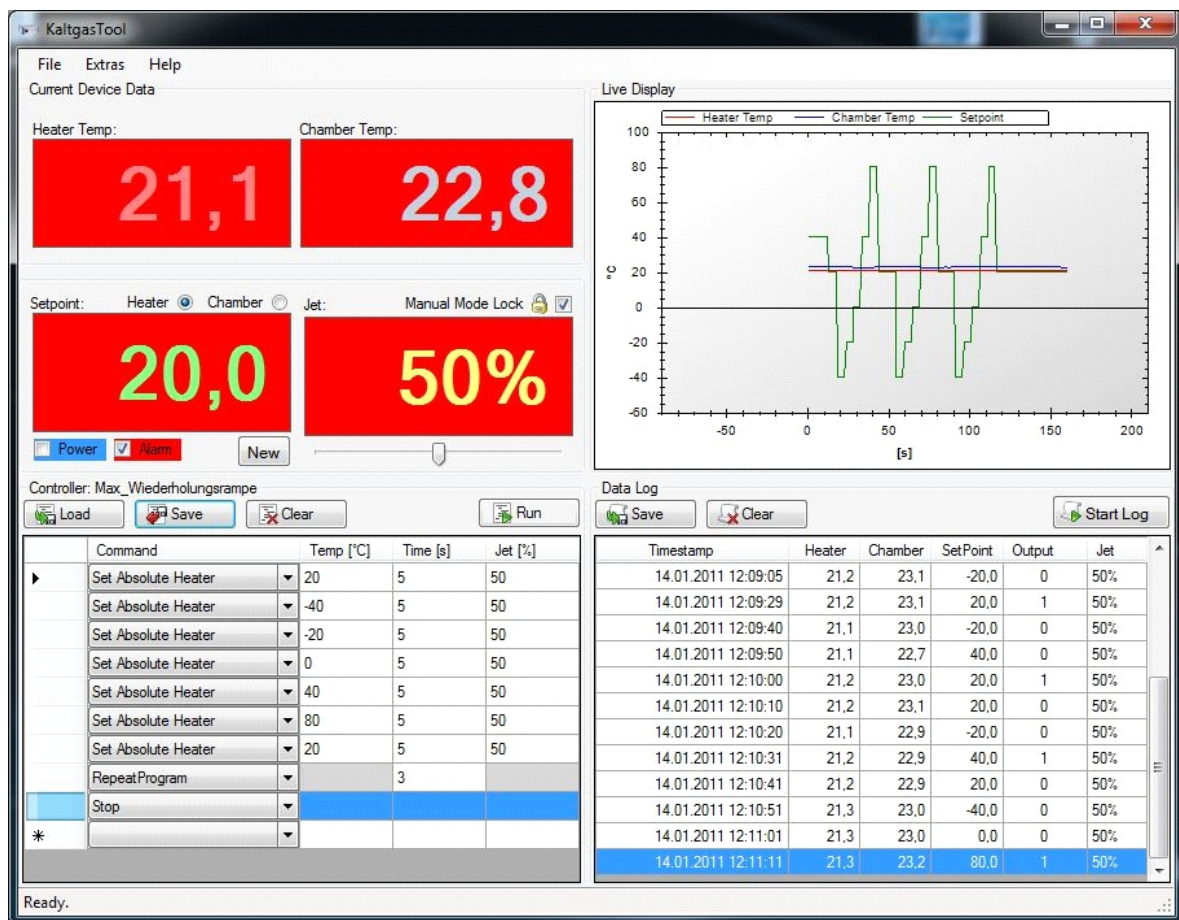# 9) Display Examples of the Software

Example for a standard temperature ramp
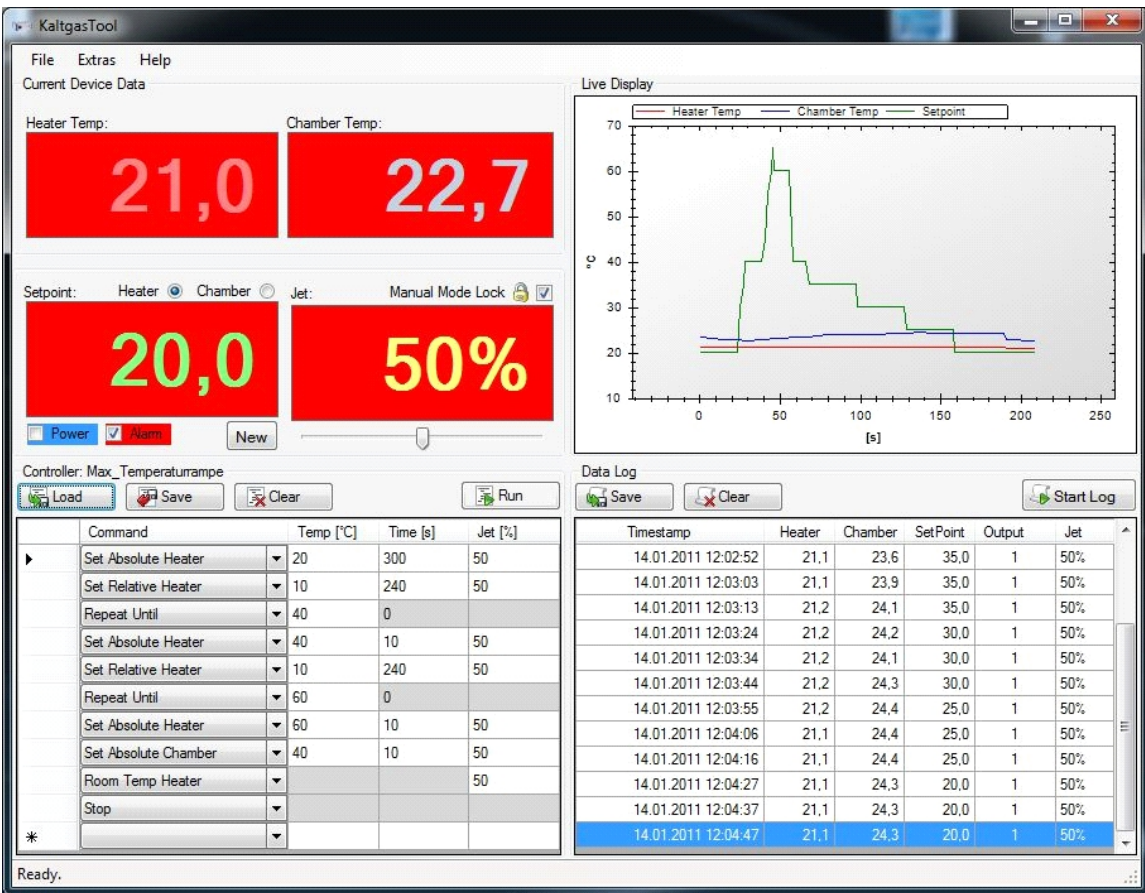
	Command		Temp [°C]	Time [s]	Jet [%]
	Set Absolute Heater	▼	20	300	50
	Set Relative Heater	▼	10	240	50
	Repeat Until	▼	40		
	Set Absolute Heater	▼	40	10	50
	Set Relative Heater	▼	10	240	50
	Repeat Until	▼	60		
	Set Absolute Heater	▼	60	10	50
	Set Absolute Chamber	▼	40	10	50
	Room Temp Heater	▼			50
▶	Stop	▼			
✳		▼			

