

## CompactConnect

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### Basics

[Installation](#)  
[Connection Sensor - Computer](#)  
[RS485/ RS422 \[CT/ CTlaser/ CTratio\]](#)  
[Easy Start-Up](#)  
[Basic Settings](#)  
[Digital Displays/ Input Monitoring](#)  
[Views](#)  
[External Displays](#)  
[Multiple Software Calls](#)  
[Start Measurement](#)  
[Scaling of the Temperature Axis](#)  
[Stop Measurement and Save Data](#)  
[Measurement Configuration](#)  
[Opening of Files](#)

### Special Features

[Loop Maintenance](#)  
[Saving the Sensor Configuration](#)  
[Emissivity Calculation](#)  
[Smart Averaging](#)  
[Binary Chat Program](#)

### Menus

[Menu Overview](#)

### CT/ CTlaser

[Sensor Setup CT/ CTlaser – Signal Processing](#)  
[Emissivity and Transmissivity](#)  
[Material Table](#)  
[Ambient Temperature Compensation](#)  
[Post Processing](#)  
[Signal Graphs](#)  
[Sensor Setup CT/ CTlaser – Output Signals](#)  
[Output Channel 1](#)  
[Output Channel 2](#)  
[Visual Alarms](#)

[Sensor Setup CT/ CTlaser – Advanced Settings](#)  
[Head Parameter](#)  
[Lock Programming Keys](#)  
[Device Adjustment/ Temperature unit](#)  
[RS485 Multidrop Address](#)

## CompactConnect

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### **CTratio**

[Sensor Setup CTratio – Output Signals](#)

[Output Channel 1](#)

[Digital I/O pins](#)

[Sensor Setup CTratio – Signal Processing](#)

[Emissivity/ Slope/ Attenuation](#)

[Post Processing](#)

[Sensor Setup CTratio – Visual Alarms](#)

[Sensor Setup CTratio – Advanced Settings](#)

[Lock Programming Keys](#)

[Temperature unit](#)

[RS485 Multidrop Address](#)

[Calibration](#)

### **CSlaser/ CX**

[Sensor Setup CSlaser/ CX](#)

[General \[CX\]](#)

[General \[CSlaser\]](#)

[Analog Output \(mA\)](#)

[Digital Output](#)

[Open Collector Alarm Output](#)

[Post Processing – Peak/ Valley Hold](#)

[Calibration](#)

### **CS/ CSmicro**

[Sensor Setup/ General](#)

[IN/ OUT \(green\) – ext. Emissivity/ Ambient temp.](#)

[IN/ OUT \(green\) – ext. Trigger](#)

[IN/ OUT \(green\) – Communication input](#)

[IN/ OUT \(green\) – Alarm Output \(open collector\)](#)

[IN/ OUT \(green\) – Temp. Code Output \(open collector\)](#)

[Analog Output \(mA\)/ Alarm Output](#)

[OUT \(yellow\) – Analog Output \(mV\)/ Alarm Output](#)

[OUT \(yellow\) – 3-state Output](#)

[OUT \(yellow\) – Digital Outputs](#)

[Status LED – LED Alarm/ Automatic Aiming Support](#)

[Status LED – Self Diagnostic](#)

[Status LED – Temperature Code Indication](#)

[Signal Processing](#)

[Vcc Adjust](#)

[Calibration](#)

### Installation

Insert the installation CD into the according drive on your computer. If the autorun option is activated the installation wizard will start automatically. Otherwise please start **CDsetup.exe** from the CD-ROM.

After pressing the button **Install Compact Connect** the software will be installed on your PC. The installation wizard will place a launch icon on the desktop and in the start menu: **[Start]\Programs\CompactConnect**.

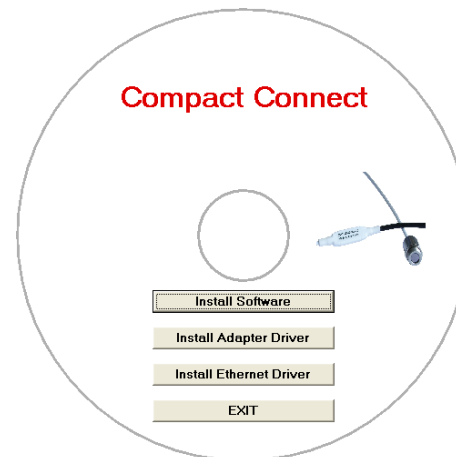
Now please press the button **Install Adapter driver** – all necessary device drivers will be installed. After connecting new sensors or new USB adapter cables to your PC the system will allocate them to the correct driver automatically.

If the **Found New Hardware Wizard** appears you can select **“Connect to Windows Update”** or **“Install the software automatically”**.

The button **Install Ethernet Driver** will only be needed if the Ethernet interface is used (CT/ CTlaser). **EXIT** will close the installation wizard.

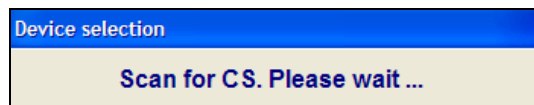
#### Minimum system requirements:

- Windows XP, Vista, 7
- USB interface
- Hard disc with at least 30 MByte free space
- At least 128 MByte RAM
- CD-ROM drive

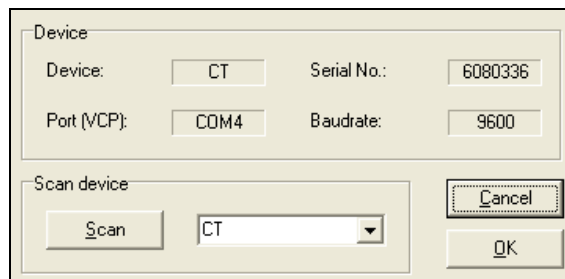


### Connection Sensor - Computer

If you connect your sensor to your PC and start the software, the following message will appear (if option **Auto scan device** is activated). ► **Basic Settings/ Options:**



If the Auto Scan Device option is deactivated, please open at first **[Menu: Preferences\ Interface]**.



You can predefine the search for connected sensors as follows:

- All
- CS/ CSM/ CX/ CSL/ CSM v2
- CT (incl. CTlaser, CT XL, CTratio)

Then please press the **Scan** button. All sensors found will be shown in a selection screen:

**Device selection**

No	Device	Serial	Com	Baudrate	TObj
1	CS	#6085096	COM10	9600	33.7°C

**Example 1:** A sensor (CS) was found. Press **Select** to close the window.

**Refresh** starts a new search.

**Device selection**

No	Device	Serial	Com	Baudrate	TObj
1	CT	#6080336	COM13	57600	26.1°C
2	CS	#6085096	COM10	9600	45.4°C

**Example 2:** Two sensors (CT and CS) were found. Please activate with the cursor the desired unit and after that press the **Select** button to close the window.

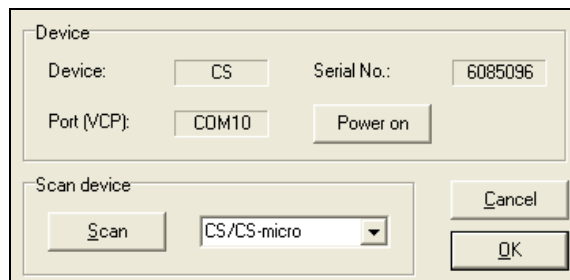
**Refresh** starts a new search.

After the selection of a sensor you will get to the previous screen again. Here you will find now information about the used virtual COM port (VCP), the serial number and the baud rate.

#### ONLY CS/ CSMICRO

If CS/ CSMicro sensors are selected you will find in addition the button **Power On** in this screen. With this function you can operate your sensor as analog device (mV or mA output). The USB interface of your computer will act only as power supply in this case.

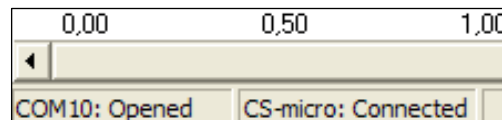
After you have pressed **Power On** the sensor will be powered via USB, but operates in the analog mode (mV output via OUT pin).



To finish please press **OK**. The window will be closed.

If **Auto start device** is activated ► **Basic Settings/ Options** the measurement starts and the temperature values will be shown in the diagram.

After the sensor selection the status line (below the time axis) shows the following information:



**COMxx: Opened** active COM port

**CT/ CS/ CSmicro: Connected** successfull communication with the connected sensor

### RS485/ RS422 [CT/ CTlaser/ CTratio]

If a RS485 interface is used please activate the **RS485 Mode [Menu: Preferences\ Interface]**. After selection of **COM port, Baud rate** and **Sensor address** (both of these values must be identical with the settings on the unit) please press **Connect**. In RS485 mode up to 32 sensors can be connected in one network. The CompactConnect can only display one sensor at once.

For a faster data transfer we recommend the **RS422 mode**. You will need also the RS485 module and the RS485-USB adapter **[ACCTRS485USBK]**. To activate the RS422 mode you have to call this function with the programming keys on the sensor at first (menu item: multidrop address). Now you can connect the sensor as described under ► **Connection Sensor – Computer**. The RS485 Mode must be deactivated in this case.

The screenshot shows a software window with a light beige background. It is divided into two main sections. The top section, titled 'Device', contains four input fields: 'Device:' with a dropdown menu showing 'CT', 'Serial No.:' with a text box containing '9030239', 'Port (VCP):' with a dropdown menu showing 'COM38', and 'Baudrate:' with a text box containing '9600'. The bottom section, titled 'Scan device', contains a 'Scan' button, a dropdown menu showing 'CT', a checked checkbox labeled 'RS485 Mode', and three more dropdown menus: 'Comport :' showing 'COM1', 'Baudrate :' showing '9600', and 'Addr. : :' showing '1'. Below these is a 'Connect' button. To the right of the 'Scan device' section are two buttons: 'Cancel' and 'OK'.

### Easy Start-Up

If you restart the software and the last used sensor is connected to the computer and the **Auto scan device** option is activated ► **Basic Settings/ Options** the connection will be made automatically (without sensor selection window).

If this option is deactivated, please press the **Connect** button in the tool bar or **[Menu: Device\ Scan Device]**.

The button **Disconn.** or **[Menu: Device\ Disconnect Device]** breaks the connection to the sensor and closes the COM port.



## Basic Settings

### LANGUAGE

You can choose the desired **language** in the menu **[Menu: Preferences\ Language]**.

### OPTIONS

The menu item **[Menu: Preferences\ Options]** allows the following settings:

The screenshot shows the 'Options' dialog box for CompactConnect. It is divided into two main sections. The left section contains a list of checkboxes: 'Ask for saving' (unchecked), 'Force data saving after "stop"' (unchecked), 'Scan non-USB devices' (unchecked), 'Auto scan device' (unchecked), 'Auto start device' (unchecked), 'Enable button to toggle LASER' (checked), 'Warning message if LASER ON' (checked), and 'CS rev. 2 - Input monitoring' (checked). The right section contains three sub-sections: 'Decimal separator' with 'System' (selected) and 'User defined:' (unchecked); 'Application title' with 'Application name' (selected) and 'User defined:' (unchecked), followed by a text box containing 'CompactConnect 1.8.3'; and 'Temperature unit' with '°C' (selected) and '°F' (unchecked). At the bottom are 'Cancel' and 'OK' buttons.

#### **Scan non-USB devices**

Activate this option, if you use sensors with other interfaces (non-USB) e.g. CT with RS232 or Ethernet interface.

### **Auto scan device**

If activated, after each program start the software is looking for connected devices.

### **Auto start device**

If activated, after each program start the measurement will be started automatically (if connected sensors have been found before).

### **Enable button to toggle LASER**

**[CTlaser, CTratio only]** If activated, an additional button to switch on and off the laser will be shown in the tool bar and in the menu:

**[Menu: Device]**

### **Warning message if LASER ON**

**[CTratio only]** If activated, a warning message will appear inside the diagram (if the laser is activated) that the measurement has been stopped **► Sensor manual CTratio]**

### **CS rev. 2 – Input monitoring**

**[CS/ CSmicro v2 only]** Must be activated for display of additional values (mV in, Vcc, Eps, TAmb)

### **Application title**

Selection between the program name of the manufacturer or a user defined name. The title will be shown in the top line of the program window.

### **Temperature unit**

Selection between °C and °F **[CS, CSmicro only]**.

For all sensors of the CT series this selection has to be made under:

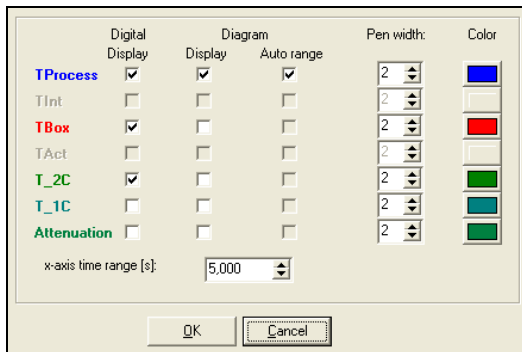
**[Menu: Device\ Device Setup].**

**► Sensor Setup CT – Temperature unit**

The further options are described under **► Stop Measurement and Save Data.**

**DIAGRAM SETTINGS**

The menu item Settings [**Menu: Diagram\ Settings**] enables the selection of the following diagram options:



The dialog box is titled 'Diagram Settings' and contains the following controls:

	Digital Display	Diagram Display	Auto range	Pen width:	Color
TProcess	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	Blue
TInt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	White
TBox	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	Red
TAct	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	White
T_2C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	Green
T_1C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	Teal
Attenuation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	Dark Green

x-axis time range [s]: 5,000

Buttons: OK, Cancel

**Digital Display**

Selection which signals should be displayed as digital display

**Diagram Display**

Selection which signals should be displayed as graph

**Diagram Auto range**

Selection, for which signal graphs an auto scaling should be active

**Pen Width**

Pen width of the temperature graphs [**1...5**]

**Color**

Color of the temperature graph and digital displays

**x-axis time range**

Time frame on the x-axis, which should be displayed at the beginning of a measurement

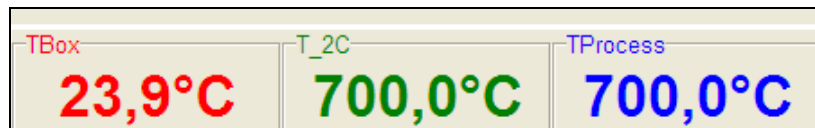
## Digital Displays/ Input Monitoring

If the sensor is connected to your computer and you start the software, the object temperature **TProcess** will be shown as digital display (top right).

You can add additional displays [**Menu: View\ Digital**]. Dependent on the sensor type the available signals may vary.

**TProcess** includes the current post processing functions (average, peak hold, etc.).

The once selected displays will also appear after a restart of the software. The **size** can be changed if you put the cursor on the line beneath the display and pull it down. The buttons of the tool bar will also be moved (depending on the display size).

