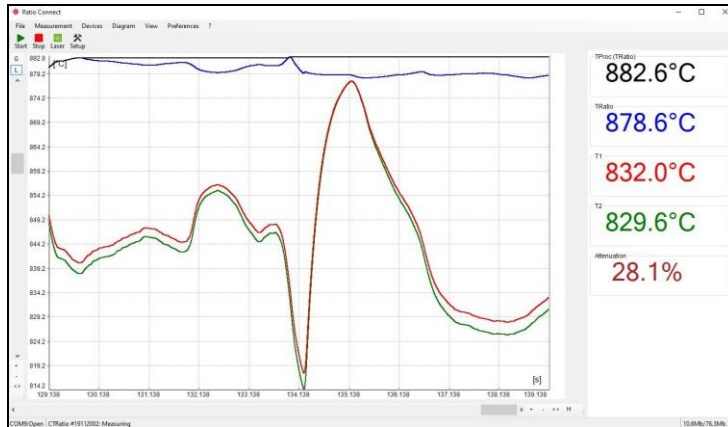


optris Ratio Connect

Software for Infrared Thermometer



Operator's Manual



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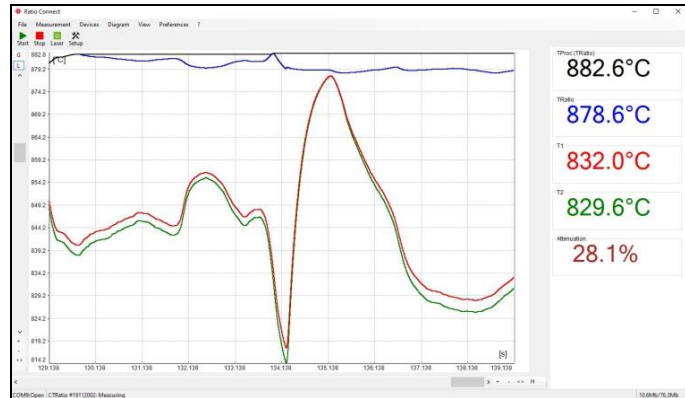
Welcome!

Thank you for choosing an infrared thermometer and corresponding Ratio Connect software!

The sensor calculates the surface temperature based on the emitted infrared energy of objects [► **Basics of Infrared Thermometry**].

Main features of Ratio Connect software:

- Temperature data analysis and documentation
- Automatic process control
- Customer specific software adjustments
- Complete parameterization of the device
- Temperature display and recording



Legal disclaimer

All products are warranted against defective materials and workmanship for a period of two (2) years from the delivery date of the original purchase, provided such products have been under normal storage, use and service, and in accordance with the instruction. This warranty expires in case of inappropriate use of all delivered components.

All products not manufactured by us included in systems delivered by us to the original purchaser carry the warranty, if any, of the particular supplier only and we have no responsibility whatsoever for such products. The manufacturer is not liable for any use of the software Ratio Connect including data recording. The manufacturer does not carry liability for error-free operation of the software in any hardware and operating system.

The warranty is not expressed for possible quality changes, errors when presenting the software, occurring defects during operation or insufficiencies in certain applications. The user is liable for any defects or data processing insufficiencies when in using the software.

The manufacturer has no other liability inside the scope of supply other than mentioned above. The manufacturer shall not be liable for any business loss or claim for compensation, loss of the computer software, possible loss of data, additional costs for replacement software, claims of third parties or other occurring costs or failures and deficits.

The software is protected by copyright and is not allowed to be changed or sold to third parties.

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Note

Read the manual carefully before you start the device. The manufacturer reserves the right to change the herein described specifications in case of technical advance of the product.

1. Basics

1.1. Software installation

Download the software from the Optris website. Please start **Setup.exe** and follow the instructions of the wizard until the installation is finished.

Minimum system requirements:

- Windows 7, 8, 10
- USB interface
- Hard disc with at least 30 MByte free space
- At least 128 MByte RAM

The installation wizard will place a launch icon on the desktop and in the start menu:
[Start]\Programs\RatioConnect.



When using the Ethernet interface, the driver must be installed separately. This can be found in the download package in the Driver folder (Name: Ethernet).



Note

The software can be downloaded via the Optris website under the following link:
<https://www.optris.global/downloads-software>

IRmobile App

The CTratio pyrometer has a direct connection to an Android smartphone or tablet. All you have to do is download the IRmobile app for free in the Google Play Store. This can also be done via the QR code.



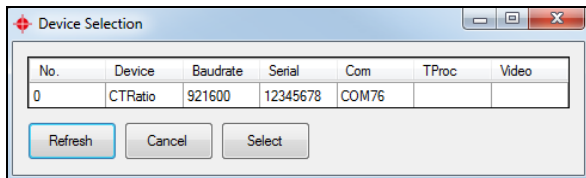
Note

The IRmobile app works on most Android devices running 5.0 or higher with a micro USB or USB-C port supporting USB-OTG (On The Go).

1.2. Connection Sensor - Computer

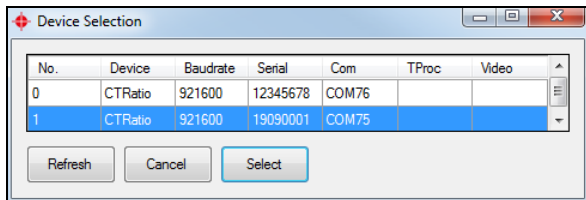
If you connect your sensor to your PC and start the software, the following message will appear (if option **Auto Start** is activated). ► **Menu Preferences/ Options**

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



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

Refresh starts a new search.



