



TCCOM for Windows™

Configuration Program for Peltier- and Heating-Controllers

User Manual

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1. Overview

1.1. Purpose of the program

The program TCCOM for Windows™ allows the operation and configuration of Peltier-Controllers TC2812 and TC0806, and of Heating-Controllers TC2812HT produced by CoolTronic GmbH. The program is provided to the customer together with the RS232-Option at no extra cost.

1.2. Warning

The program allows extensive changes of internal parameters. Misuse of the program may render the attached controller unusable.

Components attached to the controller or the controller itself may be destroyed. Risk of excessive currents and temperature. Risk of Fire hazard and Injuries !

Therefore it is mandatory to read and understand the manual prior to using the program. Please also consult the manual accompanying the controller and other components of the system. Be sure to understand what you are doing, **BEFORE** using the program

In case of unexpected effects or any uncertainty disconnect the system from power supply and consult the manufacturer or his sales representative.

CoolTronic GmbH cannot be made liable for any damages caused by the use of the program.

1.3. About the documentation

This documentation is valid for TCCOM for Windows™ Version 1.8.3 Build 122 as of October 23, 2016. It does not contain specific information about the instruments. Please refer to the manual of the controller used.

General knowledge and experience with Windows™ programs is required.

Besides the German version of the program we provide an English localized version of the program.

1.4. Items supplied

Supplied items are:

- TCCOM for Windows™ on CD
- User manual TCCOM for Windows™ as PDF-document on CD

1.5. System-Requirements

Minimum requirement for the correct function of the program is a personal computer with a Pentium 4 processor, 32 MByte of RAM and 32 MByte of disc space running MS Windows™ XT SP3 up to MS Windows 10.

Although the program has been basically tested with MS Windows™ XT SP3 , Windows™ Vista , Windows™ 7 and MS Windows 10 on selected hardware, **the correct function under any circumstances cannot be guaranteed.**

Depending on the Log-File-options disc space requirements may increase to several 100 MByte.

The personal computer must be equipped with a native RS232 interface, integrated on the motherboard or provided by internal PCI-slot based add-on-cards. PC-Card or USB-based RS232-Interfaces may work, but often cause strange effects or unreliable connection to the attached controller.

CoolTronic GmbH is unable to provide any support for such configurations. The customer should test such configuration at his own risk and switch to other type of converters of other manufacturers in case of any problems.

1.6. Legal information

CoolTronic GmbH and its subcontractors provide this program „as is“ without any guarantee. Any liability for any direct and consequential damages arising from the use of the program TCCOM for Windows™ is excluded.

The Copyright of this program is owned by jagdt engineering, CH-5712 Beinwil am See, Switzerland. The user is given a single users license for using the program together with controllers of CoolTronic GmbH only. It is strictly forbidden to use the program for other purposes, to change, analyze or reverse-engineer it. jagdt engineering reserves the right to cancel the above mentioned license at any time without the need of any justification.

The user may make backup copies for personal use and install the program on his personal computers. The program is not technically copy-protected to avoid problems typically observed with such limitations.

1.7. User support

In case of problems first contact the seller of the controller / program, who will initiate the necessary steps.

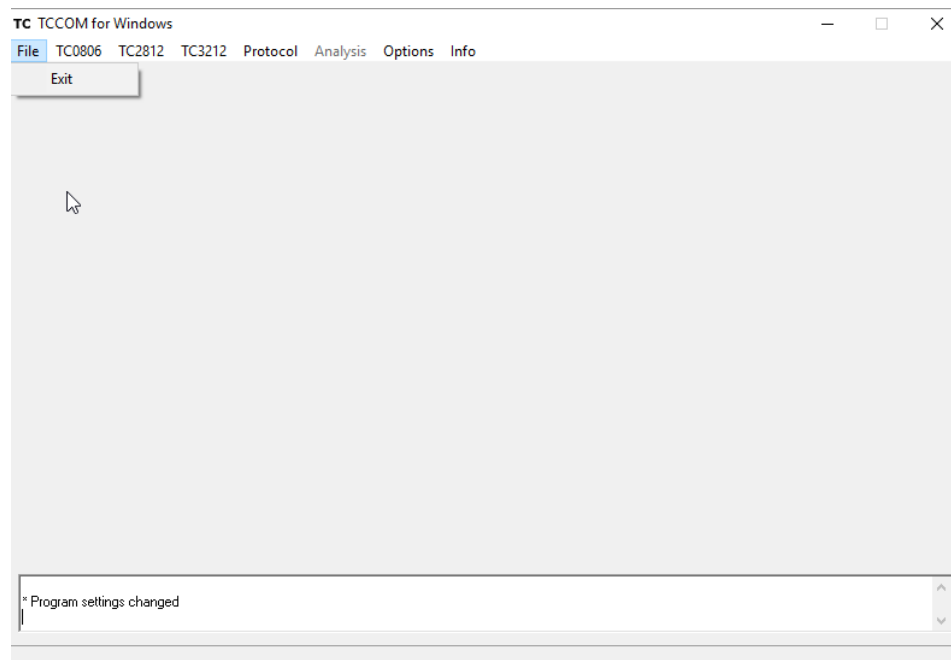
In case of assumed please include with your report:

- program version, firmware-version of the attached controller (can be read out with the user interface) ?
- PC hardware and operating system ?
- try to describe at which point the assumed anomaly has occurred
- what operation was intended ?
- what exactly does not function correctly ?
- any other information which may be useful...

2. Menu- and Command Structure

2.1. Overview

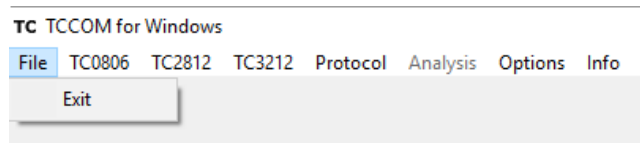
At startup of the program you will see the application window according to the picture below. In the following chapters the menu structure will be explained in detail.



Please observe any messages shown in the log area of the program window (like “*Program settings changed” in the screenshot above ..)

2.2. Menu "File"

The Menu "File" has only one command - "Exit" to terminate the program.



Menu File

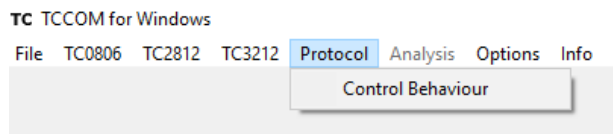
2.3. Menu "TC0806", "TC2812", "TC3212"

These menu give access to the controller-specific functions. Please refer to the manual of the controller used. Please note that depending on the program not all sub menu items will be accesable.