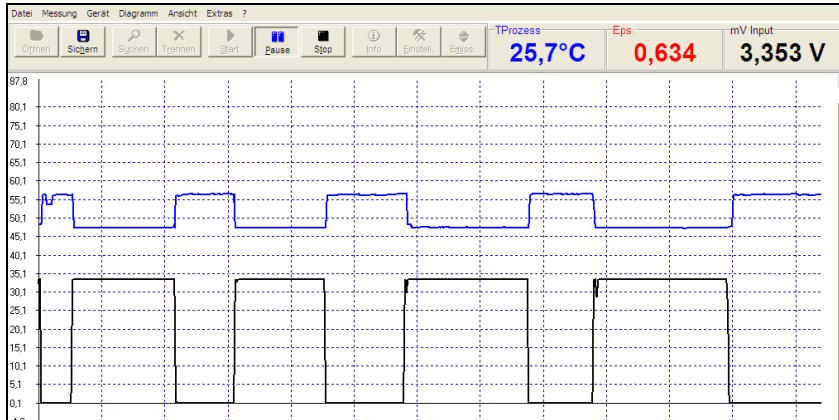


The colors of the different displays are equal to the colors selected under [**Menu: Diagram\ Settings**] for the corresponding temperature graphs. ► **Basic Settings**

**INPUT MONITORING**

On the CS and CSmicro (Rev. 2) the following additional values can be visualized in the diagram and shown as digital display:

<b>mV in</b>	Voltage at pin IN/ OUT if used as functional input
<b>Vcc</b>	Supply voltage
<b>Eps</b>	Emissivity value
<b>TAmb</b>	Value for external ambient temperature compensation



**Example: External emissivity setting via an analog voltage at the pin IN/ OUT. The graph allows an analysis of the process temperature change in dependence on the set emissivity.**

For a display of the input monitoring the following settings have to be made:

1. Measurement settings: Set the communication mode to *Realtime* [**Menu: Measurement\ Settings**]
2. Options: Activate *CS rev. 2 – Input Monitoring* [**Menu: Preferences\ Options**]

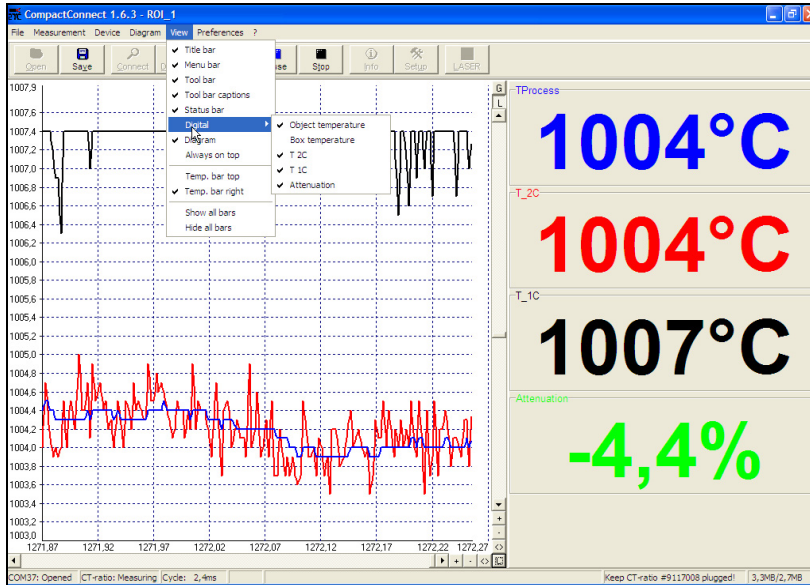
The values will be updated only after the measurement has been started (pressing of **Start**).

**After** you have started the measurement you can disconnect the green wire of the sensor cable (IN/ OUT) from the terminal block and connect a voltage for controlling of the selected function.

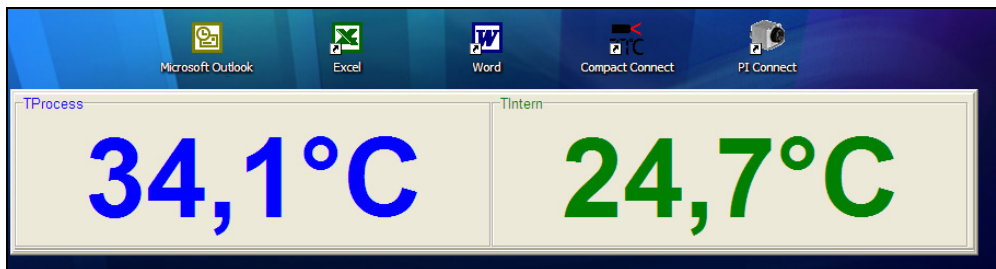
**Before** you stop the measurement you have to connect the green wire with the USB cable again as the sensor will switch back into the bidirectional digital communication mode.

## Views

The CompactConnect allows the creation of free definable screens and views:



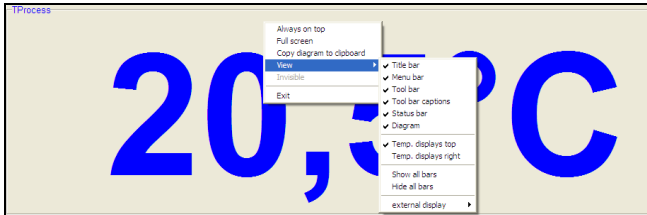
The digital displays can be arranged optional on top or right side [**Menu: View\ Temp. displays top or Temp. displays right**].



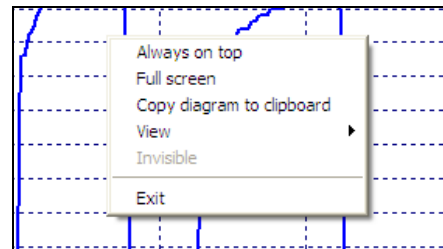
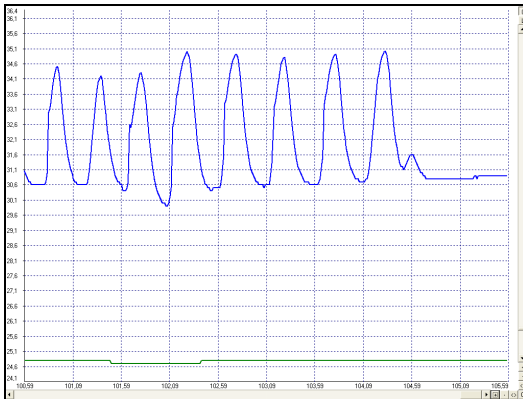
You can show the digital displays also separate by hiding of selected information (e.g. title bar, menu bar, etc.) in any size ► **Digital Displays** and, if desired, also always on top of your PC screen [**Menu: View\ Always on top**].







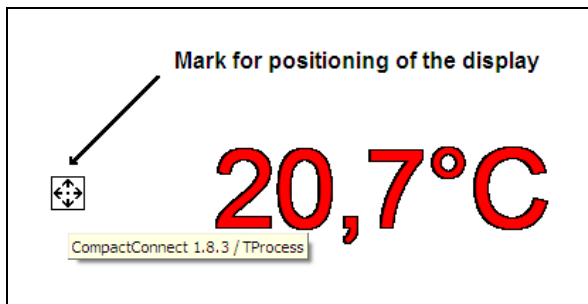
The view menu can also be called from the context menu (right mouse button).



Separate diagram screen – this screen can be inserted into other applications (Word e.g.) by using the copy to clipboard function (right mouse button). This functionality allows an easy print-out of a diagram.

### External Displays

By double click on one of the digital displays you can start an external display for the respective signal. This display will appear initially in the same color than the respective display in the software. By drag and drop these external displays can be placed at any desired location on the PC screen (the position of the according software display will not change). For an easy positioning a mark will appear on the left of the display if crossed with the cursor:



To distinguish between several displays the name of the software/ instance (for multiple software calls) as well as the signal name will be shown shortly.

There are different options available for the design of the external displays which can be called with the right mouse button:



### Border

Presenting the display with a border – in this mode the size of the display can be changed.



### Transparent

Transparent presenting – useful for a positioning of the display in front of pictures or wallpapers.



### Change color

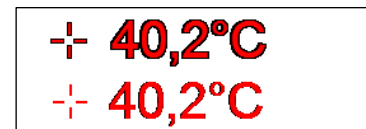
For changing the display color

**Cross hairs**

To show cross hairs which can be positioned independent on the external display.

**Use contrast color**

Dependent on the used background the presenting of the display figures with contrast color (black edging) can be useful.

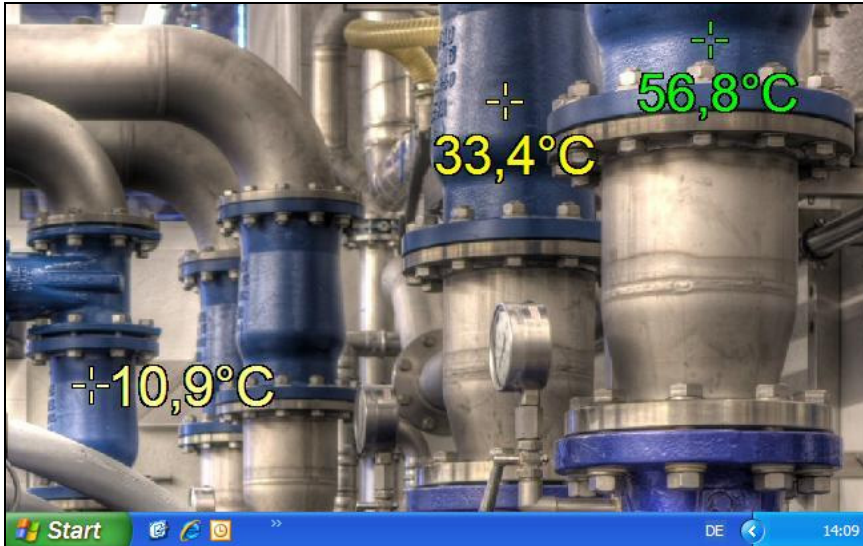
**Show main application****Remove display****Exit (all)**

Calls the window of the main application (out of the invisible mode e.g.)

Closes the associated external display

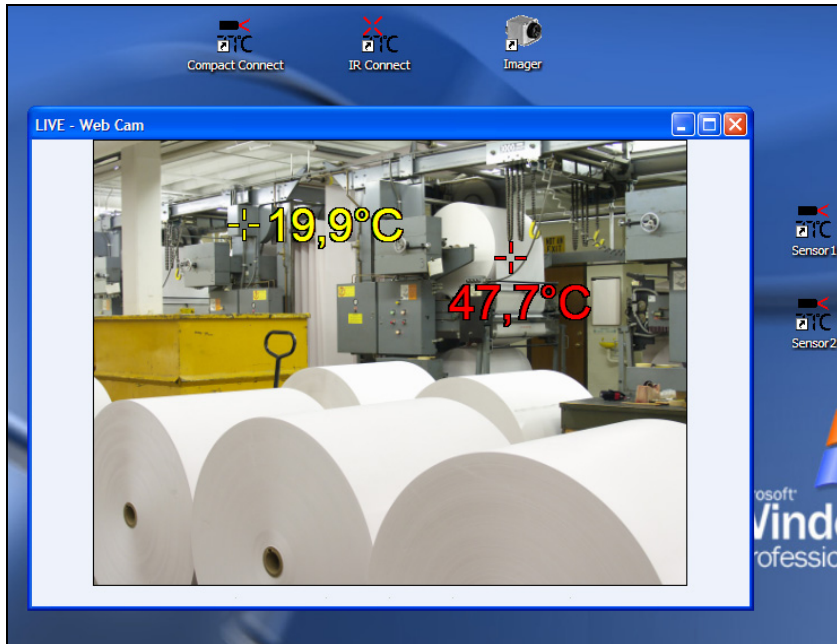
Closes all external displays as well as the main application.

### Application examples for external displays



#### Temperature displays in front of a static machine view

The picture of an industrial plant or of a process is used as wallpaper on the computer. The single instances of the CompactConnect are running in the invisible mode. The external displays are positioned that they are showing the real measurement targets on the plant. After a reboot of the computer the CompactConnect is started automatically via the autostart feature and the external displays are appearing on the previously defined positions.



### Temperature displays in front of a live picture

A camera is showing the live picture of an industrial plant or a machine. As in the previous example the external displays are pointing to the real measurement targets on site showing the current temperatures inside the live picture.

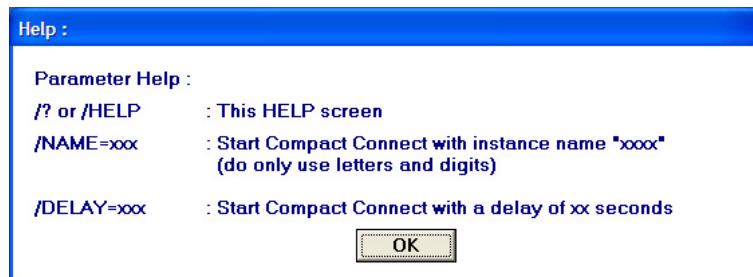
## Multiple Software Calls

### Command Line Parameters

The software can be started with different command line parameters.

You will get an overview if you enter **[blank space] /?** behind the program call in the shortcut (properties).

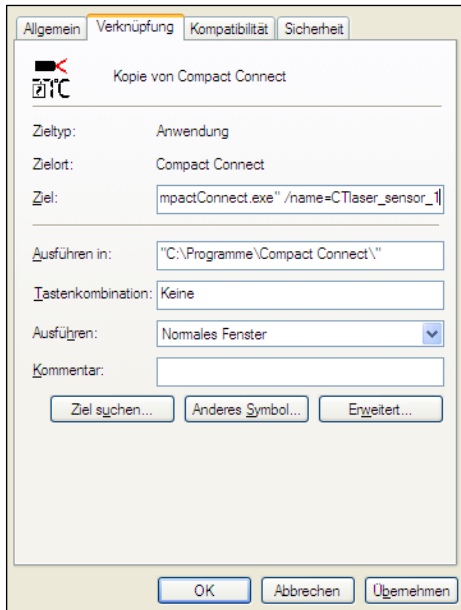
If you start the application now the following window will appear:



The parameter **/NAME** allows a multiple start of separate software instances for displaying different instruments simultaneously.

The parameter **/DELAY** should be used, if several instances of the software are started at the same time. It prevents possible conflicts which can be caused by simultaneous access to the virtual COM ports.

Also a combination of both parameters is possible (see next page).

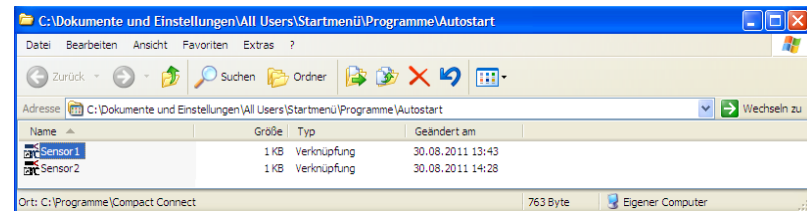


Please make at first a copy of the existing shortcut on your desktop. Under properties you have to add now at the end of the line:

**"C:\Programme\Compact Connect\CompactConnect.exe"**  
a blank space and after:  
**/Name=example**

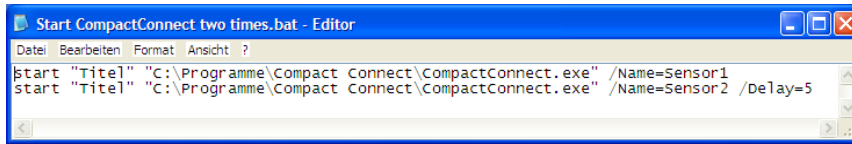
*Example* can be the desired sensor or measurement location name.

To start those different instances automatically shortcuts can be copied into the **autostart** folder or called with the help of a **batch file (\*.bat)**:



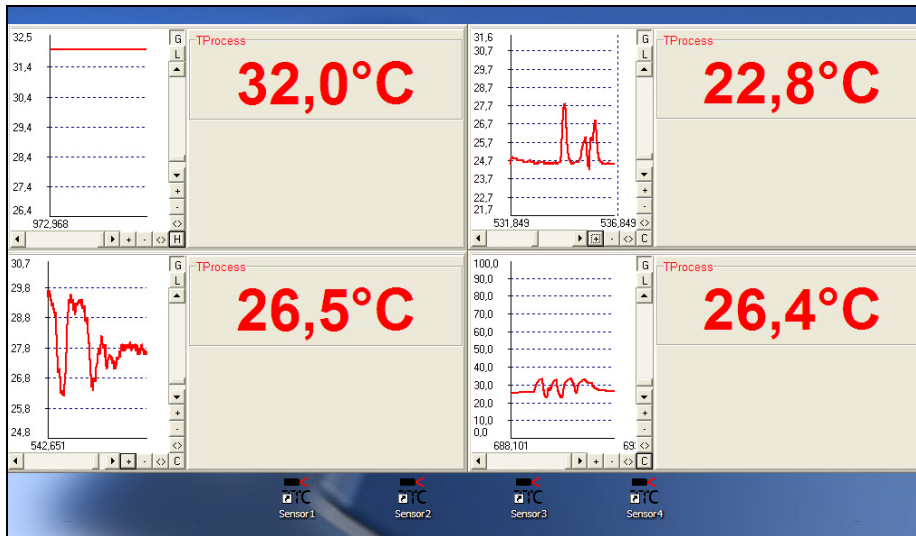
**Autostart folder with two instances of the CompactConnect**





```
Start CompactConnect two times.bat - Editor
Datei Bearbeiten Format Ansicht ?
start "Title" "C:\Programme\Compact Connect\CompactConnect.exe" /Name=Sensor1
start "Title" "C:\Programme\Compact Connect\CompactConnect.exe" /Name=Sensor2 /Delay=5
```

**Batch file for an automatized call of two instances of the CompactConnect**



**Four displays with diagrams are showing the temperature of four via USB connected sensors**

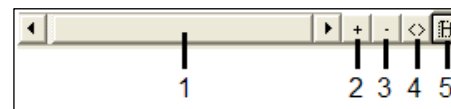
## Start Measurement

To start a measurement please press the **Start** button in the tool bar [Menu: Measurement\ Start].



