CIMPS-emit

Photo-Electrochemical Light Emission Measurements

1. Introduction

Within the last decades electro-luminescence processes gained extremely high importance. Light emitting diodes LED are on the way to beat any other light source technique regarding energy efficiency and design flexibility. Inorganic electro-luminescence light sources are playing a role as niche product since many years. Nowadays they were taken over by Organic light emitting diodes OLED. These devices allow flat, flexible lamps and promise both high efficiency as well as low production costs. Common to all of them is that there is still high potential for economic and energetic improvements. In particular research effort is necessary to control the light emission color, the color temperature and the influence of the electric power on the emission characteristics.

In order to support such research CIMPS-emit was designed as an add-on to the core applications of the CIMPS system. Recording of spectral resolved and integral emission characteristics in dependence of the voltage across and the current through the object under test is the main purpose of CIMPS-emit. The resulting emission spectra can be visualized, processed, analyzed and exported in manifold ways by means of the Thales light spectra analysis software.

Similar to the light absorbance measurement package, CIMPS-emit complements CIMPS by a wideband UV-VIS-IR spectrometer in order to enable spectral resolved light emission measurements. For integral emission, an additional NIST traceable calibrated photo-detector is available. Automatic spectra series measurements vs. voltage, current or time may be performed. In addition, series parameters like temperature and pH can be included. The light spectra analysis package present in Thales supports single / multi-spectra 2-D, multi-spectra 3-D and contour plot visualization of the emission spectra in linear or logarithmic scale vs. wavelength or wave-number and different analysis features for emission lines or bands. Data can be exported in the ASCII format, as bitmaps or as Windows®-EMF graphics via copy & paste or as files.

Dependent on the ordering, CIMPS-emit comes up in different stages of expansion.

2. Hardware and Installation

The hardware is provided for CIMPS-emit is,
if the "Integral option" was ordered:

- NIST traceable calibrated photo-detector for integral emission measurements

if the "Spectral resolved" option was ordered:

- UV/VIS or IR-spectrometer for spectral resolved emission measurements

2.1. NIST Traceable Calibrated Photo-Detector

CIMPS-emit including the "Integral option" is delivered together vwith an NIST traceable calibrated photo-detector for integral emission measurements. The calibration files for the photo-detector are included in the Zahner IM6/Zennium Calibration Data CD. For more information on installing the Calibration Data CD refer to manual ***Installation & Getting Started***.

The calibration files are:
```
C:\Thales\cimps\caltab.bin
C:\Thales\cimps\caltabxxxx.is_
C:\Thales\cimps\yyyyyyyyy.xls
```

2.2. UV/VIS Spectrometer

Spectral resolved CIMPS-emit is delivered with either an International Light ILT-9x0 or an Avantes AVASPEC UV/VIS-spectrometer. The ILT-9x0 requires the manual installation of the SpectrlLight software package delivered on the yellow International Light installation disk(s).
Please note, that the installation procedure depends on the software version of SpectrlLight. All CIMPS-emit systems delivered after 01.03.2011 include SpectrlLight version 3.2.x or later. In this case refer to chapter 2.2.1 for installation.
In case your SpectrlLight version is 3.1.x and lower, as with CIMPS-emit systems delivered before 28.02.2011, refer to chapter 2.2.2 for installation.
If the CIMPS-emit system is delivered with an Avantes AVASPEC spectrometer refer to chapter 2.2.3 for installation.

Warning: Do not connect the spectrometer before the software including the USB drivers of the spectrometer is installed.

2.2.1. ILT-9x0 Installation, SpectrILight Version 3.2.x and higher

Insert the SpectrILight III installation disk labeled **SOFTWARE** into your CD-ROM drive and run the installer setup.exe. Location differs between SpectriLight versions:
Version 3.2.x and 3.3.x CD-ROM:\Installer\SpectrILight III v3.x.x\Installer\Volume
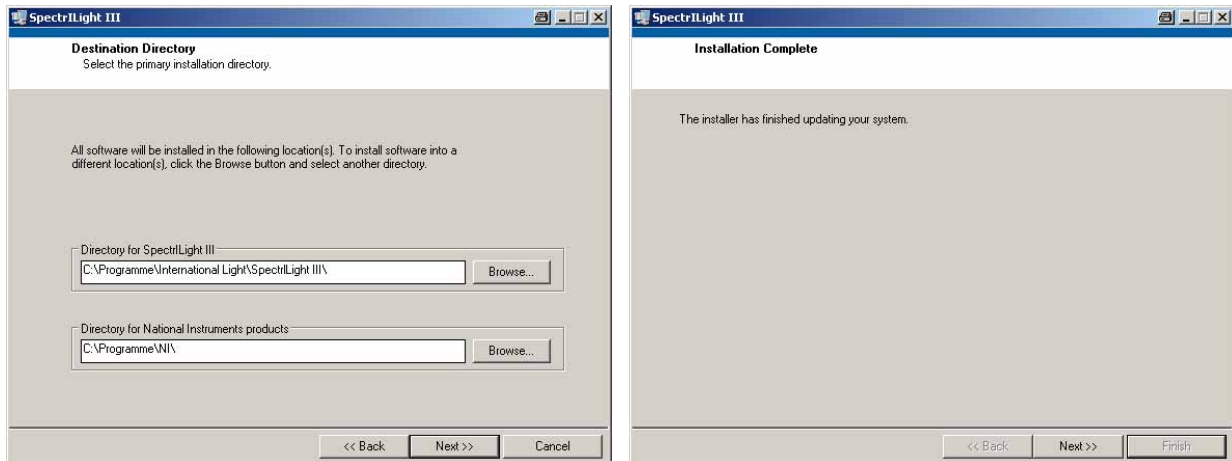Version 3.4.0 CD-ROM:\SpectrILight III v3.4.0\Installer\Volume

Fig. 1 SpectrILight installation first and last window

Follow the instructions until installation is complete (Fig. 1). Now the ILT-9x0 interface package installation automatically starts. Again follow the instructions until the drivers are installed (Fig. 2).
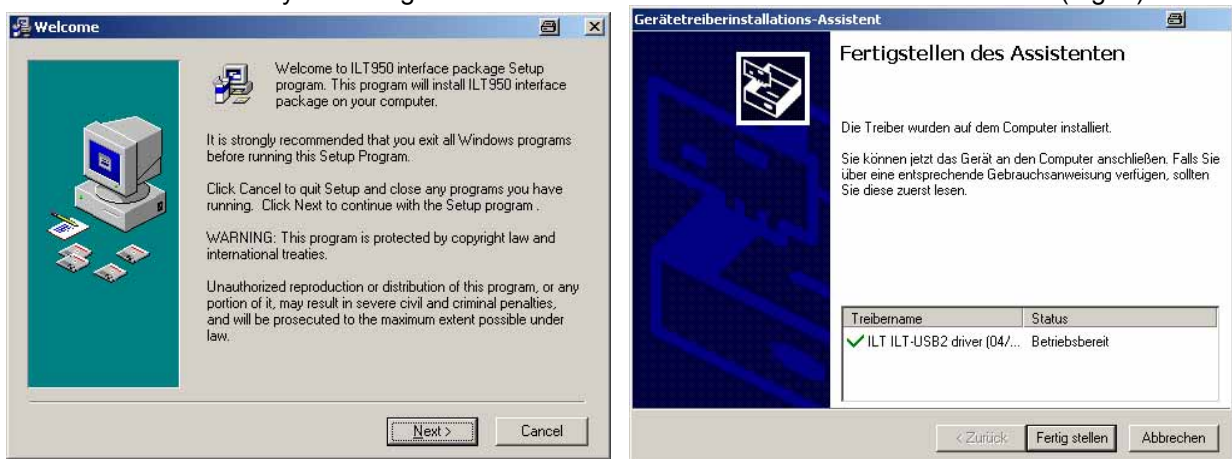

