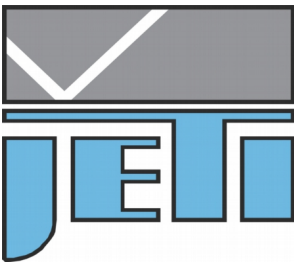
# Short Instructions

# Spectroradiometer

# specbos 1201/ 1401



JETI Technische Instrumente GmbH
Tatzendpromenade 2
D-07745 Jena
Tel. +49-3641-225 680
Fax. +49-3641-225 681
e-mail: sales @ jeti.com
Internet: www.jeti.com

License Agreement for JETI Technische Instrumente GmbH Software Products
**IMPORTANT -- READ CAREFULLY BEFORE USING THE JETI SOFTWARE**
JETI hereby grants to you a non-exclusive license to use one copy of the delivered JETI software program (the "software") on a single computer according to the following items: The software is in "use" on the computer when it is loaded into temporary memory (i.e. RAM) or installed into permanent memory (e.g. hard disk, CD-ROM, or other storage device) of the computer. However, installation on a network server for the sole purpose of distribution to one or more other computer(s) shall not constitute "use" for which a separate license is required, provided you have separate license for each computer to which the software is distributed.
It is only allowed to use the software in connection with the JETI product (instrument, spectrometer or OEM electronics), which was delivered with this software. For additional JETI products you need an extra software license.
The software is owned by JETI or its suppliers and is protected by German copyright laws and international treaty provisions and all other applicable national laws. Therefore, you must treat the software like any other copyrighted material (e.g. a book or musical recording) except that if the software is not copy protected you may either

(a) make one copy of the software solely for backup or archival purposes, or
(b) transfer the software to a singlehard disk provided you keep the original solely for backup or archival purposes. You may not copy the user documentation provided with the software and the connected JETI product.

You may not:

(i) permit other individuals to use the software except under the terms listed above;
(ii) modify, translate, reverse engineer, decompile, disassemble (except to the extent that this restriction is expressly prohibited by law) or create derivative works based upon the software or documentation;
(iii) copy the software or documentation (except for back-up or archival purposes);
(iv) rent, lease, transfer, or otherwise transfer rights to the software or documentation;
(v) remove any proprietary notices or labels on the software or documentation.

Any such forbidden use shall immediately terminate your license to the Software.

(a) You agree that you shall only use the software and documentation in a manner that complies with all applicable laws in the jurisdictions in which you use the software and documentation, including, but not limited to, applicable restrictions concerning copyright and other intellectual property rights.
(b) You may not use the software in an attempt to, or in conjunction with, any device, program or service designed to circumvent technological measures employed to control access to, or the rights in, a content file or other work protected by the copyright laws of any jurisdiction.
(c) If you receive the first copy of the software electronically and a second copy on physical media (e.g., CD, diskette, etc.), the second copy may be used for archival purposes only and may not be transferred to or used by any other person. This license does not grant you any right to any enhancement or update.

The software may include certain external software components ("Add-Ons"), including the Lab Windows user interface and drivers. You may only call to or otherwise use such Add-Ons through the use of the JETI applications. Any direct use of Add-Ons through a non-JETI proprietary application, including a custom or user-written application is prohibited by this Agreement.
If you have purchased JETI software in connection with a JETI product, you have the right of purchasing a software update, if it is available, for a priority price.
Title, ownership, rights, and intellectual property rights in and to the software and documentation shall remain in JETI and/or its suppliers. Title, ownership rights and intellectual property rights in and to the content accessed through the software including the content contained in the software media demonstration files shall be retained by the applicable content owner and may be protected by applicable copyright or other law. This license gives you no rights to such content.
For the JETI operating environment, the following terms apply:

JETI warrants that for a period of ninety (90) days from the date of acquisition the software, if operated as directed, will substantially achieve the functionality described in the documentation. JETI does not warrant however that your use of the software will be uninterrupted or that the operation of the software will be error-free or secure. JETI also warrants that the media containing the software, if provided by JETI, is free from defects in material and workmanship and will so remain for ninety (90) days from the date you acquire the software.
To the maximum extend permitted by applicable law JETI and its suppliers disclaim all other warranties either express or implied including but not limited to implied warranties of merchantability and fitness for a particular purpose with regard to the software, the accompanying written materials and any accompanying hardware.
If the media is subjected to accident abuse or improper use during the warranty period; or if you violate the terms of this License Agreement, this warranty shall immediately terminate. This warranty shall not apply if the software is used on or in conjunction with hardware or software other than the unmodified version of hardware and software with which the software was designed to be used as described in the documentation.
This limited warranty gives you specific legal rights.
Your remedies:
JETI's sole liability for a breach of this warranty shall be in JETI's sole discretion:

(i) to replace your defective media; or
(ii) to advise you how to achieve substantially the same functionality with the software as described in the documentation through a procedure different from that set forth in the documentation; or
(iii) if the above remedies are impracticable, to refund the license fee, if any, you paid for the software. Repaired, corrected or replaced software and documentation shall be covered by this limited warranty for the period remaining under the warranty that covered the original software or if longer for thirty (30) days after the date JETI either shipped to you the repaired or replaced software or advised you as to how to operate the software so as to achieve the functionality described in the documentation, whichever is applicable. Only if you inform JETI of the problem with the software during the applicable warranty period and provide evidence of the date you acquired the software will JETI be obligated to honor this warranty.