9a) Display Examples of the Software

Example for a triple repetition ramp

Save temperature ramp
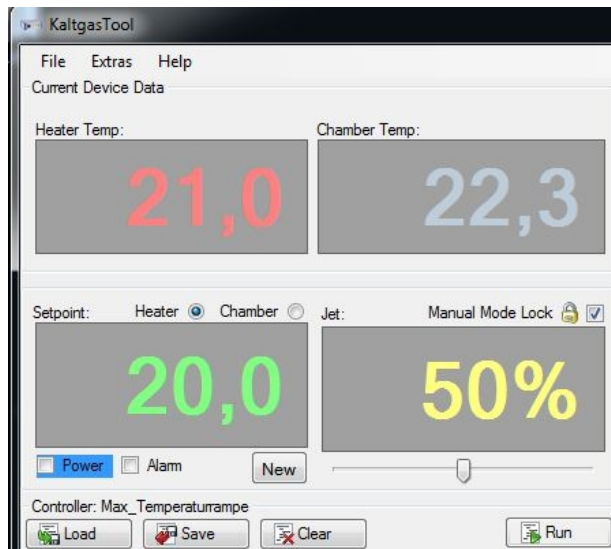## (Display background grey, Kaltgas system not in operation)
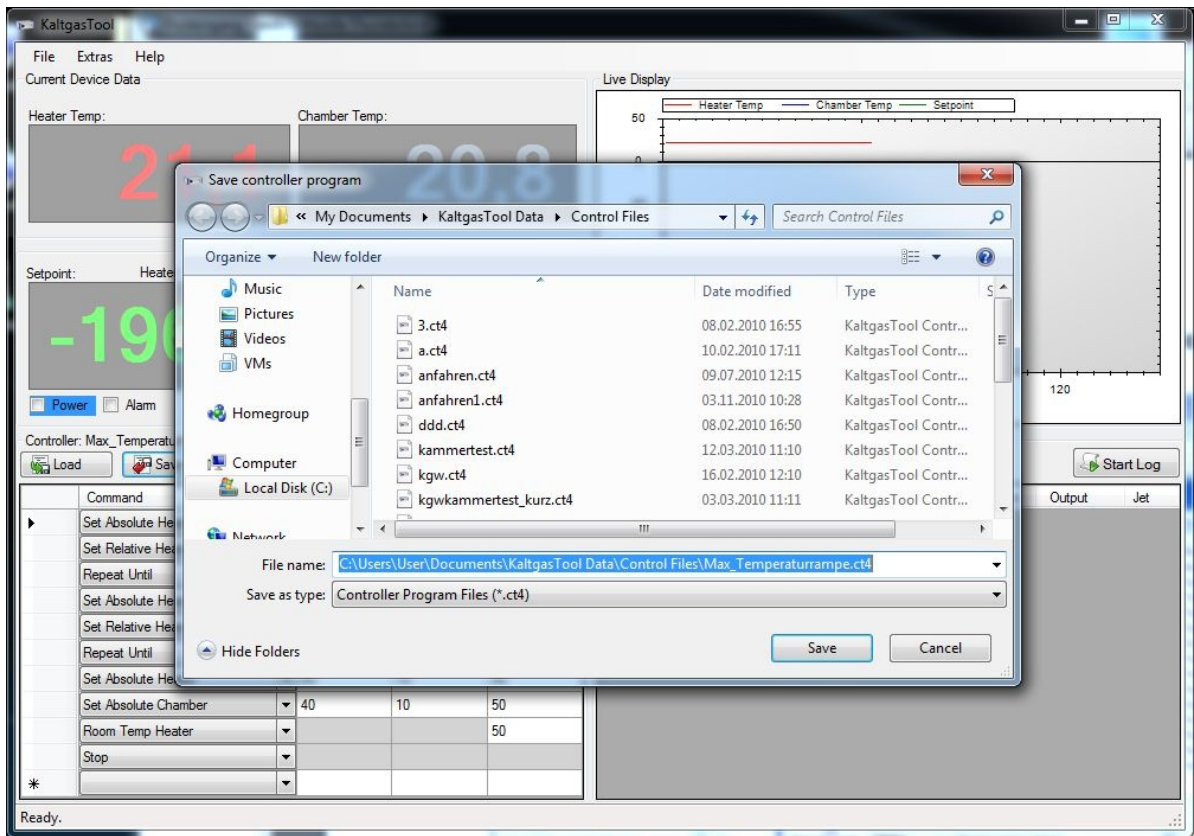