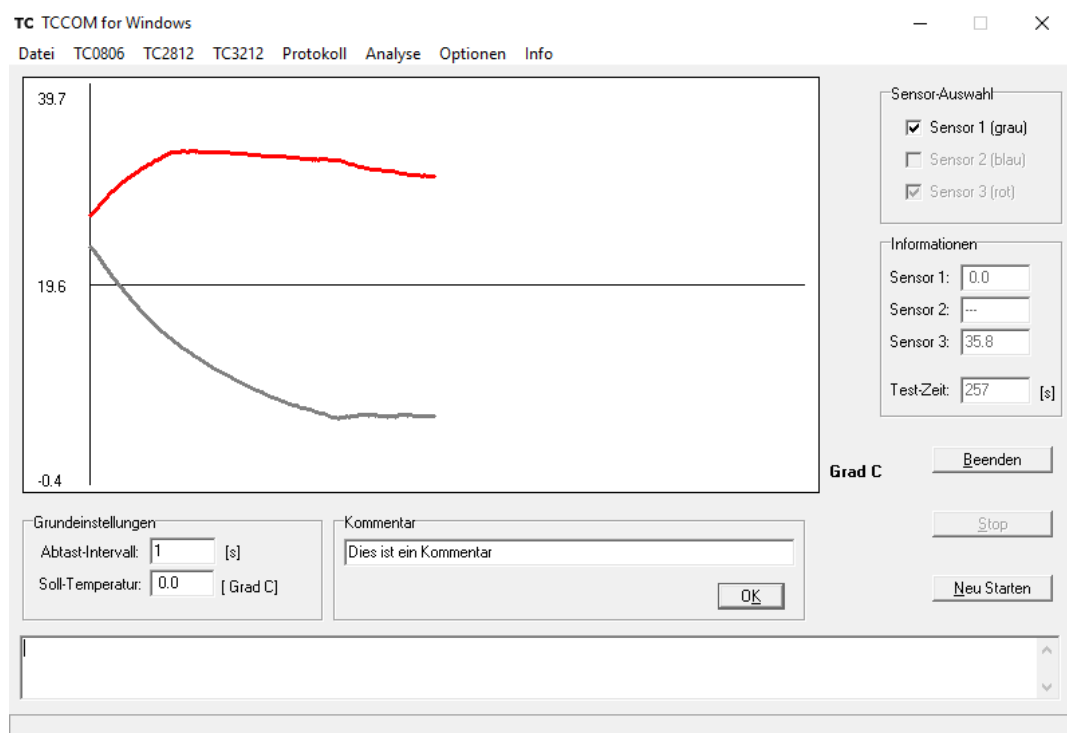
2.4. Menu Protocol

2.4.1. Overview

This function allows to record the temperature values over time.



2.6.2 Protocol / Control behavior



Graphic window for "Protocol / Control behavior"

This function allows to record the temperature values over time. Only functional with a TC2812-S014 attached to the serial communication line.

The temperature over time is shown in the graph. In the background all values are stored together with a time stamp in a text file specified at start.

Item	Description
Close	close the window display
Stop	stops recording, closes the file
Start	starts the process, first ask for file name then starts the recording with the values given
Sensor selection	if the controller supports more than one sensor, the user may select, which sensor to watch and record
Sample interval	time between two samples of the temperature, is the resolution of the recording over time
Set temperature	this value is transmitted to the attached controller just before the first sample is taken and is then the set value for the temperature control
Comment	text entered here will be stored together with a time stamp when the OK button is clicked or the Enter key is pressed

Information

Sensor 1 .. Sensor 3	temperature value of sensor 1..3 at the time of the last sample
Test time	time elapsed since start of recording

The sampled values will be saved to the text file specified at the beginning. The example shows a run with the following setup (the first 15 samples of the screenshot above):

- Sensor 1 + 3 enabled, sensor 1 is the control loop sensor, sensor 3 measures the hot side temperature of the peltier system
- the set temperature for the process was 0.0 °C
- Sensor 1 had 25.0 °C at start, sensor 3 31.0 °C

```
-----  
Program name:  TCCOM for Windows  
Version:      1.8.3.xxx  
Build:       1.8.3.122  
-----  
Sample Interval:    1 s  
Set temperature:    0.0 °C  
Start temperature:  25.0 °C  
-----  
22.10.2016 15:55 Temperieren auf:    0.0 Grad  
-----  
0  25.0  31.0  
1  25.0  30.9  
2  24.8  31.0  
3  24.5  31.2  
4  24.2  31.4  
5  23.8  31.6  
6  23.5  31.9  
7  23.3  32.2  
8  23.0  32.3  
9  22.8  32.6  
10 22.5  32.8  
11 22.2  33.1  
12 21.9  33.4  
13 21.6  33.6  
14 21.3  33.7  
15 21.1  34.0
```

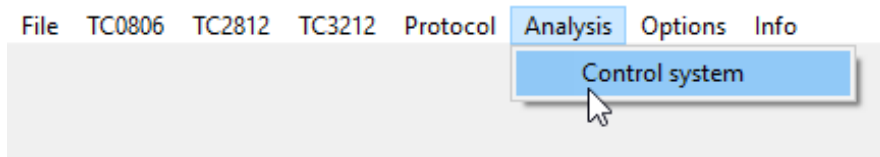
... and so on until stopped ...

2.5. Menu Analysis

2.5.1. Overview

This menu allows to analyze the open loop behavior of the control loop. It is only available if the „Expert-Modus“ (see Options / General options) is activated.

