LUMASENSE™
TECHNOLOGIES

InfraWin 5

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Service Centers

LumaSense Technologies, Inc.
North America
Sales & Service
Santa Clara, CA
Ph: +1 800 631 0176
Ph: +1 408 727 1600
Fax: +1 408 727 1677

LumaSense Technologies GmbH
Other Than North America
Sales & Support
Frankfurt, Germany
Ph: +49 (0) 69 97373 0
Fax: +49 (0) 69 97373 167

Global and Regional Centers

Our Headquarter
LumaSense Technologies, Inc.
Santa Clara, CA
Ph: +1 800 631 0176
Fax: +1 408 727 1677

Americas, Australia, & Other Asia
LumaSense Technologies, Inc.
Santa Clara, CA
Ph: +1 800 631 0176
Fax: +1 408 727 1677

Europe, Middle East, Africa
LumaSense Technologies GmbH
Frankfurt, Germany
Ph: +49 (0) 69 97373 0
Fax: +49 (0) 69 97373 167

Brazil
LumaSense, Vendas Brasil
Campinas, Brasil
Ph: +55 19 3367 6533
Fax: +55 19 3367 6533

India
LumaSense Technologies, India
Mumbai, India
Ph: + 91 22 67419203
Fax: + 91 22 67419201

China
LumaSense Technologies, China
Shanghai, China
Ph: +86 133 1182 7766
Fax: +86 21 5877 2383

E-mail   info@lumasenseinc.com
                support@lumasenseinc.com
Website   http://www.lumasenseinc.com

Contents

1 General

InfraWin is a measurement and evaluation application which allows temperatures to be displayed, represented graphically, saved, and subsequently evaluated. In addition, depending on the device type, some or even all available device parameters can be set using the software.

InfraWin works with all stationary, digital IMPAC and MIKRON pyrometers in the series 5, 6, 10, 12, 50, 100, 120, 140, 320, 500, 510, 520, 530 und 2000 as well as with the digital display DA 6000 (in the analog measuring mode). It also provides the programming platform for the program controller PI 6000 or PI 6000-N.

1.1   About This Manual

This manual provides information you need to configure and use the InfraWin software with your pyrometer.

This manual assumes you have a working knowledge of the Windows™ Operating System and its conventions; including how to use a mouse, standard menus and commands, and how to open, save, and close files. For help with any of these functions, refer to the documentation that came with your computer.

1.2   Conventions

- Section headings appear in large Frutiger type.

- Instruction sets appear with Bold headings.

- Menu, display, and keyboard options appear in Bold Title Case. (i.e., File, Open, Save, etc.)

ⓘ   Note: The note symbol indicates tips and useful information in this manual. All notes should be read to effectively operate the software.

⚠   Attention: This sign indicates special information which is necessary for a correct temperature measurement.

1.3   System Requirements

InfraWin is designed to operate on a Windows™ based computer with the following (minimum) system components:

- Windows XP

- 2 GHz or faster processor

- 1 GB Ram

- Monitor with 1280 pixel width

1.4 What's New in InfraWin 5

The following is a list of improvements over the previous version of InfraWin.

Device / Parameters:

- Detect available serial ports automatically with InfraWin. InfraWin can also search and list connected devices.
- Connect several pyrometers at the same time and maintain the ability to view and change the parameters for each connected pyrometer.
- View the device type (name), interface selection, and pyrometer parameters in one window.
- Utilize the service protocol (access to Internet is necessary).

Measurement:

- View the parameters of the connected devices directly.
- Change the various settings (parameters, scaling, PC sampling rate, marking, and threshold) during measurement operation.
- Adjust measurement scaling automatically with InfraWin.
- Preview the current measurement as a graphic with a list of data.
- Trigger measurement externally using the I/O module.
- Measure the time duration of temperature differences between warming and cooling.

Output trend / list:

- View the name and serial number of the device through expanded measurement information.
- Store the output trend/list as a binary file, text, and/or picture.
- Retrieve the last 20 data files (shown as a file list in "graphic", "list" and "main form").

Mailing (Access to Internet is necessary):

- Error report
- Comments and suggestions
- Service protocol

Special Information:

- There are two versions available: In the free version, a maximum of two devices can be used. In the paid version, up to 31 devices can be used simultaneously for measurement.

1.5 Installing InfraWin

To install the InfraWin Software Program:

1. Select setup.exe from the InfraWin Software CD or use the unpacked zip file downloaded from the internet.

2. On the Welcome Screen, click Next.

3. On the Ready to Install Screen, click Install.

4. On the Complete InfraWin 5 Setup Screen, click Finish.

   If InfraWin 5 doesn't automatically start after clicking Finish, open InfraWin 5 by double clicking the icon on your desktop (if installed), or by locating the program in your computer's start menu.

5. The first time you load InfraWin 5, you will be prompted to select a default language. The InfraWin software is available in German, English, Spanish, French, Portuguese, and Chinese.

(i) Note: Although you are required to select a language preference during the installation process, you also have the ability to change your language preference after the software has been installed. Once installed, click Language/Languages to select another language.

(i) Note: During the installation process, an InfraWin directory is created in your user profile for storing your user settings and files. The path to this directory in Windows XP is "C:\Documents and Settings\<user name>\InfraWin". The path to this directory in Windows 7 is "C:\Users\<user name>\InfraWin".

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6. The first time you load InfraWin 5, you may encounter a "message." Click Search for Solutions to have the program search for a solution. (This is typically because you need to install a USB driver.) Follow the on-screen steps to install the USB driver.
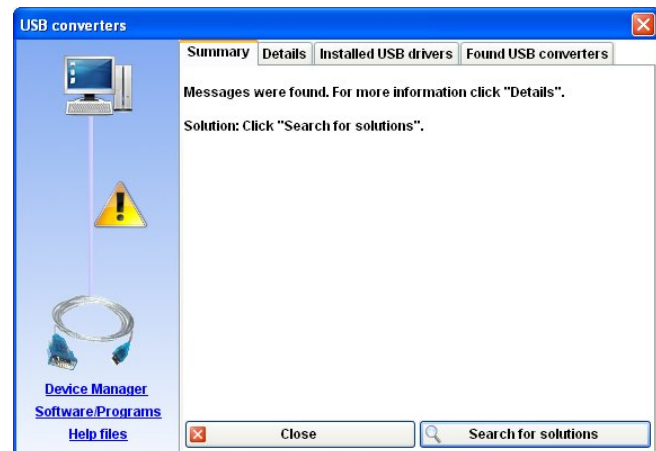
To ensure consistent document formatting, this page was intentionally left blank.

2 Getting Started

2.1 Starting the InfraWin Software

If you chose to create a desktop icon during the installation process, you will be able to double-click the InfraWin 5 icon on your desktop to start the InfraWin software.

If you did not choose to create a desktop icon during the installation process, you will be able to access the InfraWin 5 program through your Windows Start Menu.

Most InfraWin tools and options will not be available until you connect to a LumaSense pyrometer or programmable controller.