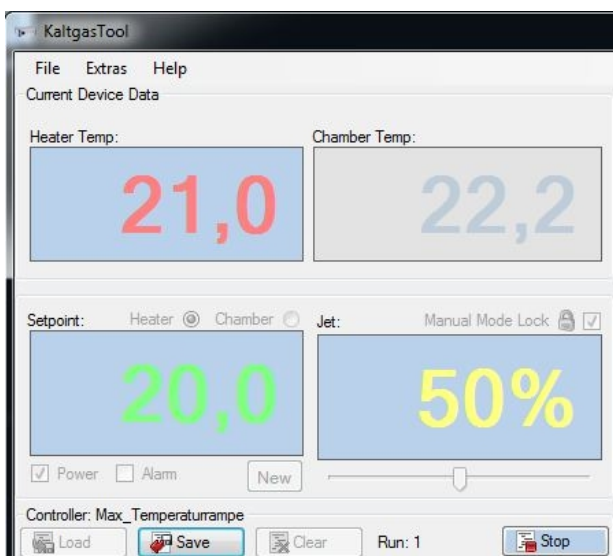# The stop function changes the display background
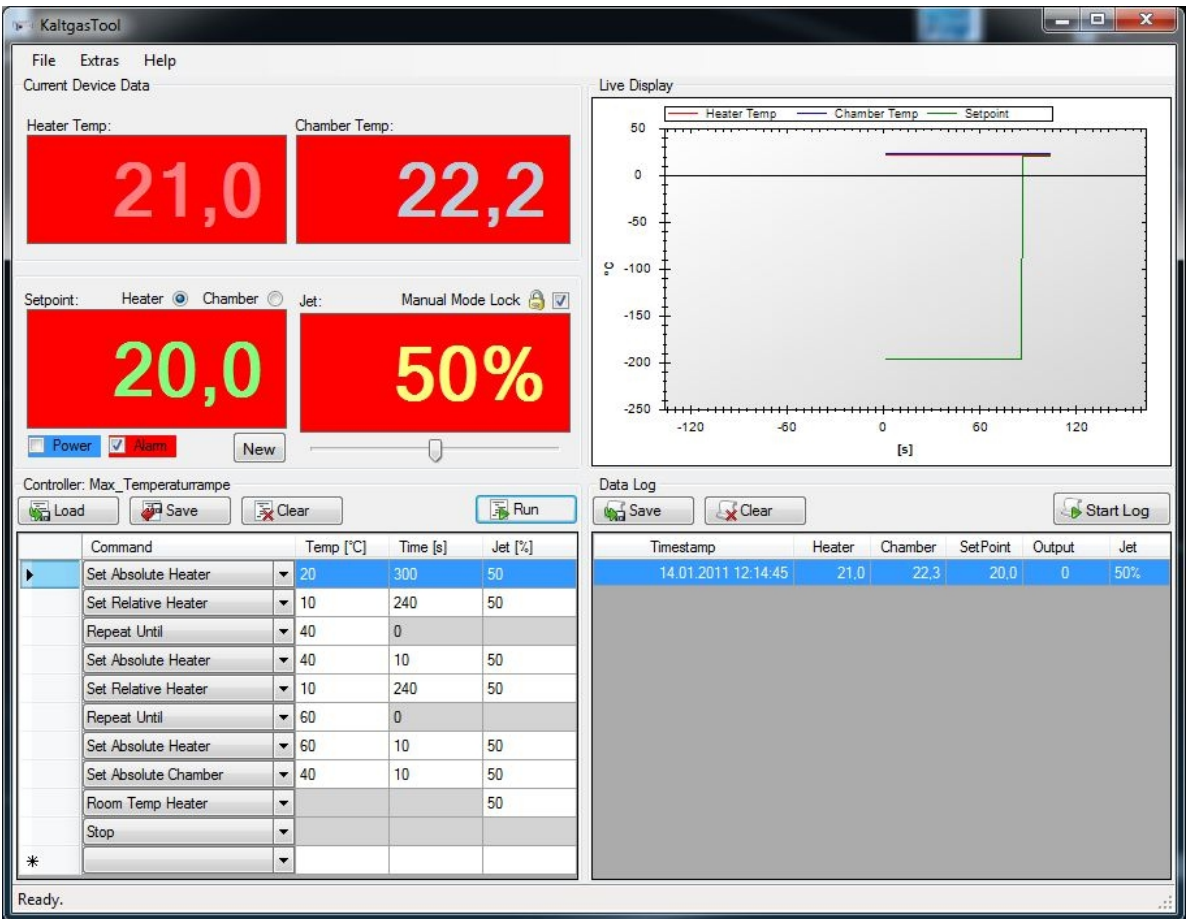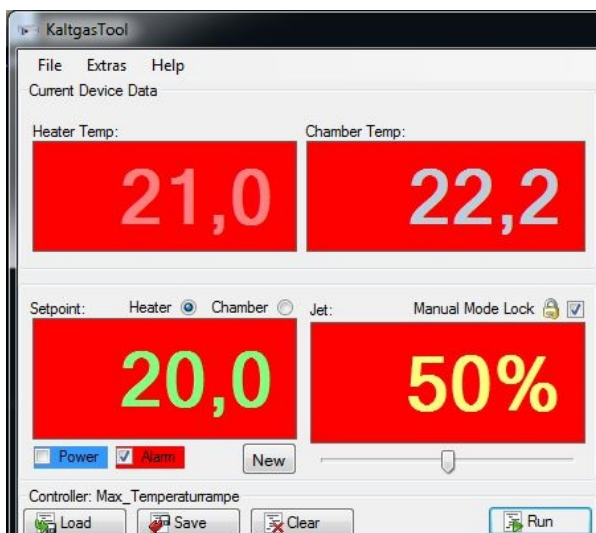
Colour changes with different functions