Fig. 2 ILT-950 interface package installation

In a second step the DLL for communication with Thales has to be installed. Again the folder of the installer setup.exe depends on SpectriLight version:
Version 3.2.x and 3.3.x CD-ROM:\SDK\SpectrILight III DLL\Installer\Volume
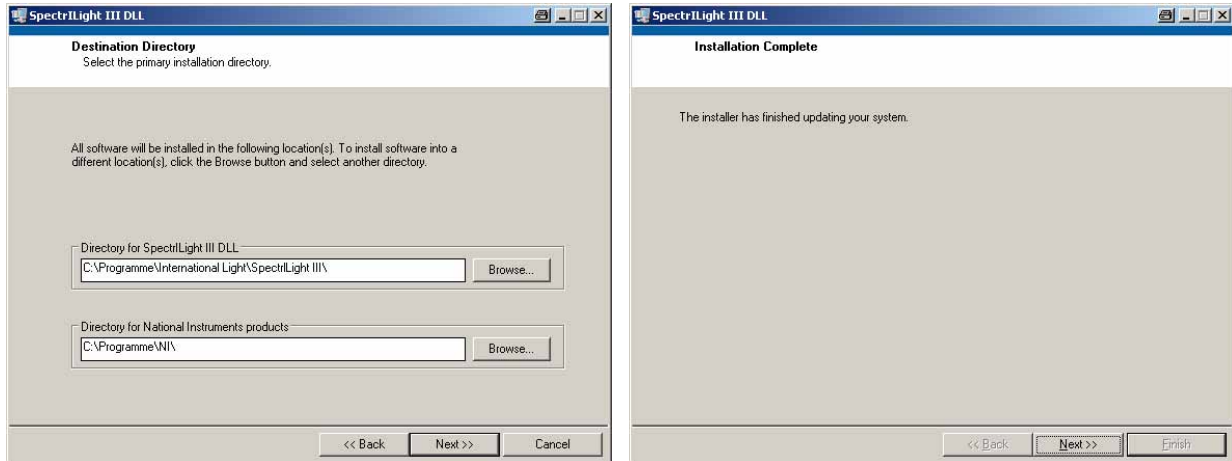Version 3.4 CD-ROM:\PUB950DLLC v3.4.1

Fig. 3 SpectrlLight DLL installation first and last window

Now plug in the USB-connector of the ILT-9x0. Windows will detect a new USB device and start the driver installation. Only Windows XP: In the first dialog (Fig. 4, left hand side) choose not to connect to Windows Update and continue with the automatic installation (Fig. 4, right hand side).

Fig. 4 Windows driver installation for the ILT-9x0 spectrometer

As the driver package was preinstalled before, the driver can be directly installed from c:\windows\inf (Fig. 5).
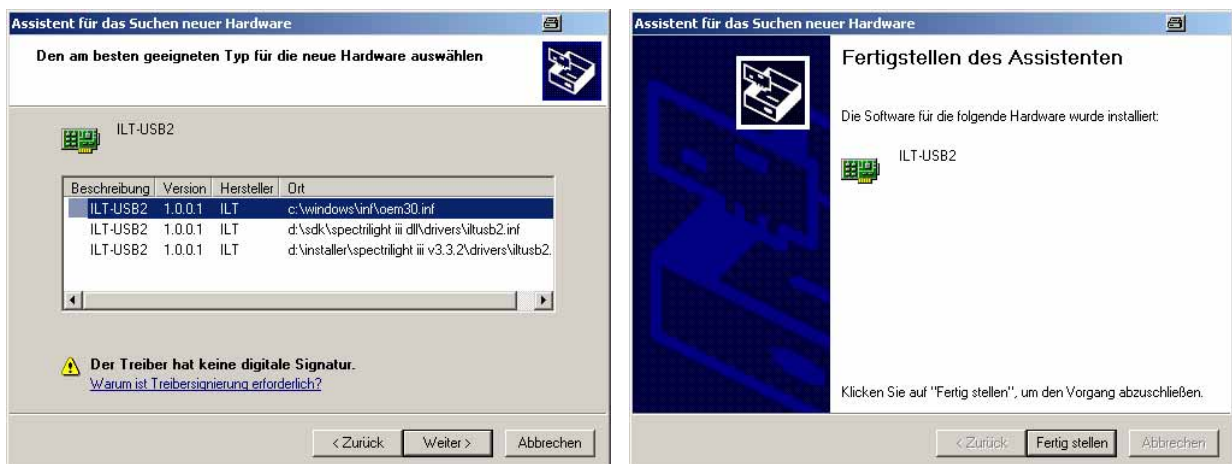

Fig. 5 Windows driver installation for the ILT-9x0 spectrometer continued

Before using the spectrometer, the corresponding wavelength and irradiance calibration file has to be loaded in the SpectrlLight III software. Therefore start the SpectrlLight III application using the desktop

icon, see Fig. 6 left hand side. At the first startup of SpectrILight III the folders for user and calibration data are created. The activation code asked for is printed on the CD cover.

Now insert the SpectrILight III installation disk labeled **SOFTWARE CALIBRATION DATA** into your CD-ROM drive and locate the folder CD-ROM:\Cal_File. It contains a spectrometer calibration file ILTXXXXYYYY.cal where XXXX denotes the serial number of the spectrometer and YYYY the type of input optics, e.g. ILT1007122U1W2.cal. Copy this file to the following folder:

Windows XP:
Documents and Settings\username\Local Settings\Application Data\International Light\SpectrILight III\ Calibration

Windows Vista, Windows 7:
Users\username\AppData\Local\International Light\SpectrILight III\Calibration

Username is the name of the user currently logged in. In case of doubt about the correct folder check the preset folder in the calibration file dialog. After the calibration file is copied, click the cogwheel-button (see Fig. 6 right hand side) and choose the calibration file in the file dialog.

Fig. 6 Activation of the spectrometer calibration file in SpectrILight

If the calibration file was loaded successfully its name is indicated in the status line of SpectrILight III as shown in Fig. 7. Otherwise UNCALIBRATED indicates that no calibration file will be used and measured wavelength and irradiance will differ from the correct values. SpectrILight III memorizes the setting of the calibration file so it has only to be loaded once.
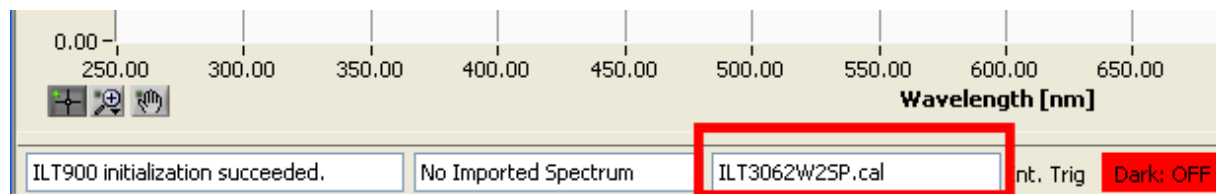

Fig. 7 Status line of SpectrILight indicating the loaded calibration file

Before using the ILT9x0 spectrometer with Thales CIMPS make sure to close SpectrILight III. The spectrometer is controlled completely by the Thales Software Package using ILTControl.

2.2.2. ILT-9x0 Installation, SpectrlLight Version 3.1.x and lower

The ILT-9x0 spectrometer is supplied with a separate CD-ROM containing both SpectrlLight software and calibration data. Insert the SpectrlLight III software installation disk and locate the folder CD-ROM:\ILTXXXX\Installer\Volume v.3.Y.Y where XXXX denotes the serial number of the spectrometer and Y.Y the version number of the software. Start the installation program setup.exe and follow the instructions. In a second step the DLL for communication with Thales has to be installed. Open the directory CD-ROM:\ILTXXXX\SDK\SpectrlLight III DLL v3.Y.Y\Installer\Volume v.3.Y.Y\ and start setup.exe