2.1.1 The Home Menu

Open	Opens a saved file
Save as	Storage of measured values for further processing
Measurement	Starts measurement for the selected device
Devices/Parameters	Setting of the parameters of the instruments
Sampling rate PC	Time interval between two measurements
Output List	Listing of measured or stored values in tabular form
Output Graphic	Processing of measured (stored) readings in graph form
.txt file	Processing of measured (stored) readings in a text file
Measuring field ca...	Calculation of spot sizes in various measuring distances
PI6000 Controller	Only if available: controls the programmable controller PI 6000
Search "I/O module"	Search I/O module

2.2 Connecting to a Pyrometer or Programmable Controller

To connect to a device, first ensure that the device you wish to connect to is properly connected to your computer using an RS485 to USB, RS232 to USB interface, or a built-in RS232 COM connection. For information about how to properly connect a device to your computer, consult the documentation provided with your device or contact a LumaSense application engineer for assistance.

Once you have connected your device to the computer, the software will automatically detect the device and allow you to start taking measurements. The InfraWin software also allows you to obtain simultaneous measurements from multiple devices as long as they do not share the same address, baud rate, or COM port (USB interface).

ⓘ   Note: Although the software has the ability to recognize multiple devices, the free version of the software only allows you to obtain measurements from two devices at the same time.

In order to obtain simultaneous measurements, you will need to select the device(s) you wish to use through the Device/ Parameters menu. You can also load, view, and change the pyrometer parameters for each connected device as well as perform other functions pertaining to each device you have selected.

Refer to Chapter 3 for more information on working with the Devices/Parameters Window.
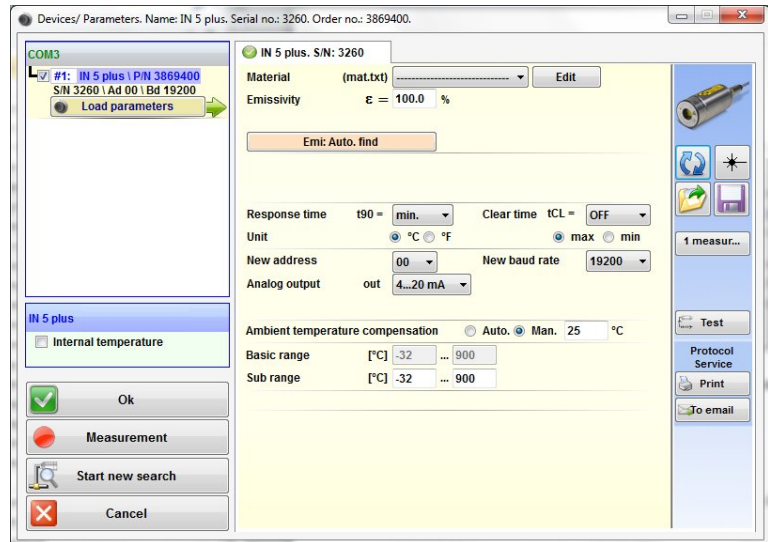
Figure 1: Devices/Parameters Window

2.3   Obtaining Measurement Values

Measurement values for the selected device can be found in the Measurement (online trend) window. This window contains three regions. In the central region, you will find the real-time graphical representation (output trend) of the measured values for the selected device. The two outer regions (left "input area" and right "output area") can be opened or closed as needed, which allows the size of the middle (graphic) area to be changed for better viewing.
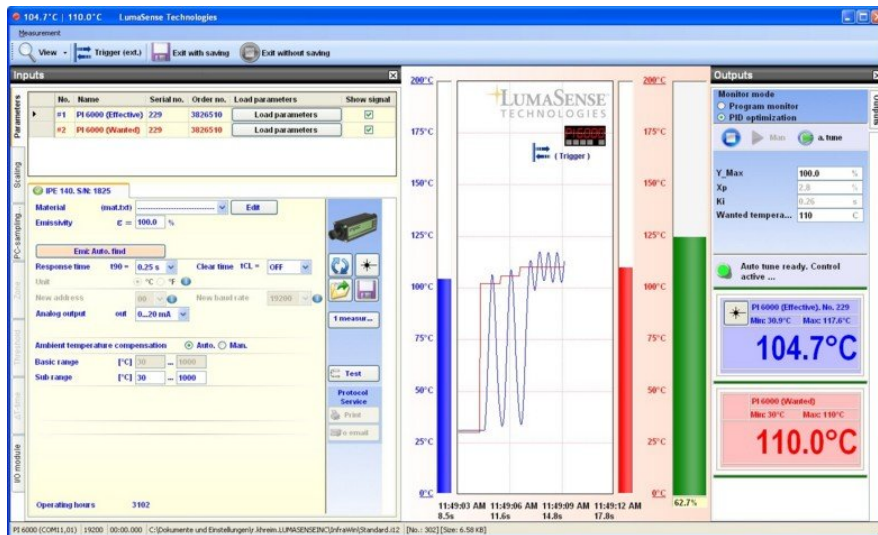
Figure 2: Measurement Window

You have the option of viewing the recorded values for the current session graphically or in list form. You can also choose to pause your measurement, change device parameters, perform advanced measurement functions, and exit the Measurement window with or without saving a copy of your measurement values.

When the Measurement window is open, the measured values are automatically recorded and saved to your computer in a file named STANDARD.I12. This file is located in your Documents and Settings\<user name>\InfraWin folder.

(i) Note: When you close the Measurement window, recording stops and no additional values will be written to the STANDARD.I12 file until the Measurement window is once again opened.

However, it is important to note that when the Measurement window is reopened, your old values will be overwritten by measurements obtained during the new session. It is also important to note that when you close the InfraWin program, the values for your last session will be saved only until you once again restart the software and open a new measurement session.

If you want to keep your recorded values, you will need to make sure you save your values to a new file before reopening the Measurement window. See section 2.4 for more information on Saving Measurement Values.

2.4   Saving Measurement Values

InfraWin automatically records your measurement values to a file named STANDARD.I12, which is located in an InfraWin folder on your computer. (Refer to the notes in section 1.5 for more information on this directory.)

Each time you open the Measurement window, your old measurement values in the STANDARD.I12 file are automatically overwritten by new measurements. However, InfraWin does provide you with the option of saving a copy of your measurement values to a new file for future use.

Measurement values can be saved as a binary file with the InfraWin file extension .I12 so the data can be reopened and re-evaluated using the InfraWin software. Measurement values can also be saved as a text file with the file extension .txt for reporting purposes.

2.4.1   Using the Remind to Save Option

The Remind to Save option is an InfraWin feature that will provide you with a reminder to save a copy of your measurements to a new file before closing out of the Measurement window.