"Power switched off, no program is running, display background grey"

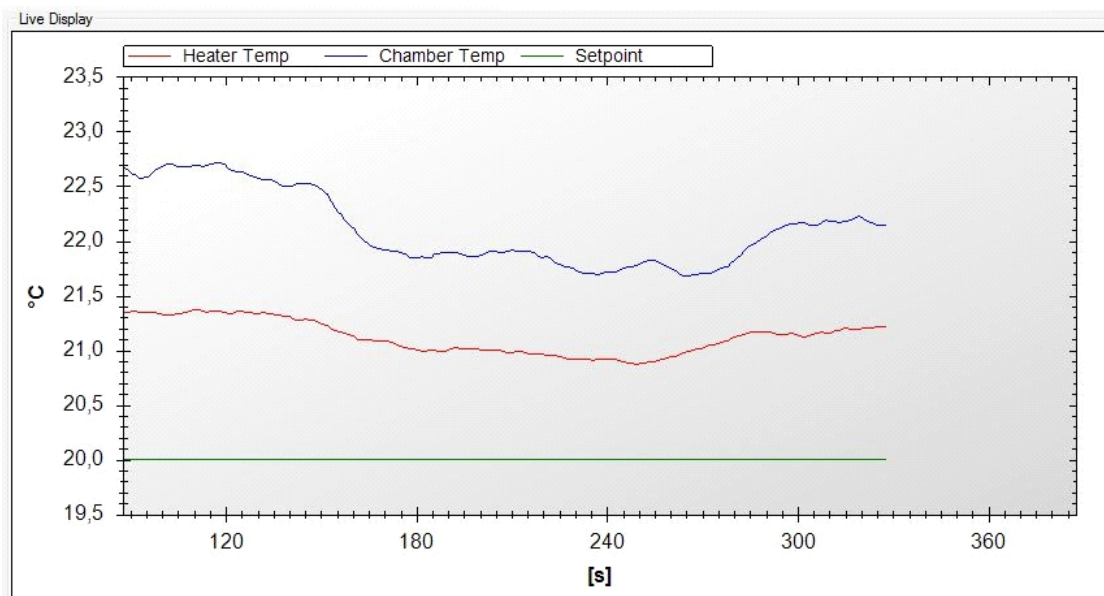**"Power switched on, a temperature ramp is running, display background blue"**

"Temperature ramp has expired and switched off with stop, display background is red, power is switched off"

Live display

The live display indicates the current temperature values on the heater sensor, the chamber sensor and the set point in graphical terms.

Protocol

The temperature data is shown in this field. The time interval corresponds to the preset times in "Extras / Options / Logging interval" e.g. 10 seconds

Timestamp	Heater	Chamber	SetPoint	Output	Jet
14.01.2011 12:23:38	20,9	21,7	20,0	0	0%
14.01.2011 12:23:49	20,9	21,8	20,0	0	0%
14.01.2011 12:24:00	21,0	21,7	20,0	0	0%
14.01.2011 12:24:10	21,0	21,7	20,0	0	0%
14.01.2011 12:24:21	21,2	21,9	20,0	0	0%
14.01.2011 12:24:32	21,1	22,1	20,0	0	0%
14.01.2011 12:24:43	21,1	22,1	20,0	0	0%
14.01.2011 12:24:53	21,2	22,2	20,0	0	0%
14.01.2011 12:25:04	21,2	22,1	20,0	0	0%
14.01.2011 12:25:15	21,2	22,1	20,0	0	0%
14.01.2011 12:25:26	21,2	22,2	20,0	0	0%
14.01.2011 12:25:36	21,2	22,3	20,0	0	0%