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

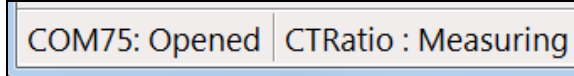
Refresh starts a new search.

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.

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

If **Auto start device** is activated ► **Menu Preferences/ 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

CTRatio: Measuring successful communication with the connected sensor

1.3. RS485/ RS422

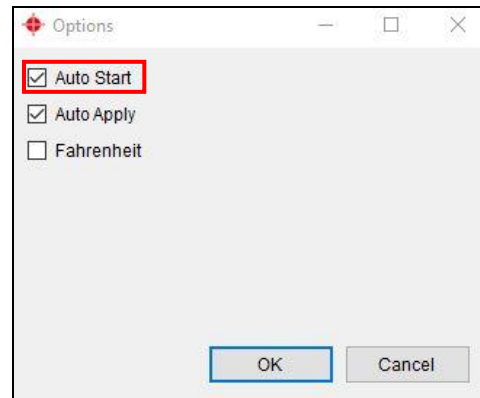
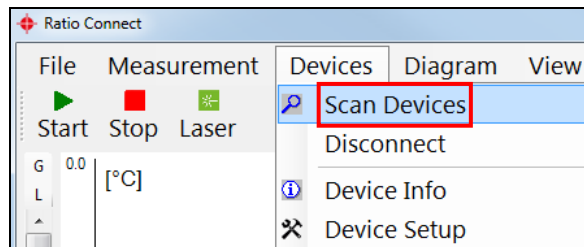
If a RS485 interface is used please activate the RS422 mode. Therefore you have to call this function with the programming keys on the sensor at first (menu item: multidrop address). You will need also the RS485 module and the RS485-USB adapter **[ACCTRS485USBK]**.

1.4. Easy Start-Up

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

If this option is deactivated, go the menu **Devices\ Scan Devices**.

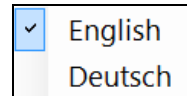
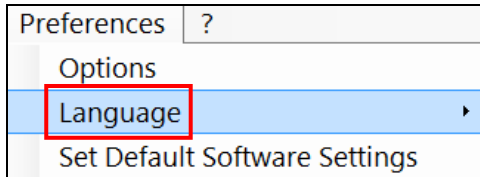
The button **Disconn.** or **[Menu: Device\ Disconnect Device]** breaks the connection to the sensor and closes the COM port.



1.5. Basic Settings

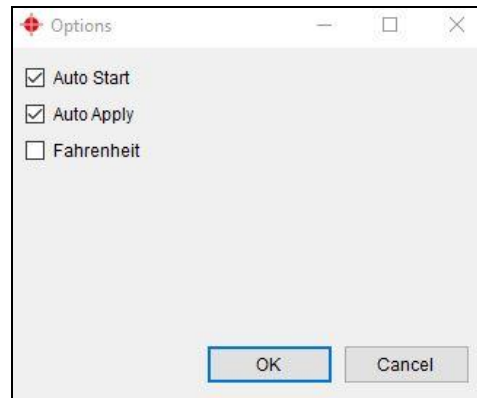
1.5.1. Language

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



1.5.2. Options

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



Auto Start

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

Auto Apply

If activated the changing of the settings will be directly effected

Fahrenheit

If activated, the temperature is displayed in Fahrenheit.

The further options are described under [**► Stop Measurement and Save Data.**](#)

1.5.3. Diagram settings

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

Digital Display	Selection which signals should be displayed as digital display
Diagram	Selection which signals should be displayed as graph
Pen Width	Pen width of the temperature graphs [1...5]
Color	Color of the temperature graph and digital displays
Y-axis	Time frame on the y-axis, which should be displayed at the beginning of a measurement

	Digital Display	Diagram	Pen Width	Color	Y Axis
TProc	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	Grey	Primary Y Axis
TRatio	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	Teal	Primary Y Axis
T1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	Purple	Primary Y Axis
T2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	Olive	Primary Y Axis
TActRatio	<input type="checkbox"/>	<input type="checkbox"/>	2	Grey	Primary Y Axis
TAct1	<input type="checkbox"/>	<input type="checkbox"/>	2	Blue	Primary Y Axis
TAct2	<input type="checkbox"/>	<input type="checkbox"/>	2	Red	Primary Y Axis
Attenuation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	Green	Secondary Y Axis
THead	<input type="checkbox"/>	<input type="checkbox"/>	2	Black	Primary Y Axis
TBox	<input type="checkbox"/>	<input type="checkbox"/>	2	Blue	Primary Y Axis

OK Cancel

1.6. Digital Display

If the sensor is connected to your computer and you start the software, the process temperature T_{Proc} (T_{Ratio}) 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.