To activate/deactivate the Remind to Save option:

Click Options > Remind to Save from the Menu Bar, located at the top of the page, to activate or deactivate the feature.
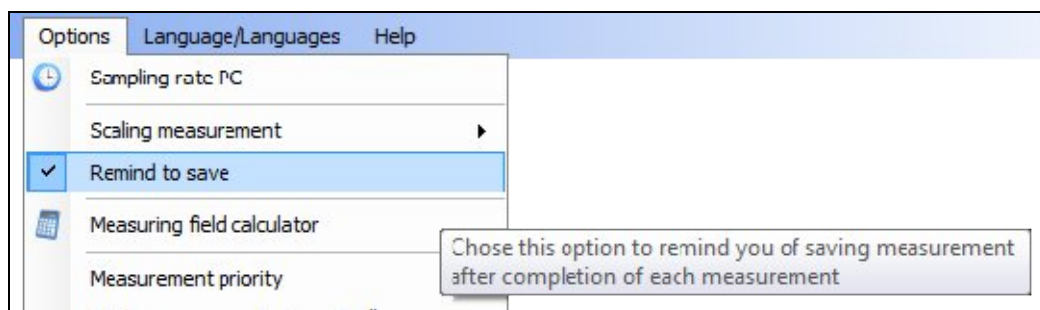
Figure 3: Remind to Save Option

Once the Remind to Save feature has been activated, you will receive a pop-up message whenever you attempt to close the Measurement window asking if you want to store your measurement.

You can select Yes to save your measurement values to a new file before closing the Measurement window, No to close the Measurement window without saving, or Cancel to cancel your request and continue working within the Measurement window.

2.4.2   Saving Measurement Values to a New File

To save measurement values to a new file:

1. Click the Exit with saving button located at the top of the Measurement window

    OR,

    If you have the Remind to Save feature activated, you can select Yes in the dialog box that appears when you attempt to close the Measurement window.

    A standard Windows™ dialog box will appear allowing you to save your file to your default InfraWin collections folder or to create a new folder in a directory of your choice.
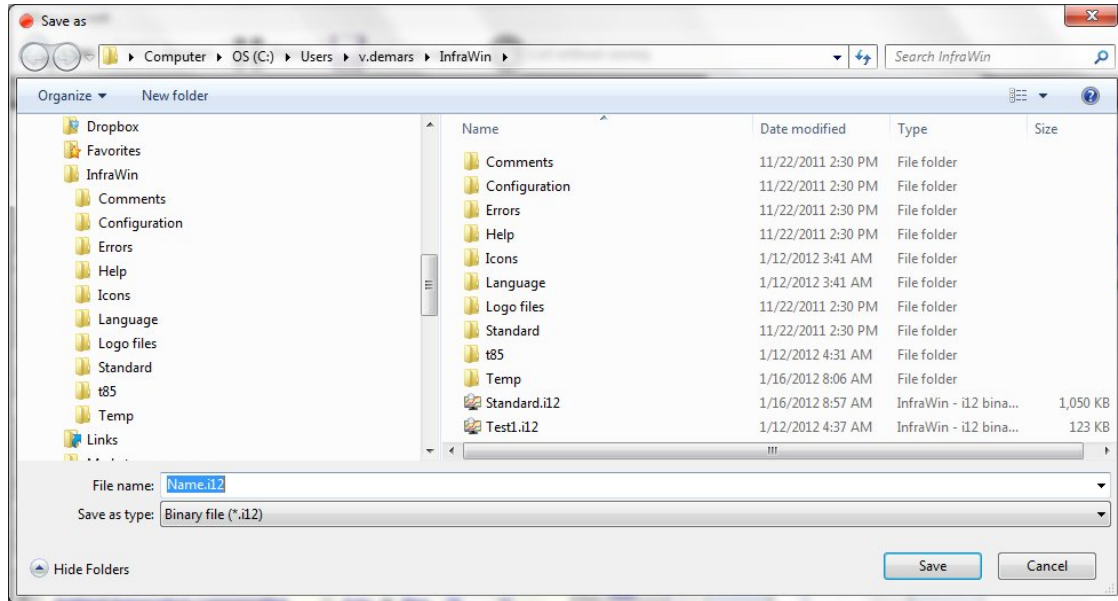
Figure 4: File Save Box

   If you want to save your file to a different location, select the new location before proceeding to the next step.

2. Create a File Name for your file.

3. Click the Save button to save your file.

(i)   Note: If you have already closed out of the Measurement window, but want to save your last measurements to a separate file, you can do so by using the Save As command found in the Quick Access bar located at the left of your screen. You can also choose File > Save As from the Menu Bar located at the top of the screen.

   However, it is important to note that you will have to perform this function before you reopen the Measurement window.

Refer to Chapter 4 for more information on working with Measurements.

3 Working with the Devices/ Parameters Window

3.1 Selecting Devices

1. Click the Devices/ Parameters button located on the Quick Access Toolbar.

   You can also access the Devices/ Parameters window by selecting Measurement > Devices/ Parameters from the Menu Bar located at the top of the page, or by selecting the Devices option found in the Measurement window, or by using the keyboard shortcut Ctrl+D.

   ⓘ Note: InfraWin will automatically search all baud rates within each Com Port for all connected devices (pyrometer, DA 6000, I/O interface, controller PI6000). Once a device is found, it appears in the list on the left side of the screen.

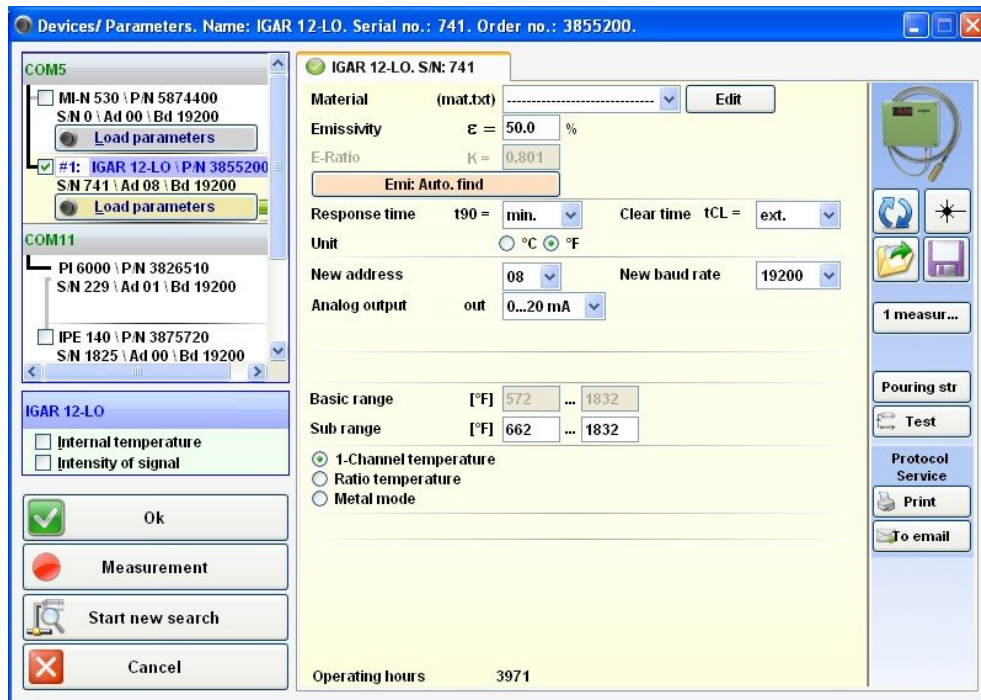2. Click to mark the checkbox next to each device you want to obtain measurements for.