TC TCCOM for Windows



Menu Analysis

2.5.2. Control system

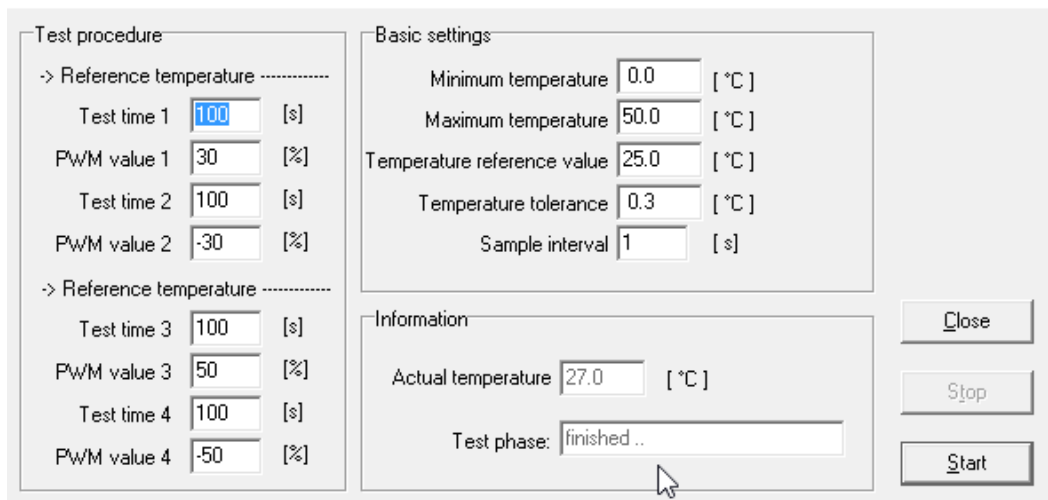
The purpose of this function is the recording of the step response of the open control loop. It allows to analyze the behavior for different output power settings. The controller is disabled, the power value is defined in the dialog described below and held constant.

This function is only available if the „Expert Mode“ (see Options / General options) is activated.

Wrong use of this function can destroy the controller unit and / or the attached peltier system. Risk of injuries and fire hazard !

Only functional with a controller attached to the serial communication line.

Analyze Control

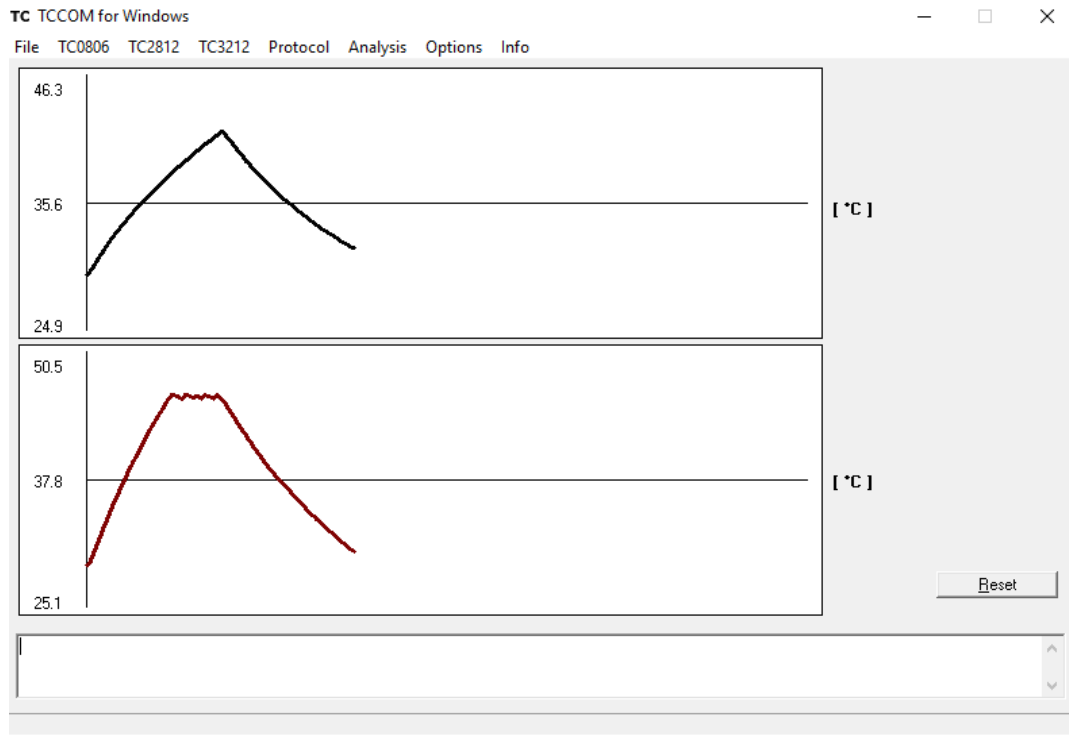


Dialog "Analyze control" (analysis of open control loop)

The dialog "Analyze control" allows to enter the test conditions and provides the buttons to start and stop the process.