After SpectrlLight installation is finished, plug in the spectrometer. Windows will detect a new USB device and start the driver installation as shown in Fig. 8, left hand side. In the first dialog chose not to connect to Windows Update. If the SP SM ILX USB2.0 (in case of the ILT-900) or ILT-USB2 (in case of the ILT-950) is suggested for installation in the second dialog, see Fig. 8, right hand side, continue with the automatic installation. In case the correct driver is not found automatically, choose the Drivers folder of the SpectrlLight installation (default: C:\Programme\International Light\SpectrlLight III\Drivers).
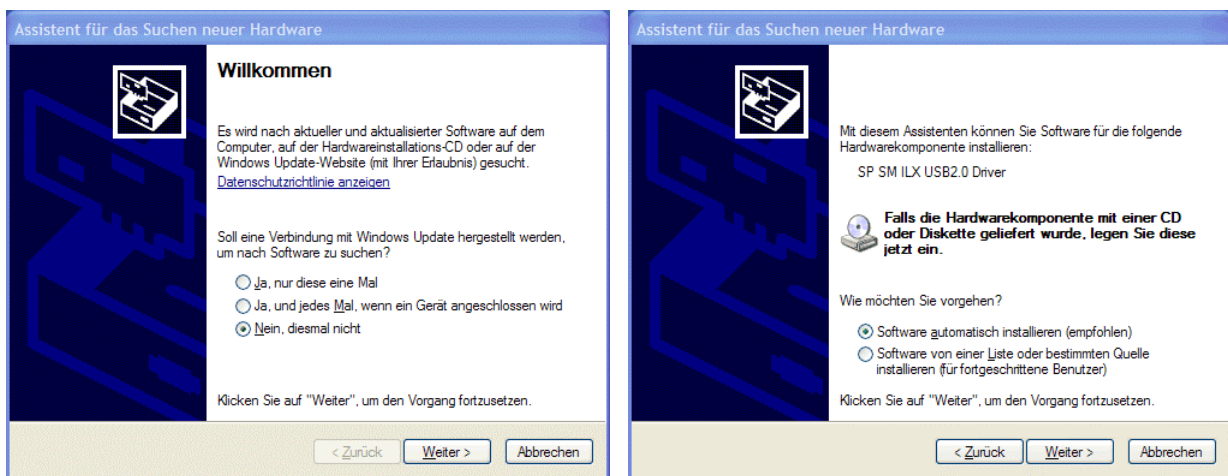

Fig. 8 Windows driver installation for the ILT-900 spectrometer

Before using the spectrometer, the corresponding wavelength and irradiance calibration file has to be loaded in the SpectrlLight III software. It is located on the SpectrlLight installation CD in the folder Cal_File with a filename ILTXXXXYYYY.cal where XXXX denotes the serial number of the spectrometer and YYYY the type of input optics, e.g. ILT3062W2SP.cal. Copy this file to the calibration folder of the SpectrlLight III software which is C:\Programme\International Light\SpectrlLight III\Calibration in a default installation.

Now start the SpectrlLight III software, click the CAL-button (see Fig. 9) and chose this calibration file in the file dialog.
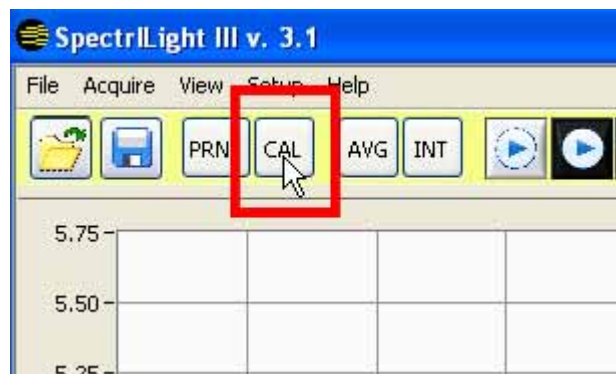

Fig. 9 Activation of the spectrometer calibration file in SpectrlLight

If the calibration file was loaded successfully its name is indicated in the status line of SpectrlLight III as shown in Fig. 10. Otherwise UNCALIBRATED indicates that no calibration file will be used and

measured wavelength and irradiance will differ from the correct values. SpectrlLight III memorizes the setting of the calibration file so it has only to be loaded once.
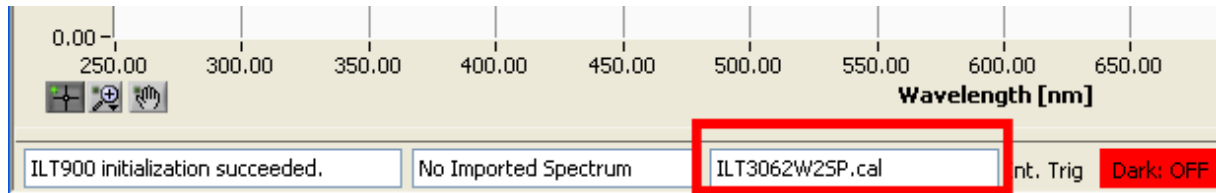

Fig. 10 Status line of SpectrlLight indicating the loaded calibration file

Finally the Dynamic Link Library (DLL) for communication between Thales and the spectrometer has to be installed. The procedure depends on the software version of SpectrIlight III.

For version 3.1.15 and newer:
Start the DLL-installer on the Spectrllight installation CD located in CD-ROM:\ILTXXXX\SDK\SpectrlLight III DLL v3.Y.YY\Installer\Volume v.3.Y.YY\setup.exe where XXXX denotes type and serial number of the spectrometer and Y.YY the version number of the software. Install the DLL to the same directory as the Spectrllight software.

For versions older than 3.1.15:
Copy SpectrlLight.dll from C:\FLINK\ILTControl to the program folder of SpectlLight III which is C:\Programme\International Light\SpectrlLight III in a default installation.

Before using the ILT9x0 spectrometer with Thales CIMPS make sure to close SpectrlLight III. The spectrometer is controlled completely by the Thales Software Package using ILTControl.

2.2.3. AVASPEC

Insert the Avantes installation disk into your CD-ROM drive, the installation will start automatically. Otherwise start start.exe from your CD-ROM drive (i.e. D:\setup.exe). From the installer menu select **Software -> Avasoft-7.6.1-USB2** to start the software installation process. Continue with the installation of the software and the spectrometer driver.
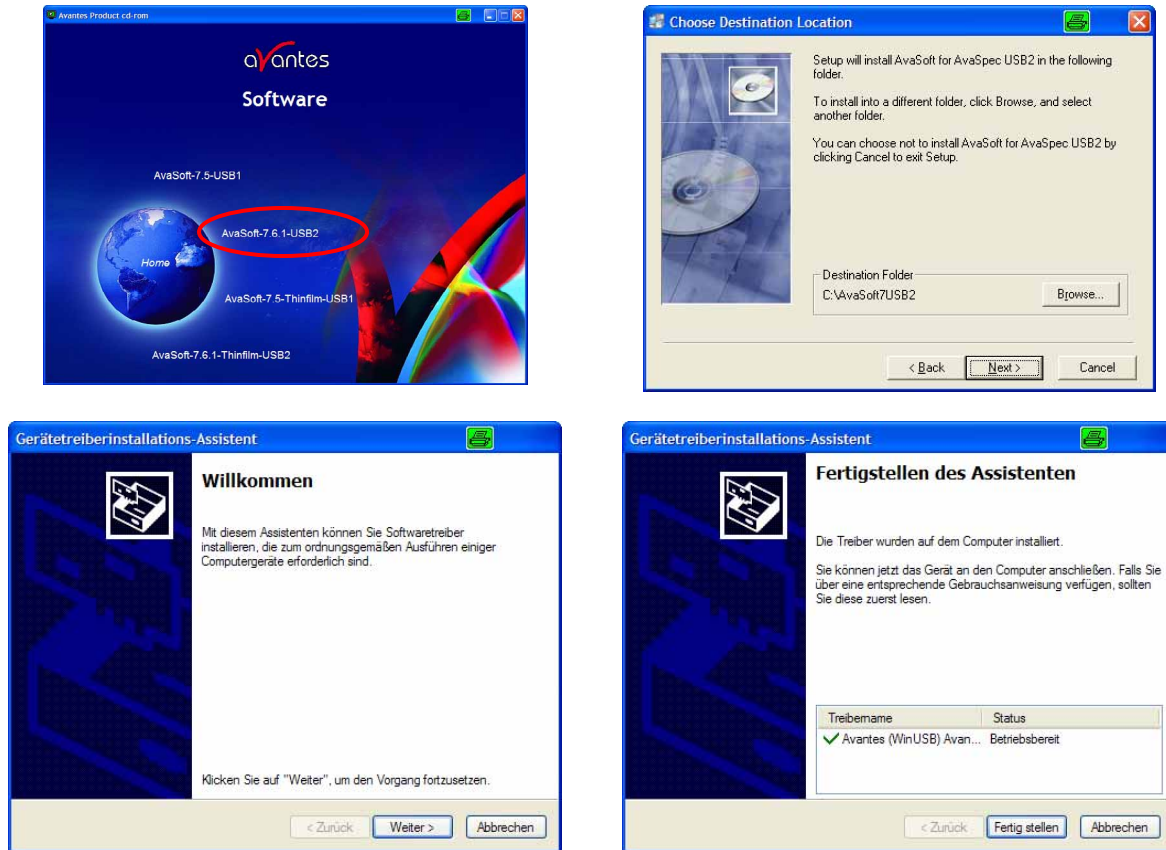