T_{Proc} (T_{Ratio}) 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

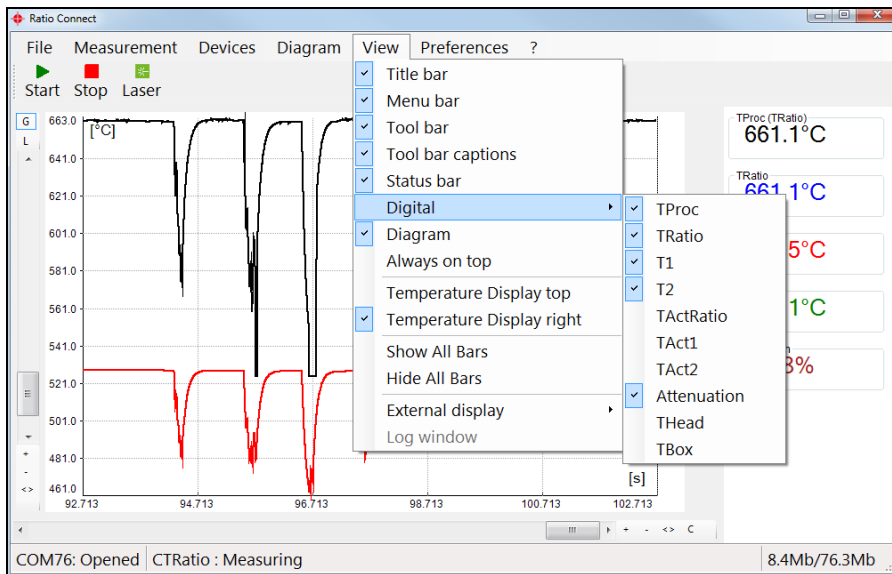


Overview of Digital Display

Notation		Description
T_{Proc}	Process temperature	With signal processing, including averaging
T_{Ratio}	Ratio temperature	Without signal processing, including averaging
T_1	1-channel temperature	Without signal processing, including averaging
T_2	2-channel temperature	Without signal processing, including averaging
T_{ActRatio}	Actual temperature of ratio	Without signal processing, without averaging
T_{TAct1}	Actual temperature of channel 1	Without signal processing, without averaging
T_{TAct2}	Actual temperature of channel 2	Without signal processing, without averaging
Attenuation	Signal attenuation	Signal attenuation
T_{Det}	Head temperature	Temperature value of detector
T_{Box}	Box temperature	Temperature of electronic box

1.7. Views

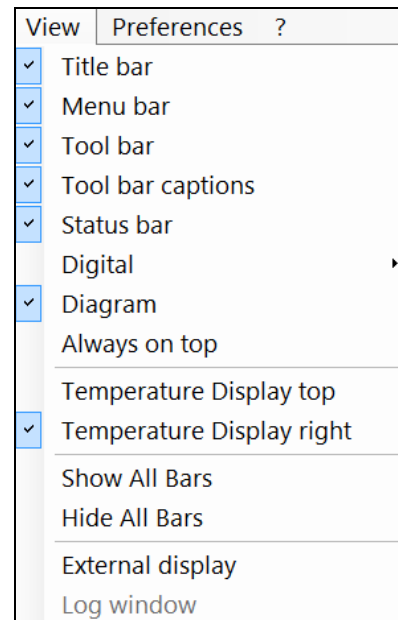
The Ratio Connect allows the creation of free definable screens and views:



Note

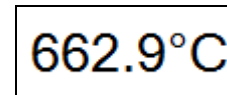
The digital displays can be arranged optional on top or right side [Menu: View\ Temp. displays top or Temp. displays right].

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**].



1.8. External Displays

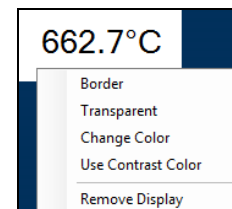
By double click on one of the digital displays **[Menu: View\ External Display]** you can start an external display for the respective signal. This display will appear initially in the same color than the respective display in the software. By drag and drop these external displays can be placed at any 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:



Note

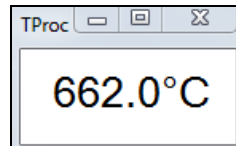
To distinguish between several displays the name of the software/ instance (for multiple software calls) as well as the signal name will be shown shortly.

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



Border

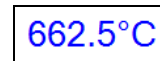
Presenting the display with a border – in this mode the size of the display can be changed.

**Transparent**

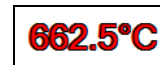
Transparent presenting – useful for a positioning of the display in front of pictures or wallpapers.

**Change color**

For changing the display color.

**Use contrast color**

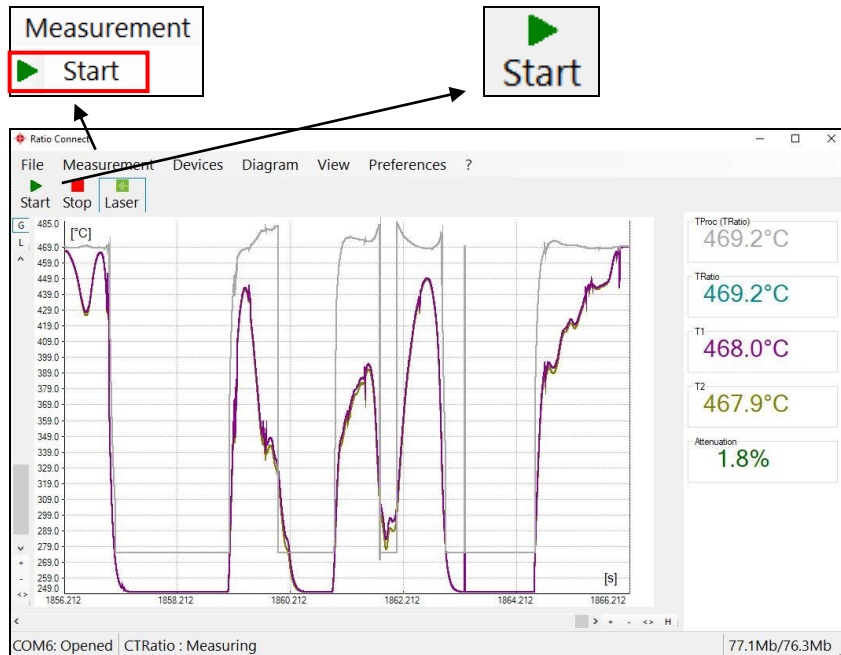
Dependent on the used background the presenting of the display figures with contrast color (black edging) can be useful.