### Control elements of the time axis:

- 1 Scroll bar
- 2 Zoom in (increase)
- 3 Zoom out (decrease)
- 4 Whole range
- 5 H: Hold/ C: Continue



Any activation of a control element of the time axis or of the **Pause** button will stop the further actualization of the measurement graph. The measurement itself continues in the background. To return to the current measurement graph please press the **Pause** button again **[Menu: Measurement\ Pause]** or **C**.

During the stopped status any parts of the diagram can be selected with the **Time scroll bar**. With the zoom in-button **+** these parts can be stretched (enlarged) and with the zoom out-button **-** clinched (minimized).

## Scaling of the Temperature Axis

With **global scaling** the temperature range of the diagram will automatically be adapted to the respective peak values. The range will remain as set during the whole measurement.

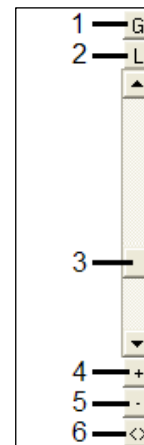
With **local scaling** the temperature range of the diagram will be adapted dynamically to the respective peak values. After the respective peak has left the diagram in the further process of the measurement, the range will be readapted. This option enables an optimum display of the temperature graph.

A **manual scaling** can be done at any time using the control elements of the temperature axis.

**Activation of the desired option:**  
Control elements (temperature axis) or [Menu: Diagram].

### Control elements of the temperature axis:

- |   |                     |
|---|---------------------|
| 1 | Global auto scaling |
| 2 | Local auto scaling  |
| 3 | Scroll bar          |
| 4 | Zoom in (increase)  |
| 5 | Zoom out (decrease) |
| 6 | Whole range         |



## Stop Measurement and Save Data

To stop the current measurement please press the **Stop** button [Menu: Measurement\ Stop].

The **Save** button [Menu: File\ Save as] opens an explorer window to select destination and file name [file type: \*.dat].

The menu [Menu: Preferences\ Options] enables the following settings for data protection:

The screenshot shows the 'Options' dialog box with the following settings:

- ☐ Ask for saving
- ☐ Force data saving after "stop"
- ☐ Scan non-USB devices
- ☒ Auto scan device
- ☐ Auto start device
- ☐ Enable button to toggle LASER
- ☒ Warning message if LASER ON

Buttons: Cancel, OK

Decimal separator:  
☒ System  
☐ User defined: [ ]

Application title:  
☒ Application name  
☐ User defined: [CompactConnect 1.6.3]

Temperature unit:  
☒ °C ☐ °F

### **Ask for saving<sup>1)</sup>**

If activated, each **Stop** and new **Start** will be followed by the query:  
**There is unsaved Data. Save now?**

### **Force data saving after „stop“<sup>1)</sup>**

If activated, after each **Stop** an explorer window for saving the data will be opened automatically.

### **Decimal separator**

**System** uses the computer system based separator for saving the data. If you want to use a **user defined** you can enter the desired separator in the according field.

<sup>1)</sup> If none of both options is activated, a new measurement will be started after termination of one measurement and pressing of the **Start** button again. In this case the former data are deleted!

The further options are described under ► **Basic Settings**.

## Measurement Configuration

With the menu item **[Menu: Measurement\ Settings]** you can define the following parameter for the measurement:

Max. data count 1000 x 1000

If max. data count reached ...

☒ Stop ☐ Overwrite

Memory: 11.4MB

Recording interval (equal with diagram resolution): 1msec

Recording time: 16 min, 40 sec

Communication mode

☒ Auto (recommended) ☐ Realtime ☐ Standard

OK Cancel

### Max. data count

Limitation of the maximum number of data values – when achieved the measurement will be stopped.

### Stop/ Overwrite

If the maximum number of data values is achieved, at **Stop** the current measurement will be terminated automatically/ at **Overwrite** the measurement will continue and the first values will be overwritten (principle of ring memory)

### Memory

Memory, calculated from the max data count value

### Recording interval

Time between single data  
**[1ms...10s]**

### Recording time

Maximum time of measurement, calculated from **Max data count** and **Recording interval**

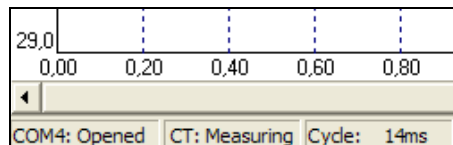
A change of the parameter **Max data count** will have influence on the **Memory** and **Recording time**.

A change of the parameter **Recording interval** will have influence on the **Recording time** only.

## Communication mode

At **Auto** setting (recommended) the connected sensor works in **Realtime mode** (=Burst mode: Sensor is sending data continuously) if the recording interval is <200 ms. If the recording interval is >200 ms the sensor works in the **Standard mode** (= Polling mode: Temperature values will be polled by the software).

The current real cycle time will be shown in the status line:





## Opening of Files

To open a saved file please press the button **Open** [Menu: File\ Open].

You can select the desired file in an explorer window which will be opened [file type: \*.dat].

**The temperature files can also be opened and edited with any text editor or with Microsoft Excel.**

	A	B	C	D	E
1	[Connect DataFile][1.1]				
2	Date:	07.06.2007			
3	Time:	15:49:28			
4	Unit:	°C			
5	Resolution:	0,5			
6	Values:	4			
7	Time	TObj	TInt	TBox	TAct
8	00:00,0	30	29	29	29
9	00:00,5	30	29	29	29
10	00:01,0	30	30,7	34,1	30
11	00:01,5	30	30,7	34,1	30
12	00:02,0	30	30,7	34,1	30
13	00:02,5	30	30,7	34,1	30
14	00:03,0	30,1	30,7	34,1	30
15	00:03,5	30,1	30,7	34,1	30
16	00:04,0	30,1	30,7	34,1	30,1
17	00:04,5	30,1	30,7	34	30,1
18	00:05,0	31,8	30,7	34	30,3
19	00:05,5	35	30,7	34,1	32,4
20	00:06,0	37	30,7	34,1	35,7
21	00:06,5	36,5	30,7	34,1	37,2
22	00:07,0	37	30,7	34,1	36,9
23	-----				
24	End of File				
25					

## Sensor Setup CT/ CTlaser – Signal Processing

The button **Setup** [Menu: **Device\ Device Setup**] opens a window for the setting of all sensor parameters.

The dialog window is separated into 3 categories:

- Signal processing Emissivity, Transmissivity, Tamb compensation, Post processing
- Output signals Output channels and Alarm settings
- Advanced settings Head parameter, Device adjustment, Multidrop address, Lock of programming keys, Temperature unit

Serial No.: 6080336 Firmware Rev.: 42

Signal processing | Output signals | Advanced settings

**Emissivity / Transmissivity**

Emiss. mode: Fixed value

Emissivity: 0,950

Edit material table

Transmissivity: 1,000

**Ambient control**

Amb. mode: Internal (Head)

Fixed value: 300,0

Low range temperature: 23,7

High range temperature: 23,7

**Post processing**

Mode: Averaging

Avg. time [s]: 0,5

Hold time [s]: 0,0

Threshold [°C]: 0,0

Hysteresis [°C]: 160,0

☐ Smart averaging

Save Config Load Config Cancel OK

## Emissivity and Transmissivity

In the selection field **Emiss. mode** in section **Signal processing/ Emissivity, Transmissivity** you can choose between three options to set the emissivity:

**Fixed value:** The value can be set in the input field **Emissivity**

**External:** The value is determined by a voltage on the functional input F2.  
**[0–10 V: 0 V ►  $\varepsilon=0,1$  | 9 V ►  $\varepsilon=1,0$  | 10 V ►  $\varepsilon=1,1$ ]**

**Table:** Input of up to eight different emissivity values and corresponding alarm values A and B in a **Material Table**. A combination of low and high values on the functional inputs F1 to F3 selects the different table values.

**A non connected input represents: F1=High | F2, F3=Low.**  
**[High level:  $\geq +3$  V...+36 V | Low level:  $\leq +0,4$  V...–36 V]**

In the input field **Transmissivity** you have to enter the transmissivity of optional optical components like an additional lens (CF-optics ACCTCF e.g.) or a protective window (ACCTPW e.g.).

Table entry	F1	F2	F3
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

Signal processing | Output signals | A

Emissivity / Transmissivity

Emiss. mode: Fixed value ▼

Emissivity: 0,950 ▲▼

Edit material table

Transmissivity: 1,000 ▲▼

## Material Table

After selection of **Table** in the field **Emiss. mode** you can press the button **Edit material table**. You can now preset the emissivity values for up to 8 different materials. Thereto you have to set the cursor in the respective field of the table.

Two alarms (A and B) can be allocated for each material/ emissivity value. For the output of the alarm the following selection is possible:

- Alarm 1 (blue)
- Alarm 2 (red)
- Output channel 1
- Output channel 2
- <none>

	Eps.	Alarm A Value	Alarm A output to	Alarm B Value	Alarm B output to
0	0.650	105,0	Alarm 1 (blue)	300,0°C	Alarm 2 (red)
1	0.830	200,0°C	Alarm 2 (red)	71,0°C	Alarm 1 (blue)
2	0.945	185,0°C	output channel 1	65,0°C	<none>
3	0.920	87,0°C	output channel 2	-20,0°C	Alarm 1 (blue)
4	0.800	310,0°C	Alarm 2 (red)	0,0°C	<none>
5	0.680	155,0°C	Alarm 1 (blue)	200,0°C	Alarm 2 (red)
6	0.770	38,5°C	Alarm 1 (blue)	55,0°C	Alarm 2 (red)
7	0.960	620,0°C	Alarm 1 (blue)	700,0°C	Alarm 2 (red)

Set all: ☐ ☐ ☐ ☐

OK Cancel

Output channel 1 and 2 can only be selected if they are defined as digital (section **Output signals**) before.

Other properties like normally open/ close and source (the source of output channel 1 [TObj] cannot be changed) have to be defined in section **Output signals** too.

The selection of **Set all** (below the columns) will cause a take over of an entered value for all fields of the according column.

## Ambient Temperature Compensation

In dependence on the emissivity value of the object a certain amount of ambient radiation will be reflected from the object surface. To compensate this impact, the software provides the feature **Ambient control**:

- **Internal (Head):** The ambient temperature will be taken from the head-internal Pt1000 probe (factory default setting).
- **External:** The ambient temperature will be determined by a voltage on the functional input-pin F3  
**[0 – 10 V ► -40 – 900 °C; range scalable]**. With an external probe or with a second CT a real-time ambient temperature compensation can be realized.
- **Fixed value:** A fixed value can be entered in the edit box **Fixed value** (if the ambient radiation is constant).

Especially if there is a big difference between the ambient temperature at the object and head temperature the use of Ambient control with **External input** or **Fixed value** is recommended.

Advanced settings

Ambient control

Amb. mode: Internal (Head) ▼

Fixed value: 300,0 ▼

Low range temperature: 23,7 ▼

High range temperature: 23,7 ▼

## Post Processing

In section **Signal processing/ Post processing** you can select the following functions:

- Averaging
- Peak hold
- Valley hold
- Adv. peak hold
- Adv. valley hold
- Off

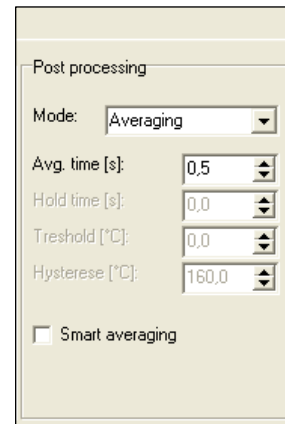
### Averaging

In this mode an arithmetic algorithm will be performed to smoothen the signal. The **Avg. time** is the time constant. This function can be combined with all other post processing functions. The minimum adjustable average time is 0,1s; on the models 1M, 2M and 3M 1ms (0,001s).

### Peak hold

In this mode the sensor is waiting for descending signals. If the signal descends the algorithm maintains the previous signal peak for the specified **Hold time**. The minimum adjustable hold time is 0,1s; on the models 1M, 2M and 3M 1ms (0,001s).

After the hold time the signal will drop down to the second highest value or will descend by 1/8 of the difference between the previous peak and the minimum value during the hold time. This value will be held again for the specified time.



The screenshot shows a 'Post processing' configuration window with a light beige background. It contains several settings: 'Mode' is set to 'Averaging' in a dropdown menu; 'Avg. time [s]' is set to '0,5' with up/down arrow buttons; 'Hold time [s]' is set to '0,0' with up/down arrow buttons; 'Threshold [°C]' is set to '0,0' with up/down arrow buttons; 'Hysteresis [°C]' is set to '160,0' with up/down arrow buttons. At the bottom, there is an unchecked checkbox labeled 'Smart averaging'.

After this the signal will drop down with slow time constant and will follow the current object temperature.

### ► Signal Graphs

Therefore, if periodic events will be measured (bottles on a conveyor e.g.) this peak hold function avoids a drop down of the signal to the conveyor temperature in-between 2 events.

### Valley hold

In this mode the sensor waits for ascending signals. If the signal ascends the algorithm maintains the previous signal valley for the specified **Hold time**. The definition of the algorithm is according to the peak hold algorithm (inverted).

### Advanced Peak hold

In this mode the sensor waits for local peak values. Peak values which are lower than their predecessors will only be taken over if the temperature has fallen below the **Threshold** value beforehand. If **Hysteresis** is activated a peak in addition must decrease by the value of the hysteresis before the algorithm takes it as a new peak value.

### Advanced Valley hold

This mode is the inverted function of Advanced Peak hold. The sensor waits for local minima. Minimum values which are higher than their predecessors will only be taken over if the temperature has exceeded the **Threshold** value beforehand. If **Hysteresis** is activated a minima in addition must increase by the value of the hysteresis before the algorithm takes it as a new minimum value.

### Peak picking function [1M/ 2M/ 3M only]

In order to detect fast events which are shorter than 1ms you have to set the **Avg. time** to 0,0s and activate the **Peak hold** function. In this mode the sampling rate is 250  $\mu$ s.

You can display the object temperature **TProcess** (with post processing) and also the current object temperature **TActual** (without any post processing) in the diagram. In this way the result and functionality of the selected post processing features can easily be traced and controlled.

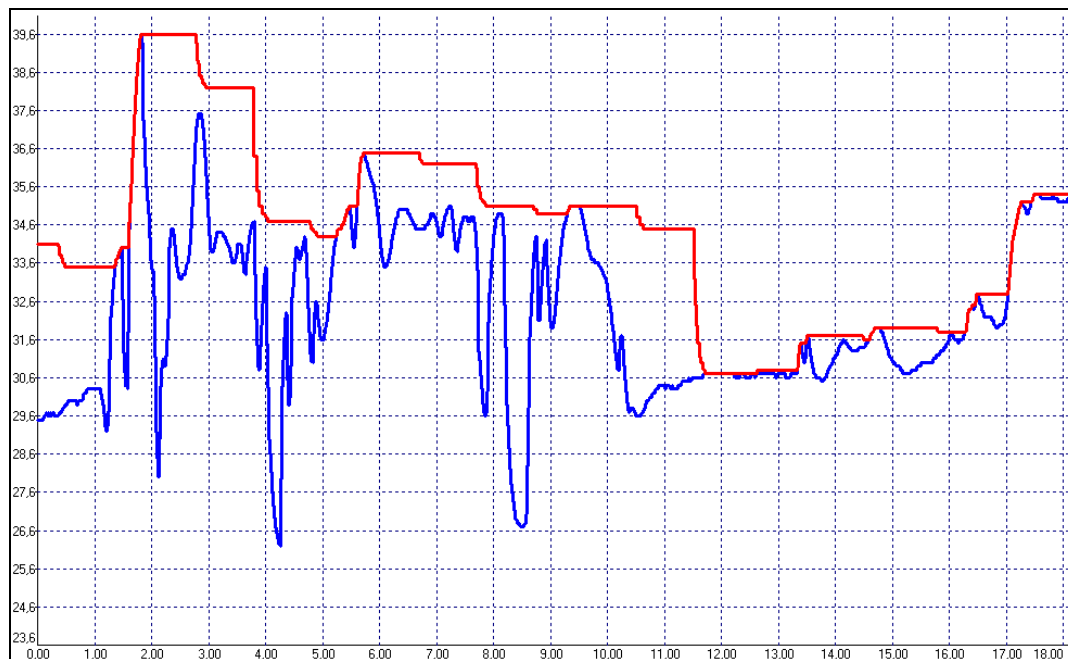
### Smart Averaging

If activated, a dynamic average adaptation at high signal edges is active.