Fig. 11 Avantes AVASPEC Software Installation

After the software installation is finished, plug in the spectrometer. Windows will detect a new USB device and start the driver installation as shown in Fig. 12, left hand side. In the first dialog chose not to connect to Windows Update. If the AvaSpec-USB2 is suggested for installation in the second dialog, see Fig. 12, right hand side, continue with the automatic installation.
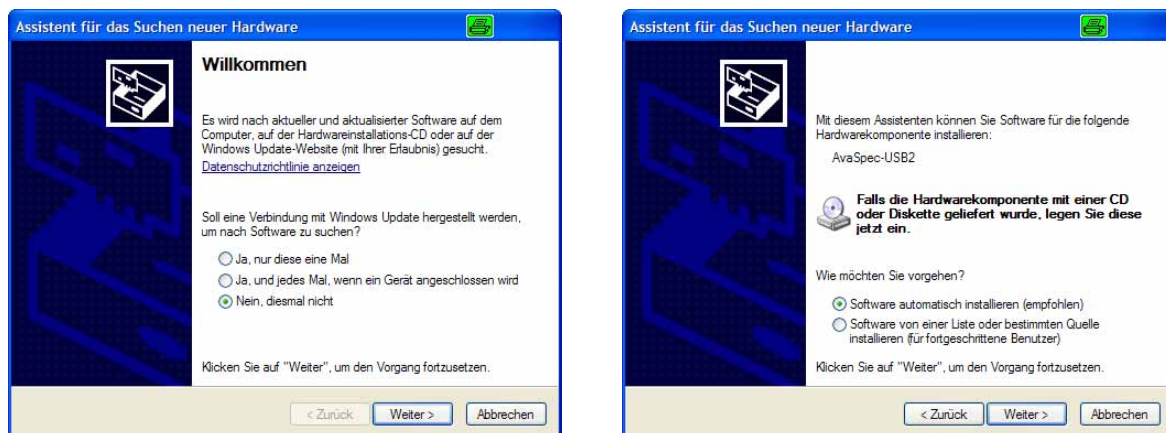

Fig. 12 Windows driver installation for the Avantes AVASPEC spectrometer

For further information refer to Avantes AVASPEC operating manual.

2.2.4. ILT Control

The UV/VIS spectrometer is integrated into CIMPS-emit by an application called ILT Control. It is started automatically when switching CIMPS-emit to spectral resolved measurements (c.f. chapter 3.3) and communicates with Thales using a file interface. The software settings are configured in ILTControl.INI, which is located in C:\Flink\ILTControl:

[Spectrometer] section   set the type of the spectrometer

[Paths] section   *ILTDLLFile and ILTINIFile are only relevant for ILT 9x0 spectrometers!*
                                         ILT Control uses a dynamic link library (SpectrILight.dll) of the
                                         SpectrILight software to communicate with the ILT spectrometers. The
                                         paths and filenames of the SpectrILight DLL are defined here. Several
                                         possible configurations are given as comments starting with `;`

Example of a ILTControl.INI
```
[Spectrometer]
; Set type of used spectrometer here
; ILT-900, ILT-950     0
; Avantes              1
Spectrometertype=0

[Paths]
; DLL-Path for Windows 7, SpectriLight V3.3 and smaller
;ILTDLLFile=C:\Program Files (x86)\International Light\SpectrlLight III\SpectrILight.dll

; DLL-Path for Windows 7, SpectriLight V3.4
ILTDLLFile=C:\Program Files (x86)\International Light\SpectrlLight III\SpectrILightC.dll

; DLL-Path for Windows XP, SpectriLight V3.3 and smaller
;ILTDLLFile=C:\Programme\International Light\SpectrlLight III\SpectrILight.dll

; DLL-Path for Windows XP, SpectriLight V3.4
;ILTDLLFile=C:\Programme\International Light\SpectrlLight III\SpectrILightC.dll

ILTINIFile=C:\Programme\International Light\SpectrlLight III\Para.ini
```

ILTDLLFile sets the path and name of the DLL for spectrometer control which is in the SpectrILight installation folder. If SpectrILight was installed to a different directory change the path accordingly. For Windows XP comment the blue ILTDLLFile entries for *Windows 7* with `;` and uncomment one of the red ILTDLLFile entries for *Windows XP*. The example above shows the configuration for Windows 7 with standard installation path. Name of the DLL differs for SpectriLight versions. Uncomment the line corresponding to your SpectriLight version.
Do not change the paths of ControlFile and DataFile which are used for communication with Thales.
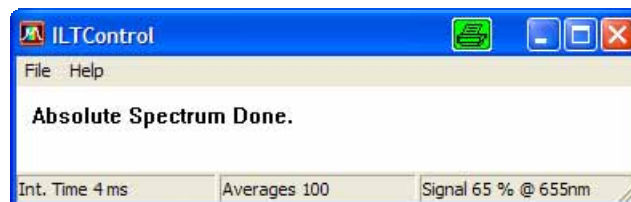

Fig. 13 Window of spectrometer control application ILT Control

It is not necessary to open SpectrILight III / Avasoft in order to use the ILT-9x0/AVASPEC with Thales. But the spectrometers can also be used without Thales as a stand alone spectrometer with the SpectrILight III / Avasoft software. For further information please refer to the spectrometer manuals. Even without directly using SpectrILight III / Avasoft it is necessary for spectrometer communication of ILT Control, so installation is mandatory.

3. Software

3.1. Startup

CIMPS-emit is easily activated by using the pull down menu as shown in Fig. 14. To open the pull down menu click onto the Z-icon ![Z] in the title bar of the Thales window.

Fig. 14 Start of CIMPS-emit using the pull down menu

During startup CIMPS-emit automatically warns the user to check the measurement set-up and connection scheme (see Fig. 15), if the instrument was used in a different configuration previously.
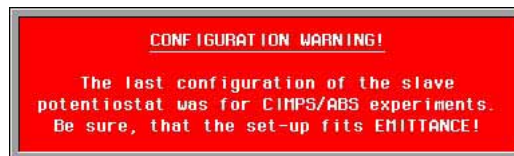

Fig. 15 Check that the light emitting object is connected to the slave potentiostat

3.2. Integral Emittance Characteristics

After initialization the main window of CIMPS-emit for integral emittance characteristic measurements is displayed (see Fig. 16). The initialization phase may last for some seconds if the potentiostats involved have to be started first.
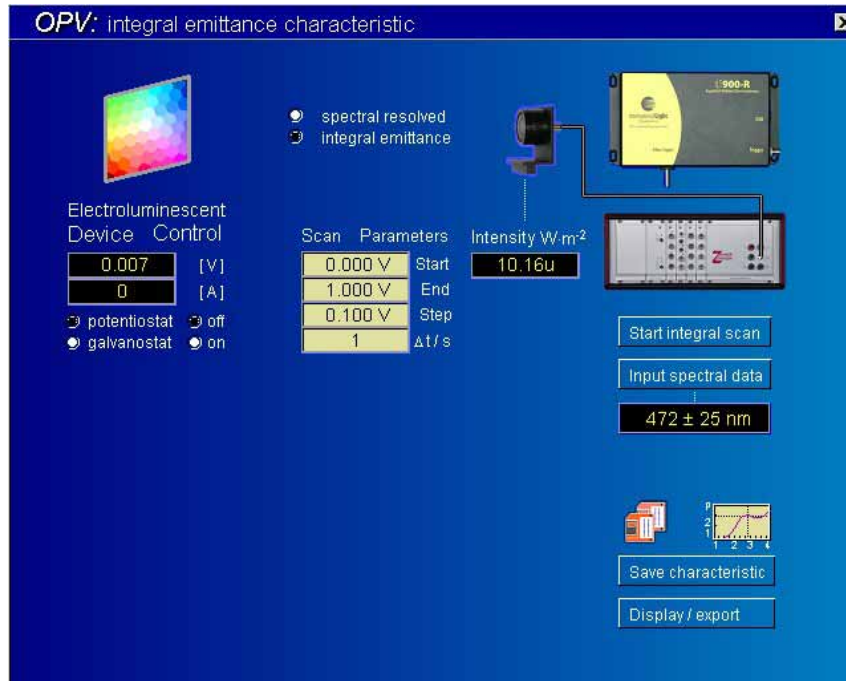