**Remove Display**

Closes the associated external display.

1.9. Start measurement

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

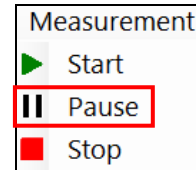


Control elements of the time axis:

- 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).

1.10. 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.

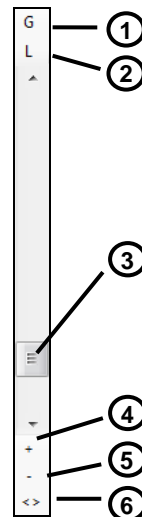
With **local scaling** the temperature range of the diagram will be adapted dynamically to the respective peak values. After the respective peak has left the diagram in the further process of the measurement, the range will be readapted. This option enables an optimum display of the temperature graph.

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)

Control elements of the temperature axis:

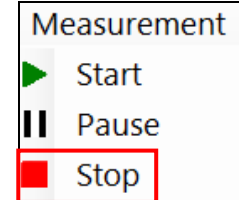
- | | |
|---|---------------------|
| 1 | Global auto scaling |
| 2 | Local auto scaling |
| 3 | Scroll bar |
| 4 | Zoom in (increase) |
| 5 | Zoom out (decrease) |
| 6 | Whole range |



1.11. Stop Measurement and Save Data

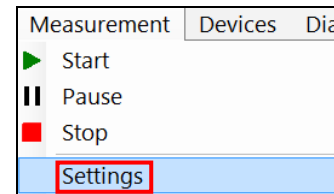
To stop the current measurement please press the **Stop** button
[Menu: Measurement\ Stop].

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



1.12. Measurement Configuration

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

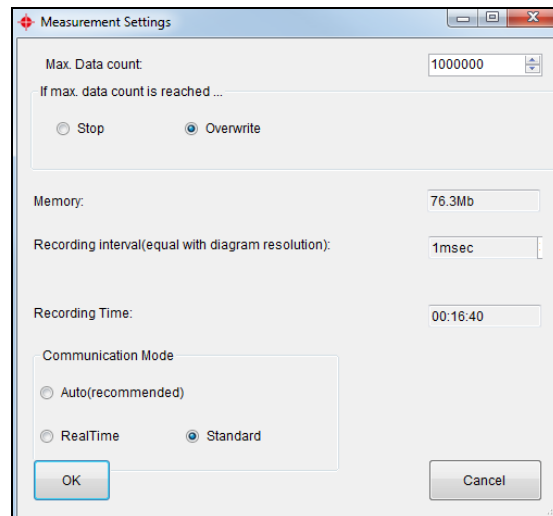


Max. data count Limitation of the maximum number of data values – when achieved the measurement will be stopped.

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**



Note

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

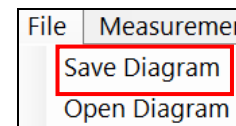
A change of the parameter **Recording interval** will have influence on the **Recording time** only.

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).

1.13. 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].



Note

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

If you open a file with a spreadsheet program you will find beside the relative time (starting with 000:00:00 – column A) also the absolute time for each measurement value (column N).

On video devices and if the function “Automatic Snapshots” is activated you will find further information to the recorded snapshots in the columns O and P:

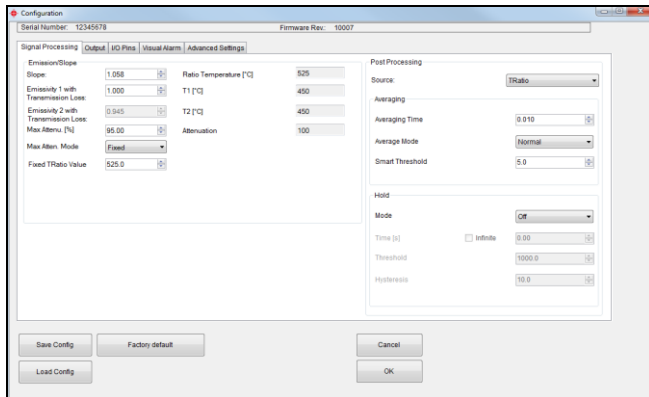
	A	B	C	D	E	F	G	H	I	J	K
1	[Connect DataFile][1.1]										
2	Date:	01.11.2019									
3	Time:	28:12,2									
4	Unit:	°C									
5	Resolution:	0,001									
6	Values:	10									
7	Time	TProc	TRatio	T1	T2	TActRatio	TAct1	TAct2	Attenuation	THead	TBox
8	00:00,0	525	525	506,2	499	525	506,3	499,5	100	60,3	38,9
9	00:00,1	525	525	506,2	499	525	506,2	499	100	60,3	38,9
10	00:00,2	525	525	506,2	499	525	506,3	499,3	100	60,3	38,9
11	00:00,2	525	525	506,2	499	525	506,4	499,5	100	60,3	38,9
12	00:00,3	525	525	506,2	499	525	506,6	499,6	100	60,3	38,9
13	00:00,4	525	525	506,3	499,1	525	506,5	499,4	100	60,3	38,9
14	00:00,5	525	525	506,5	499,3	525	506,5	499,3	100	60,3	38,9
15	00:00,6	525	525	506,6	499,4	525	506,6	498,9	100	60,3	38,9
16	00:00,7	525	525	506,5	499,3	525	506,4	498,9	100	60,3	38,9

2. CTratio

2.1. Sensor Setup CTratio

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:

- Signal processing Setting of Emissivity/ Slope and Post processing
- Output Setting of Output 1 and Output 2
- I/O Pins Setting the In- and Outputs
- Visual alarms Display main value and Backlight/ Alarm setting
- Advanced settings Field Calibration, USB connection, RS485 Multidrop address



CTratio

2.1.1. 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 **Post processing**.