Item	Description
Start	start the analysis with the given values
Stop	stops the process, the result are kept on the display. The closed loop controller is reactivated and tries to regulate to the reference temperature.
Close	stops the process and hides the window. The file is closed. The closed loop controller is reactivated and tries to regulate to the reference temperature.

Item	Description
Test time / PWM value 1 + 2	test time in seconds and PWM value in percent for test phase 1 and 2. If the values are zero the corresponding test-phase will be skipped
Test time / PWM value 3 + 4	test time in seconds and PWM value in percent for test phase 3 and 4. If the values are zero the corresponding test-phase will be skipped Before the start of test-phase 3 the controller regulates to the reference temperature.
Minimum temperature	lower limit for the temperature, the output stage will be shut off if the actual temperature of sensor 1 will fall below this limit. If the temperature increases again above the limit the output stage will be turned on again, which will result in a see saw line around the limit value. This is a precaution to safeguard peltier element and the attached system - but because of dead time in the system critical temperatures may be reached despite this mechanism. Wrong setting of the limit value may cause damage and hazards !
Maximum temperature	upper limit for the temperature, the output stage will be shut off if the actual temperature of sensor 1 will rise beyond this limit. If the temperature decreases again below the limit the output stage will be turned on again, which will result in a see saw line around the limit value. This is a precaution to safeguard peltier element and the attached system - but because of dead time in the system, critical temperatures may be reached despite this mechanism. Wrong setting of the limit value may cause damage and hazards !
Temperature reference value	temperature reference value is the set value which must be reached before test phase 1 and 3 can start
Temperature tolerance	when the actual temperature is within this tolerance range around the given temperature reference value test phase 1 and 3 can start
Sample interval	time in seconds between two samples of the temperature value
Test phase	display the current test-phase and the remaining time
Reset	erases the recorded data, the process continues (button in the graphic window)



Graphic window with the result of the analysis of some open control loop with the settings shown above.

Some remarks:

- in the upper graph with smaller PWM setting the maximum temperature was not exceeded
- the flat top of the lower graph is caused by reaching the maximum temperature, the output of the controller is shut OFF and ON to limit the temperature
- after the test time for phase 3 elapsed the process starts with cooling down in phase 4

The values sampled will be stored in the *.RSA text file specified at the start of the process:

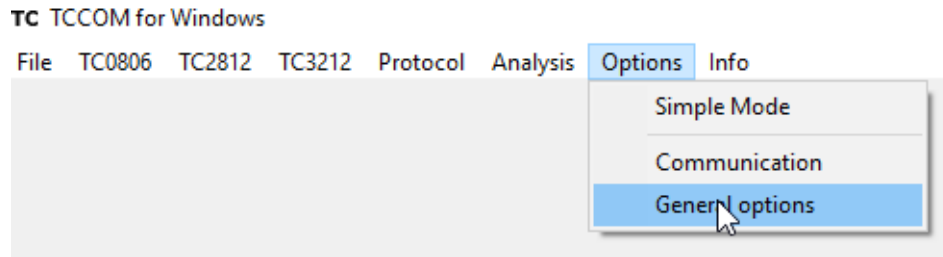
```
22.10.2016 16:18 Start recording ...
SampleInterval:          1 [s]
Reference temperature:   25.0 [°C]
Minimum temperature:    0.0 [°C]
Maximum temperature:    50.0 [°C]
-----
Start temperature:      24.9 [°C]
-----

22.10.2016 16:18 Proceed to set temperature 25.0 °C
22.10.2016 16:18 Phase 1, PWM: 10 %, Duration: 200 [s]
0 25.0
1 25.0
2 25.1
3 25.2
4 25.3
5 25.4
6 25.6
7 25.7
8 25.8
9 26.0
10 26.1
11 26.3
12 26.4
```

... and so on ..