Fig. 16 Main window of CIMPS-emit after startup

3.2.1. Device Control

The "Electroluminescent Device Control" is located in the upper left of the main screen. The device control icon is used to enter the control menu of the device potentiostat (slave potentiostat PP or XPot) as shown in Fig. 17. Here the electroluminescent device state including the setpoint voltage / current can be set up manually. During series measurements over voltage or current the potentiostat is set automatically so no manual set up is required in this case.
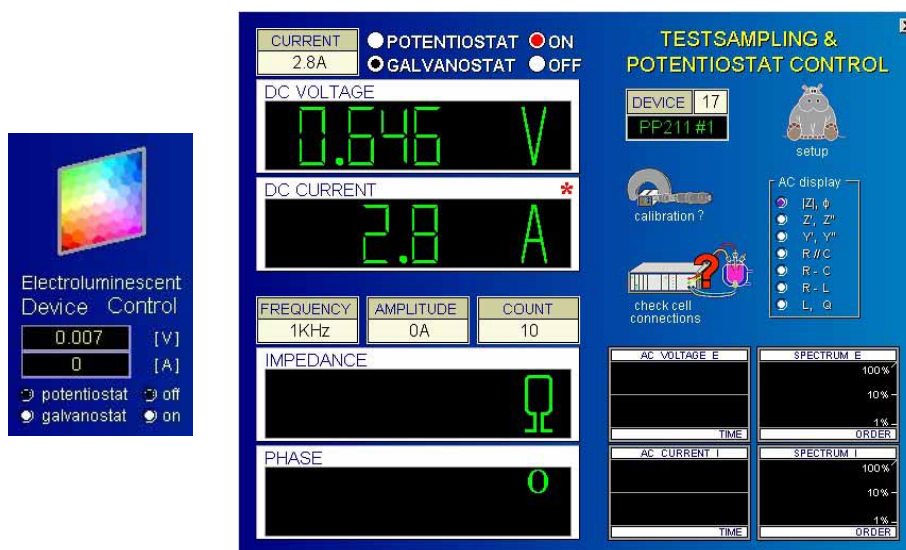

Fig. 17 Electroluminescent device control icon and control potentiostat window

The two meters below the "Electroluminescent Device Control" icon indicate the actual potential and current of the device. The radio buttons "off" and "on" turn the slave potentiostat on or off. The radio buttons "potentiostat" (voltage controlled) and "galvanostat" (current controlled) allow mode switching in the CIMPS-emit main window. In case the potentiostat is active while switching mode Thales asks whether to keep the luminescent state (Fig. 18). Clicking "y" the actual potential/current is preserved and the potentiostat stays on. Clicking "n" the potentiostat is switched off.

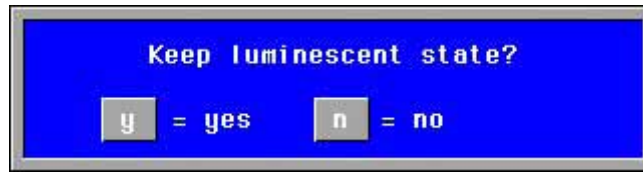

Fig. 18 Switching between potentiostat and galvanostat in active state

3.2.2. Integral Emittance Settings

Acquisition of light intensity is done by means of the controls on the right hand side of the CIMPS-emit main window. A click on "Input spectral data" opens the settings Fig. 19, which are necessary to calculate the integral power.
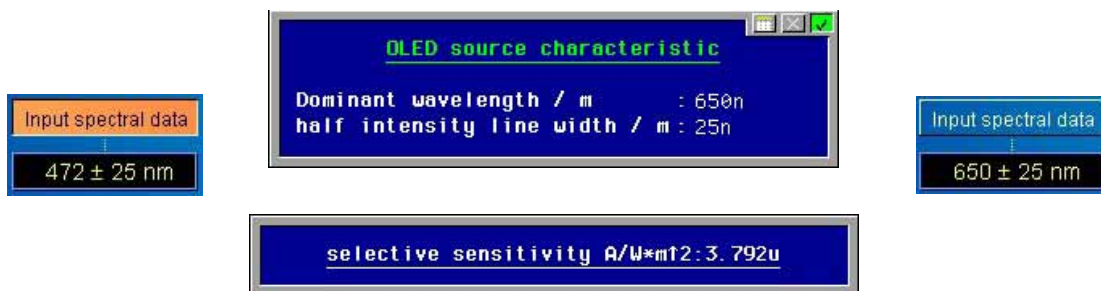
Fig. 19 Select wavelengths for the intensity characteristic of the photo-detector

The specified wavelength range is assumed by the software to characterize the dominant wavelength and the line width of a Gaussian shape emitter source characteristic. The shape is convoluted with the calibration table of the photo-detector (chap. 2.1) for proper integral emittance calculation. After confirming the source characteristic the effective sensitivity of the photo-detector is displayed. The actual light intensity corresponding to the set values is shown in the meter below the sensor icon (see Fig. 20).

Fig. 20 Photo-detector and light intensity meter

3.2.3. Integral Scan Parameters

Before an integral scan is started the parameters of the scan have to be set up by a click on the meters of the scan parameters (see Fig. 21, left hand side). A dialog box now offers voltage, current or time as changing quantity for the measurements. After choosing a certain quantity the scan range is defined in another dialog box popping up.

Fig. 21 Configuration of a integral scan over current

In case of an integral scan over current the parameters are entered in the dialog box of Fig. 21 right hand side. The current is varied between the starting value and the ending value in the given step width. If the ending value cannot be reached with the step width entered, it is adjusted to a larger value so the ending value is reached exactly. Settling time is the time span between applying a new current and starting acquisition of the light intensity. During this time the electroluminescent device investigated can equilibrate to the new current. Setting up a scan over potential is done in an analog way.
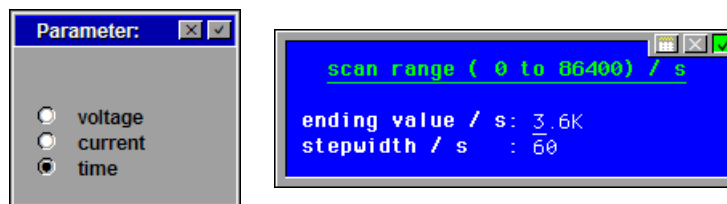

Fig. 22 Configuration of an integral scan over time

In case of a scan over time the ending value determines the overall time of the scan. Intensity is recorded every time the step width is reached. If the ending value cannot be reached with the entered step width, the latter is increased so an integer number of steps match the ending value. Mind to set the step time long enough for the light intensity to be recorded. Otherwise the given step width cannot be achieved and the intensity is recorded as fast as possible.

3.2.4. Start Integral Scan

The button "Start integral scan" runs an intensity characteristic using the actual scan parameter. After the integral scan has finished the data are plotted in the lower left of CIMPS-emit main page (see Fig. 23).
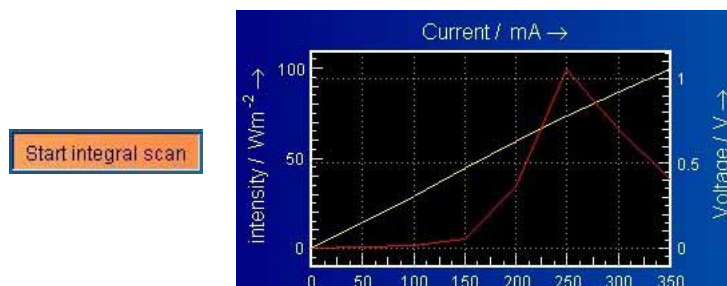

Fig. 23 Start of an integral scan over time and display the scan after finishing

3.2.5. Save Characteristic

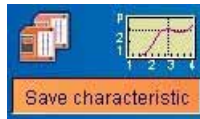Integral scans can be saved using the "Save characteristic" button.