The screenshot shows the 'Configuration' window for the optris Ratio Connect sensor. The window has a title bar with a red cross icon and the text 'Configuration'. Below the title bar, there are two fields: 'Serial Number: 19112002' and 'Firmware Rev: 10009'. The main area is divided into two tabs: 'Signal Processing' (highlighted with a red box) and 'Post Processing'. The 'Signal Processing' tab contains several input fields for parameters: 'Emission/ Slope' (Slope: 1.002, TRatio [°C]: 881.5), 'Emissivity/ Transmission 1' (1.000, T1 [°C]: 880.5), 'Emissivity/ Transmission 2' (0.998, T2 [°C]: 880.5), 'Max Atten. [%]' (80.00, Attenuation [%]: 0.5), 'Max Atten. Mode' (Fixed), and 'Fixed TRatio Value [°C]' (527.0). The 'Post Processing' tab contains several input fields for parameters: 'Source' (TRatio), 'Averaging' (Averaging Time [s]: 1.000, Averaging Mode: Normal, Smart Averaging Hysteresis [K]: 5.0), 'Hold' (Mode: Peak, Time [s]: 1.000, Threshold [°C]: 1000.0, Hysteresis [K]: 10.0). At the bottom of the window, there are four buttons: 'Save Config', 'Factory default', 'Load Config', and 'OK'.

Parameter	Value
Slope	1.002
TRatio [°C]	881.5
Emissivity/ Transmission 1	1.000
T1 [°C]	880.5
Emissivity/ Transmission 2	0.998
T2 [°C]	880.5
Max Atten. [%]	80.00
Attenuation [%]	0.5
Max Atten. Mode	Fixed
Fixed TRatio Value [°C]	527.0
Source	TRatio
Averaging Time [s]	1.000
Averaging Mode	Normal
Smart Averaging Hysteresis [K]	5.0
Mode	Peak
Time [s]	1.000
Threshold [°C]	1000.0
Hysteresis [K]	10.0

Emissivity/ Slope/ Attenuation

The **Emissivity** (ϵ – 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 emissivity's 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.

Emission/ Slope			
Slope	<input type="text" value="1.002"/>	TRatio [°C]	<input type="text" value="881.5"/>
Emissivity/ Transmission 1	<input type="text" value="1.000"/>	T1 [°C]	<input type="text" value="880.5"/>
Emissivity/ Transmission 2	<input type="text" value="0.998"/>	T2 [°C]	<input type="text" value="880.5"/>
Max Atten. [%]	<input type="text" value="80.00"/>	Attenuation [%]	<input type="text" value="0.5"/>
Max Atten. Mode	<input type="text" value="Fixed"/>		
Fixed TRatio Value [°C]	<input type="text" value="527.0"/>		

Post Processing

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

- **Averaging** (Averaging time, average mode, smart threshold)
- **Hold** mode (Mode: Off, Peak, Valley, AdvPeak, AdvValley)

You will find the description of the single functions on the next page.

The field **Source** shows the output signal (= T_{Proc}) 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

Source: TRatio

Averaging

Averaging Time 0,300

Average Mode Normal

Smart Threshold 5,0

Hold

Mode Off

Time [s] ☐ Infinite

Threshold

Hysteresis 10,0

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 0,001 s.

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 0,001 s.

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

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.

Smart Averaging

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

Off

If **Off** is activated, no post processing will happen.

2.1.2. Output

The output 1 is used for output of the process temperature T_{Proc} .

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

- **TProcess** Process temperature
- **TRatio** Ratio temperature
- **T1** 1C temperature
- **T2** 2C temperature
- **Attenuation** Signal attenuation in %
- **TDet** Detector temperature
- **TBox** Box temperature

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

- 0/4-20 mA

Adjustment of the temperature range of the sensor: The range limits can be entered directly in the input fields

Output 1

Output Mode: Analog

Analog

Source	TProcess	FailSafe Min Range [°C]	700.0
TMin [°C]	700.0	FailSafe Max Range [°C]	2000.0
TMax [°C]	2000.0	FailSafe min [mA]	3.5
min [mA]	4.0	FailSafe max [mA]	20.1
max [mA]	20.0	<input type="checkbox"/> FailSafe is Active min	
		<input type="checkbox"/> FailSafe is Active max	

Output 2

Output Mode: Alarm

Alarm

Source	TRatio
Threshold	800,0
Hysteresis	10,0
Alarm Off	0,0
Alarm On	0,0
Mode	Open
Difference Mode	Inactive

2.1.3. I/O pins

The CTratio has three I/O pins which can be programmed as in- or outputs using the software. The following options are available:

<u>Function</u>	<u>I/O pin acts as</u>	<u>Description</u>
Digital Alarm	output (dig.)	Open collector output/ definition as HIGH- or LOW alarm via norm. open/ norm. close options in software dialog.
Valid LO	input (dig.)	The output follows the process 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 (dig.)	The output follows the process 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 $\overline{\text{LE}}$	input (dig.)	The last value will be held if there is a signal with a rising edge on the I/O pin.
Hold $\overline{\text{HE}}$	input (dig.)	The last value will be held if there is a signal with a falling edge on the I/O pin
Slope external	input (analog)	External adjustment of the slope value using an analog voltage (0-10 V)
Emiss. external	input (analog)	External adjustment of the emissivity value using an analog voltage (0-10 V)
Hold Reset LO	input (digital)	Reset of a hold function on a Low level at the I/O pin
Hold Reset HI	input (digital)	Reset of a hold function on a High level at the I/O pin