Figure 5: Devices/Parameters Window

OR,

Click to mark the checkbox for a single device <u>and</u> click to mark the Internal temperature checkbox for that device.
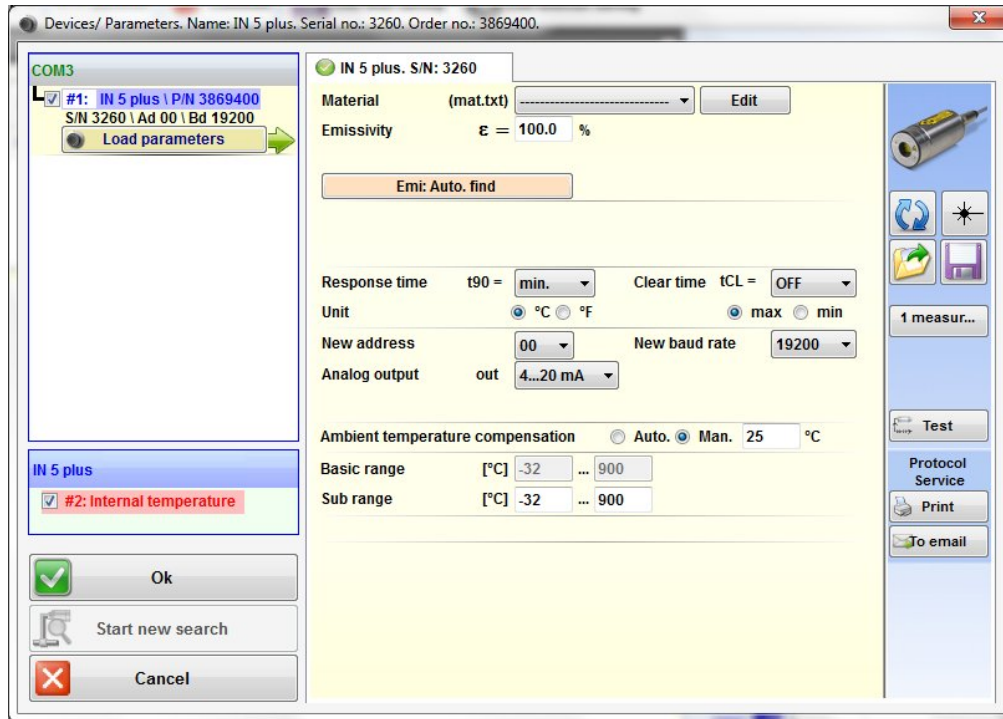
Figure 6: Parameters Window

(i) Note: The free version of this software only allows you to select two measurement sources at the same time. This can be measurements from two devices or measurements from a single device and its internal temperature or intensity of signal (with 2 color pyrometer).

(i) Note: Once a device has been selected, you also have the ability to view and change the parameters of the device while in the Parameters Tab of the Measurement window. See Chapter 4 for more information on working with the Measurements.

(i) Note: If multiple devices are selected, a separate tab will appear in the Devices/Parameters window for each device allowing you to view and change settings for the individual devices.

3.2 Working with Pyrometer Parameter Settings

All preset values for the device can be displayed and modified, if necessary, through the pyrometer parameters of the Devices/Parameters window. Changing an existing pyrometer setting can be accomplished by typing a value in an input box or by selecting a preset value from the list field. Choose the correct settings for your application from the displayed options.

(i) Note: The information and settings available in this section are based entirely upon the features/capabilities of the connected device. For more information on device-specific features and settings, refer to the documentation that came with the device.

3.2.1 Material

Under Material you have the option of storing names of different measuring objects along with their emissivity values. Once this information is stored, you will be able to recall the item at any time from the list of choices.

To add a material:

1. Click the Edit button next to the (mat.txt) drop-down list.

2. Enter the material in the form of "emissivity value"="material".
   Example: 95.0=Water

3. Click the Add button to add the material to the end of the list

   OR,

   Click a location in the list where you want the material added and then click the Insert button to insert the new material in that location on the list.

(i) Note: InfraWin automatically records your materials to a file named mat.txt, which is located in the InfraWin folder on your computer. (Refer to the notes in section 1.5 for more information on how to access this folder.)

You can also choose to populate the mat.txt file directly. However, you will need to restart the InfraWin program before your edits will appear in the list.

3.2.2 Emissivity

Emissivity is the relationship between the emission of a real object and the emission of a blackbody radiation source (this is an object which absorbs all incoming rays and has an emissivity of 100%) at the same temperature.

Different materials have different emissivities ranging between 0% and 100%. The emissivity is also dependent upon on the surface condition of the material, the spectral range of the pyrometer, and the measuring temperature. As such, the emissivity setting of the pyrometer has to be adjusted accordingly.

To adjust the emissivity setting for the selected pyrometer, type a value in the input box and click the OK button.

3.2.3 Transmittance τ

Transmittance is a parameter that can compensate for signal loss due to external windows etc. For example, if the emissivity of the material is 0.6 and the transmittance of an additional window is 0.9, then the product would be 0.54, which is well inside the allowed range.

You will have the ability to make adjustments to the Transmittance τ values of window setting based upon the limits of the selected device.

3.2.4 E-Ratio K

The emissivity slope is only used on ratio pyrometers and is only active if "Ratio temp" is selected as the operating mode. When operating in 2-color (ratio) mode, the pyrometer is measuring simultaneously with 2 sensors in adjacent wavelengths. In some cases, the emissivities of the two wavelengths can differ so that it is necessary to correct the ratio of the two emissivities to get a correct temperature reading.

It calculates the temperature by calculating a ratio with the radiation intensities of the two wavelengths. This ratio technique eliminates a number of factors that degrade the accuracy of conventional 1-color instruments.

If you are operating the device in ratio (two-color) mode, you will have the ability to add a value for the Emissivity Slope (K = $\varepsilon 1 / \varepsilon 2$).

3.2.5 EmiAutoFind

If the true temperature of the measured object is known, you can calculate the emissivity of the measured object using the Emi: AutoFind function.