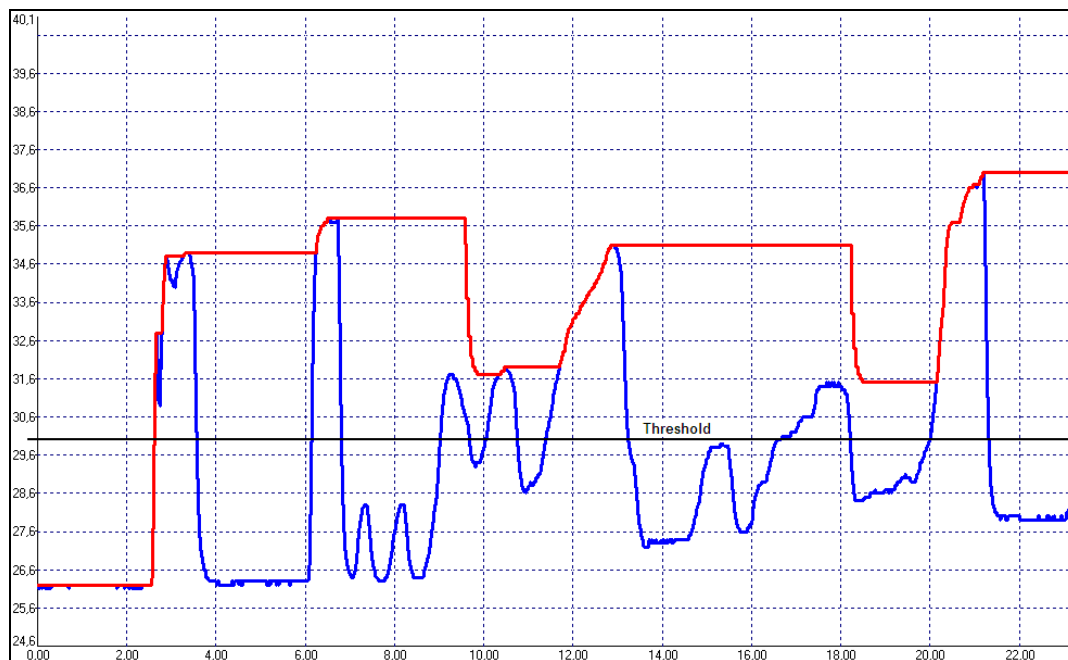
If **Off** is activated, no post processing will happen ( $T_{Process} = T_{Actual}$ ).



## Signal Graphs

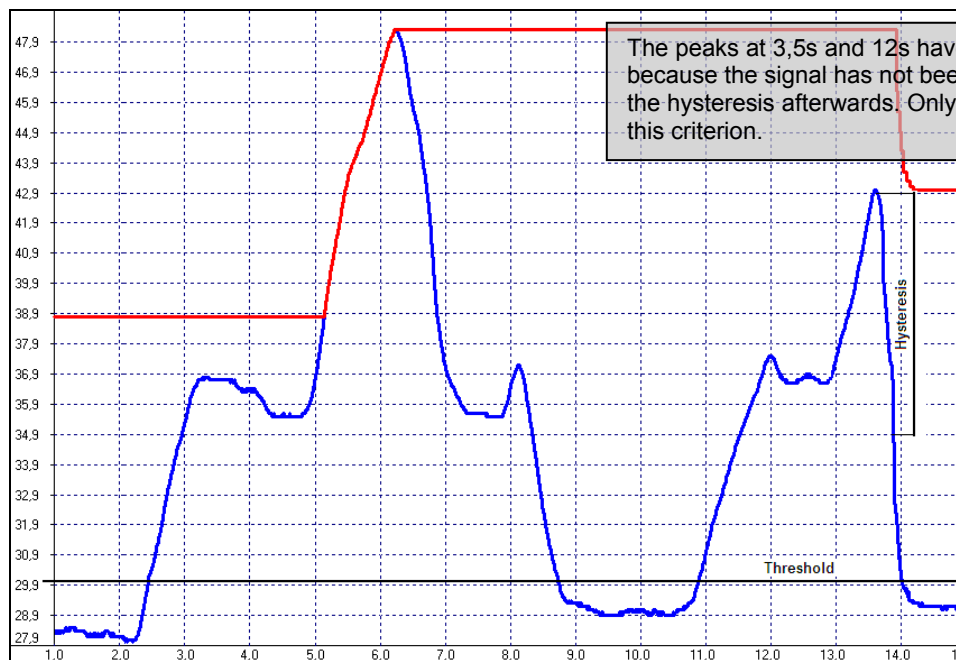


— TProcess with Peak Hold (Hold time = 1s)  
— TActual without post processing



— TProcess with Advanced peak hold (Threshold = 30 °C/ Hysteresis = 1 °C)

— TActual without post processing



— TProcess with Advanced peak hold (Threshold = 30 °C/ Hysteresis = 8 °C)

— TActual without post processing

## Sensor Setup CT/ CTlaser – Output Signals

You can set up the **Output channels 1 and 2** and the **Visual alarms** in section **Output signals**.

The screenshot shows the 'Output signals' tab of the CompactConnect configuration software. At the top, it displays 'Serial No.: 9030239' and 'Firmware Rev.: 1028'. The 'Output signals' tab is selected, showing settings for 'Output channel 1 (TProc.)' and 'Output channel 2 (THead)'. Channel 1 is configured with 'Mode: analog', 'Normally: closed', 'Output: 0.5V', and 'Alarm [°C]: 80.0'. Channel 2 is configured with 'Mode: analog', 'Normally: closed', 'Range: 0..5V', 'Source: THead', and 'Alarm [°C]: 60.0'. A 'Visual alarms' section on the right shows 'Alarm 1' and 'Alarm 2' settings, both with 'Normally: closed' and 'Source: TProc'. At the bottom, there are buttons for 'Save Config', 'Load Config', 'Cancel', and 'OK'.

### Overview Alarm outputs

- **Output channel 1 and 2** if Mode is set to digital
- **Visual alarms**
  - = color alarms in the LCD display
  - = alarms of the optional relays interface
  - = AL2 output (open collector/ only Alarm 2)

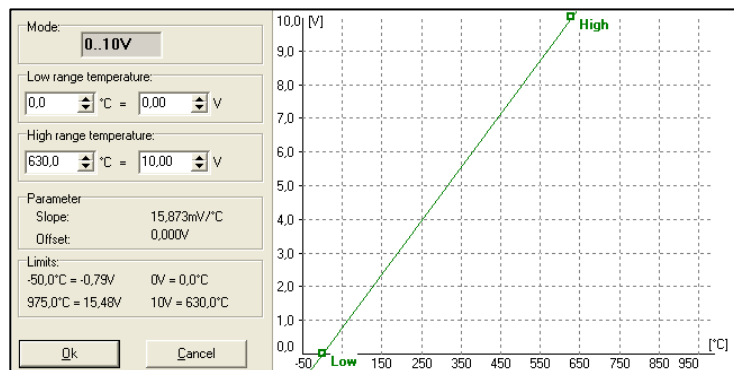
## Output Channel 1

The output channel 1 is used for output of the object temperature **TProcess**.

If **analog** is activated the following analog output signals are available in the selection field **Output: Mode**:

- 0-5 V
- 0-10 V
- 0/4-20 mA
- Thermocouple (t/c J or t/c K)

After you have selected the desired output you can adjust the temperature range of the sensor by pressing the button **Adjust output slope**. The range limits can either be entered directly in the input fields or by shifting the output function graph (by catching the points **Low** or **High** with the cursor).



Alternatively the output channel 1 can also be used as an alarm output. Thereto you have to choose the mode **digital**. The selection **Normally open/ closed** defines the output as High or Low alarm.

Please enter the alarm value (threshold) in the input field **Alarm**.

The selected output signal (0-5 V/ 0-10V/ 0-20 mA/ 4-20 mA) is also valid if the channel is used as alarm output. Dependend on the alarm status either the lower or the upper range limit value will be given out.

## Output Channel 2 [LT/ G5/ P7 only]

This channel is normally used as output for the head temperature **THead** (Analog mode preset). The output signal is 0-5 V or 0-10 V [according -20...180 °C or -20...250 °C on CThot models].

Alternatively the output channel 2 can also be used as an alarm output. For this you have to choose the mode **digital**. The selection **Normally open/ closed** defines the output as High or Low alarm.

In the selection field **Source** the alarm signal source can be selected between **TObj**, **THead** and **TBox**.

Please enter the alarm value (threshold) in the input field **Alarm**.

The output can be selected between 0-5 V and 0-10V.

Dependent on the alarm status either the lower or the upper range limit value will be given out.

Advanced settings

Output channel 2 (THead):

Mode:  
☐ digital ☒ analog

Normally:  
☐ open ☒ closed

Range:  
☒ 0..10V ☐ 0..5V

Source:  
TObj

Alarm [°C]: 25,0

## Visual Alarms

The **Alarms 1 and 2** (Visual Alarms) will cause a change of the backlight color of the LCD display of the electronic box and in addition they are available via the optional relay interface. In addition the Alarm 2 can be used as open collector output on pin **AL2** at the CT electronics (24V/ 50mA).

Also here the selection **Normally open/ closed** defines the alarm as High or Low alarm.

In the selection field **Source** the alarm signal source can be selected between **TProcess**, **THead** and **TBox**. Both alarms will cause the following color change of the LCD display:

- blue: alarm 1 active
- red: alarm 2 active
- green: no alarm active

The standard mode for the visualization of the alarms can be reset with the button

### **Standard visual alarms**

The button **Blue Backlight** is a presetting to achieve a permanent blue backlight on the LCD display.

**All alarms (Alarm 1, Alarm 2, Output channel 1 and 2 if used as alarm output) have a fixed hysteresis of 2 K (CThot: 1K).**

The screenshot shows a configuration window titled "Visual alarms:". It contains two columns for "Alarm 1" and "Alarm 2". Each column has a numerical value field (30.0 for Alarm 1, 100.0 for Alarm 2), a "Normally:" section with radio buttons for "open" and "closed" (both are selected), and a "Source:" dropdown menu set to "TProces". At the bottom, there is a "Presets:" section with two buttons: "Blue Backlight" and "Standard visual alarms".



On the models 1M, 2M and 3M the hysteresis at Alarm 2 can be adjusted in addition:

Visual alarms:

Alarm 1	Alarm 2
800,0	1400,0
Normally: <input type="radio"/> open <input checked="" type="radio"/> closed	Normally: <input checked="" type="radio"/> open <input type="radio"/> closed
Source: TProcess	Source: TProcess
	Hysteresis : 0,0

## Sensor Setup CT/ CTlaser – Advanced Settings

In section **Advanced settings** the following settings can be made:

- Head parameter
- Device adjustment
- Multidrop address
- Lock/ Unlock of programming keys
- Temperature unit

The screenshot shows the 'Advanced settings' tab of the CompactConnect software interface. At the top, it displays 'Serial No.: 7030242' and 'Firmware Rev.: 42'. The 'Advanced settings' tab is selected, showing four main sections: 'Head parameter', 'Device adjustment', 'Multidrop address', and 'User Interface'. The 'Head parameter' section contains three input fields with the values 'F4JG', '62KF', and '0HB4', and a 'Change head parameter' button below them. The 'Device adjustment' section has 'Offset' and 'Gain' spinners set to '0,0' and '1,000' respectively, with a 'Reset Offset/Gain' button. The 'Multidrop address' section features a 'Multidrop address' spinner set to '1' and a warning message: 'Changing the address takes effect after closing this dialog. Check fixed address in interface setup!'. The 'User Interface' section shows an 'Unlocked' status with a padlock icon and radio buttons for temperature units, with '°C' selected. At the bottom, there are buttons for 'Save Config', 'Load Config', 'Cancel', and 'OK'.

Serial No.:	7030242	Firmware Rev.:	42
Signal processing   Output signals   <b>Advanced settings</b>			
<b>Head parameter</b>		<b>Device adjustment</b>	
F4JG 62KF 0HB4		Offset: 0,0 Gain: 1,000	
Change head parameter		Reset Offset/Gain	
<b>User Interface</b>		<b>Multidrop address</b>	
Unlocked		Multidrop address: 1	
		Changing the address takes effect after closing this dialog. Check fixed address in interface setup!	
		Temperature unit: °C °F	
Save Config		Cancel	
Load Config		OK	

## Head Parameter

With exception of the CTfast (LT15F/ LT25F) an exchange of sensing heads and electronics on all models of the CT- and CTlaser-series is possible.

The 3x4-digit code (resp. 5x4-digit code) contains the calibration data of the head. For a correct temperature measurement it is necessary, that the sensing head code (labeled on each head or head cable) is matching the entered code in the corresponding electronic box.

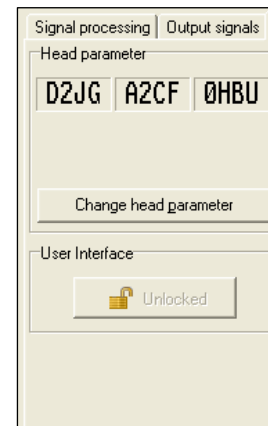
From the factory side this has been done already – a change of the setting by pressing the button

**Change head parameter** is only necessary, if the head will be exchanged.

## Lock Programming Keys

With this function you can lock the programming keys on the CT electronics to avoid a non authorized change of parameters on the unit. Pressing the button will set the unit into the **locked** or **unlocked** mode.

In the locked mode all parameter and settings can be displayed on the unit by pressing the **Mode** button – a change of parameters with the **Up** or **Down** button is not possible.



## Device Adjustment

For certain applications or under certain circumstances a temperature offset or a change of the gain for the temperature curve may be useful.

The factory default settings for Offset and Gain are:

- Offset: 0,0 K
- Gain: 1,000

A changed **Offset** causes a parallel shifting of the temperature curve and therewith it has a linear effect on the temperature reading (change constant independent on object temperature). A change of the **Gain** will have a non-linear effect on the temperature reading (change depends on object temperature).

## Temperature unit

Selection between °C and °F as temperature unit.

## RS485 Multidrop Address

In combination with a RS485 interface you can build a network of several CT sensors (max. 32 sensors).

For the digital communication each sensor must have its own address which you can enter in the input field Multidrop address.

### ► RS485/ RS422

The screenshot shows the 'Advanced settings' dialog box. At the top, 'Firmware Rev.: 42' is displayed. The 'Advanced settings' tab is selected. It contains two main sections: 'Device adjustment' and 'Multidrop address'. In 'Device adjustment', 'Offset' is set to '0,0' and 'Gain' is set to '1,000', both with up/down arrow buttons. Below these is a 'Reset Offset/Gain' button. The 'Multidrop address' section has a 'Multidrop address' dropdown menu currently showing '1'. Below this dropdown is a note: 'Changing the address takes effect after closing this dialog. Check fixed address in interface setup!'. At the bottom of the dialog is a 'Temperature unit' section with two radio buttons: '°C' (which is selected) and '°F'.

## Sensor Setup CTratio – Output Signals

The button **Setup** [Menu: Device\ Device Setup] opens a window for the setting of all sensor parameters.

The dialog window is separated into 4 categories:

- Output signals                      Setting of Output channel 1 and Digital I/O pins
- Signal processing                Setting of Emissivity/ Slope and Post processing
- Visual alarms                    Display main value and Backlight/ Alarm setting
- Advanced settings                Device adjustment, Multidrop address, Lock of programming keys, Temperature unit

Serial No.: 7101001    Firmware Rev.: 5003

Output signals | Signal processing | Visual alarms | Advanced settings

Output channel 1 (TProcess):

Source : T\_2C

Output:

Mode: 0.5V

Connect your hardware to pin:

OUT-mV/mA

Adjust output slope

Digital I/O:

Dig. I/O 1

Function: Dig. Alarm

Source:

Attenuation

Value : [%]

99.0

Normally:

☐ open

☒ closed

"I/O 1" acts as : OUTPUT

Dig. I/O 2

Function: Dig. Alarm

Source:

T\_2C

Value : [°C]

1000.0

Normally:

☒ open

☐ closed

"I/O 2" acts as : OUTPUT

Save Config    Cancel

Load Config    OK

## Output Channel 1

The output channel 1 is used for output of the object temperature **TProcess**.