High-Pegel: > via software, low-Pegel: via software

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

- **TProcess** Process temperature
- **TRatio** Ratio temperature
- **T1** 1C temperature
- **T2** 2C temperature
- **Attenuation** Signal attenuation in %
- **TDet** Detector temperature
- **TBox** Box temperature

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

If you select the function **ext. Slope** or **ext. Emiss.** the I/O pin is set as analog input. The scaling can be done using the input fields Slope@ 0V (Emiss.@ 0V) or Slope@ 10V (Emiss.@ 10V).

I/O Pin 1

Mode Dig. Alarm

Parameter

Source TProcess

Threshold [°C] 800.0

Hysteresis [°C] 10.0

Normally Open

Difference Mode Inactive

I/O

OUTPUT

I/O Pin 2

Mode Slope external

Parameter

P1 [V] 0.0

P2 [V] 10.0

Slope P1 0.9

Slope P2 1.1

I/O

INPUT

If you select the function **Hold Reset LO** or **Hold Reset HI** the I/O-Pin is set as digital input. An activated hold function (MAX, MIN, advanced MAX, advanced MIN) will be reset if a low or high level is at the I/O pin.

I/O Pin 3

Mode Hold reset LO

Hold Reset Low Values

Hold Reset Low Threshold 0,0

Hold Reset Low Hysteresis 0,0

I/O

INPUT

2.1.4. Visual Alarms

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

Basically you can select between the two modes **Ranges** and **Threshold**.

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:

TProcess	Process temperature
TRatio	Ratio temperature
T1	Temperature value 1-color-mode
T2	Temperature value 2-color-mode
Attenuation	Signal attenuation in %
TDet	Temperature of the detector
TBox	Temperature of the electronics

In the **Threshold** mode only two values can be entered (for **blue** and **red**).

In the **Ranges** mode 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.

From	To	Blue	Green	Red
0.0 [%]	95.0 [%]	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
95.1 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
0.0 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0 [%]	100.0 [%]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Note**

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

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:

Blau ► **Low-Alarm (Relais 1)**

Rot ► **High-Alarm (Relais 2)**

2.1.5. Advanced Settings

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

- Field Calibration
- RS485 - Multidrop address

The screenshot displays the 'Advanced Settings' tab of the optris Ratio Connect software. The tab is highlighted with a red box. The interface is organized into several sections:

- Field Calibration:** This section contains three sub-sections: 'Ratio', 'Top', and 'Bottom'. Each sub-section has 'Offset' and 'Gain' fields, both set to 0.0 and 1.00000 respectively.
- RS485:** This section contains a 'Multidrop Address' field, which is set to 1.
- Others:** This section contains a 'Main Display Source' dropdown menu, currently set to 'Process Value', and a 'Usb Communication' section with a checked 'Checksum' checkbox.

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](#)

RS485

Multidrop Address:

1

▲▼

Calibration

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

Field Calibration

Ratio

Offset

0.0

▲▼

Gain

1.00000

▲▼

Top

Offset

0.0

▲▼

Gain

1.00000

▲▼

Bottom

Offset

0.0

▲▼

Gain

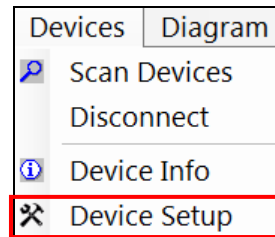
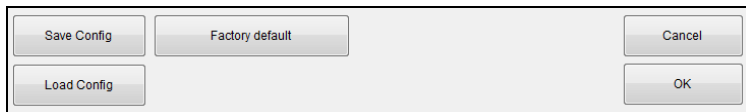
1.00000

▲▼

3. Special Feature

3.1. 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

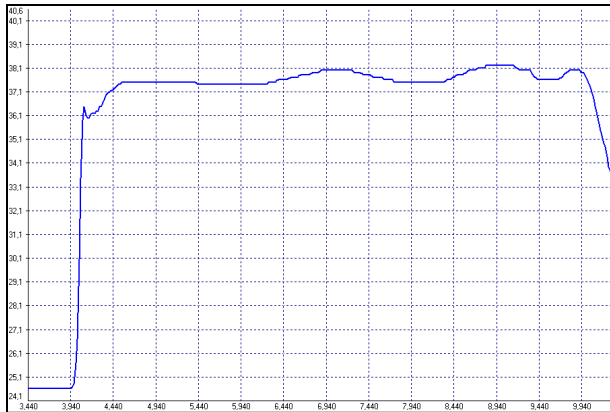
This button enables the user to reset the unit to the factory default values. It also can be reset by pressing at first the **Down** button and then the **Mode** button (keep both pressed for approx. 3 seconds).

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

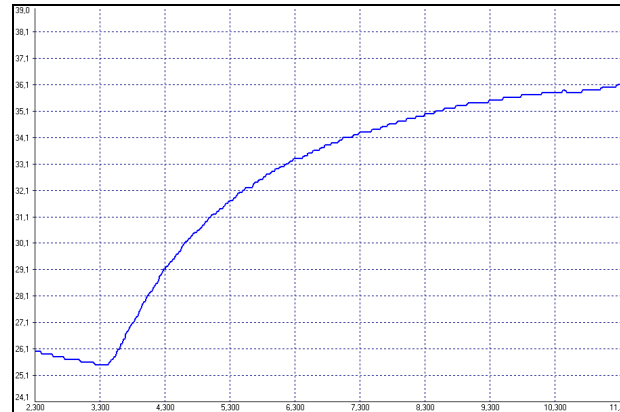
3.2. Smart Averaging

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.