Under no circumstances and under no legal theory whether in tort contract or otherwise shall JETI or its suppliers or resellers be liable to you or any other person for any indirect, special, incidental or consequential damages of any character including without limitation damages for loss of goodwill, work stoppage, computer failure or malfunction or any and all other commercial damages or losses even if JETI shall have been informed of the possibility of such damages or for any claim by any other party. Further, in no event shall JETI´s liability under any provision of this agreement exceed the license fee paid to JETI for the software and documentation.
This software is intended for use only with properly licensed media, content, and content creation tools. It is your responsibility to ascertain whether any copyright, patent or other licenses are necessary and to obtain any such licenses to serve and/or create, compress or download such media and content. You agree to record, play back and download only those materials for which you have the necessary patent, copyright and other permissions, licenses, and/or clearances. You agree to hold harmless, indemnify and defend JETI, its officers, directors and employees, from and against any losses, damages, fines and expenses (including attorneys' fees and costs) arising out of or relating to any claims that you have

(a) viewed, downloaded, encoded, compressed, copied or transmitted any materials (other than materials provided by JETI) in connection with the software in violation of another party's rights or in violation of any law, or
(b) violated any terms of this License Agreement.

This License Agreement will automatically terminate if you fail to comply with any term hereof. No notice shall be required from JETI to effect such termination.

Technical support for the software, as made available by JETI, is given directly from the JETI office in Jena, Germany.
This License Agreement shall constitute the complete and exclusive agreement between JETI, it's resellers and the end user, notwithstanding any variance with any purchase order or other written instrument submitted by you, whether formally rejected by JETI or not. The acceptance of any purchase order you place is expressly made conditional on your consent to the terms set forth herein. The terms and conditions contained in this License Agreement may not be modified except in a writing duly signed by you and an authorized representative of JETI. If any provision of this License Agreement is held to be unenforceable for any reason, such provision shall be reformed only to the extent necessary to make it enforceable, and such decision shall not affect the enforceability of such provision under other circumstances, or of the remaining provisions hereof under all circumstances. This License Agreement shall be governed by the laws of Germany, without regard to conflicts of law provisions, and you hereby consent to the exclusive jurisdiction of the provincial and federal courts sitting in Germany. Any and all unresolved disputes relating in any way to, or arising out of, the software, your use of the software or this License Agreement shall be submitted to arbitration in Germany; except that, to the extent that you have breached or have indicated your intention to breach this License Agreement in any manner which violates or may violate JETI's intellectual property rights, or may cause continuing or irreparable harm to JETI (including, but not limited to, any breach that may impact JETI's intellectual property rights, or a breach by reverse engineering), JETI may seek injunctive relief, or any other appropriate relief, in any court of competent jurisdiction.

# Table of Contents

# 1. Introduction

*specbos 1x01* are easy to use spectroradiometers for various applications. Their miniaturized shape makes them suitable for laboratory and industrial use. The spectroradiometer *specbos 1201* can measure luminance/ radiance as well as illuminance/ irradiance. Furthermore colorimetric data (CCT, chromaticity, color purity, dominant wavelength, CRI) are calculated from the spectral data. Therefore it is suited for the test of light sources as CRT screens, for the measurement of room illuminance and for the measurement of the total optical power of light sources.

The indication of the measuring spot on the target in case of luminance/ radiance measurements will be proceeded with a pilot laser circle. Irradiance measurements are done with a cosine corrector head-piece. The software switches automatically to the appropriate measuring mode depending from the attached measuring head.

Measurement of radiant flux can be done with *specbos 1301*, which contains an integrating sphere (diameter selectable from 50 to 300 mm).

*specbos 1401* is suited for the radiant intensity measurement of LED's according to CIE 127. Both instruments can measure in luminance and illuminance mode as well.

Acquisition and analysis of data is done by the PC software JETI LiVal. The connection to the PC is via USB interface (virtual COM port). It is also possible to measure directly with the instruments without the PC program. Virtual Instruments for LabView are contained on the CD as well as radiometric and spectrometric DLLs. Detailed helping information for both applications is included. Furthermore the instruments can be driven by the SCPI compatible firmware commands. The command list is also available on the CD.

*specbos 1201* is optionally available in two special versions – *specbos 1201 flash* for pulsed source measurements and *specbos 1201 focus* for measurement of small spots from 0.5 to 3 mm diameter.

**PC requirements:**

- Pentium 4/ AMD Athlon XP or higher, min. 512 MB RAM
- Graphic resolution: 1024*768, 16 bit color depth recommended
- Windows XP; Vista or Windows 7, Windows 8; Excel 2000 (for data transfer)

**The spectroradiometer *specbos 1201/ 1301/ 1401* packages includes:**

- Basic device spectroradiometer *specbos 1201*with protection cap
- Cosine corrector head-piece
- Short instructions
- Tripod
- Transport box
- CD-ROM with PC software JETI LiVal, DLLs, LabView Virtual Instruments, operating instructions and firmware commands list
- USB cable
- Trigger connector
- Integrating sphere for Luminous flux measurement (only *specbos 1301*)
- Tubes and integrating sphere for Luminous intensity measurement (only *specbos 1401*)

## 2. Installation of Hardware

Unpack the spectroradiometer *specbos 1x01* carefully and check the delivered parts.
Connect the device to an USB interface of the PC using the enclosed USB cable as shown in the following figure:

*specbos 1201*can be used with the tripod or attached to a suited base with M 4 screws. The positions of the threads you find in chapter Technical Data on page 30.

# 3. Installation of Driver Software

## 3.1. Installation of Driver Software

**Don't connect the device during driver installation.**
**Please note that you must have administrator privileges to install the device driver!**
This chapter describes the installation procedure of the USB driver.

### 3.1.1 Installation under Windows XP

- Insert CD-ROM delivered with your device into the CD/DVD drive.
- If Autorun is enabled on your PC an installation program starts automatically. Please exit this program by pressing Exit Install.
- Open directory 'Driver' on the installation CD-ROM.
- Run 'install.bat' and follow the instructions.
- After finishing connect your device to an USB-port.
- A ‘New Hardware found’ wizard should appear. If it asks to connect to Windows Update answer with No.
- Select Install software automatically (recommended) and press Next.
- Windows should complete the driver installation automatically.