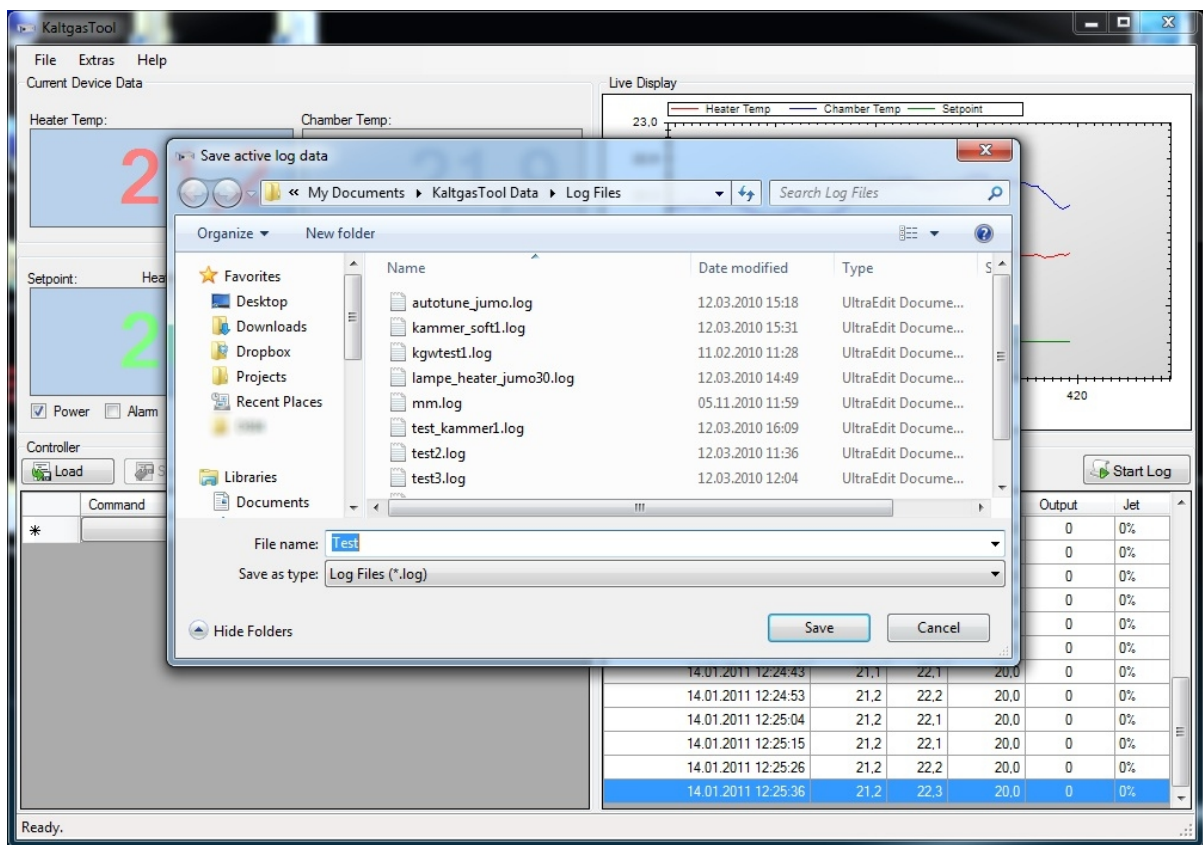**Save** Saves the data listed in the protocol in a file entitled "name.log."