Fig. 24 Saving integral scans

The button "Save characteristic" opens a comment box where additional information about the measurement can be entered (see Fig. 25, left hand side). Some of the fields are already preset with parameters; others are available for user comments. After confirming the comment box with the checkmark in the upper right edge a standard file dialog is opened (see Fig. 25, right hand side). Choose path and filename here and confirm with "SAVE" to write the data file.
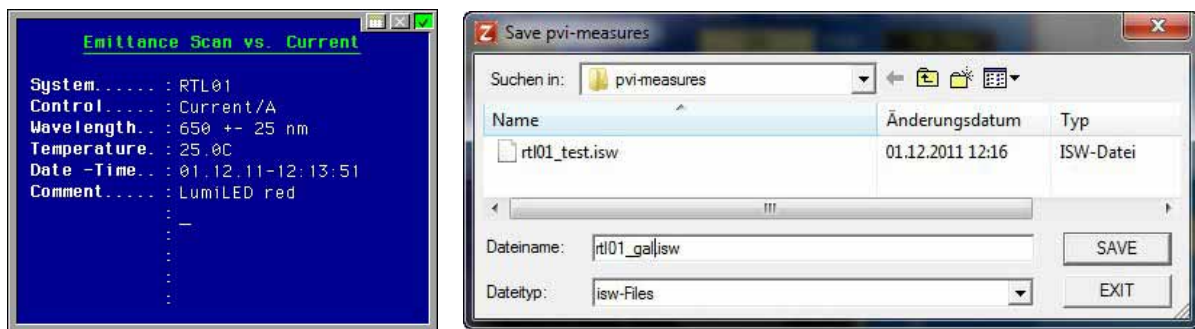
Fig. 25 Save characteristic comment block and file dialog

3.2.6. Display Characteristic and Export ASCII Data

The "Display / Export" button will pass the last scan record to the output menu (see Fig. 26) for comprehensive plotting and exporting of intensity scan characteristics.
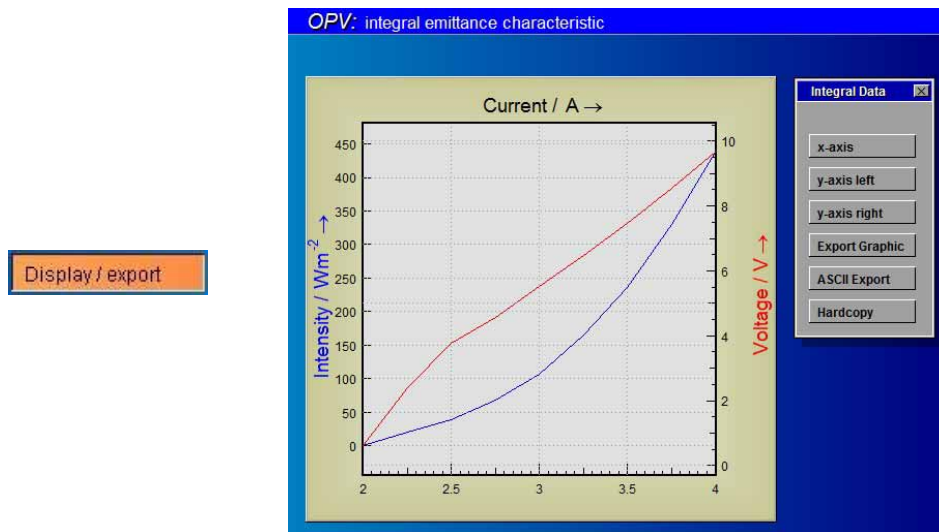
Fig. 26 Display and export intensity scan diagrams main menu

Here the plot of the integral scan characteristic can be configured. You can pass this plot to *Windows*® clipboard, export it as an EMF file or take an instant bitmap hardcopy. For data exchange with other

software you can export the recorded scan as an ASCII formated text file. See Fig. 27 for detailed information.

Choose parameter for plotting

Copies the graphics to the *Windows*® clipboard. You may paste it to Windows programs like Word, PowerPoint, Draw, etc.).
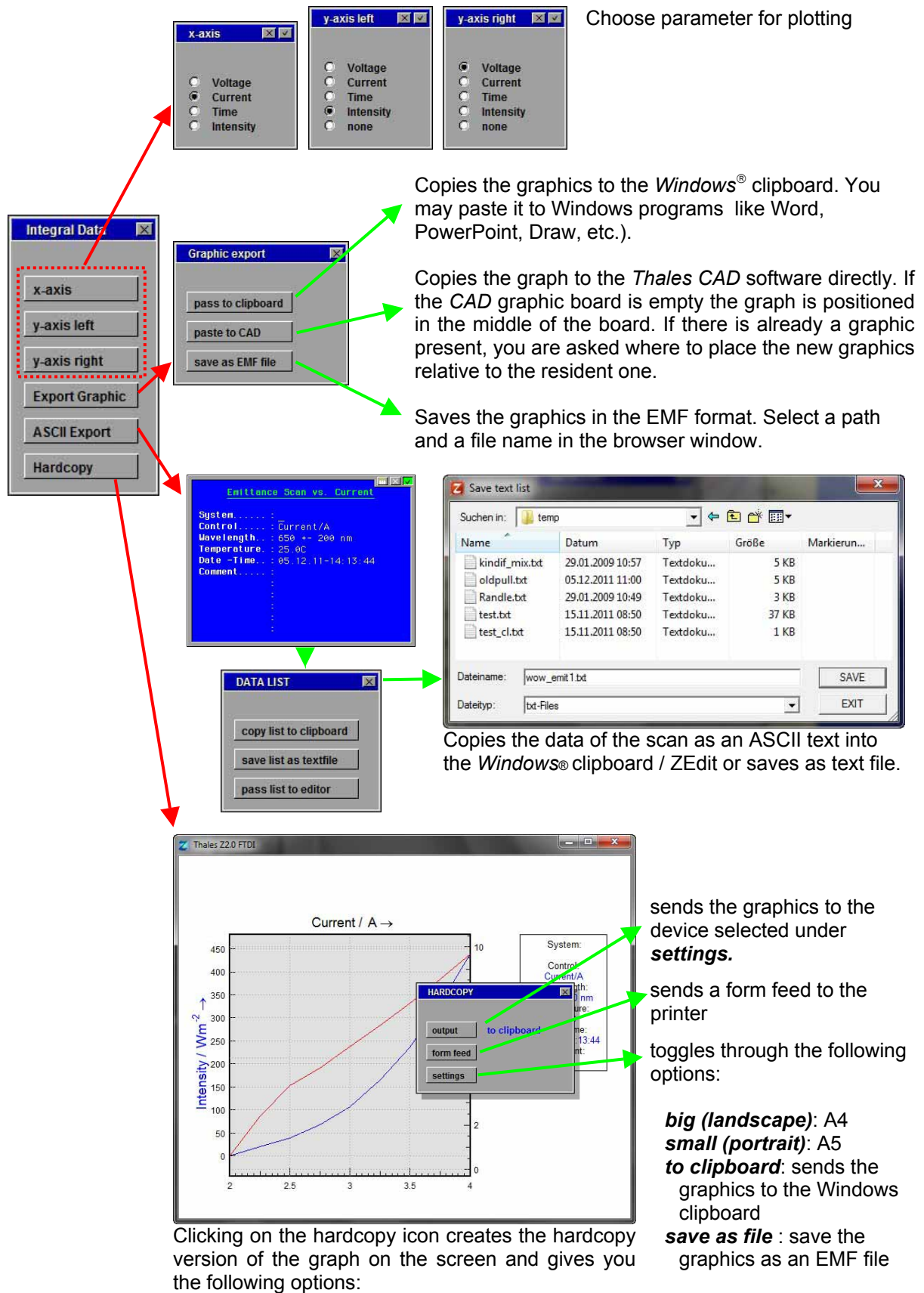
Copies the graph to the *Thales CAD* software directly. If the *CAD* graphic board is empty the graph is positioned in the middle of the board. If there is already a graphic present, you are asked where to place the new graphics relative to the resident one.

Saves the graphics in the EMF format. Select a path and a file name in the browser window.

Copies the data of the scan as an ASCII text into the *Windows*® clipboard / ZEdit or saves as text file.

sends the graphics to the device selected under *settings.*

sends a form feed to the printer

toggles through the following options:

> *big (landscape)*: A4
> *small (portrait)*: A5
> *to clipboard*: sends the
>   graphics to the Windows
>   clipboard
> *save as file* : save the
>   graphics as an EMF file

Clicking on the hardcopy icon creates the hardcopy version of the graph on the screen and gives you the following options:

Fig. 27 Display and export function overview

3.3. Spectral Resolved Emittance

After switching the radio button to "spectral resolved" CIMPS-emit starts the ILTControl application and interface to the spectrometer (see Fig. 28).