### 3.1.2 Installation under Windows Vista and Windows 7 and 8

- Insert CD-ROM delivered with your device into the CD/DVD drive.
- If Autorun is enabled on your PC an installation program starts automatically. Please exit this program by pressing Exit Install.
- Open directory 'Driver' on the installation CD-ROM.
- Run 'install.bat' and follow the instructions.
- After finishing connect your device to an USB-port.
- Windows should complete the driver installation automatically.

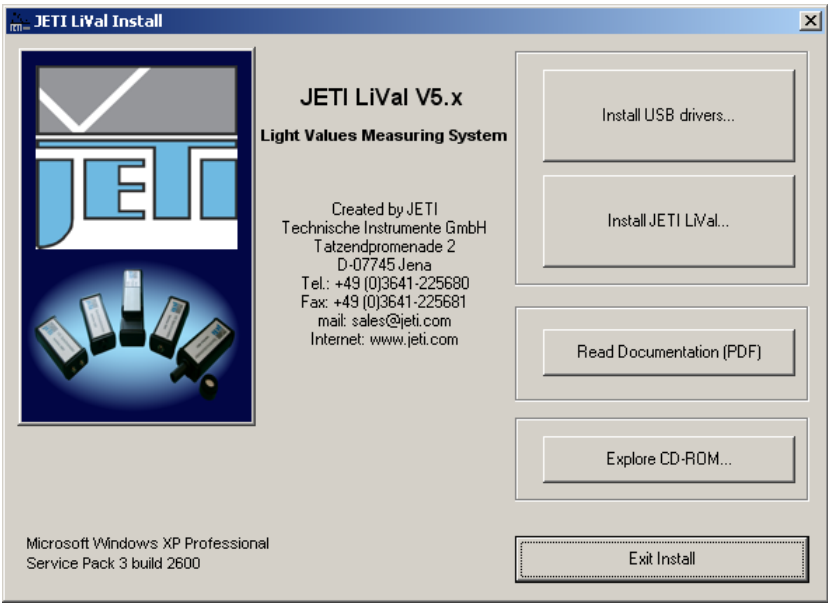
## 3.2. PC- Software

### 3.2.1 Installation under Windows

**Please note that you must have administrator privileges to install the device driver!**

Execute the following steps on the PC to install the software *JETI LiVal*:

- Start Windows 7/ 8/ XP/ Vista
- Insert the CD in the CD-ROM drive
- The following window appears, if the autostart function of Windows is activated.

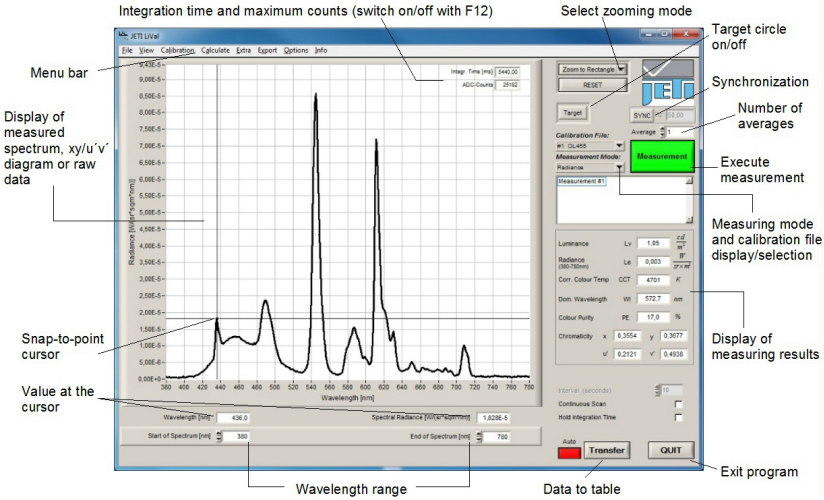



Otherwise press install.exe in the Install folder of the CD ROM.

- Click the Install JETI LiVal... and follow the instructions to install the program.

# 4. Quick Start

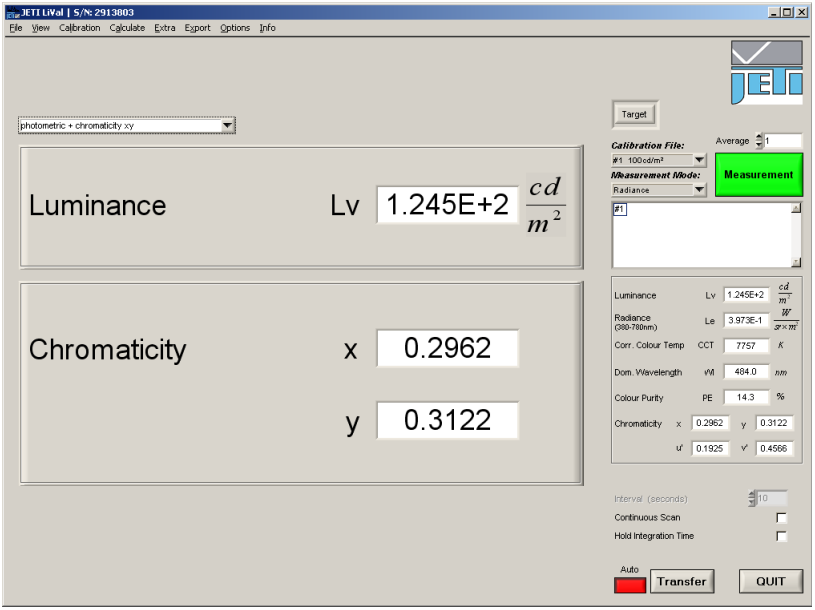
- Connect specbos 12x1 to a PC, laptop or netbook
- Start JETI LiVal under Programs in the Start menu




## Measuring mode luminance

| | |
|---|---|
| Attention: | Do not look into the laser beam or direct the laser to another person! Do not look into the beam with optical devices as telescopes or collimator lenses! |