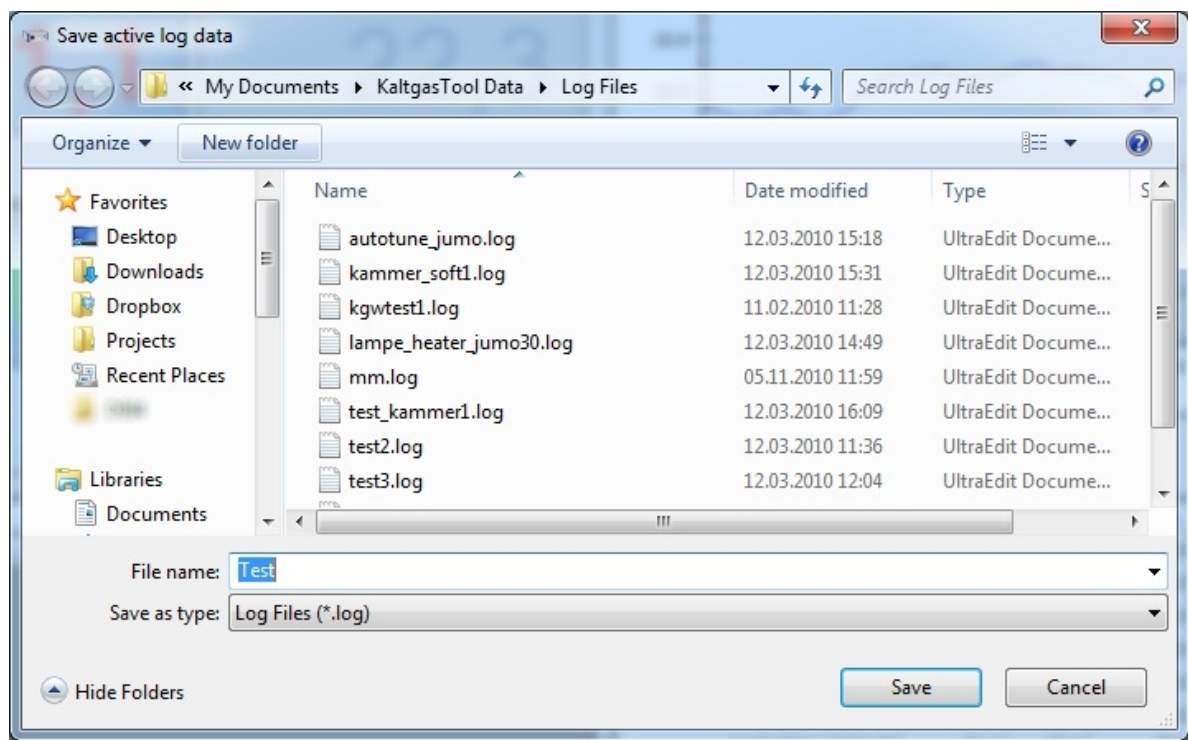**Delete** Deletes the data in the protocol.

Start/stop: Starts to log the data in the protocol and stops logging the values.
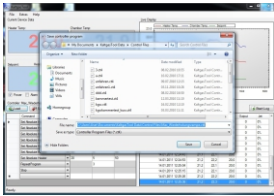
Save measured data

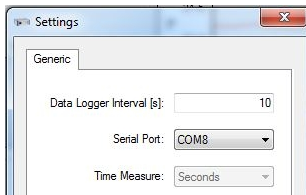## Save measured data at: My documents / Kaltgas Tool Data / LogFiles

Short Description regarding the Use of the Software

1) The requested temperature ramp was created and saved.

2) Logging interval was specified in Extras / Options (e.g.10 seconds).
(Interval to be logged with the measured data)

3) Start Kaltgas system   Start

4) Logging of measured data is automatically switched on and logs the data.

5) After the entire temperature ramp has been completed, this is ended with the STOP function.
.

6) Save measured data protocol. (The measured data protocol can also be saved whilst the program is running)
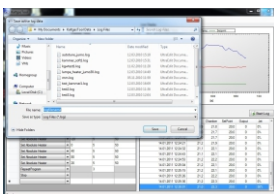
7) End the program first and then switch off the safety controller. If this sequence is not followed, the program may crash.

11) Safety Controller Connections - Converter - PC

Converter to safety controller

Data connection from safety controller to converter

Green connection cable to D1 +
Yellow connection cable to D1 -

Converter to computer USB

USB cable converter to:

USB

ICP CON - 7561

RS 232 / 422 / 485
to USB

Data + Data -

Connection cable SI – CONTROLLER

Cable green or grey on D1 +
Cable yellow or pink on D1 -

Plug Type Renk three-pole

Plug pin 1/93 on D1 +
Plug pin 2/94 on D1 –

geändert Datum	Name	Maße und Toleranzen, wenn nicht näher spezifiziert, unterliegen den Eigenarten und Besonderheiten der Glasverarbeitung und werden dem Stand der Technik entsprechend realisiert.	KGW-ISOTHERM 76185 Karlsruhe Tel.0721/958970 Fax.0721/9589777
		Tag: 10.04.2000	Name: W.Schieder	
		Maße: mm	unmaßstäblich	**Converter 7561**
		Werkstoff:	Z.Nr:Controller/ Converter USB	