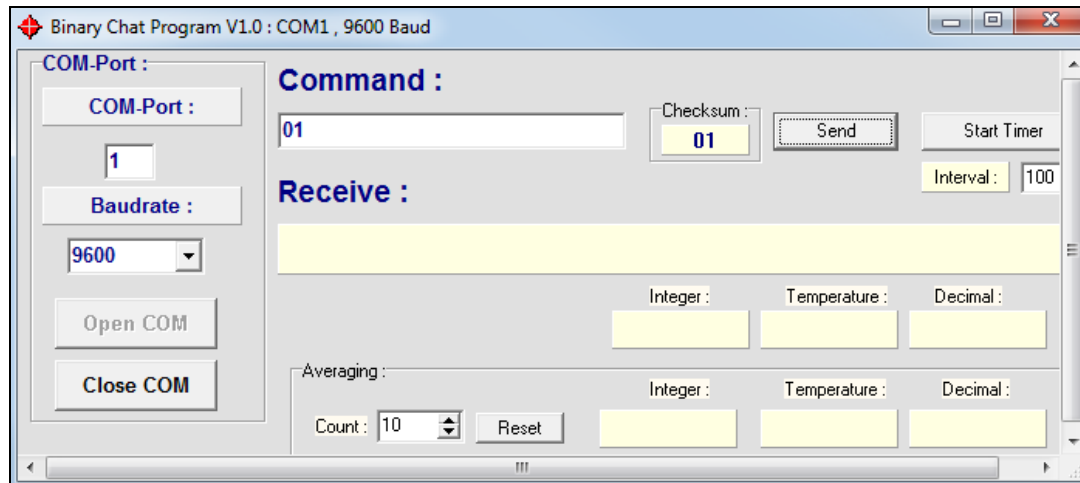
Signal graph with Smart Averaging function



Signal graph without Smart Averaging function

3.3. Binary Chat Program

In the download package 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 **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 Ratio Connect 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**.

**Note**

Before you open the COM port please close the Ratio Connect 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.

The screenshot shows the 'Binary Chat Program V1.0 : COM75 , 115200 Baud' window. On the left, the 'COM-Port' is set to '75' and the 'Baudrate' is '115200'. The 'Command' field contains '01' and the 'Checksum' field also contains '01'. The 'Send' button is visible. The 'Receive' section shows a yellow box with the text '1D~4E'. Below this, there are three columns: 'Integer' with value '8033', 'Temperature' with value '703,3', and 'Decimal' with value '8,033'. At the bottom, there is an 'Averaging' section with a 'Count' of '10' and a 'Reset' button. Below this, there are three columns: 'Integer' with value '4314', 'Temperature' with value '331,4', and 'Decimal' with value '4,314'.

Example 1: CTratio/ Polling of the process temperature

Example 1 shows the polling of the process temperature from a CTratio. This is done according to the command list (Folder: Commands):

1 Basic Functions

DECIMAL	HEX	Command	Data	Answer	Result	Unit
1	0x01	READ Temp. - Process	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	°C
2	0x02	READ Temp. - Det	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	°C
3	0x03	READ Temp. - Box	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	°C
10	0x0A	READ Temp. - Ratio	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	°C
11	0x0B	READ Temp. - T2	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	°C
12	0x0C	READ Temp. - T1	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	°C
13	0x0D	READ Temp. - Attenuation	none	byte1 byte2	$= (\text{byte1} \cdot 256 + \text{byte2} - 1000) / 10$	%

3.3.1. Additional Features

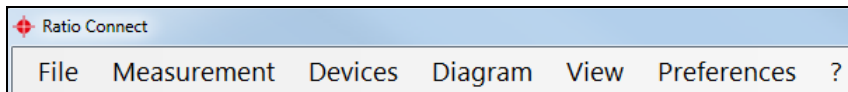
Under **Averaging** you can calculate the average value out of a defined number of values **Count**.

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

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

4. Menu Overview

Using the menu you can adjust all software settings. Each feature will be explained in detail in the following chapters of this manual:



4.1. Menu: File

Save Diagram

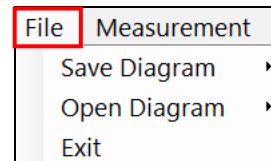
To save temperature files

Open Diagram

To open saved temperature files (*.dat)

Exit

To exit the program



4.2. Menu: Measurement

Start

To start the measurement

Pause

To freeze the continuous diagram actualization

Stop

To stop the measurement

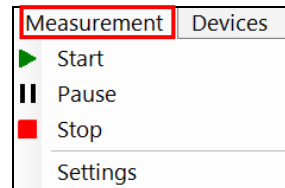
Settings

Opens the window: **Measurement configuration**

Diagram compression

Opens the configuration window for diagram compression

Burst Mode



4.3. Menu: Device

Scan Devices

Scans for connected sensors (if Auto scan is deactivated)

Disconnect

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

Device Info

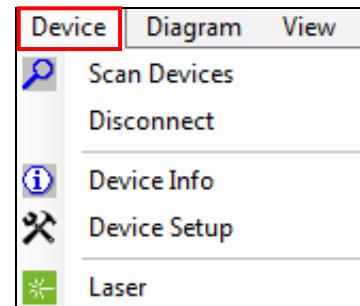
Shows information about the connected unit (firmware revision etc.).