- Click the Target circle button (or press the illuminated switch of *specbos 1211* shortly) and adjust the device viewing to the desired position
- Click the Measurement button to start a luminance measurement
- Maximum measuring time is 120 s
- Press Esc to interrupt a running measurement
- Spectrum and measuring values are shown
- Click View/ Diagram/ Numeric values in the menu bar to open a window, which shows the measuring values in a jumbo format
- Select the desired combination of values from the list



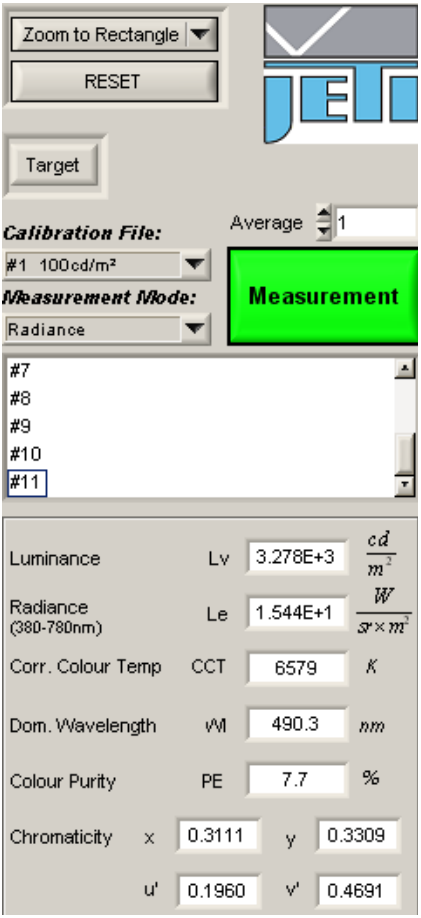

- Switch between SI and imperial units using the Options/ Photometric units menu point
- Measuring data transferred into the table view can be stored in csv or xls file format.
- Use Export/ Save Table, select the file name, format and storage location of the file and press OK.
- Proceed further measurements by clicking on the Measurement button again
- Scroll between different measurements in the legend by clicking on the name

**Change measuring mode to illuminance**

- Attach the diffuser cap to the device
- Use the program as before (except of target marker)

# 5. Measurement

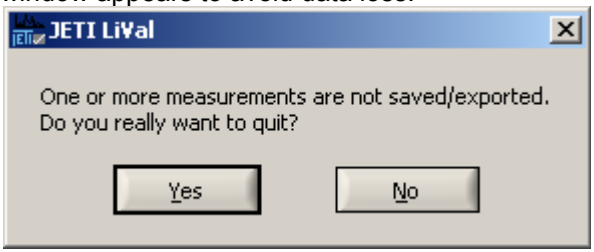
## 5.1. Measuring Procedure




The measurement procedure consists of a first spectra acquisition with a fixed integration time, a subsequent calculation of the best integration time for a well-driven spectrum, a second measurement with this time and a final dark spectrum measurement. In some cases more adaptation steps are necessary. You will be informed about the status of the measurement ("Adaption to exposure", "Performing measurement") and about the remaining time. The maximum integration time is 60 s, therefore the maximum measuring time for low intensity sources is approx. 120 s (adaption time + max. integration time + max. dark measuring time).
The measured spectrum as well as the radiometric, photometric and colorimetric data, calculated from the spectrum are displayed. Furthermore the number of the measurement is shown in the legend.
Following measurements will be shown with their values. Clicking on the spectrum line displays the data of former measurements. A thick line always indicates the actual spectrum.
Pressing Esc can interrupt a started measurement.

## 5.2. Finishing the Program

The program can be closed by selecting the Quit button or with a hotkey Alt+Q. If one or more measurements were not stored the following window appears to avoid data loss:



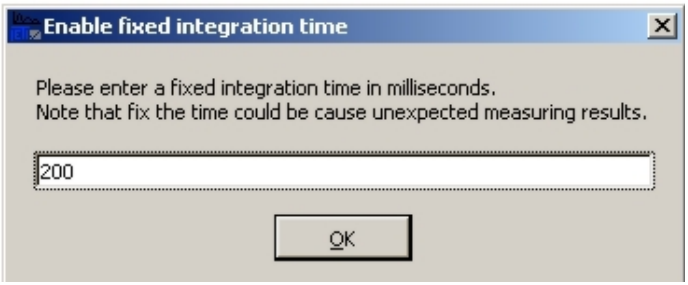
# 6. Software Settings

## 6.1. Measurement Settings

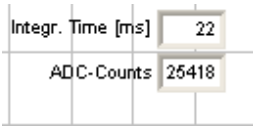
### 6.1.1 Integration Time

The devices adapt the integration time automatically according to the light level of the source.


It is possible to hold an once determined integration time for further measurements. This is mainly interesting in case of measuring objects with similar intensity. Simply click the box Hold Integration Time. There will shown a warning if over and underexposure occurs (Couldn't hold integration time). Then a new adaptation will be processed and the new time will be hold for further measurements. In some cases it is desirable to set the integration time to a fixed value. This can be done with CTRL T. Afterwards write the desired time (in ms) into the appearing window.




Following measurements will use this integration time without any adaption.
A suitable value for the integration time can be found after a first measurement with activated adaption by pressing the F12 button (Tint). The information of adapted integration time and the related counts will appear in upper right corner of the spectral diagram.
Deactivate the fixed integration time function by pressing CTRL T again.