Fig. 28 Spectral resolved OPV configuration and spectrometer control application

After initialization of the spectrometer the main window of CIMPS-emit for spectral resolved emittance measurements is displayed (see Fig. 29).
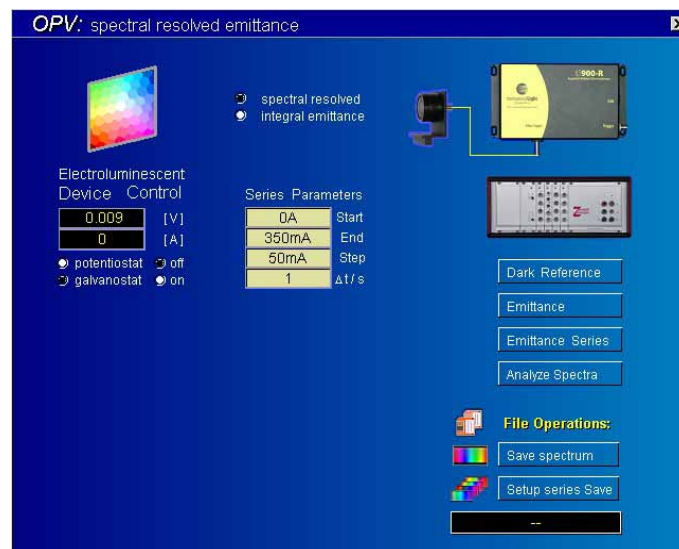

Fig. 29 Main window of spectral resolved CIMPS-emit

3.3.1. Device Control

The "Electroluminescent device control" is located in the upper left of the main screen. The device control icon is used to enter the control menu of the device potentiostat (slave potentiostat PP or XPot) as shown in Fig. 30. Here the electroluminescent device state can be set up manually. This is necessary for spectral resolved single emittance measurements and series measurements over time. During series measurements over voltage or current the potentiostat is set automatically so no manual set up is required in this case.

Fig. 30 Electroluminescent device control icon and control potentiostat window

The two meters below the "Electroluminescent Device Control" icon indicate the actual potential and current of the device. The radio buttons "off" and "on" turn the slave potentiostat on or off. The radio buttons "potentiostat" (voltage controlled) and "galvanostat" (current controlled) allow mode switching in the CIMPS-emit main window. In case the potentiostat is active while switching mode Thales asks whether to keep the luminescent state (Fig. 31). Clicking "y" the actual potential/current is preserved and the potentiostat stays on. Clicking "n" the potentiostat is switched off.

Fig. 31 Switching between potentiostat and galvanostat in active state

3.3.2. Spectrometer Settings

Acquisition of light spectra is done with the controls on the right hand side of the CIMPS-emit main window. A click on the spectrometer icon opens the spectrometer settings of Fig. 32, which are valid for all following measurements.

Fig. 32 Setup of the spectrometer

The wavelength range can be set arbitrarily within the maximum range of the used spectrometer, which is 250 – 1000 nm for the ILT-9x0. As the ILT-9x0 is a CCD-array spectrometer the entered wavelength range has no influence on sensitivity, needed acquisition time or other parameters. Integration time determines the amount of light collected during a spectrum and can be set between 1 ms and about 10 s. For best signal to noise ratio adjust integration time to a value of 50 to 75 % of spectrometer fullscale (displayed in the status bar of ILTControl). Avoid overdriving the spectrometer as this will cause distorted spectra. To reduce noise several spectra can be recorded and averaged automatically. Please mind the overall measurement time of integration time multiplied with the number of averages plus some overhead.

3.3.3. Dark Reference Spectra

Before the spectrometer can record spectra a dark scan has to be done. During the dark scan detector dark current, electronic noise and residual scattering light inside the spectrometer are measured and subtracted automatically from all following spectra. Each change of the integration time requires a new dark scan.
Please ensure that ambient light is excluded during the dark scan. A enclosure covering the complete optical bench is recommended to avoid detrimental effects caused by ambient light during the whole measurement time.

Dark scans can be done manually using the Dark Reference button (see Fig. 33, left hand side). Presence of a valid dark scan is indicated by a checkmark on the right hand side of the Dark Reference button (see Fig. 33, right hand side).
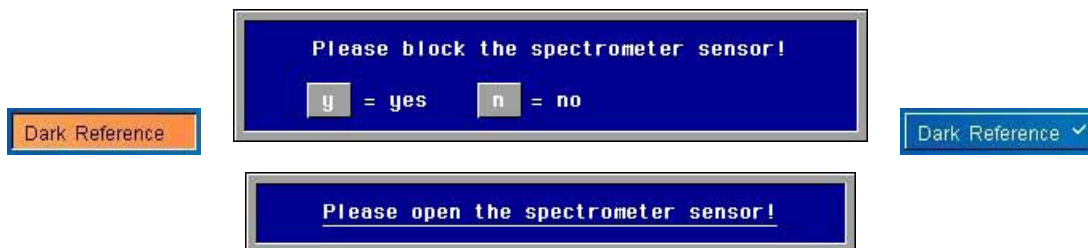

Fig. 33 Manual acquisition of a dark reference spectrum

3.3.4. Single Emittance Measurements

With a valid dark reference single emittance spectra can be recorded using the "Emittance" button (see Fig. 34, left hand side). The spectrum is acquired at the actual electroluminescent device state so this has to be preset using the Device Control (cf 3.3.1) before. The spectrum is displayed in the lower

left side of the window (see Fig. 34, right hand side) after measurement and remains in memory until a new spectrum is recorded.
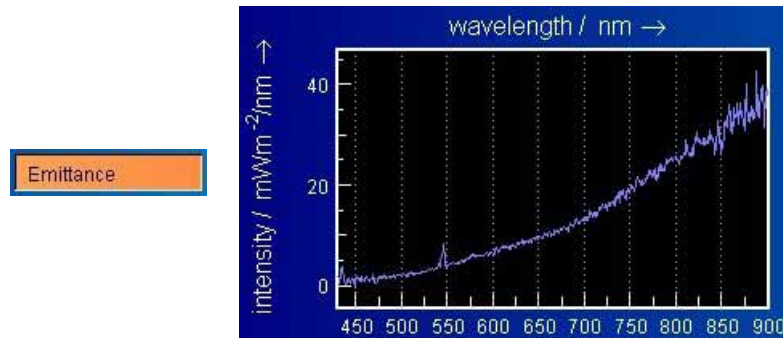

Fig. 34 Start emittance spectrum and display last record

3.3.5. Saving Single Spectra

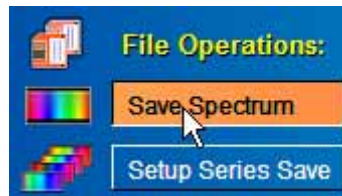Single emittance spectra can be saved using the Save Spectrum button (see Fig. 35).

Fig. 35 Saving single spectra

The button Save Spectrum opens a description box where additional information about the measurement can be entered (see Fig. 36, left hand side). Some of the fields are already preset with parameters, others are available for user comments. After confirming the description box with the checkmark in the upper right edge a standard file dialog is opened (see Fig. 36, right hand side). Choose path and filename here and confirm with "Save" to write the data file.
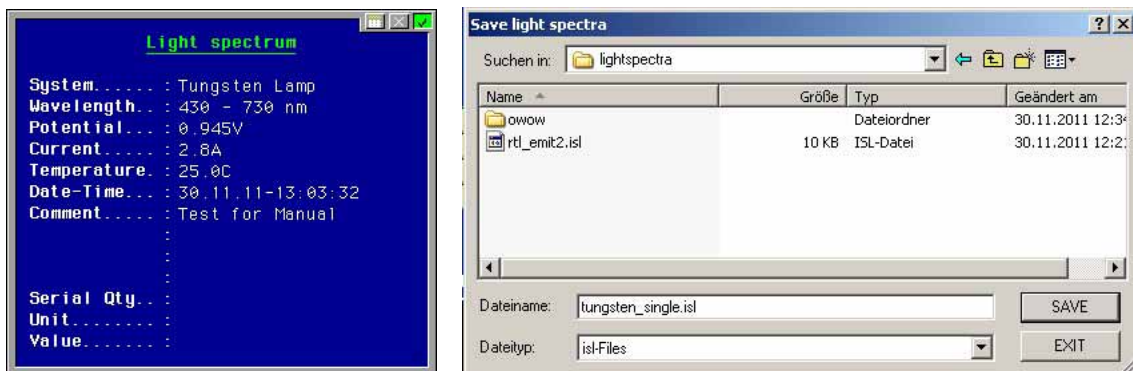

Fig. 36 Description box and file dialog for saving single emittance spectra

3.3.6. Emittance Series Parameters

Before a series measurement is started the parameters of the series have to be set up by a click on the meters of the series parameters (see Fig. 37, left hand side). A dialog box now offers voltage, current or time as changing quantity for the measurements. After choosing one quantity the scan range is defined in another dialog box.