When you click the Emi: AutoFind button, a measured temperature is displayed along with the current set emissivity. In the example below, the set emissivity is 57% and the measured Temperature is 239.4°C.
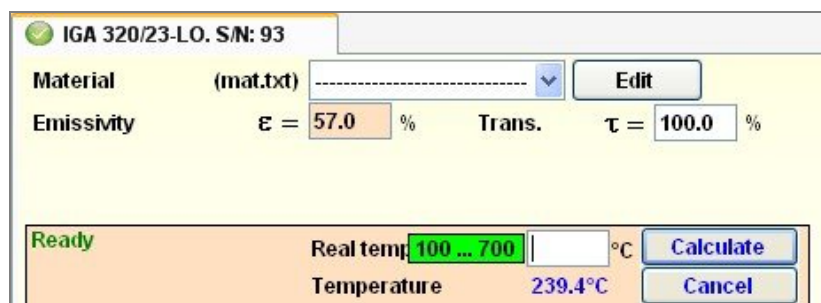

Figure 7: EmiAutoFind Window

With Emi: Autofind, you can enter a Real temperature (true temperature) value and confirm your entry by pressing the Calculate button. InfraWin will then calculate the new emissivity associated with this temperature value. This new emissivity is displayed immediately and can be used for further temperature measurement. If you operate a 2-color device in ratio mode, the same feature is available as "K AutoFind" to evaluate the correct emissivity slope K = $\varepsilon 1 / \varepsilon 2$.

(i) Note: AutoFind only works if the measured radiation temperature is sufficiently different from the detector temperature. If these temperatures are too close together, the AutoFind Button is disabled.

3.2.6 Operating Modes

The Operating Modes feature allows you to choose whether or not you want to run the device in 1-Channel temperature mode, Ratio temperature mode, or Metal mode.

3.2.7 "Dirty Window" Warning (2-color pyrometers only)

Certain 2-color pyrometers are equipped with a warning level "dirty window" monitoring system. A correct temperature measurement might be impossible if the ratio pyrometer is working at a too low signal level. To avoid these wrong measurements in advance, a built-in relay switch can be used to switch to a warning signal when the signal becomes too low. When this happens, the built-in indicator of the pyrometer starts blinking, but will continue the measurement.

The warning level can be set between 0 and 99% by entering a value in the "Warning threshold" and pressing the OK button. 0% means the "dirty window" warning system is switched off (factory setting) and the relay can perform the function external clearing of maximum value storage or external hold, when one of them is activated. Set the warning threshold well above the value of the "Minimum Intensity Switch-Off level" or to 0%.

3.2.8 Minimum Intensity Switch-Off Level (2-color pyrometers only)

The minimum intensity switch-off level is a function that is used to avoid measurement errors caused by signals which are too low. This may be caused by a dirty viewing window, dust that exists in the field of view, or when the spot is not filled by the measuring object, for example.

If the signal is too low for a correct measurement, the pyrometer interrupts the measurement and displays 1 °C below of beginning of the temperature range. Although the factory default is set to 10%, the switch-off limit can be adjusted between 2 and 50%, depending on the application. However, it is important to note that the smaller the value, the higher the chance that daylight or reflections will affect a correct measurement.

3.2.9 Response Time t_{90}

The response time t_{90} is the time interval for the analog output of the pyrometer to go from a low temperature value up to 90% of the temperature step to a high value when measuring an abrupt increase from said low to said high temperature.

When set to min, the device operates using its time constant. The dynamic exposure time adjustment prolongs the exposure time at the lower range limit, also its t_{90} is set to a lower value. However, a higher response time will need to be chosen if the maximum value storage is selected, the measuring object has a low emissivity, and the measuring temperature is at the beginning of the range. Longer response times can also be used to achieve constant temperature readings for the measurement of objects which have rapidly fluctuating temperatures.

For more information on this setting, refer to the documentation that came with your pyrometer.

3.2.10 Clear time of the maximum / minimum value storage (t_{CL})

If the maximum value storage is switched on, the highest last temperature value will always be displayed and stored. The minimum value storage saves the lowest measurements taken during a reading. As such, it may be beneficial to periodically clear and reset the stored values in order to obtain new temperature readings.

This feature is particularly useful when fluctuating object temperatures cause the display or the analog outputs to change too rapidly, or the pyrometer is not constantly viewing an object to be measured. In addition, it may also be beneficial to periodically delete and reset the stored maximum values.

Single and Double Storage Modes

Depending upon the selected settings, the maximum value storage will either work in single storage mode or in double storage mode.

Single Storage Mode	Single storage mode is used when you want to reset the stored value using an external impulse via one contact closure from an external relay (such as between two measured objects). This mode allows a new value to be established after each impulse from the reset signal. Single storage mode also comes into effect when the Clear Peak Memory t_{clear} is set to AUTO.
Double Storage Mode	Double storage mode comes into effect when selecting one of the reset intervals via push buttons or PC interface. This mode utilizes two memories. With the first memory, the highest measured value is held and is deleted alternately in the time interval set (clear time). The other memory retains the maximum value throughout the next time interval. The disadvantages of fluctuations in the display with the clock frequency are thereby eliminated.

> ⓘ Note: The maximum value storage coincides with adjustments made to the response time. Therefore:
> - clear time ≤ the adjusted response time is useless
> - clear times must be at least 3 times longer than the response time
> - only maxima with full maximum value can be recorded, which appear at least 3 times longer than the response time.

max / min

When entering a reset time interval other than 0, it must also be determined with max or min if the maximum or minimum value storage will be activated.

For more information on these settings, refer to the documentation that came with your pyrometer.

3.2.11 Temperature display in °C or °F

You can choose whether the temperature scale should be displayed in °C (Celsius) or °F (Fahrenheit).

3.2.12 Address

When connecting several pyrometers with RS485 to one serial interface, it is necessary for each instrument to have its own device address for communication purposes. First it is necessary to connect only one instrument at a time, to give it a unique address. After that, all instruments can be connected together.

> ⚠ Attention: Only for customer's own communication program (not for *InfraWin*)
>
> Parameters can be simultaneously changed on all pyrometers, by using the Global Address 98. Using Global Address 98 allows you to program all pyrometers at the same time, regardless of the addresses that have already been assigned to each device.
>
> If the address of a pyrometer is unknown, it is possible to communicate with it using the Global Address 99. However, make sure you only have the one pyrometer connected to the interface when using Global Address 99.

3.2.13 Baud Rate

The Baud Rate drop down menu allows you to choose a different transmission rate for your connection. Settings for Baud Rate are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

3.2.14 Analog Output

The analog output has to be selected according to the signal input of the connected instrument (controller, PLC, etc.). For example, if your device is set at 4 to 20 mA, the analog output gives 3.9 mA for temperatures below the lower range limit.

3.2.15 Current Input (only for series 6000 display and controller units)

The 6000 instruments are displays or controllers which get an analog current signal from the pyrometer, so they have an analog current input. This input has to be configured to 0 to 20 mA or 4 to 20 mA, and the 6000 has to know the beginning and end temperatures corresponding to these current values.

3.2.16 Ambient Temperature Compensation

The ambient temperature compensation setting should be used when standard (lab) conditions are not present. The pyrometer receives a radiation intensity from an object and this intensity consists

of emitted signal (providing the object's temperature) and unwanted reflected (and for transparent objects: transmitted) signals from objects (such as walls) in the environment.

For example, under standard (lab) conditions, the walls have nearly the same temperature as the air, which is surrounding the pyrometer. In this case, the ambient compensation setting is set to "auto." The pyrometer senses the environment as ambient air temperature and can compensate for this influence.