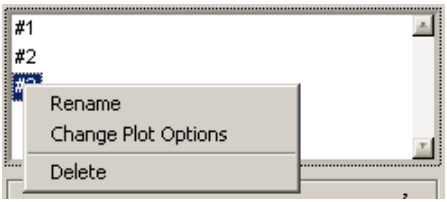


### 6.1.2 Continuous Measurement

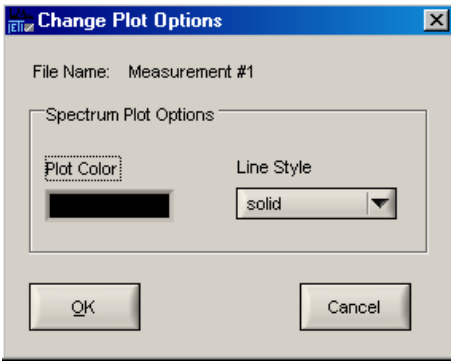
If you want to measure continuously you have two options. If you select Continuous Scan and the interval [s] the measurement procedure is as described in chapter Measuring Procedure.
If you select Hold Integration Time and Continuous Scan the measurement will be done without adaption. Normally the integration time at start will be hold for all subsequent measurements.
It will be adapted without warning in case of over or under exposure. This can influence the difference of time between the successive measurements. If you want to get a constant repetition rate you have to use the CTRL T option (fixed integration time).

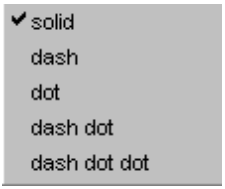
### 6.1.3 Change Measurement Name

The proceeded measurements will be named with consecutive numbers. It is possible to change this standard name.




- Make a right mouse click on the desired measurement name in the legend to open a panel
- Rename changes the measurement name
- Change Plot Options open the following window:



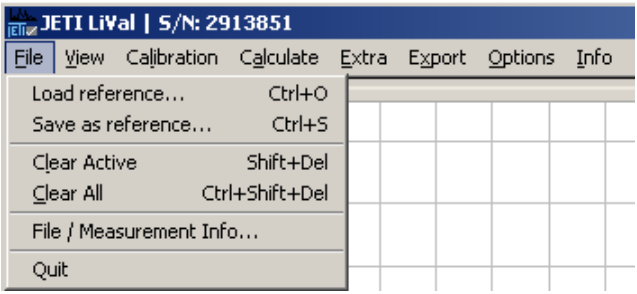

The plot color can be changed and the line style too.

- Delete deletes the measurement

There will always appear a confirmation window before the data will be deleted.

### 6.1.4 Delete Measurements

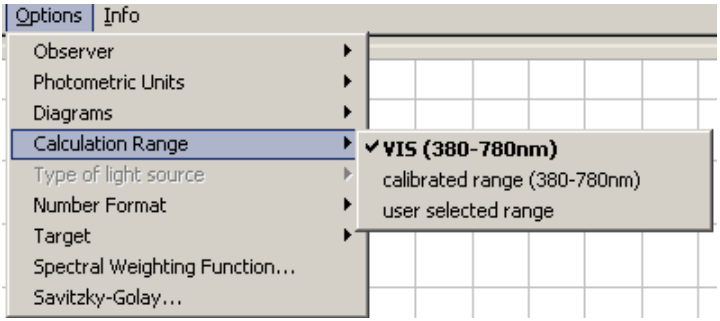
The active measurement or all measured data can be deleted under the menu point File.
A single measurement can also be deleted with the SHIFT+DEL key after selecting it in the legend with a left mouse click. It is also possible to delete a number of measurements using the CTRL or SHIFT keys in the usual manner to mark the entries to be deleted. All measurements can be deleted at once with CTRL SHIFT DEL.




There will appear a confirmation window before the data will be deleted.

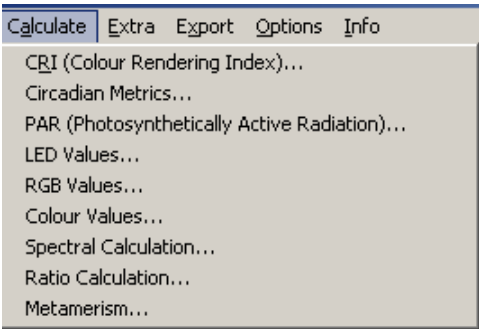
### 6.1.5 Calculation Range

The menu point Options/ Calculation Range allows to specify if the radiometric value will be calculated from the entire calibrated wavelength range (specbos 1201 380 … 780 nm; specbos 1211 350 … 1000 nm) or only from the limited (displayed) range (user selected range).




See chapter Spectra Calculations how to change the wavelength range.