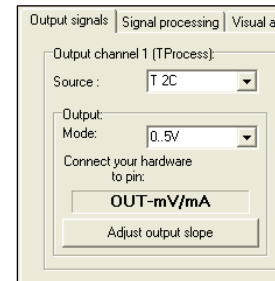
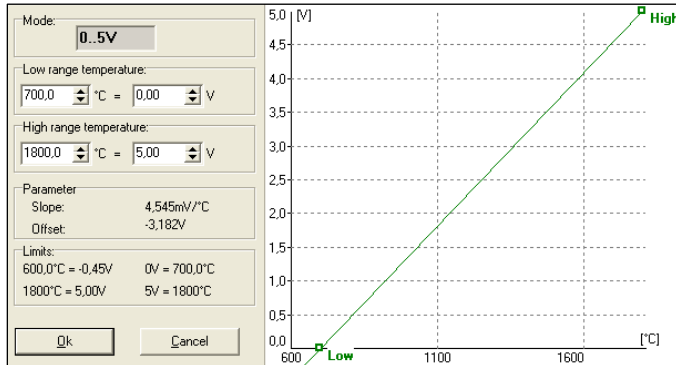
The following signal sources are available in the selection field **Source**:

- T 2C                      2C temperature
- T 1C                      1C temperature
- Attenuation              Signal attenuation in %

The following analog output signals are available in the selection field **Output: Mode**:



- 0-5 V
- 0-10 V
- 0/4-20 mA

After selection of the desired output you can adjust the temperature range of the sensor by pressing the button **Adjust output slope**. The range limits can either be entered directly in the input fields or by shifting the output function graph (by catching the points **Low** or **High** with the cursor).



## Digital I/O pins

The CTratio has two digital pins which can be programmed as in- or outputs using the software. The following options are available:

Function	I/O pin acts as	Description
Digital Alarm	output	Open collector output/ definition as HIGH- or LOW alarm via norm. open/ norm. close options in software dialog.
Valid LO	input	The output follows the object temperature as long as there is a Low level at the I/O pin. After discontinuation of the Low level the last value will be held.
Valid HI	input	The output follows the object temperature as long as there is a High level at the I/O pin. After discontinuation of the High level the last value will be held.
Hold 	input	The last value will be held if there is a signal with a rising edge on the I/O pin.
Hold 	input	The last value will be held if there is a signal with a falling edge on the I/O pin

**High-Pegel:** > 0,8 V

**Low-Pegel:** < 0,8 V

If you select the function **Digital Alarm** the following signal sources can be selected:

T_2C	Temperature value 2-color-mode
T_1C	Temperature value 1-color-mode
Attenuation	Signal attenuation in %
TBox	Temperature of the electronics
TProcess	Signal which was selected for <b>Output channel 1</b>

The definition as Low or High alarm can be done by switching between **Normally: open** and **Normally: closed**.

The screenshot shows a 'Digital I/O' configuration window with two columns for 'Dig. I/O 1' and 'Dig. I/O 2'. Each column has a 'Function' dropdown set to 'Dig. Alarm', a 'Source' dropdown (set to 'Attenuation' for I/O 1 and 'T\_2C' for I/O 2), and a 'Value' field with a spinner. For I/O 1, the value is 99.0 with a unit of [%]. For I/O 2, the value is 1000.0 with a unit of [°C]. Below these are 'Normally:' radio buttons for 'open' and 'closed', with 'closed' selected for both. At the bottom, there are two boxes labeled 'OUTPUT' with the text 'I/O 1 acts as:' and 'I/O 2 acts as:' above them.



## Sensor Setup CTratio – Signal Processing

In this category you can adjust the parameters **Emissivity**, **Slope**, **Attenuation** and select the functions and define the parameters for **Signal processing**.

The screenshot shows the 'Signal processing' tab of the CompactConnect configuration interface. At the top, it displays 'Serial No.: 7101001' and 'Firmware Rev.: 5003'. Below this are four tabs: 'Output signals', 'Signal processing' (selected), 'Visual alarms', and 'Advanced settings'. The 'Signal processing' tab is divided into two main sections. The left section, titled 'Emissivity/Slope', contains three rows of controls: 'Slope:' with a value of 1,000 and a spin button; '2C Temp.: [°C]:' with a value of 700,0 and a spin button; 'Emissivity:' with a value of 1,000 and a spin button; '1C Temp.: [°C]:' with a value of 600,0 and a spin button; and 'max. Attenuation:' with a value of 95,0 and a spin button. The right section, titled 'Post processing (TPProcess)', contains a 'Source: T 2C' label, a 'Mode:' dropdown menu set to 'Peak hold', and four rows of controls: 'Avg. time [s]:' with a value of 0,20 and a spin button; 'Hold time [s]:' with a value of 0,5 and a spin button; 'Threshold [°C]:' with a value of 65,0 and a spin button; and 'Hysteresis [°C]:' with a value of 10,0 and a spin button. Below these is a checked checkbox for 'Smart averaging' and a 'min. difference [°C]:' control with a value of 5,0 and a spin button. At the bottom of the window are four buttons: 'Save Config', 'Load Config', 'Cancel', and 'OK'.

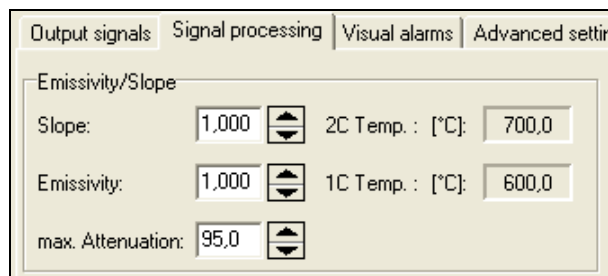
Parameter	Value
Serial No.	7101001
Firmware Rev.	5003
Slope	1,000
2C Temp. [°C]	700,0
Emissivity	1,000
1C Temp. [°C]	600,0
max. Attenuation	95,0
Post processing (TPProcess) Source	T 2C
Mode	Peak hold
Avg. time [s]	0,20
Hold time [s]	0,5
Threshold [°C]	65,0
Hysteresis [°C]	10,0
Smart averaging	<input checked="" type="checkbox"/>
min. difference [°C]	5,0

## Emissivity/ Slope/ Attenuation

The **Emissivity** ( $\epsilon$  – Epsilon) is a material constant factor to describe the ability of a body to emit infrared energy. The emissivity only affects measurements in the 1-color-mode.

The **Slope** is the quotient of the emissivities of both of the overlapping wavelengths and therewith the deciding parameter for measurements in 2-color-mode.

**Attenuation** : The temperature measurement will stop if the attenuation exceeds this limit.



To use the full range up to 1800 °C in the 1-color-mode the attenuation has to be limited to **50%**.

**NOTE:** By clicking at the button beside the dialog box (increase value/ decrease value) and simultaneous movement of the mouse upwards or downwards the values will be changed continuously. Dependent on the distance of the cursor from the initially position the color of the arrow button will change and also the speed of value increasing/ decreasing.



## Post Processing

In the category Signal processing/ Post processing you can select the following functions:

- Average
- Peak hold
- Valley hold
- Advanced Peak hold
- Advanced Valley hold
- Off

You will find the description of the single functions under ► **Post Processing**. The field **Source** shows the output signal (= TProcess) which has been selected in the category **Output signals**.

### Smart Averaging

If activated, a dynamic average adaptation at high signal edges is active. In addition you can enter the minimum temperature difference (**min. difference**) to trigger this function.

Post processing (TProcess)

Source : T 2C

Mode: Peak hold

Avg. time [s]: 0,20

Hold time [s]: 0,5

Threshold [°C]: 65,0

Hysteresis [°C]: 10,0

☒ Smart averaging

min. difference [°C]: 5,0

## Sensor Setup CTratio – Visual Alarms

In this category you can make settings regarding **display** and **LCD backlight** (= visual alarms).

Independent on the selected signal for the analog output you can select a signal (**Display main value/Source**) out of the following listing, which will be displayed on the LCD of the electronics:

<b>T_2C</b>	<b>Temperature value 2-color-mode</b>
<b>T_1C</b>	<b>Temperature value 1-color-mode</b>
<b>Attenuation</b>	<b>Signal attenuation in %</b>
<b>TBox</b>	<b>Temperature of the electronics</b>
<b>TProcess</b>	<b>Signal which was selected for Output channel 1</b>

At **Backlight settings** one signal can be allocated to up to eight alarm limits. The selected signal (under **Source**) can be selected independently from the signal shown in the display and independently from the analog output.

**By combining the different colors up to seven different backlight conditions can be realized.**

Serial No.: 7101001 Firmware Rev.: 5003

Output signals | Signal processing | Visual alarms | **Advanced settings**

Display main value :  
Source : T\_2C

Backlight settings :  
Source : T Process

from	to			
700.0 [°C]	900.0 [°C]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
900.0 [°C]	1000.0 [°C]	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1000.0 [°C]	1800.0 [°C]	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
700.0 [°C]	700.0 [°C]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
700.0 [°C]	700.0 [°C]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
600.0 [°C]	600.0 [°C]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
600.0 [°C]	600.0 [°C]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
600.0 [°C]	600.0 [°C]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Set display to STANDARD

Save Config Load Config Cancel OK

In dependence on the set ranges the display backlight color will change. If the relay interface is used the color change to **Blue** or to **Red** is also representing the threshold values for the relays:

**Blue**    ► **Low alarm (Relay 1)**

**Red**     ► **High alarm (Relay 2)**

The following signals can be selected as source for the display backlight:

<b>T_2C</b>	<b>Temperature value 2-color-mode</b>
<b>T_1C</b>	<b>Temperature value 1-color-mode</b>
<b>Attenuation</b>	<b>Signal attenuation in %</b>
<b>TBox</b>	<b>Temperature of the electronics</b>
<b>TProcess</b>	<b>Signal which was selected for Output channel 1</b>
<b>blue display</b>	
<b>green display</b>	
<b>red display</b>	

The button **Set display to STANDARD** will set the **Display main value** as well as the **Source** for backlight to TProcess and the alarm values back to standard values.

## Sensor Setup CTratio – Advanced Settings

In the category **Advanced settings** the following parameter can be adjusted:

- Temperature unit
- Lock/ Unlock of programming keys
- Multidrop address
- Calibration

The screenshot shows the 'Advanced settings' tab of the CompactConnect configuration window. At the top, it displays 'Serial No.: 7101001' and 'Firmware Rev.: 5003'. The 'Advanced settings' tab is selected, showing four main sections: 'Temp. unit', 'User Interface', 'Calibration', and 'Multidrop address'. The 'Temp. unit' section has radio buttons for '°C' (selected) and '°F'. The 'User Interface' section has a button labeled 'Unlocked' with a padlock icon. The 'Calibration' section contains four input fields: 'Gain 2C: 1,000', '2C Temp.: [°C]: 700,0', 'Gain 1C: 1,000', and '1C Temp.: [°C]: 600,0'. The 'Multidrop address' section has a dropdown menu set to '1' and a note: 'Changing the address takes effect after closing this dialog. Check fixed address in interface setup!'. At the bottom, there are buttons for 'Save Config', 'Load Config', 'Cancel', and 'OK'.

Section	Parameter	Value
Temp. unit	°C	<input checked="" type="radio"/>
	°F	<input type="radio"/>
User Interface	Unlocked	<input type="button" value="Unlocked"/>
	Multidrop address	1
Calibration	Gain 2C	1,000
	2C Temp. [°C]	700,0
	Gain 1C	1,000
	1C Temp. [°C]	600,0

### Lock Programming Keys

With this function you can lock the programming keys on the CTratio electronics to avoid a non authorized change of parameters on the unit. Pressing the button will set the unit into the **locked** or **unlocked** mode. In the locked mode all parameter and settings can be displayed on the unit by pressing the **Mode** button – a change of parameters with the **Up** or **Down** button is not possible.

### Temperature unit

Selection between °C and °F as temperature unit.

### RS485 Multidrop Address

In combination with a RS485 interface you can build a network of several CTratio sensors (max. 32 sensors). For the digital communication each sensor must have its own address which you can enter in the input field Multidrop address.

#### ► RS485/ RS422

### Calibration

You can enter gain factors for the 2C-channel and 1C-channel. Factory default both values are set to 1,000.

## Sensor Setup CSLaser/ CX

The button **Setup** [Menu: Device\ Device Setup] opens a dialog window for set up the parameters of the sensor.

### General [CX]

General | Output | Alarm | Post Processing | Calibration

General setup

Transmission: 1.000

Avg. Time (s): 0.09 ☒ Smart averaging

Emissivity Source: fixed value

Emissivity: 0.950

Ambient temp. source: Head temperature

Ambient temperature:

-IN" pin is configured as  
**communication input**

Save Config Factory default Cancel

Load Config OK

Transmission:	Transmissivity setting
Avg. Time (s):	Average time setting
Smart averaging:	Function for dynamic average adaptation at high signal edges
Emissivity Source:	Fixed value
Emissivity:	Emissivity setting (Fixed value)
Ambient temp. source <sup>1)</sup> :	Selection between <b>Internal (THead)</b> , or <b>Fixed value</b>
Ambient temperature:	Value input for mode <b>Fixed value</b>



## General [CSlaser]

General | mA output | Output | Alarm | Post Processing | Calibration

General setup

Transmission:

Avg. Time [s]:  ☒ Smart averaging

Emissivity:

Ambient temp. source:

Ambient temperature [°C]:

Emissivity switches:

☐ Enable emissivity switches

Emissivity switches = 0,97

Emissivity = fixed value ( 0,900 )

"IN" pin is configured as

communication input

Save Config Factory default Cancel

Load Config OK

Transmission: Transmissivity setting

Avg. Time (s): Average time setting

Smart averaging: Function for dynamic average adaptation at high signal edges

Emissivity: Emissivity setting (Fixed value)

Ambient temp. source <sup>1)</sup>: Selection between **Internal (THead)** or **Fixed value**

Ambient temperature: Value input for mode **Fixed value**

Emissivity switches: Activation or Deactivation of the emissivity switches on the sensor.

**If the switches are activated the consequent emissivity is the result of the multiplication of the emissivity set on the sensor and the emissivity set in the software.**

Emissivity:

Ambient temp. source:

Ambient temperature [°C]:

Emissivity switches:

☒ Enable emissivity switches

Emissivity switches = 0,97

Emissivity = fixed value \* switches ( 0,873 )

<sup>1)</sup> For the compensation of the ambient temperature the internal head temperature is used if Internal (THead) is selected. In dependence on the emissivity value of the object a certain amount of ambient radiation will be reflected from the object surface. Therefore for certain applications it may be useful taking the ambient temperature on the object site for compensation (if significant different from head ambient temperature e.g.).

The following settings can be made:

- **Fixed value:** You can enter a value which represents the ambient radiation in the field **Ambient temp.**

## Analog Output (mA)

The screenshot shows the 'mA output' tab in the CompactConnect software. The 'mA Output' section has two input fields: 'Temp @ 4mA [°C]' set to 0.0 and 'Temp @ 20mA [°C]' set to 500.0. Below this is a 'Failsafe settings' section with a checkbox that is currently unchecked. Under this checkbox are two sub-sections: 'Headtemp. Failsafe' and 'Objecttemp. Failsafe'. Each sub-section has 'Temp min' and 'Temp max' fields with corresponding units (°C and mA). For 'Headtemp. Failsafe', the values are 0.0 °C and 4 mA. For 'Objecttemp. Failsafe', the values are 0.0 °C and 4.0 mA. At the bottom, a label indicates '"IN" pin is configured as communication input'. At the very bottom are buttons for 'Save Config', 'Factory default' (highlighted with a dashed border), 'Cancel', 'Load Config', and 'OK'.

### mA output

Temp @ 4 mA: Lower limit temperature range  
Temp @ 20 mA: Upper limit temperature range

Failsafe settings<sup>1)</sup>: Definition of failsafe modes

If the sensor will be connected to the supply voltage, the unit is checking for the first 300ms if a USB adapter is connected. In this case the bidirectional communication mode will be activated automatically.

<sup>1)</sup> The settings for failsafe mode enable a defined level on the analog output in dependence on preset temperature limits for object temperature and/ or sensing head temperature (**Temp min** and **Temp max**).

## Digital Output

In the selection field **Mode** you can select between **communication output** (bidirectional digital communication for interaction with the software) and **burst output**.