The measurement might be falsified (probably too high) if you place the measured object in an area with a higher wall temperature than the air temperature around the pyrometer. InfraWin allows for some pyrometer models to switch to "manual" compensation. In this case, you will need to enter the average temperature of the walls surrounding the measurement object and perform the compensation with the value you entered.

⚠ Attention: This method only improves the results if the ambient temperature surrounding the measured object is always constant and the emissivity is well known.

3.2.17 Basic Range

The Basic Range automatically displays the total range of the pyrometer. The values for the Basic Range cannot be changed.

3.2.18 Sub Range

You have the opportunity to choose a sub range within the basic measuring range of the pyrometer. Example: Temperature Range 700...1800 °C, Sub range 925...975 °C.

This sub range corresponds to the analog output. Reduction of the temperature range increases the accuracy of the analog output.

In addition to setting the sub range, it is also possible to fulfill the requirements of the "auto" clear mode of the maximum value storage.

3.2.19 Laser

If the pyrometer is equipped with a laser targeting light, the laser icon should be visible. You can activate and deactivate the laser targeting light through the InfraWin software by clicking on the laser targeting light icon.

The laser targeting light can also be activated and deactivated by pressing the laser targeting button located on the back of the pyrometer.

After approximately two minutes, the laser targeting light is switched off automatically.

⚠ Attention: To reduce the risk of injury to the eyes, do not look directly into the targeting laser and do not point the targeting laser into anyone's eyes. Never look directly into the laser beam. The beam and spot can be watched safely from the side. Also make sure that the beam will not be reflected into others' eyes by mirrors or shiny surface.

3.2.20 1-Channel Temp / Ratio Temp

The standard operation mode for 2-color pyrometers is Ratio temp. If 1-channel temp is selected, the pyrometer can be used like a conventional single- channel pyrometer.

3.2.21 LED targeting light

When the pyrometer is supplied with power, the LED targeting light is automatically active. InfraWin allows you to change the power-on status of the LED to inactive. Independent of the LED setting, the targeting light can be switched on or off at this point using the targeting icon.✳).

3.2.22 Limit switch (SP1)

Some instrument types are equipped with a built-in Limit switch. The switching temperature and hysteresis of this switch can be set with InfraWin. For more information on this setting, refer to the documentation that came with your pyrometer.

3.3 Additional Settings

3.3.1 Open/Save

The open / save buttons enable you to save customized configurations, which can then be opened and reused at any time.

3.3.2 1 meas.

The 1 meas function shows the current measuring temperature in the pyrometer parameters window for approximately 1 second.

3.3.3 Print

The print icon will generate a screenshot of the parameter form and allow you to send it a printer.

3.3.4 Close

The close icon will close the pyrometer parameters window.

3.3.5 Test

Clicking on the Test icon will open a window that allows you to directly communicate with the pyrometer using the UPP (Universal Pyrometer Protocol) Data Format commands.

See Chapter 7 for information on working with the UPP Data Format commands.

4 Measurement

To learn more about obtaining and saving measurement values, view Sections 2.3 and 2.4.

4.1   Measurement Input/Output Screen

The measurement function allows you to access a number of "input" tabs located on the left side of the screen. The main or home tab is the Output Screen. You can toggle the input tabs on and off by clicking them.

This window displays:
- temperature as graphical diagram
- internal temperature of the instrument
- current temperature
- quantity of the measured values and file size of the current measurement

Note: The measuring values of the measurement color bar or measurement online trend are automatically saved as *standard.i12.* Should you need to edit the data later, you need to save the file as another .i12-file because old values are overwritten when a new measurement is taken.

InfraWin5 uses .i12-files. To view a .i10-file in InfraWin5, you must open the .i10-file using InfraWin4 and save it as an *.i12-file.

4.1.1   Parameters Tab

The pre-selected devices are listed in the Devices/Parameters section of the Parameters Tab. Select the desired device from the list to show or hide its outputs.

When you click Load parameters for a selected device, the pyrometer parameters will be loaded and shown. These values can then be changed through the software. However, note changes will cause the measurement to pause for milliseconds.
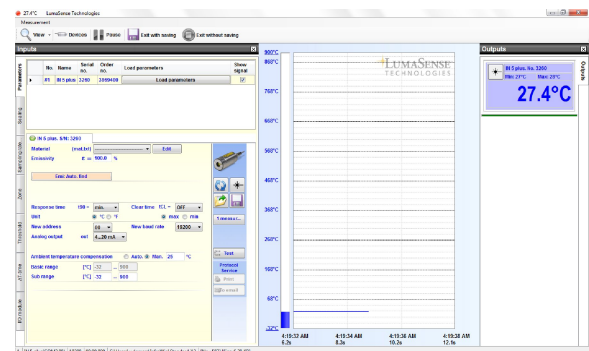
4.1.2   Scaling Tab

The Scaling feature allows you to determine how to handle the graphical presentation of temperature values.

You can set the scaling function manually by clicking on the device. You can also choose to set the function
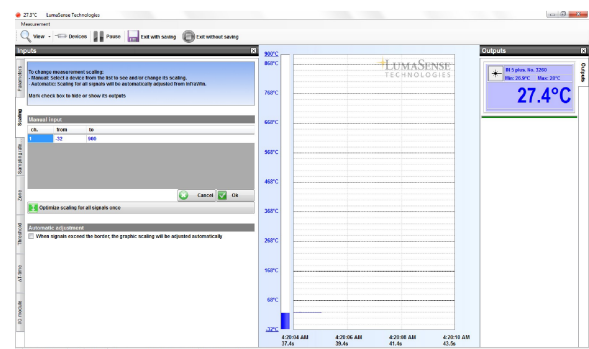
automatically by selecting the When signals exceed the border, the graphic scaling will be adjusted automatically option. This option will adjust the graphical scaling within the previously determined minimum and maximum values as they apply to the entire measurement.

4.1.3 Sampling Rate Tab

In the PC sampling rate tab, a time interval can be set after individual measuring value is stored on the computer. If the time interval is longer, the saved file will be smaller. This function is mainly used for long-term trials and has no effect on the pyrometer and its measurement speed. When all of the Wanted fields are set to 0, the Effective fields show the quickest possible transfer rate (baud rate dependent).

4.1.4 Zone Tab

By selecting the Marketing temperature zone option, you can choose a temperature range to mark green for easier recognition.

4.1.5 Threshold

The Threshold feature allows you to enter a temperature limit for evaluation purposes. When selected, only temperatures above or below threshold value are recorded. Data is limited to the main events. So cold gaps between hot components can, for example, be hidden.

4.1.6 Δ T-Time

The ΔT-Time feature allows you to establish the amount of time it should take for an object to pass through a temperature difference in a predetermined direction (warming or cooling). This feature can be used, for example, to check how long it takes for a weld to cool from 800 °C to 500 °C. and to verify that the time interval does not exceed the t8/5 limit.

The resulting list can be stored as a *.t85 file for documentation purposes. When used with the (Optional) I/O module, an external alarm can be generated whenever the maximum allowed time for the process is exceeded.