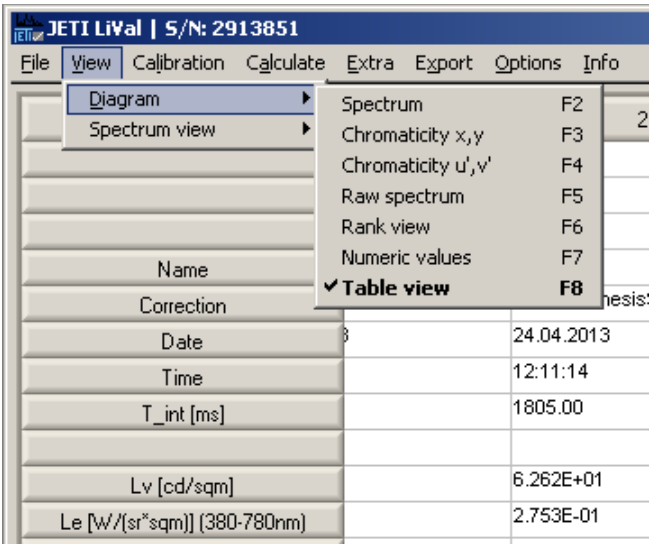
## 6.2. Special Calculations



# 7. Data Storage

## 7.1. Data Transfer

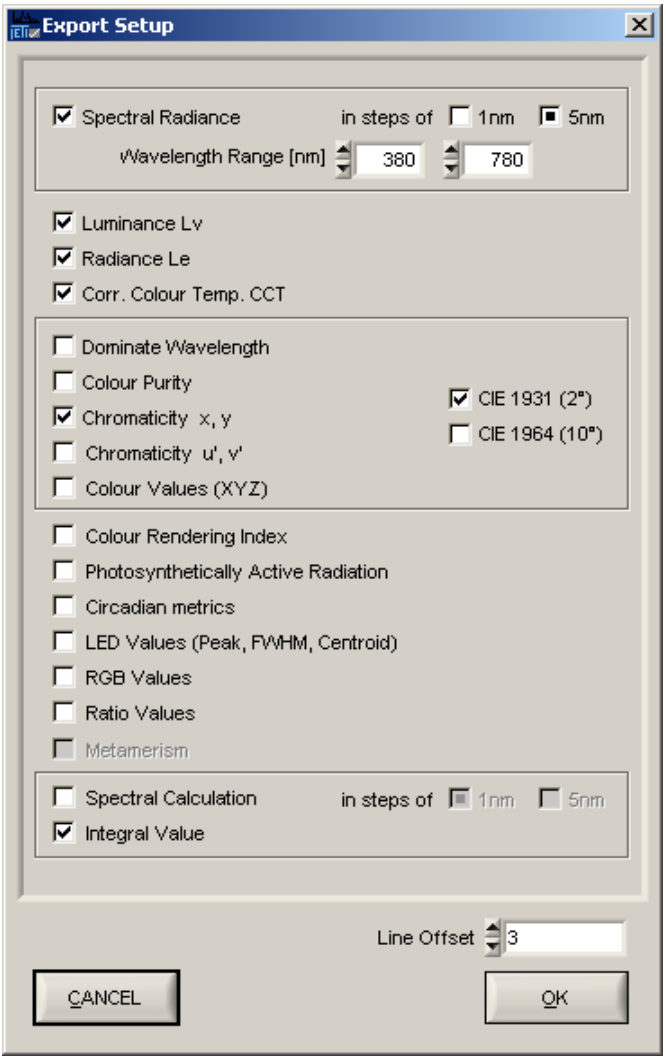
- Open the data table (View/Diagram/ Table view).




- The table will be empty in the beginning.
- Click Transfer to export the data to a table (F8 shows the table, see chapter Shortcut Keys for shortcut keys to switch between different display modi)

The marked measurement will be transferred. It is possible to mark several measurements simultaneously by using CTRL or Shift as usual; using CTRL marks single measurements and Shift marks a block of measurements.
If a measurement was already identified by an individual name this name will be used as column header in the table. If not changed the automatically generated measurement number will be used.
It is also possible to store loaded reference spectra in the same manner.
If the button Auto is activated, all following measurements will be transferred automatically.


- Select Export/ Setup Output and choose the desired quantities to be shown in the table.




- The cells of the first lines can be edited. The number of these lines has to be selected in the “Line Offset” setting.

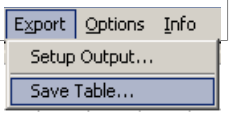
**Remark:** The boxes Spectral Radiance/ Irradiance; Luminance/ Illuminance and Radiance/ Irradiance appear in dependence from the attached measuring head.

- In case of selection of the spectral data the user has to click on the desired wavelength step width for the transfer (1 or 5 nm). Line Offset in Table shifts the transferred data downwards. Finally click on the OK button to close the window.

## 7.2. Data Export

- Measuring data transferred into the table view can be stored in csv, xls or xlsx file format (Excel 97 or higher).

| | |
|---|---|
| **Remark:** | Excel installation isn't necessary. |



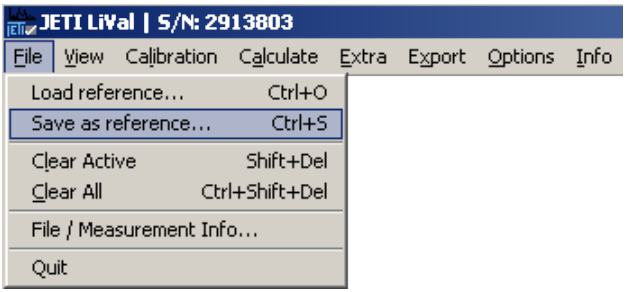

- Use Export/ Save Table, select the file name, format and storage location of the file and press OK.

| | |
|---|---|
| **Remark**: | The selected quantities are the same which were selected under setup output. |

## 7.3. Reference files

### 7.3.1 Store as Reference

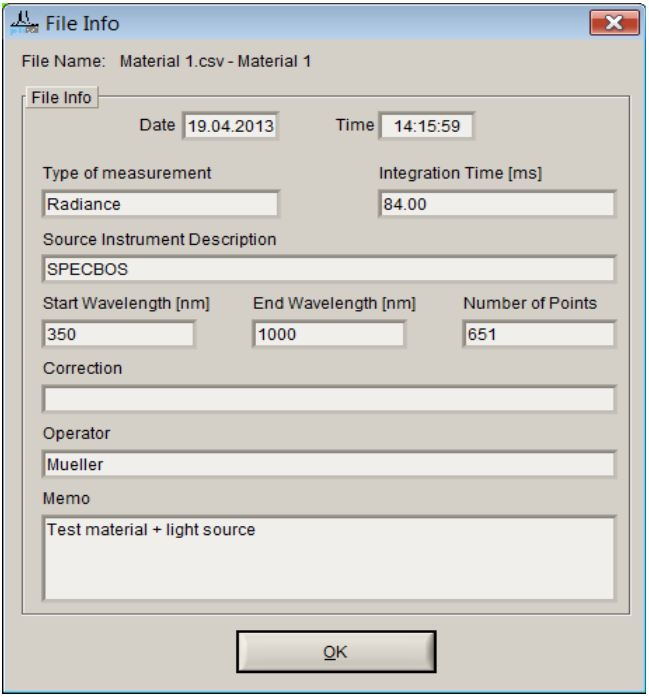
The items File in the menu bar allows to store measured spectra as a reference for further measurements. There can be used two formats – Character Separated Values (CSV, file extension .csv) or the Galactic SPC file format (GRAMS compatible, file extension *.spc)*.