General | mA output | **Output** | Alarm | Post Processing | Calibration

Mode:

communication output  
communication output  
burst output

"IN" pin is configured as  
**communication input**

Save Config | Factory default | Cancel  
Load Config | OK

### Burst output

Value 1...3:

Selection between:

<none>

Process temperature

Internal temperature

Emissivity

Transmissivity

Ambient temperature

Act. target temperature

In the burst mode the sensor works in a unidirectional communication mode – the sensor is sending data continuously. The burst string can be configured by selection of value 1 to 3.

**► Command List on software CD]**

## Open Collector Alarm Output

This function activates an additional alarm output (open collector output) at the **RxD pin (green)**.

The screenshot shows the 'Alarm' tab in the CompactConnect software. The 'Alarm' checkbox is checked. The 'Source' dropdown is set to 'target temp', the 'Mode' dropdown is set to 'normally off', and the 'Temp' field is set to '30.0 °C'. Below these settings, a text box states '"/>IN" pin is configured as **alarm output**'. At the bottom, there are buttons for 'Save Config', 'Factory default', 'Cancel', 'Load Config', and 'OK'.

### Alarm [open collector]

Source:                      Selection between:  
                                    Target temperature  
                                    Head temperature  
Mode:                        normally off/ on  
Temp.:                       alarm value

The RxD pin acts as alarm output.

[► Sensor manual: Electrical Installation]

## Post Processing – Peak/ Valley Hold

General | Output | Alarm | **Post Processing** | Calibration

Post processing

Hold mode: Peak hold

Hold time [sec]: 1.0

“IN” pin is configured as  
**communication input**

Save Config Factory default Cancel

Load Config OK

Hold mode:

Selection between:

Off

Peak hold

Valley hold

Advanced peak hold

Advanced valley hold

Peak hold Trigger off

Valley hold Trigger off

Hold time (sec.):

Hold time adjustment

(999,9 = infinite)

In the **Peak hold** mode the sensor is waiting for descending signals. If the signal descends the algorithm maintains the previous signal peak for the specified **Hold time**.

In the **Valley hold** mode the sensor waits for ascending signals. If the signal ascends the algorithm maintains the previous signal valley for the specified **Hold time**.

You will find a detailed description of these functions under **Post Processing**.

## Calibration

General | Output | Alarm | Post Processing | Calibration

Calibration

Gain: 1,000

Offset: 0,0

"TIN" pin is configured as  
**communication input**

Save Config Factory default Cancel

Load Config OK

Gain: Adjustment of Gain  
Offset: Adjustment of a temperature offset

For certain applications or under certain circumstances a temperature offset or a change of the gain for the temperature curve may be useful.

The factory default settings for Gain and Offset are:

- Gain: 1,000
- Offset: 0,0 K

A changed **Offset** causes a parallel shifting of the temperature curve and therewith it has a linear effect on the temperature reading (change constant independent on object temperature). A change of the Gain will have a non-linear effect on the temperature reading (change depends on object temperature).

## Sensor Setup CS/ CSmicro

The button **Setup** [Menu: Device\ Device Setup] opens a dialog window for set up the parameters of the sensor.

### General

Signal processing		Vcc adjust		Calibration	
General	IN/OUT (green)	OUT (yellow)	Status LED		
<b>General setup</b>					
Transmission:	1,000				
Avg. Time [s]:	0,100				
Avg. mode:	smart				
Avg. hysteresis [°C]:	5,0				
Emissivity fix value:	0,950				
Ambient temp. source:	Internal (Head)				
Ambient temperature: [°C]:	23,0				
<input type="checkbox"/> "IN/OUT" pin is configured as <div>communication input</div>					
<input type="checkbox"/> "OUT" pin is configured as <div>mV output</div>					
Save Config		Factory default		Cancel	
Load Config				OK	

Transmission:	Transmissivity setting
Avg. Time:	Average time setting
Avg. mode:	Selection between smart and normal mode
Avg. hysteresis:	Adjustment of the minimum temperature difference for activation of the <b>smart averaging</b> function
Emissivity fix value:	Emissivity setting (Fixed value)
Ambient temp. source <sup>2)</sup> :	Selection between <b>Internal (Head)</b> , or <b>Fixed value</b>
Ambient temperature <sup>2)</sup> :	Value input for mode <b>Fixed value</b>

In the lower range of the unit adjustment window the current use of the **IN/ OUT** (green) and **OUT** (yellow) pins will be shown.



**IN/ OUT (green) – ext. Emissivity/ Ambient temp. [CS/ CSmicro LT only]**

The **IN/ OUT** pin can be programmed as an input as well as an output.

Mode:


Selection between:


ext. analog emissivity [IN] <sup>1)</sup>

ext. analog ambient [IN] <sup>1)</sup>

valid control high active (high level >0,8 V [IN]

valid control low active (low level <0,8 V) [IN]

ext. hold  rising edge (edge level 0,8 V) [IN]

ext. hold  falling edge (edge level 0,8 V) [IN]

communication input [IN]

alarm output (open collector) [OUT]

temp. code indication (open collector) [OUT]

inactive <sup>2)</sup>

**ext. analog emissivity [IN] ] <sup>3)</sup>**

Slope settings:

Emissivity @ 0V: lower range limit emissivity

Emissivity @ 10V: upper range limit emissivity

**ext. analog ambient [IN] ] <sup>3) 4)</sup>**

Slope settings:

Temp. @ 0V: lower range limit ambient temp.

Temp. @ 10V: upper range limit ambient temp.

<sup>1)</sup> only available on CS/ CSmicro LT

<sup>2) 3)</sup> for explanation see next page

- 2) If the mV output is used exclusively the **IN/ OUT** pin should be set to **inactive** to avoid interferences. If **mV output** is selected in the tab **OUT (yellow)** the IN/ OUT pin is set automatically to inactive for this reason.
- 3) If the function **ext. analog emissivity** or **ext. analog ambient** is selected the **IN/ OUT** pin acts as analog input. Via a voltage (0-10 V) on the **IN/ OUT** pin the emissivity or ambient temperature (see footnote 2) can be adjusted remotely. The range limits can be adjusted using the slope settings.
- 4) For the compensation of the ambient temperature the internal head temperature is used if **Internal (Head)** is selected. In dependence on the emissivity value of the object a certain amount of ambient radiation will be reflected from the object surface. Therefore for certain applications it may be useful taking the ambient temperature on the object site for compensation (if significant different from head ambient temperature e.g.).

The following settings can be made:

- **ext. analog ambient temperature (tab: IN/ OUT):**

Using the IN/ OUT pin you can control the ambient temperature value with an external voltage of 0-10 V.

- **Fixed value (tab: General):**

You can enter a value which represents the ambient radiation in the field **Ambient temperature**.

### **IN/ OUT (green) – ext. Trigger**

To trigger the measurement signal the following functions are available:

#### **Valid control – high active**

The output follows the object temperature as long as there is a High level ( $>0,8$  V) at the **IN/ OUT** pin. After discontinuation of the High level the last value will be held.

#### **Valid control – low active**

The output follows the object temperature as long as there is a Low level ( $<0,8$  V) at the **IN/ OUT** pin. After discontinuation of the Low level the last value will be held.

#### **ext. Hold $\overline{\uparrow}$ rising edge**

The last value will be held if there is a signal with a rising edge (level  $0,8$  V) at the **IN/ OUT** pin.

#### **ext. Hold $\overline{\downarrow}$ falling edge**

The last value will be held if there is a signal with a falling edge (level  $0,8$  V) at the **IN/ OUT** pin

### **IN/ OUT (green) – Communication input**

The input for the digital communication can be activated and used independent on the communication output. (to change sensor parameters via binary commands e.g.). The maximum UART voltage should not exceed  $3,3$  V.

**[► Sensor manual: Digital Commands]**

## IN/ OUT (green) – Alarm Output (open collector)

With this function an additional alarm output (open collector output) at the **IN/ OUT** pin will be activated.

**[► Sensor manual: Electrical installation]**

Signal processing		Vcc adjust		Calibration	
General	IN/OUT (green)	OUT (yellow)	Status LED		
Mode: alarm output (open collector) <OUT>					
Alarm settings:					
Source: Process temp		<input checked="" type="checkbox"/> tempcode indication for values above alarm levels			
Mode: Normally open		Range settings:			
Alarm threshold [°C]: 40,0		Temp min [°C]: 0,0 = 0%			
Difference mode (TOBj-TAmb) <input checked="" type="checkbox"/>		Temp max [°C]: 100,0 = 100%			
"IN/OUT" pin is configured as: alarm output (open collector)					
"OUT" pin is configured as: mV output					
<input type="button" value="Save Config"/>		<input type="button" value="Factory default"/>		<input type="button" value="Cancel"/>	
<input type="button" value="Load Config"/>				<input type="button" value="OK"/>	

Source:

Selection between:

Process temperature

Act. object temperature

Head temperature

Electronic temperature

Mode:

normally open/ closed

Alarm threshold:

Temperature for alarm activation

Difference mode:

If activated, the difference between object temp. and ambient temp. will be used for the alarm threshold.

Temp. code output:

If activated, in case of an active alarm the current temperature will be given out as temp. code via the open collector output.

Range settings:

Definition of the range limits for the temp. code output (0 and 100% value)

## IN/ OUT (green) – Temp. Code Output (open collector)

With this function an output of the **temperature code** (open collector output) at the **IN/ OUT** pin will be activated.

Signal processing		Vcc adjust	Calibration
General	IN/OUT (green)	OUT (yellow)	Status LED
Mode: temp. code output (open collector) <OUT>			
Range settings: Temp min [°C]: 0,0 = 0% Temp max [°C]: 100,0 = 100%			
"IN/OUT" pin is configured as temp. code output (open collector)			
"OUT" pin is configured as mV output			
Save Config	Factory default	Cancel	
Load Config		OK	

Range settings:

Definition of the range limits for the temp. code output (0 and 100% value)

**Analog Output (mA)/ Alarm Output [CSmicro 2W]**

Status LED	Signal processing	Calibration
General	mA output	INI/OUT (green)    OUT (yellow)
Mode: <div>mA output</div>		
<div> <div> <b>mA settings :</b>            Temp min [°C]: <input type="text" value="0,0"/>            Temp max [°C]: <input type="text" value="350,0"/>            mA min : <input type="text" value="4,0"/>            mA max : <input type="text" value="20,0"/>            Slope : <input type="text" value="0,0 mA/K"/>  <input type="button" value="Adjust output slope"/>  <input checked="" type="checkbox"/> Failsafe aktivieren         </div> <div> <b>Failsafe settings :</b>  <input checked="" type="checkbox"/> Headtemp. failsafe            Temp min: [°C]: <input type="text" value="0,0"/> [ mA ]: <input type="text" value="4,0"/>            Temp max: [°C]: <input type="text" value="80,0"/> [ mA ]: <input type="text" value="20,0"/>  <input checked="" type="checkbox"/> Targettemp. failsafe            Temp min: [°C]: <input type="text" value="0,0"/> [ mA ]: <input type="text" value="4,0"/>            Temp max: [°C]: <input type="text" value="500,0"/> [ mA ]: <input type="text" value="20,0"/> </div> </div>		
<input type="checkbox"/> "IN/OUT" pin is configured as <div>alarm output (open collector)</div>		
<input type="checkbox"/> "OUT" pin is configured as <div>burst output</div>		
<input type="button" value="Save Config"/> <input type="button" value="Factory default"/> <input type="button" value="Cancel"/>		
<input type="button" value="Load Config"/> <input type="button" value="OK"/>		

Mode:                      Selection between:  
                                  mA output [analog]  
                                  mA alarm output [two-level alarm]

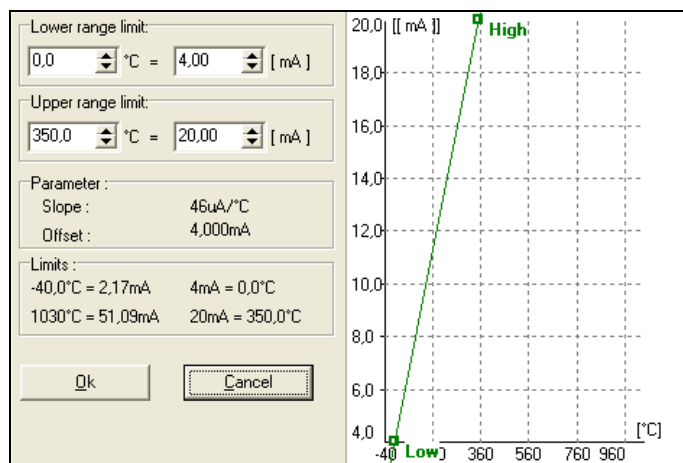
**mA output**

Temp min:                      Lower limit temperature range  
 Temp max:                      Upper limit temperature range  
 mA min:                        Lower output range  
 mA max:                        Upper output range  
 Failsafe settings<sup>1)</sup>:        Definition of failsafe modes

If the sensor will be connected to the supply voltage, the unit is checking for the first 300ms if a USB adapter is connected. In this case the bidirectional communication mode will be activated automatically.

<sup>1)</sup> The settings for failsafe mode enable a defined level on the analog output in dependence on preset temperature limits for object temperature and/ or sensing head temperature (**Temp min** and **Temp max**).

You can adjust the temperature range of the sensor by pressing the button **Adjust output slope**. The range limits can either be entered directly in the input fields or by shifting the output function graph (by catching the points **Low** or **High** with the cursor).



Status LED	Signal processing	Calibration
General	mA output	IN/OUT (green)    OUT (yellow)
<b>Mode:</b> <div>mA alarm output</div>		
<b>Alarm settings:</b>		
Source: <div>Process temp</div>		
Mode: <div>Normally open</div>		
Alarm threshold [°C]: <div>40,0</div>		
Difference mode (TObj-TAmb) <input type="checkbox"/>		
Lower alarm current: <div>4,0</div>		
Upper alarm current: <div>20,0</div>		
<input type="checkbox"/> "IN/OUT" pin is configured as <div>alarm output (open collector)</div>		
<input type="checkbox"/> "OUT" pin is configured as <div>burst output</div>		
<div>Save Config</div> <div>Factory default</div> <div>Cancel</div>		
<div>Load Config</div> <div>OK</div>		

## alarm output

Source:

Selection between:

Process temperature

Act. object temperature

Head temperature

Electronic temperature

normally open/ closed

Mode:

Alarm threshold:

Difference mode:

Temperature for alarm activation

If activated, the difference between object temp. and ambient temp. will be used for the alarm threshold.

Low alarm current:

High alarm current:

lower alarm output value

higher alarm output value



**OUT (yellow) – Analog Output (mV)/ Alarm Output [CS/ CSmicro LT]**

Signal processing		Vcc adjust	Calibration
General	IN/OUT (green)	OUT (yellow)	Status LED
Mode: <span style="border: 1px solid black; padding: 2px;">mV output</span>			
mV settings : Temp min [°C]: <span style="border: 1px solid black; padding: 2px;">0,0</span> Temp max [°C]: <span style="border: 1px solid black; padding: 2px;">1000</span> mV min : <span style="border: 1px solid black; padding: 2px;">0</span> mV max : <span style="border: 1px solid black; padding: 2px;">10000</span> Slope : <span style="border: 1px solid black; padding: 2px;">10,0 mV/K</span> <input type="button" value="Adjust output slope"/>		Failsafe settings : <input checked="" type="checkbox"/> Headtemp. failsafe Temp min: <span style="border: 1px solid black; padding: 2px;">-10</span> [°C] <span style="border: 1px solid black; padding: 2px;">0</span> mV Temp max: <span style="border: 1px solid black; padding: 2px;">85</span> [°C] <span style="border: 1px solid black; padding: 2px;">10000</span> mV <input checked="" type="checkbox"/> Targettemp. failsafe Temp min: <span style="border: 1px solid black; padding: 2px;">-20</span> [°C] <span style="border: 1px solid black; padding: 2px;">0</span> mV Temp max: <span style="border: 1px solid black; padding: 2px;">1020</span> [°C] <span style="border: 1px solid black; padding: 2px;">10000</span> mV	
<input type="checkbox"/> "IN/OUT" pin is configured as: <div style="border: 1px solid black; padding: 2px; text-align: center;">alarm output (open collector)</div> <input type="checkbox"/> "OUT" pin is configured as: <div style="border: 1px solid black; padding: 2px; text-align: center;">mV output</div>			
<input type="button" value="Save Config"/> <input type="button" value="Factory default"/>		<input type="button" value="Cancel"/>	
<input type="button" value="Load Config"/>		<input type="button" value="OK"/>	

Mode:

Selection between:

mV output [analog]  
 alarm output [two-level alarm]  
 3-state output [three-level alarm]  
 communication output [bidirectional digital]  
 burst [unidirectional digital]

**mV output**

Temp min: Lower limit temperature range  
 Temp max: Upper limit temperature range  
 mV min: Lower output range  
 mV max: Upper output range

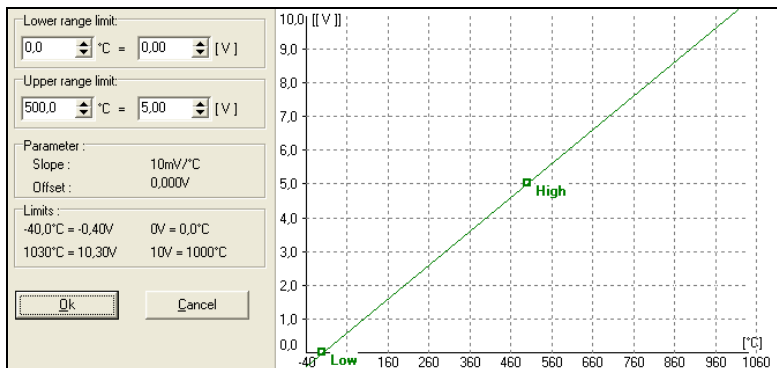
Failsafe settings<sup>1)</sup>: Definition of failsafe modes

If the sensor will be connected to the supply voltage, the unit is checking for the first 300ms if a USB adapter is connected. In this case the bidirectional communication mode will be activated automatically.