4.1.7 I/O Module (optional)

An external USB connected I/O module can be ordered (P/N 3 826 710). It provides one digital input (for triggering the measurement), and one digital output (potential-free contact), which can be used as a temperature alarm (see 4.1.5) or ΔT alarm (see 4.1.6) output.

4.2 Listing (analyzing)

Output List

For analyzing the measured values in this field, all measured data appear in a numeric list.

The date beside the time gives more exact values to see what happened on time units smaller than 1 s. The value specifies the time in seconds after midnight (0:00 h). The amount of data depends on the frequency that readings were taken (settings at PC sampling rates). As the amount of data increases, so does the amount of storage space required to save it. In order to save room, all .i12 data files are stored by a binary code.

4.3 Output .TXT file (analyzing)

.txt file

The same file as found under Output listing may be converted into a text file and can be easily opened, for example with Excel. With the standard import settings, Excel automatically formats the columns accordingly (tabulator as separators).

4.4 Trend output (analyzing)

Output Graphic
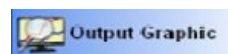
The graph's curve depicts the temperature change over time within the specified temperature range.

Additionally, other information appears in this window; such as recorded time (x-axis) and temperature in degrees (y-axis) as well as the time and temperature at the vertical cursor line, which can be dragged with the mouse.
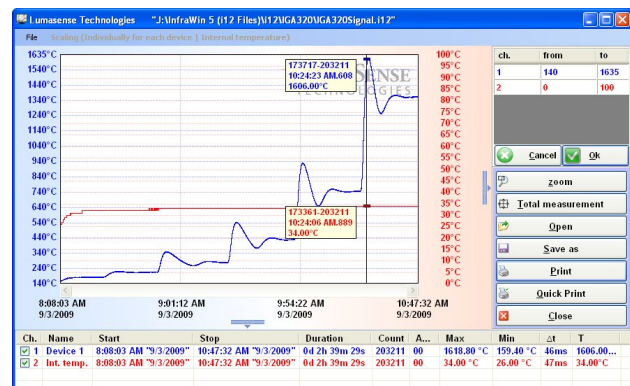
Selecting the Trend output initially causes all the saved data to be displayed.

If the data exceeds an amount that can reasonably be represented, you may Zoom in on a partial segment using the mouse. Under Total you can return to the representation of the entire curve.

Scaling determines the type of graphics scaling for Trend output. When you start the Trend output, scaling is automatically set up as Same for all Signals. You can adjust this setting to Individually for each device to adjust scaling for each connected device.
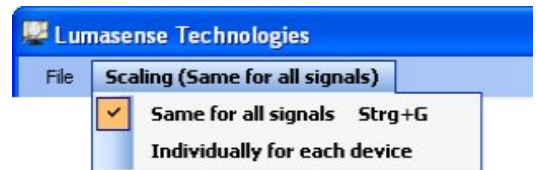
Scaling for measurements with measured internal Temperature will automatically be viewed (0 to 100 °C or 32 to 212 °F), and for measured intensity of signal (0 to 150%). Scaling will also automatically be selected individually for each device and the scaling option will be disabled.

Scaling for measurements created by PI6000 will automatically be viewed Individiually for each device. The scaling option will also be disabled.

> ⓘ Note: The last reading is saved in the *standard.i12* file and automatically appears in this form upon opening Listing or Trend output. If file open was loaded using another file, the previous file will be overwritten and replaced by the *standard.i12* file.

4.5 PC sampling rate (time interval between two measurements)

🕐 **Sampling rate PC** This function sets a time interval. After each interval, one measured value is stored on the PC. Longer time intervals will result in creating smaller stored file sizes. This function is mainly used for long term measurements.


4.6 Spot Size Calculator

🔲 **Measuring field ca...** The InfraWin Spot Size Calculator calculates the data for the non-focused regions. To calculate data, enter the values of aperture *D*, focused measurement distance *a*, and focused measuring field diameter *M* as found in the documentation relating to the optics supplied with your specific pyrometer.

After entering the aperture and the main spot size, the input of interim values calculates spot sizes in different measuring distances of the fixed optics.
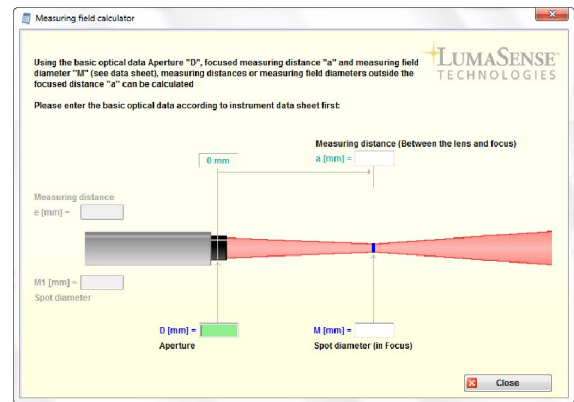

4.7 Special Settings

4.7.1 Measurement Priority

This option allows you to set the priority of your measurements. This can assist in minimizing the resulting load on the PC (especially if you are using an old/slow PC) so all opened PC programs can operate properly."

Practical experience has shown that *normal priority* fits for fast PCs and *below normal* or *low priority* fits for old and slow PCs.

To change the measurement priority, click Options > Measurement Priority and select the appropriate priority level.
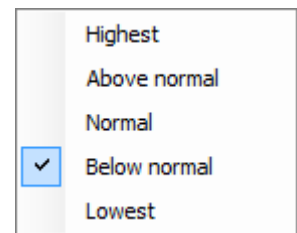
4.7.2 Start Measurement Automatically

If you select this option, the measurement starts automatically for each new start of InfraWin.


To access this option, click Options > Start measurement automatically.

4.7.3 Scaling Measurement

Determine the type of graphics scaling for online measurement.

To change the online measurement scaling, click Options > Scaling Measurement and select the appropriate scaling. Selection will be saved for future online measurements in the configuration file of InfraWin5.
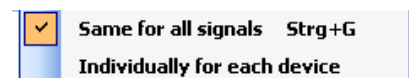
5 I/O Module

The I/O Module allows accessories to connect to the software and is used to trigger measurements externally or to send a signal (like a relay) under certain conditions.

5.1 Searching for an I/O module

There are four ways to start the search for an I/O module:

1. Use Instrument Search in Devices/Parameters.

2. Manually (before the search function starts) by clicking Options > I/O Module > Search I/O Module.

3. Automatically by clicking Options > I/O Module > Start search automatically by connecting. Connect I/O Module.

4. By pressing the Search I/O module button in the left-hand main menu of the main screen.

5.2 Applying the I/O module

By using the I/O module, users can access trigger input and alarm output functions.

5.2.1 Trigger Function (Input)

- State Controlled – As long as the contact is closed, it will be measured. If the contact is opened, measurement will pause.

- Edge Controlled – Triggering by brief contact. Measurement will continue independently of the contact until measurement is paused or stopped.