Choose a spectrum or spectra you want to save in the legend (multiple selection is possible), then save it/them by clicking File/ Save as reference. First type in the name of the file and select the folder for storage. Afterwards user comments (memo) and the operators name can be inserted into the following windows.

| **Remark:** | Saved reference spectra can be directly used for Spectra Calculations (see chapter Spectra Calculations), but in this case they must be saved as CSV and every CSV-file must contain only 1 spectrum. |
|---|---|

The menu item File/ File/Measurement Info … shows a window with information about the actual spectrum (measured or reference).



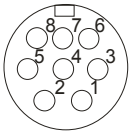
# 8. Shortcut Keys

| | |
|---|---|
| F1 | About box (including product/ vendor ID, virtual COM port number, baudrate, firmware version) |
| Shift F1 | Battery status (specbos 1211 LAN) |
| F2 | Display of spectrum |
| F3 | Display of xy diagram |
| F4 | Display of u´v´diagram |
| F5 | Display of raw spectrum (dark signal corrected) |
| F6 | Rank view |
| F7 | Large display of numerical values |
| F8 | Open the data table |
| F9 | Start of measurement |
| F11 | Snapshot into file |
| Shift F11 | Snapshot to printer |
| F12 | Display of actual integration time and maximum counts in spectrum (including dark counts) |
| ESC | Abort a running measurement |
| CTRL D | Open the distance panel of luminous intensity measurement |
| CTRL I | Reconnect device |
| CTRL O | Load reference |
| CTRL S | Save reference |
| CTRL T | Open/ Close the panel for fixed integrating time |
| CTRL + left mouse key | Zoom in (xy and u´v´diagrams) |
| Space | Start of measurement (only if measurement button is active) |
| Shift Del | Clear active measurement |
| CTRL Shift Del | Clear all measurements (with accepting window) |
| Alt Q | Finish the program |

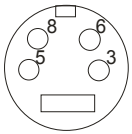
# 9. Trigger Functions

It is possible to trigger the measurement externally or to initiate a flash of a pulse light source.
The trigger female connector at the rear side of the device has the following pin out (specbos1211 Mini DIN 8; specbos1201 Mini DIN 4):

Mini DIN 8




Mini DIN 4




Pin out (view to female connector of the device):
3 Lamp out 5 V TTL signal (flash lamp trigger)
5 Measuring trigger input
6 not used
8 Ground

The fitting male connector is included in the scope of the device delivery.

**External Control of Measurement**

A measurement can be initiated externally by a short cut between pin 5 and 8. This can be done e.g. by a foot push-button. Furthermore it is possible to use a TTL signal to start a measurement. This is done with the falling edge of the signal.
Both triggering versions act similarly as pressing the green Measurement button of the software.

**See the firmware description to change the settings.**

# 10. Maintenance and Error Messages

The instrument needs no permanent maintenance, if you use it carefully. It is recommended to recalibrate it every year. Ask your dealer or the producer (see chapter *14*) for details.

| Error message | Reason | Removal |
|---|---|---|
| Device not found! Switched to offline-mode | Device not connected or USB driver not installed correctly. | Connect the device to the PC or check the installation of the device driver (see install.txt on Setup-CD). |
| Firmware of specbos device is not compatible! | The software JETI LiVal needs the firmware version 2.0 (specbos1201), 3.0 (specbos1211) or higher. | Contact your supplier to change the firmware version. Application note 22 on the website www.jeti.com |
| Could not read calibration data from device! | It was not possible to read the data stored inside the instrument. | Contact your supplier. |
| Could not write calibration data! | | Repeat calibration process. |
| Wrong lamp file! | Lamp file was not readable or did not fit the requirements. | Change lamp file or ensure the correct file access. |
| Overexposure! Measurement failed. | The measuring object overexposed the instrument. | Reduce the measuring intensity by calibrated filters. |
| Could not read parameter. | The software can not read the necessary parameters from the instrument. | Contact your supplier. |
| Could not read file! | It was not possible to read a selected reference file. | Check the readability of the file. |
| Could not write file! | It was not possible to write a measured file as reference. | |
| Error on USB-Transfer | It was not possible to read or write data via USB | Check the USB-connection and restart the software |