Fig. 37 Configuration of a series measurement over current

In case of a series over current the parameters are entered in the dialog box of Fig. 37. The current is varied between the starting value and the ending value in the given step width. If the ending value cannot be reached with the step width entered, it is adjusted to a larger value so the ending value is reached exactly. Settling time is the time span between applying a new current and starting acquisition of the light spectrum. During this time the electroluminescent device investigated can equilibrate to the new current. Setting up a series over potential is done in an analog way.
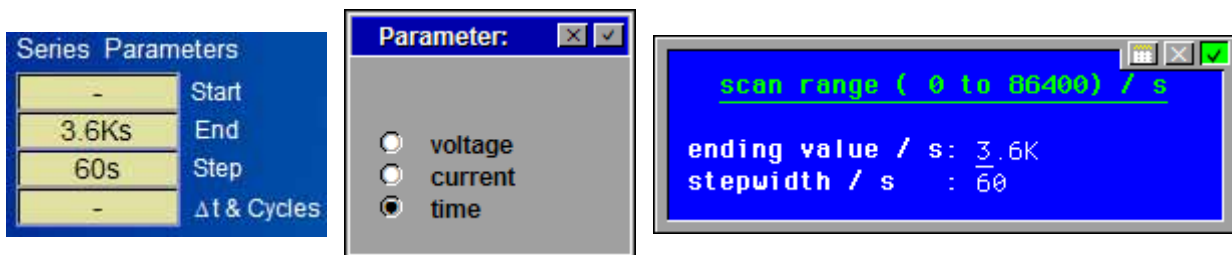

Fig. 38 Configuration of a series measurement over time

In case of a series over time the ending value determines the overall time of the series. Spectra are recorded every time the step width is reached. If the ending value cannot be reached with the entered step width, the latter is increased so an integer number of steps matches the ending value. Mind to set the step time long enough for the light spectrum to be recorded. Otherwise the given step width cannot be achieved and the spectra are recorded as fast as possible.

3.3.7. Setup Series Save

In contrast to single emittance measurements, series measurements are saved automatically so a series can run unattended. For this reason a filename has to be preset before starting the series with the Setup Series Save button (see Fig. 39). The current filename is displayed below the button.

Fig. 39 Button for entering series filenames and display of actual filename

After clicking the Setup Series Save button a description box is opened where additional information about the measurement can be entered (see Fig. 40, left hand side). In the next step directory and base file name are chosen (see Fig. 40, right hand side). The used filenames consist of this base file name and the running number of the measurement. With "series" as base filename, the files "series00.isl", "series01.isl", … are written.
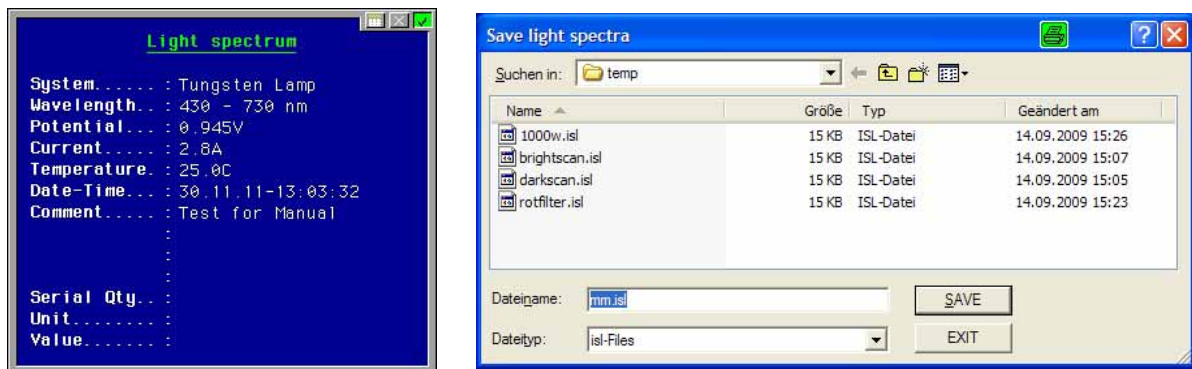

Fig. 40 Description box and file dialog for saving emittance series measurements

3.3.8. Starting Emittance Series

After series and save parameters are set the emittance series can be started using the button "Emittance Series" (see Fig. 41).

Fig. 41 Starting an emittance series

In case of a series over potential or current the potential/current is automatically applied to the electroluminescent device according to the presets (cf 3.3.6) and spectra are acquired.
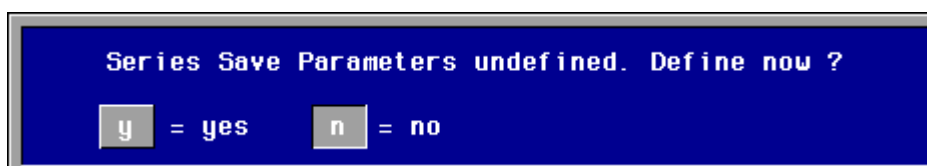

Fig. 42 Reminder to preset file name and description of a series measurement

In case an emittance series is started without defining the save parameters before, a reminder is displayed (see Fig. 42). After defining the series save parameters the series can be started.

3.3.9. Analyze Spectra

The Analyze Spectra button starts the Light Spectra Analysis for comprehensive plotting, analyzing and exporting emittance spectra. The last single spectra has to be saved before starting the Light Spectra Analysis. For further information refer to the Light Spectra Analysis manual.

4. Trouble shooting

4.1. ILT 9x0

ILT Control error message: Error loading International Light DLL. Check path in INI-File and restart.

ILT Control was not able to open the dynamic link library for spectrometer control. Check whether the path in C:\Flink\ILTControl\ILTControl.ini is consistent with the installation directory of the SpectrIlight software (default C:\Program Files\International Light\SpectrlLight III\) and SpectrlLight.dll exists in this directory. If not reinstall the DLL as described in chapter 2.2.2.

ILT Control error message: No SM240 USB devices detected.
ILT Control error message: Error opening spectrometer communication.

The ILT-9x0 spectrometer was not found. Check, whether it is connected to the PC. The ILT-9x0 needs up to 500 mA from the USB port. As bus-powered USB hubs cannot provide this current the spectrometer will not work with bus-powered hubs. Although self powered hubs may be used, connecting the ILT-9x0 directly to the PC is recommended.
If the spectrometer is connected but still not detected please unplug and replug it.

After the spectrometer is plugged in Windows finds new hardware and wants to install a driver.

Due to the way Windows handles USB ports the driver has to be installed for each port separately. The driver files are located in the program directory of SpectrIlight (default C:\Program Files\International Light\SpectrlLight III\Drivers).

Thales error: No response from spectrometer.

Thales gets no response from ILT Control. Check, if another error has occurred in ILT Control and fix it. Close ILT Control and confirm the error message. ILT Control should be reopened now automatically. In case ILT Control was closed accidentally, simply confirm the error message.

SpectrIlight III error message: LabVIEW Development system required

This error message is somewhat misleading as the Microsoft .NET Framework 2.0 is missing. In order to install the .NET Framework start dotnetfx.exe in the folder ILTXXXX\Tools\DotNetFramework of the SpectrIlight CD. XXXX denotes the serial number of the ILT-9x0 spectrometer. After installation of the .NET Framework has finished, install the Service Pack for .NET by starting NetFx20SP1_x86.exe.