5.2.2 Alarm Output Function

Activating the I/O alarm output allows users access to the following functions: threshold, zone, and Δ T-time.

5.3 Removing the I/O module

Before you remove the I/O module from the computer, you should log out of the device by clicking Remove I/O module.

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6 Controller

6.1 About the programmable controllers

The PI 6000 and PI 6000-N are programmable PID controllers that you
can configure using InfraWin.

6.2 Operating the PI 6000

To operate the PI 6000, an IMPAC digital pyrometer is required as the transducer. When connected
to the PI 6000, communication with the pyrometer is also via the controller. It can also be accessed
directly (such as Devices/Parameters, Measurement). Baud rate and unit can only be changed by
calling the programming window PI 6000.

6.3 Operating the PI 6000-N

To operate the PI 6000-N, any pyrometer with analog output 0 or 4 to 20 mA as transducer is
required. The pyrometer is connected to the PI 6000-N, but cannot communicate or be
parameterized.

For details, please see the controller's manual.

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7 Data format UPP® (Universal Pyrometer Protocol)

Via interface and suitable communication software or via "Test" function of the InfraWin (see 3.3.5 Basic settings → Test) commands can be exchanged directly with the pyrometer.

The data exchange occurs in ASCII format with the following transmission parameters:

The data format is: 8 data bits, 1 stop bit, even parity (8,1,e).

The device responds to the entry of a command with: output (e.g. the measuring value) + CR (Carriage Return, ASCII 13), to pure entry commands with "ok" + CR.

Every command starts with the 2-digit device address AA (e.g. "00"). This is followed by 2 small command letters (e.g. "em" for level of emissivity e), finished with CR.

This is followed, if necessary for that command, by the ASCII parameter "X". If this parameter "X" is omitted, then the device resets with the current parameter.

A „?" after the small command letters answers with the respective settings (only at setting commands, not at inquiry commands).

Example: Entry: "00em" + <CR>

The emissivity setting (e) of the device with the address 00 is returned

Answer: "0970" + <CR> means Emissivity = 0.97 or 97.0%

Description	Command	Parameters
Reading temperature value:	AAms	Output: XXXXX (dec., in $^1/_{10}$°C or °F) last digit is the decimal place (88880 = Temp.-Overflow)
Reading temperature value repeated:	AAmsXXX	XXX = 000…999 (XXX = number of measuring values)
Reading basic temperature range:	AAmb	Output: XXXXYYYY (hex 8-digit, °C or °F) XXXX = beginning of temp. range YYYY= end of temp. range
Reading temperature sub range:	AAme	same as mb
Reading emissivity:	AAem	Output: XXXX (dez. 0010 … 1000 in ‰)
Emissivity:	AAemXX	XX = (10…99%), 00 = 100% (decimal)
Emissivity:	AAemXXXX	XXXX = (0010 … 1000‰) (decimal)
Exposition time t_{90}:	AAezX	X = 0 … 6 (decimal)　　0 = intrinsic time constant 1 = 0.01 s　　　3 = 0.25 s　　　5 = 3.00 s 2 = 0.05 s　　　4 = 1.00 s　　　6 = 10.00 s
External deletion:	AAlx	Simulation of an external deletion contact
Delete maximum value:	AAlzX *)	X = 0 … 8 (dez.) 0 = Maximum value storage off 1 = 0.01 s　　　4 = 1.00 s　　　7 = external deletion 2 = 0.05 s　　　5 = 5.00 s　　　8 = automatically deletion 3 = 0.25 s　　　6 = 25.00 s
Setting of temperature sub range:	AAm1XXXXYYYY	XXXX (hex 4-digit) beginning of temp. range (°C) YYYY (hex 4-digit) end of temp. range (°C)
Analog output:	AAasX *)	X = 0 or 1;　　0 = 0 to 20 mA　　　1 = 4 to 20 mA

Description	Command	Parameters
Limit contact 1:	AAs1XXXX	XXXX = switch point limit contact 1 (ASCII-hex, 4 digit, full degree in °C or °F)
Limit contact 2:	AAs2XXXX	XXXX = switch point limit contact 2 (ASCII-hex, 4 digit, full degree in °C or °F)
Setting hysteresis of limit contacts:	AAhlXX	XX = 2 … 20, full degree in °C or °F
Changing °C / °F	AAfhX *)	Output: X = 0: display in °C; X = 1: display in °F
Interface type:	AAin	Output: X = 1 or 2; 1 = RS232, 2 = RS485
Changing address:	AAgaXX *)	XX = (00 … 97) 00 … 97 = regular device addresses 99 = Global address with response 98 = Global address without response (only setting commands!)
Changing baud rate:	AAbrX *)	X=0…6 or 8 (dez.) 0 = 1200 baud 3 = 9600 baud 6 = 57600 baud 1 = 2400 baud 4 = 19200 baud (7 is not allowed) 2 = 4800 baud 5 = 38400 baud 8 = 115200 baud
Wait time:	AAtwXX *)	XX = 00 … 99 (decimal)
Error status:	AAfs	Output 1 byte hex (00 = no error) Bit 0 = 1: Measurement unit doesn't work Bit 1 = 1: Internal temperature measurement doesn't work
Lock keyboard:	AAlkX	X = 0 … 3 1 = lock lk1, removal with command lk0 or power off-on 0 = removal of lock lk1 3 = continuous lock lk3, removal only with command lk2 2 = removal of lock lk3
Reading parameters:	AApa	Output decimal 11-digit: Digit 1 und 2 (10…99 or 00): e Digit 3 (0 … 6): t_{90} (Exposition time) Digit 4 (0 … 8): t_{CL} (max. storage clear mode) Digit 5 (0 … 1): Analog output Digit 6 und 7: (00 … 98): Temperature Digit 8 und 9 (00 … 97): Address Digit 10 (0 … 6 or 8): Baud rate Digit 11 (0): always 0
Laser targeting light:	AAlaX *)	X = 0 switch off laser X = 1 switch on laser CAUTION LASER RADIATION DO NOT STARE INTO BEAM WAVELENGTH: 630-680nm < 1 mW MAXIMUM CLASS II LASER PRODUCT
Internal temperature:	AAgt	Output: XX (dez. 00 … 98, in °C) XXX (dez. 032 … 208°F)
Max. internal temperature:	AAtm	Output: XX (dez. 00 … 98, in °C) XXX (dez. 032 … 208°F)
Ref. number:	AAbn	Output: XXXXXX (hex 6-digit)
Serial number:	AAsn	Output: XXXX (hex 4-digit)
Device type:	AAna	Output: "IS 12-AI" or "IS 12-AI/S" (16 ASCII-characters)
Device type / software version:	AAve	Output: XXYYZZ (6-digit decimal) XX = 07 (IS 12-AI and S 12-AL/S) YY = Month of software version ZZ = Year of software version
Software version in detail:	AAvs	tt.mm.yy XX.YY tt = Day; mm = month; yy = year; XX.YY = software version

Note: the letter "l" means the small type of "L"

Index