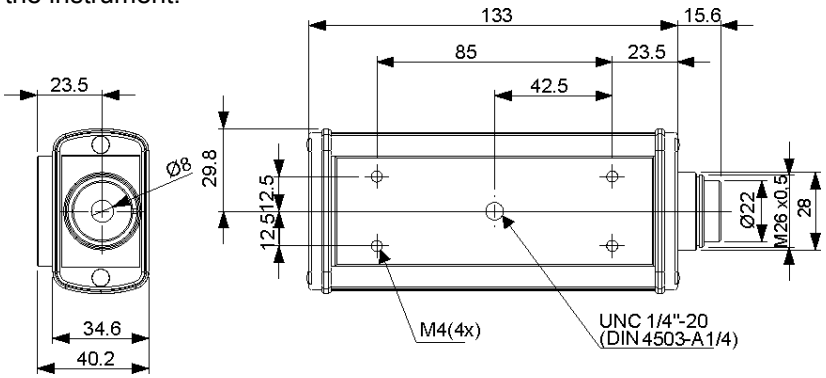
# 11. Technical Data

| | |
|---|---|
| Applications | Measurement of diffuse light sources, screens etc., of room illuminance and of lamps |
| Spectral range | 380 ... 780 nm |
| Spectral resolution (Rayleigh) | 5 nm (specbos 1x01) |
| Wavelength accuracy | ± 0.5 nm |
| Digital spectral resolution | 1.2 nm (specbos 1x01) |
| Digital electronic resolution | 16 bit A/D (15 bit used, 14 bit displayed) |
| Measuring values | Spectral radiance/ spectral irradiance (radiant flux with specbos 1301/ radiant intensity with specbos 1401)<br>Integral luminance/ integral radiance/ Integral illuminance/ integral Irradiance/ (integral luminous/ radiant flux with specbos 1301/ integral luminous/ radiant intensity with specbos 1401)<br>Chromaticity x,y; u´,v´<br>Correlated Color Temperature<br>Dominant wavelength, color purity<br>Color Rendering Index<br>Circadian metrics<br>Photosynthetically Active Radiation |
| Measuring range luminance | 2 ... 70 000 cd/m$^2$ |
| Measuring range illuminance | 20 … 50 000 lx |
| Measuring range luminous intensity | |
| **specbos 1401** | cond. A 100 mcd … 300 cd |
| | cond. B 30 mcd … 100 cd |
| Measuring range luminous flux | |
| **specbos 1301** | 50 mm sphere 30 mlm … 250 lm<br>150 mm sphere 100 mlm … 800 lm |
| Viewing angle in luminance mode | 1.8 ° |
| Measuring distance/ diameter in luminance mode | |
| | 20 cm - ∅ 6 mm; 100 cm - ∅ 30 mm |
| Accuracy photometric value | ± 5 % (@ illum. A) |
| Reproducibility of photometric value | |
| | ± 2 % |
| Color chromaticity accuracy | ± 0.001 x, y (@ illum. A) |

| | |
|---|---|
| Color reproducibility | ± 0.0005 x, y |
| CCT reproducibility | ± 20 K (@ illum. A) |
| Integration time range | 5 ms ... 60 s |
| Dispersive element | Diffraction grating |
| Light receiving element | 512 pixel photodiode array |
| Operating conditions | Temperature 10 ... 40 °C<br>Humidity < 85 % relative humidity at 35 °C |
| Power supply | Hub powered |
| PC interface | USB 2.0 fullspeed (12 Mbit/sec) |
| Dimensions | 150 mm x 58 mm x 34 mm (basic unit) |
| Weight | 300 g (basic unit) |
| Pilot laser | Laser class 1, λ= 645 … 660nm (classific. accord. to EN60825-1/Oct. 2003) |

## Mechanical Fixing

*specbos 1201* can be used with the tripod or attached to a suited base with M 4 screws. The following drawing shows the positions of the threads downside the devices and some general dimensions of the instrument.




Attach *specbos 1301* with the delivered UNC screw to the integrating sphere. The UNC screw is fixed on the angle of the integrating sphere.
Attach *specbos 1401* with the delivered UNC screw to the tube. The UNC screw is fixed in the base plate of the tube. Insert the tube extension if you want to measure in CIE standard condition A mode.

# 12. CE – Declaration of Conformity

No : **P-QK/EMV 019/2009**
We :

JETI Technische Instrumente GmbH
Tatzendpromenade 2
07745 Jena
GERMANY

declare that the product series

Spectroradiometer

specbos1201

to which this declaration relates is in conformity with the requirements of following documents:

- EU Electromagnetic Compatibility (EMC) Directive (December 2004) 2004/108/EC

EU Harmonised standards:

EN 61326-1 (2006-10)

EN 55011 (2007-11) class B

EN 61000-4-2 (2001-12); EN 61000-4-3 (2008-06);
EN 61000-4-4 (2005-07); EN 61000-4-6 (2008-04)

EN 61010-1

The conformity of the product with the standards and directives mentioned above, is confirmed by the CE sign.

Jena, March 2009

JETI
Technische Instrumente GmbH
Tatzendpromenade 2
07745 Jena
Tel.: 03641/225680
Fax: 03641/225681

Dr. Steffen Görlich
General Manager

# 13. Certificate of Warranty

Certificate of Warranty for

Model: Spectroradiometer

Type: specbos 1201
specbos 1301
specbos 1401

JETI Technische Instrumente GmbH (referred to as JETI) hereby warrants this equipment as follows:

If any part of this unit (except as described below) fails due to poor workmanship or material (determined by JETI) within TWO (2) years from date of delivery, that part will be exchanged at no charge.

This warranty is valid only when the unit is installed and adjusted according to factory specifications and serviced by competent authorized personnel.

JETI does not assume responsibility for any of the following, all of which are excluded from the coverage of this warranty:

1. Damage due to ordinary wear and tear, abusive use, or lack of proper maintenance
2. Damage due to harsh mechanical shock, e.g. falling to the floor
3. Loss or damage due to adverse environmental conditions or acts of God
4. Loss of wages or income due to repair, replacement, malfunction or damage

Warranty becomes void if serial number is removed or defaced, or the instrument was opened by the customer.

If a defect appears which the customer feel is covered by this warranty, a written notice describing the defect must be sent to JETI's office at the current address of record.

Upon receipt of customers written report of a defect, if the defective items are covered by this warranty, JETI will repair or replace it at no charge to the customer, within 30 days after receipt of the returned unit (provided there are no labor problems or materials shortages to cause delays). The choice between repair and replacement shall be determined by JETI based on actual conditions or circumstances. JETI reserves the right to substitute new and improved equipment or parts at any time. The obligation to replace defective parts does not require replacement of the complete unit.

NO OTHER WARRANTY EXPRESSED OR IMPLIED IS APPLICABLE TO THIS UNIT .

This warranty shall be in effect for a period of 24 months, beginning one week after the date of delivery.

# 14. Service

Please contact in case of any question or technical problem:

JETI Technische Instrumente GmbH
Tatzendpromenade 2
D-07745 Jena
Tel. +49 3641 225 680
Fax +49 3641 225 681
e-mail: support@jeti.com
Internet: www.jeti.com



24 October 2013

# Table of Contents