<sup>1)</sup> The settings for failsafe mode enable a defined level on the analog output in dependence on preset temperature limits for target temperature and/ or sensing head temperature (**Temp min** and **Temp max**).

If the **mV output** is selected the **IN/ OUT** pin will switch automatically to **inactive** (default setting).

You can adjust the temperature range of the sensor by pressing the button **Adjust output slope**. The range limits can either be entered directly in the input fields or by shifting the output function graph (by catching the points **Low** or **High** with the cursor).



Signal processing		Vcc adjust	Calibration
General	IN/OUT (green)	OUT (yellow)	Status LED
Mode: <div>alarm output</div>			
Alarm settings: <div>             Source: <div>Process temp</div>             Mode: <div>Normally open</div>             Alarm threshold [°C]: <div>40,0</div>             Difference mode (TObj-TAmb) <input checked="" type="checkbox"/>               Low alarm voltage [V]: <div>0,0</div>             High alarm voltage [V]: <div>10,0</div> </div>			
<div> <input type="checkbox"/> "IN/OUT" pin is configured as <div>ext. analog emissivity</div> <input type="checkbox"/> "OUT" pin is configured as <div>alarm output</div> </div>			
<div>Save Config</div> <div>Factory default</div> <div>Load Config</div>		<div>Cancel</div> <div>OK</div>	

## alarm output

Source:

Selection between:

Process temperature  
Act. object temperature  
Head temperature  
Electronic temperature  
normally open/ closed

Mode:

Alarm threshold:

Difference mode:

Temperature for alarm activation  
If activated, the difference between  
object temp. and ambient temp. will  
be used for the alarm threshold.

Low alarm voltage:

High alarm voltage:

lower alarm output value  
higher alarm output value

**OUT (yellow) – 3-state Output [CS/ CSmicro LT]**

Signal processing	Vcc adjust	Calibration
General	IN/OUT (green)	OUT (yellow)
Status LED		
Mode: 3-state output		
3-state output mode : Alarm threshold [°C]: 40,0 Difference mode (TObj-TAmb) <input checked="" type="checkbox"/>		
prealarm diff. [°C]: 5,0		
Three-state alarm output : no Alarm [V] 5,0 prealarm [V] 2,0 alarm [V] 0,0		
voltage for service [V] 5 At Vcc=5V the unit works in analog mode.		
<input type="checkbox"/> "IN/OUT" pin is configured as temp. code output (open collector)		
<input checked="" type="checkbox"/> "OUT" pin is configured as 3-state output		
Save Config	Factory default	Cancel
Load Config		OK

**3-state Output**

Alarm threshold:  
Difference mode:

Temperature for alarm activation  
If activated, the difference between object temp. and ambient temp. will be used for the alarm threshold.  
Temperature difference related to the alarm threshold value; the prealarm will be activated at alarm threshold – prealarm diff.

Prealarm diff.:

No Alarm:

Voltage level setting for status:  
no alarm

Pre-alarm:

Voltage level setting for status:  
pre-alarm

Alarm:

Voltage level setting for status:  
alarm

Voltage for service:

Setting of a supply voltage level (Vcc) at which the unit works as analog device (mV output)

The sensor is equipped with a 3-state alarm output which is useful for temperature monitoring applications. This output provides beside the main alarm a so called pre-alarm. This pre-alarm will be activated if the object temperature exceeds a defined critical value which is below the actual alarm level (pre-alarm diff.).

In order to increase the system safety furthermore the output voltage level for alarm should be 0 V – in this case also a defect sensor would activate the alarm.

The sensor can be switched into the standard analog mode (mV output) by varying the supply voltage (voltage for service).

If the function **Vcc adjust** is used simultaneously the alarm values from Vcc adjust tabel are used for the 3-state output:

The screenshot displays the 'Vcc adjust' configuration tab within the CompactConnect software. The interface is divided into three main sections: 'Signal processing', 'Vcc adjust', and 'Calibration'. Under 'Signal processing', there are sub-tabs for 'General', 'IN/OUT (green)', and 'OUT (yellow)'. The 'OUT (yellow)' sub-tab is currently selected. The 'Calibration' section contains a 'Status LED' sub-tab. In the 'OUT (yellow)' section, the 'Mode:' dropdown menu is set to '3-state output'. Below this, the '3-state output mode:' section includes an 'Alarm threshold [°C]' field set to '40,0', a 'Difference mode (TObj-TAmb)' checkbox which is checked, and a 'prealarm diff. [°C]' field set to '5,0'. A button labeled 'alarm values are used from Vcc adjust tabel' is also present.

## OUT (yellow) – Digital Outputs

In the selection field **Mode** you can switch the output to digital communication. You can select between **communication output** (bidirectional digital communication for interaction with the software) and **burst output**.

Signal processing | Vcc adjust | Calibration  
General | IN/OUT (green) | OUT (yellow) | Status LED

Modus:  
burst output

Burstmode :  
Value 1: Process temp.  
Value 2: Internal temp.  
Value 3: Emissivity  
Value 4: Transmissivity  
Value 5: Ambient temp.  
Value 6: Act. target temp.  
Value 7: Electronic temp.  
Value 8: mV input (IN/OUT green)

unidirectional digital output (9600 Baud)

IN/OUT\* pin is configured as  
communication input

OUT\* pin is configured as  
burst output

Save Config | Factory default | Cancel  
Load Config | OK

### Burst output

Value 1...8:

Selection between:

<none>

Process temperature

Internal temperature

Emissivity

Transmissivity

Ambient temperature

Act. target temperature

Electronic temperature

mV input (IN/ OUT green)

mV power supply

In the burst mode the sensor works in a unidirectional communication mode – the sensor is sending data continuously. The burst string can be configured by selection of value 1 to 8.

**► Command List on software CD**

## Status LED – LED Alarm/ Automatic Aiming Support

The green LED at the end of the sensor housing (CS) or inside the electronics (CSmicro) can be used for different functions:

Signal processing | Vcc adjust | Calibration

General | IN/OUT (green) | OUT (yellow) | Status LED

Mode:  
LED alarm

Alarm settings:

Source: Process temp

Mode: Normally open

Alarm threshold [°C]: 100,0

Difference mode (TObj-Tamb) ☐

"IN/OUT" pin is configured as:  
alarm output (open collector)

"OUT" pin is configured as:  
mV output

Save Config | Factory default | Cancel

Load Config | OK

Mode:

Selection between:

Off  
LED Alarm  
Automatic aiming support  
Self diagnostic  
Temp. code indication

### LED Alarm

Source:

Selection between:

Process temperature  
Act. object temperature  
Head temperature  
Electronic temperature  
normally open/ closed

Mode:

Alarm threshold:

Difference mode:

Temperature for alarm activation  
If activated, the difference between  
object temp. and ambient temp. will  
be used for the alarm threshold.

Signal processing		Vcc adjust	Calibration
General	IN/OUT (green)	OUT (yellow)	Status LED
Mode: <div>automatic aiming support</div>			
Aiming support settings :			
Mode: <div>searching maximum</div>			
Hysteresis [°C]: <div>2,0</div>			
Reset Time [s]: <div>10,0</div>			
<div>"IN/OUT" pin is configured as</div> <div>alarm output (open collector)</div>			
<div>"OUT" pin is configured as</div> <div>mV output</div>			
Save Config		Factory default	Cancel
Load Config		OK	

### Automatic Aiming Support

Mode:	<u>Selection between:</u> Searching maximum Searching minimum
Hysteresis:	Adjustment of the minimum temperature difference for activation of the function
Reset time:	After the set time the search function will be reset.

The function **Automatic Aiming Support** helps to adjust the unit to an object which has a temperature different to the background. The sensor is looking for the highest object temperature (mode: searching maximum); means the threshold value for activating the LED will be automatically tuned. This works also if the sensor is aimed at a new object (with probably colder temperature). After expiration of a certain reset time (standard: 10s) the sensor will adjust the threshold level for activation of the LED new.



## Status LED – Self Diagnostic

If activated, the LED will show one out of five possible states of the sensor:

Status	LED mode	
Normal	intermittent off	- - - -
Sensor overheated	fast flash	-----
Out of measuring range	double flash	-- -- -- --
Not stable	intermittent on	=====
Alarm fault	always on	=====

The preview of the different LED modes can be activated by clicking on the respective sign:



- Sensor overheated:** The internal temperature probes have detected an invalid high internal temperature of the sensor.
- Out of measuring range:** The object temperature is out of measuring range.

**Not stable:** The internal temperature probes have detected an unequally internal temperature of the sensor.

**Alarm fault:** Current through the switching transistor of the open-collector output is too high.

## Status LED – Temperature Code Indication

With this function the current measured object temperature will be indicated as percentage value by long and short flashing of the LED.

At a range setting of **0-100 °C → 0-100%** the LED flashing indicates the temperature in °C.

Signal processing | Vcc adjust | Calibration

General | IN/OUT (green) | OUT (yellow) | Status LED

Mode:  
temp. code indication

Range settings:  
Temp min. [°C]: 0.0 = 0%  
Temp max. [°C]: 100.0 = 100%

Examples:  
24%  
31%  
8%

Preview:

"IN/OUT" pin is configured as:  
alarm output (open collector)

"OUT" pin is configured as:  
mV output

Save Config | Factory default | Cancel  
Load Config | OK

Long flashing → first digit:	xx
Short flashing → second digit:	xx
10-times long flashing → first digit=0:	0x
10-times short flashing → second digit=0:	x0

**Examples**

<b>87 °C</b>	8-times long flashing indicates	<b>87</b>
and afterwards	7-times short flashing indicates	<b>87</b>
<b>31 °C</b>	3-times long flashing indicates	<b>31</b>
and afterwards	1-time short flashing indicates	<b>31</b>
<b>8 °C</b>	10-times long flashing indicates	<b>08</b>
and afterwards	8-times short flashing indicates	<b>08</b>
<b>20 °C</b>	2-times long flashing indicates	<b>20</b>
and afterwards	10-times short flashing indicates	<b>20</b>

## Signal Processing

General	IN/OUT (green)	OUT (yellow)	Status LED
Signal processing	Vcc adjust	Calibration	
<div>Post processing</div> <div>           Hold-mode: <span>Peak hold</span> </div> <div>           Hold-time [s]: <span>2.0</span> (999.9 = infinite)         </div>			
<div>           "IN/OUT" pin is configured as  <span>alarm output (open collector)</span> </div> <div>           "OUT" pin is configured as  <span>mV output</span> </div>			
<div>Save Config</div> <div>Factory default</div>		<div>Cancel</div>	
<div>Load Config</div>		<div>OK</div>	

Hold mode:

Selection between:

Off

Peak hold

Valley hold

Advanced peak hold

Advanced valley hold

Hold time:

Hold time adjustment

(999.9 = infinite)

In the **Peak hold** mode the sensor is waiting for descending signals. If the signal descends the algorithm maintains the previous signal peak for the specified **Hold time**.

In the **Valley hold** mode the sensor waits for ascending signals. If the signal ascends the algorithm maintains the previous signal valley for the specified **Hold time**.

You will find a detailed description of these functions under ► **Post Processing**.

## Vcc Adjust [CS/ CSmicro LT]

General	IN/OUT (green)	OUT (yellow)	Status LED
Signal processing		Vcc adjust	Calibration
<input checked="" type="checkbox"/> Vcc adjust : output voltage range : <input type="radio"/> Uout 0 - 5V <input checked="" type="radio"/> Uout 0 - 10V			
	Emiss.	Alarm(IN/OUT)	Difference mode
Vcc=11V	0,950	[°C]: 40,0	<input checked="" type="checkbox"/>
Vcc=12V	0,830	[°C]: 45,0	<input checked="" type="checkbox"/>
Vcc=13V	0,760	[°C]: 50,0	<input checked="" type="checkbox"/>
Vcc=14V	0,955	[°C]: 55,0	<input checked="" type="checkbox"/>
Vcc=15V	0,685	[°C]: 60,0	<input checked="" type="checkbox"/>
Vcc=16V	0,660	[°C]: 65,0	<input checked="" type="checkbox"/>
Vcc=17V	0,900	[°C]: 70,0	<input checked="" type="checkbox"/>
Vcc=18V	0,950	[°C]: 75,0	<input checked="" type="checkbox"/>
Vcc=19V	0,950	[°C]: 80,0	<input checked="" type="checkbox"/>
Vcc=20V	0,950	[°C]: 85,0	<input checked="" type="checkbox"/>
<input type="checkbox"/> IN/OUT pin is configured as alarm output (open collector)			
<input type="checkbox"/> OUT pin is configured as mV output			
Save Config		Factory default	Cancel
Load Config		OK	

If this function is activated you can switch between 10 different emissivity settings combined with alarm threshold values by variation of the supply voltage (Vcc).

Output voltage range:      Selection between 0-5 V or 0-10 V voltage output  
 0-5 V output → 6-15 V adjustment range  
 0-10 V output → 11-20 V adjustment range

Difference mode:          If activated, the difference between object temp. and ambient temp. will be used for the alarm threshold.

The set alarm values [Alarm (IN/ OUT)] will only affect the open collector output. Therefore, if the Vcc adjust mode is used, the IN/ OUT pin should be set to **alarm output (open collector)**.

## Loop Maintenance

This function enables a verification of the analog output (on CT models in addition output channel 2). An input will set the sensor output to the according percentage of the output range or to a fixed mV value or mA value.

An input in field **Ambient out** [CT models only] will set the **output channel 2** to the according percentage value of the adjusted output range.

The button **Reset to normal mode** will deactivate the loop maintenance – the sensor outputs will follow the current object or ambient temperature again.

Any change of this values sets the custom output to a fixed percentage of range.

IR out [%]: 50

Ambient out [%]: 100

Reset to normal mode

Close and reset to normal mode

CT [example: 50% of range (IR)/  
100% of range (Amb.)]

Any change of this value sets the custom output to a fixed mV value.

mV [1/10 V]: 50

Close and reset to normal mode

CS [example: 5 V]

Any change of this value sets the mA output to a fixed mA value.

mA out [1/10 mA]: 200

Reset to normal mode

Close and reset to normal mode

CSmicro 2W [example: 20 mA]

## Saving the Sensor Configuration

In each window which you enter with the button **Setup** [Menu: Device\ Device Setup] you will find at the bottom edge the following buttons for saving of the sensor configuration:



### **Save Config**

With this button you can save the current configuration of the connected sensor in a file (ending: \*.cfg).

An explorer window will be opened and enables definition of filename and destination.

### **Load Config**

A previous saved configuration can be opened and stored into the connected sensor.