Device Setup...

Opens the window: Device setup

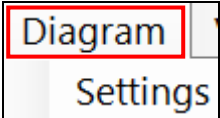
LASER

To switch On and Off the Laser



4.4. Menu: Diagram

Settings Opens the window: **Diagram settings** to select digital displays, temperature graphs, pen width and color of graphs

A screenshot of a software window titled "GraphOptionsForm". It contains a table with columns: "Digital Display", "Diagram", "Pen Width", "Color", and "Y Axis". The table lists various parameters like TProc, TRatio, T1, T2, TactRatio, Tact1, Tact2, Attenuation, THead, and TBox. Each row has checkboxes for "Digital Display" and "Diagram", a spin box for "Pen Width" (set to 2), a color swatch, and a dropdown for "Y Axis". At the bottom are "OK" and "Cancel" buttons.

Digital Display	Diagram	Pen Width	Color	Y Axis
TProc	<input checked="" type="checkbox"/>	2	Gray	Primary Y Axis
TRatio	<input checked="" type="checkbox"/>	2	Teal	Primary Y Axis
T1	<input checked="" type="checkbox"/>	2	Purple	Primary Y Axis
T2	<input checked="" type="checkbox"/>	2	Olive	Primary Y Axis
TactRatio	<input type="checkbox"/>	2	Gray	Primary Y Axis
Tact1	<input type="checkbox"/>	2	Blue	Primary Y Axis
Tact2	<input type="checkbox"/>	2	Red	Primary Y Axis
Attenuation	<input checked="" type="checkbox"/>	2	Green	Secondary Y Axis
THead	<input type="checkbox"/>	2	Black	Primary Y Axis
TBox	<input type="checkbox"/>	2	Blue	Primary Y Axis

4.5. 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
Status bar	To show or hide the status bar

Digital Selection of all available values which can be shown as a digital display

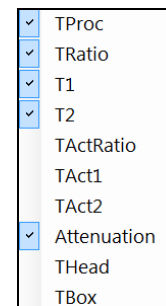
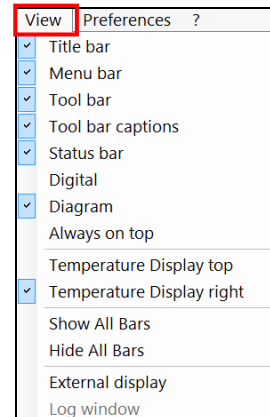
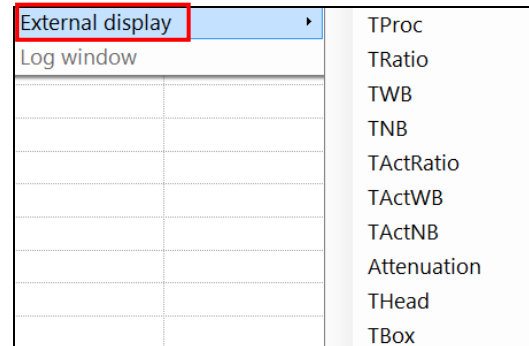


Diagram	To show or hide the temperature diagram
Always on top	If activated, the software screen will always visible on top (independent on other active applications)
Enable Video	To switch on and off the video display
Video snapshot	To make a snapshot
Temp. displays top	The digital display group will be located on the top right corner of the software screen
Temp. display right	The digital display group will be located on the right side of the software window
Show all bars	All bars will be shown (title-, menu-, tool- and status-bar)
Hide all bars	All bars will be hidden (title-, menu-, tool- and status-bar)
External Display	To open an external display
Log window	Display of logged software events



4.6. Menu: Preferences

Options...

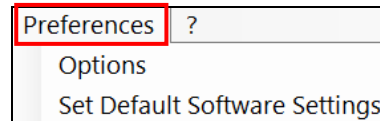
Opens the window: **Options** to make basic settings and define options for data saving

Language

To select the desired language

Set software default settings

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



4.7. Menu: Help

Help...

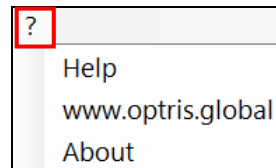
To open the help file

www.optris.global

Opens the Optris homepage in your web browser

About...

To show the software version installed on your computer



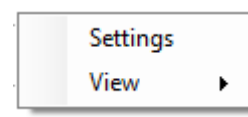
4.8. Context Menu (right mouse button)

Settings

Opens the window: **Diagram settings**
to select digital displays, temperature
graphs, pen width and color of graphs

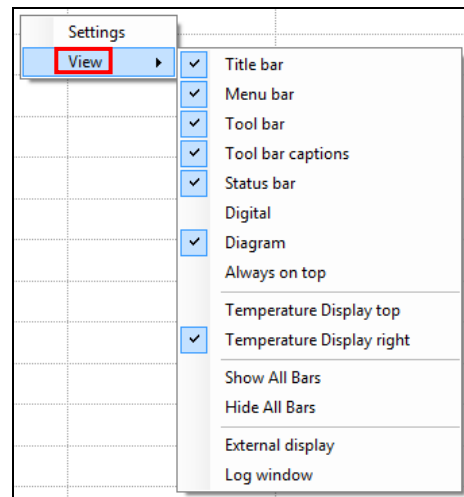
View

Linking to the sub menu **View**



4.9. 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
Enable Video	To switch on and off the video display
Video Snapshot	To make a snapshot
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
Log window	Display of logged software events



4.10. 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.