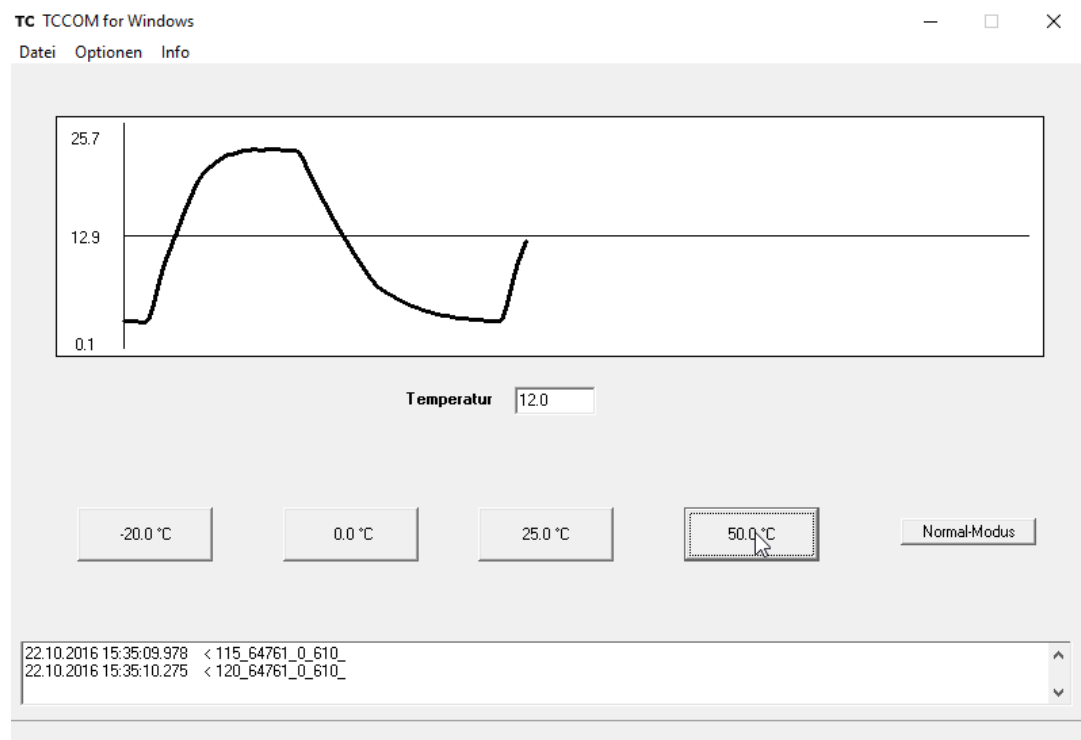
2.6. Menu Options

2.6.1. Overview



With the menu „Options“ the settings for the program can be changed

2.6.2. Simple Mode



Program view in "Simple Mode"

In the graph window the actual temperature is recorded over time, the momentary value is shown as number "12.0" in °C in the "Temperature" field.

The menu structure and the control interface is simplified.

Button	Description
-20.0 °C ... 50.0°C	pressing any of the 4 buttons will send the temperature value display on the button as new set temperature to the controller
Normal Mode	return to normal mode of program

Please note that the controller will continue to regulate to the last set temperature transmitted !

2.6.3. Communication



Dialog Interface settings

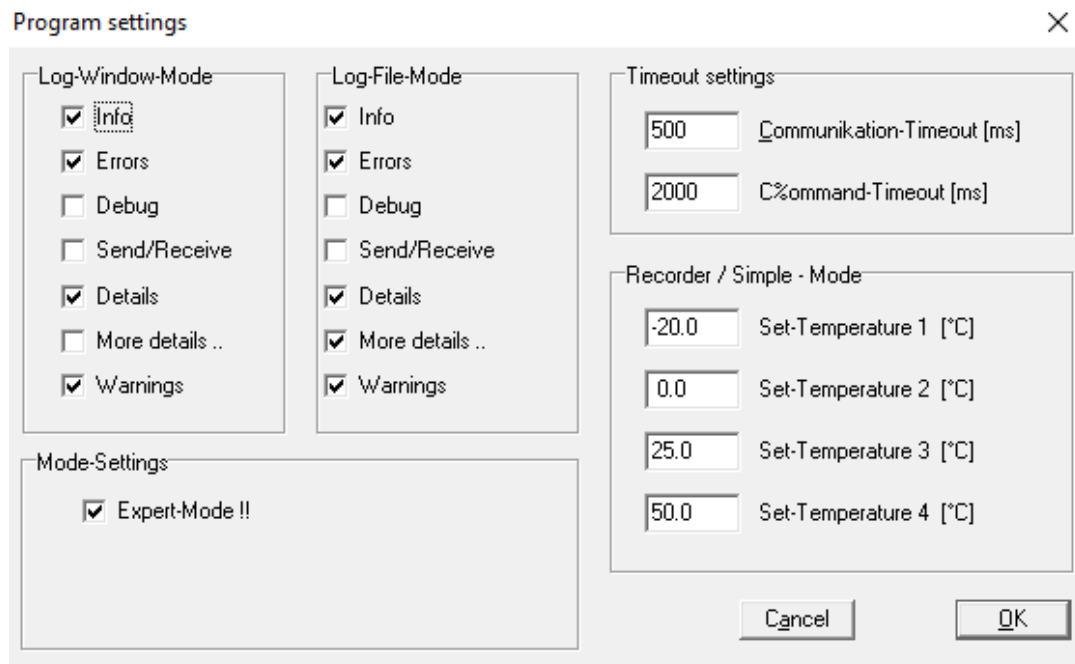
Select the communication port (COM1 ...) and the baud rate. The standard baud rate is 9600 baud, other values are currently not supported.