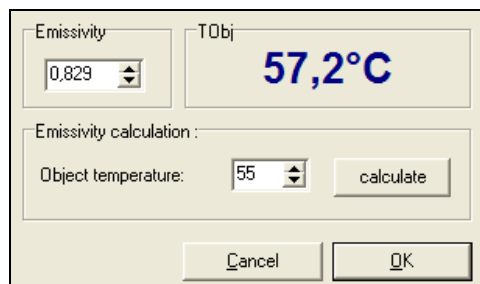
### **Factory default**

This button enables the user to reset the unit to the factory default values (CS/ CSmicro/ CX only). Sensors of the CT/ CTlaser/ CTratio series can be reset by pressing at first the **Down** button and then the **Mode** button (keep both pressed for approx. 3 seconds).

After pressing **OK** all changes and settings will apply.

## Emissivity Calculation

The button **Emiss.** [Menu: Device\ Change Emissivity] opens a window in which you can enter the current emissivity value of your object. The function **Emissivity calculation** determines an unknown emissivity based on a known object temperature.



The dialog box is titled "Emissivity Calculation". It contains two main sections. The top section has two fields: "Emissivity" with a value of 0,829 and a spinner, and "T Obj" with a value of 57,2°C. The bottom section is titled "Emissivity calculation :" and contains an "Object temperature:" field with a value of 55 and a spinner, followed by a "calculate" button. At the bottom of the dialog are "Cancel" and "OK" buttons.

Please enter the object temperature which you have determined before with another sensor (thermocouple e.g.) in the field **Object temperature**. After you have pressed the **calculate** button the calculated emissivity will be shown in the field **Emissivity** and taken over into the connected sensor.

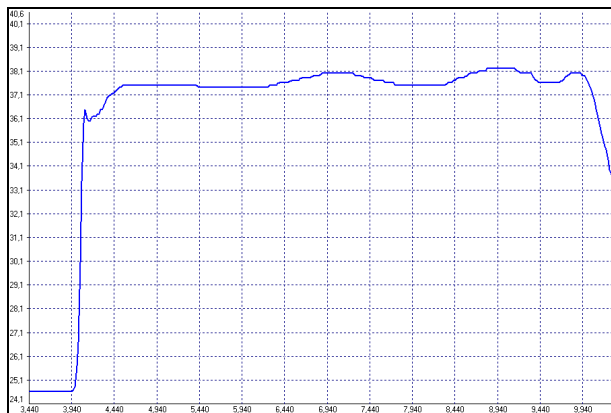
**To determine the emissivity the object temperature should be different from the ambient temperature.**



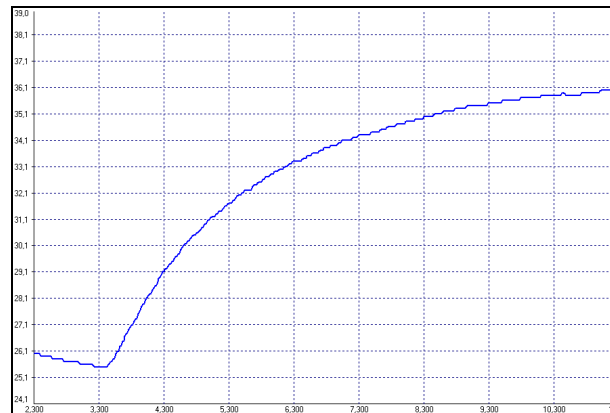
## Smart Averaging

The average function is generally used to smoothen the output signal. With the adjustable parameter time this function can be optimal adjusted to the respective application. One disadvantage of the average function is that fast temperature peaks which are caused by dynamic events are subjected to the same averaging time. Therefore those peaks can only be seen with a delay on the signal output.

The function **Smart Averaging** eliminates this disadvantage by passing those fast events without averaging directly through to the signal output.



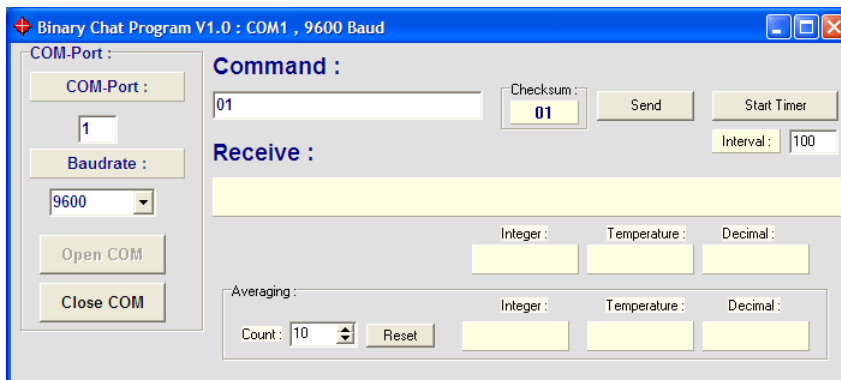
Signal graph with Smart Averaging function



Signal graph without Smart Averaging function

## Binary Chat Program

On the program CD you will find an additional program for a simple check of the digital communication of the connected sensor. Please copy the application (BinaryChat.exe) out of the folder on the CD **Binary Chat Program** on your desktop or into any desired folder on your hard disc drive of your PC. After starting the program the following window will appear:



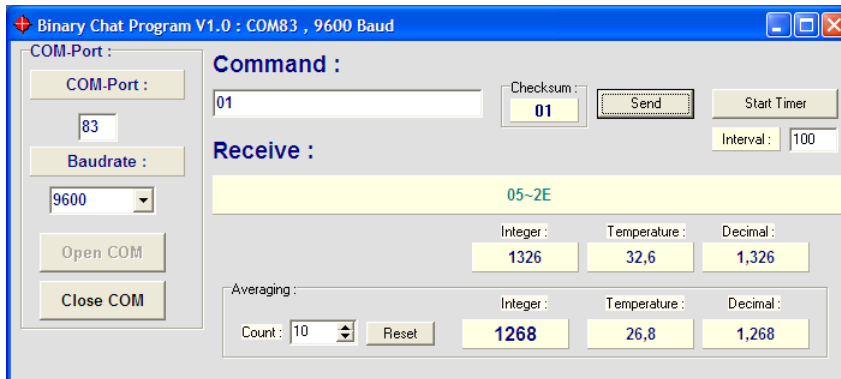
Please select at first the COM port of the connected sensor (you will find this information in the status line of your CompactConnect or in the device manager of your PC).

Please enter the **Baudrate** your sensor is working with.

Now you can open the COM port by pressing the button **Open COM**.

**Before you open the COM port please close the CompactConnect software as this application may access the same sensor/ COM port.  
Please make sure that the sensor is set to bidirectional digital communication.**

Now you can enter a binary command as hexadecimal value out of the according command list of the connected sensor. After pressing **Send** the answer will be shown in the line **Receive** (also as HEX value). Below the receive line you will find the **Integer** decimal value of the answer as well as the calculated **Temperature** or the **Decimal** value which is calculated by dividing the answer by 1000. This calculation is used for the emissivity value e.g.



**Example 1: CSmicro 2WLT/ Polling of the object temperature**

Example 1 shows the polling of the object temperature from a CSmicro. This is done according to the command list (CD: \Commands):

Readout of object temperature				
Send:	01	Command for readout of object temperature		
Receive:	04 D3	Object temperature in tenth degree + 1000		
				04 D3 = dec. 1235
				1235 - 1000 = 235
				235 / 10 = 23,5 °C

The screenshot shows the 'Binary Chat Program V1.0 : COM83 , 9600 Baud' window. On the left, the 'COM-Port' is set to 83 and the 'Baudrate' is 9600. The 'Command' field contains '8403B6' and the 'Checksum' is '31'. The 'Receive' section shows a yellow box with '03~B6'. Below this, the 'Integer' is 950, 'Temperature' is -5,0, and 'Decimal' is 0,950. The 'Averaging' section shows a 'Count' of 10, with 'Integer' 1119, 'Temperature' 11,9, and 'Decimal' 1,119.

**Example 2: CSmicro 2WLT/ Set of emissivity value**

In example 2 the sending of the command and the calculating of the emissivity out of the answer is done also according to the command list. The emissivity value can be read at **Decimal**:

Set of emissivity			
Send:	84 03 B6		03B6 = dec. 950
Receive:	03 B6		950 / 1000 = 0,950

### Additional Features

Under **Averaging** you can calculate the average value out of a defined number of values **Count**.

If you press the button **Start Timer** you can activate a repeated polling of values (useful for object temperature e.g.). The polling **Interval** can be set (in ms).

Please use only times >50 ms, as otherwise you may receive wrong data.

### Menu Overview

[File](#)

[Measurement](#)

[Device](#)

[Diagram](#)

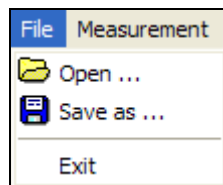
[View](#)

[Preferences](#)

[Help](#)

[Context Menu \(right mouse button\)](#)

### Menu: File



**Open...**

**Save as...**

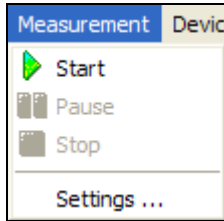
**Exit**

To open saved temperature files (\*.dat)

To save temperature files

To exit the program

### Menu: Measurement



**Start**

**Pause**

**Stop**

**Settings...**

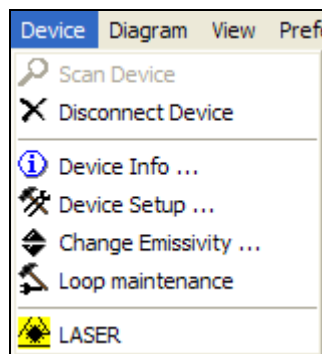
To start the measurement

To freeze the continuous diagram actualization

To stop the measurement

Opens the window: **Measurement configuration**

### Menu: Device



#### Scan Device

#### Disconnect Device

#### Device Info...

#### Device Setup...

#### Change Emissivity...

#### Loop Maintenance

#### LASER

Scans for connected sensors (if Auto scan is deactivated)

The connection will be determined and the COM port will be closed.

Shows information about the connected unit (firmware revision etc.).

Opens the window: Device setup

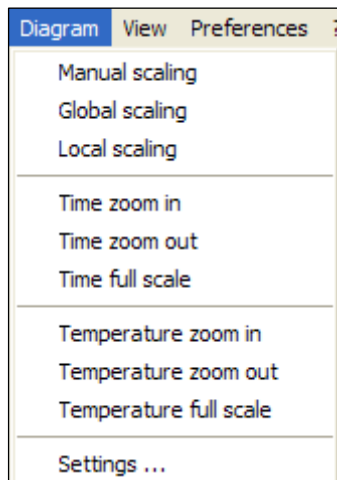
Adjustment/ Calculation of the Emissivity

Verification of the analog output channels.

To switch On and Off the Laser (not at CS/ CSmicro/ CX)/

Activation via ► **Basic Settings**



**Menu: Diagram****Manual Scaling**  
**Global auto scaling**

Manual scaling of the temperature axis  
The temperature range of the diagram will be adapted automatically to the respective peak values. The range will stay in this setting during the whole measurement.

**Local auto scaling**

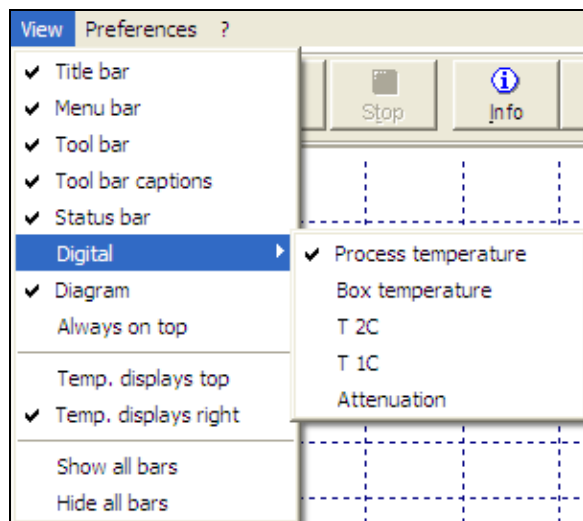
The temperature range of the diagram will be adapted dynamically to the respective peak values. After the respective peak has left the diagram the range will be readapted.

**Time zoom in**  
**Time zoom out**  
**Time full scale**

A selected part of the diagram will be stretched.  
A selected part of the diagram will be clinched.  
Shows the whole time range of the measurement.

**Temperature zoom in**  
**Temperature z. out**  
**Temperature full sc.**  
**Settings...**

To scale up a part of the temperature axis.  
To scale down a part of the temperature axis.  
Shows the whole temperature range  
Opens the window: **Diagram settings** to select digital displays, temperature graphs, pen width and color of graphs

**Menu: View****Title bar**

To show or hide the title bar of the software window

**Menu bar**

To show or hide the menu bar of the software window

**Tool bar**

To show or hide the tool bar

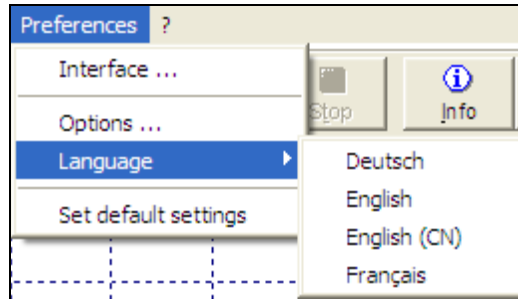
**Tool bar captions**

To show or hide the captions of the tool bar

[Menu Overview](#)

<b>Status bar</b>	To show or hide the status bar
<b>Digital</b>	Selection of all available values which can be shown as a digital display
<b>Diagram</b>	To show or hide the temperature diagram
<b>Always on top</b>	If activated, the software screen will always visible on top (independent on other active applications)
<b>Temp. displays top</b>	The digital display group will be located on the top right corner of the software screen
<b>Temp. display right</b>	The digital display group will be located on the right side of the software window
<b>Show all bars</b>	All bars will be shown (title-, menu-, tool- and status-bar)
<b>Hide all bars</b>	All bars will be hidden (title-, menu-, tool- and status-bar)

### Menu: Preferences



**Interface...**

Settings for device scan, COM port information etc.

**Options...**

Opens the window: **Options** to make basic settings and define options for data saving

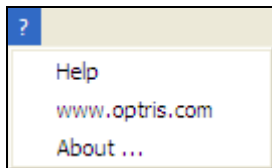
**Language**

To select the desired language

**Set default settings**

The software will be reset to the factory default settings  
(The sensor settings are not affected by this)

### Menu: Help



**Help...**

[www.optris.com](http://www.optris.com)

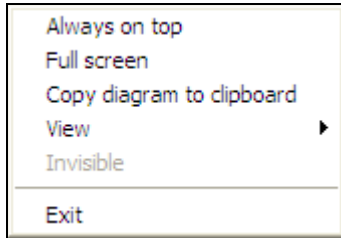
**About...**

To open the help file

Opens the Optris homepage in your web browser

To show the software version installed on your computer

### Context Menu (right mouse button)



#### **Always on top**

Shows the application permanently on top of the screen, independent of other active windows

#### **Full screen**

Shows the application as full screen

#### **Copy diagram to clipboard**

The diagram will be copied into the clipboard

#### **View**

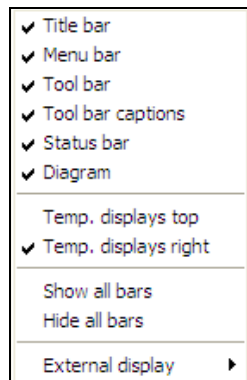
Linking to the sub menu **View**

#### **Invisible**

Closes the application window (the software is running in the background as process) – only the external displays are further visible

#### **Exit**

To exit the program

**Context Menu [Sub menu: View]****Title bar**

Shows or hides the title bar

**Menu bar**

Shows or hides the menu bar

**Tool bar**

Shows or hides the tool bar

**Tool bar captions**

Shows or hides the tool bar captions

**Status bar**

Shows or hides the status bar

**Diagram**

Shows or hides the diagram

**Temp. displays top**

Places the digital displays on top of the diagram

**Temp. displays right**

Places the digital displays right of the diagram

**Show all bars**

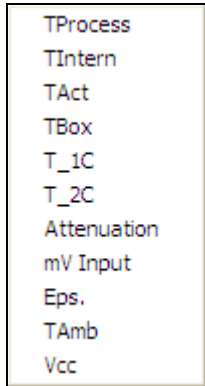
Shows all bars at once

**Hide all bars**

Hides all bars at once

**External display**Linking to the sub menu **External display**[Menu Overview](#)

### Context Menu [Sub menu: External display]



In this menu you can call separate digital displays for the different signals. These displays will also be shown if the application runs in the invisible mode. The displays are always on top of the PC screen.