The COM-Port pull down menu will only show COM ports present in the computer system. The list is updated at start of program ONLY, therefore any COM port added later i.e. by plugging in an USB to RS232 converter will not be available.

Terminate and restart TCCOM if you do not see expected COM ports.

Please observe any error messages shown in the log window in the lower part of the program window.

2.6.4. Program Settings



Dialog "Program settings"

This dialog contains the settings for the log window and the log file.

The log window mode defines how detailed the information is, which is shown in the window.

The log file mode defines how detailed the information is, which is stored on disk.

Log files are stored in the directory „LOG“. They have names of the form runlog00.log ... runlog99.log. In case all possible 100 files are present, the oldest file is overwritten.

The timeout values can be set. Change the values only in case communication problems occur.

Selecting the "expert mode" enables a number of additional function which require in depth knowledge of the controller and its functions.

Activate the expert mode ONLY if you are aware of the possible consequences !

Observe Warnings given in chapter 1.2 !

Item	Description
<u>Log window mode / Log file mode</u>	
Info	general information, should be set
Errors	error messages, must be set
Debug	very detailed, only useful for debugging the program Note: always off !
Send/Receive	shows he communication on a character by character basis, similar to a RS232 interface monitor program, needs excessive disk space ! Note: usually off, may help in case of assumed communication problems
Details	detailed information, may be set
More details	even more detailed information, under normal circumstances not needed
Warnings	Warnings, must be set
<u>Mode settings</u>	
Expert mode	expert mode, enables critical function which may cause damages and hazards if misused - for EXPERTS only !
<u>Timeout settings</u>	
Communication timeout	time limit for an answer of the controller
Command timeout	time limit for the controller having finished the command and having answered with the required response
<u>Recorder / Simple mode</u>	
Set temperature 1 ..4	define the set values shown on the 4 buttons. Value is sent as the new set value to the controller if he respective button is pressed - refer to the description of "Recorder" and "Simple mode"

2.7. Menu Info

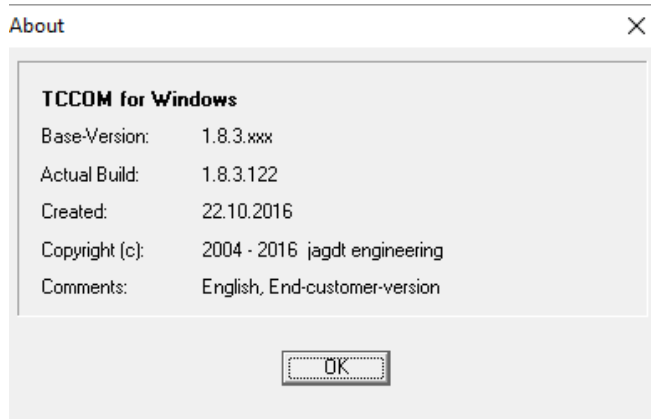
TC TCCOM for Windows

File TC0806 TC2812 TC3212 Protocol Analysis Options Info

about TCCOM ..

Menu "Info"

Sub menu "about TCCOM" displays information about the TCCOM program:



Please note - the "Actual build" information may differ with the exact version you have