

Test Program for tec5 Operating Electronics  
and Spectrometer Systems

## AdminTool

Manual

Version 1.4

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Technology for Spectroscopy

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# AdminTool Test Software

The AdminTool is a test program for tec5 operating electronics and spectrometer systems. This test software and the device drivers are included in the hardware package.

AdminTool offers the following capabilities:

- § Primary functional tests
- § Data acquisition and simple graphical and numerical display of the recorded data
- § Setting of parameters for the used sensors as well as wavelength calibration coefficients
- § Calibration between two spectrometer channels
- § Setting of parameters of a fiber-optic multiplexer

AdminTool contains a comprehensive Help text.

## Content

1 Installation of the AdminTool .....	3
2.1 Devices - Selection of Hardware .....	3
2.2 Error Messages .....	5
2.3 Show Config – Display the Current Hardware Configuration .....	6
2.4 Measurement - Acquire Spectral Data.....	7
2.5 Sensors - Setting the Parameters for the Sensor Modules.....	9
2.6 Calibrate - Creation of Calibration File for Multi-Channel Operation Based on Multiplexer .....	10
2.7 MUX-FSM – Setting Parameters for a Fiber-optical Multiplexer .....	11

# 1 Installation of the AdminTool

Remark: The related instrument drivers have to be installed before!

Step 1 : Insert the ,tec5 tools' CD or the tec5USA InfoCD

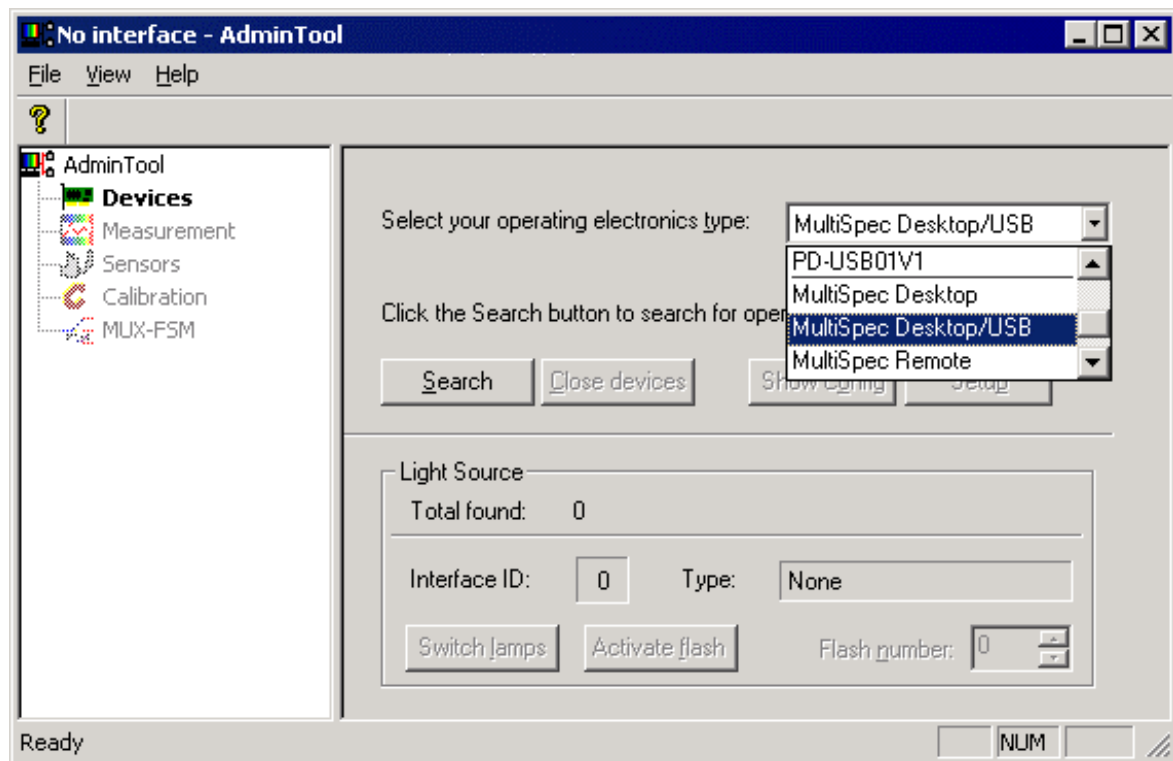
- Directory ,Software & Drivers'
- Directory 'Software-Tools'
- Directory 'AdminTool'
- Start program 'sdacq32at.exe'
- Follow the instructions of the setup program
- The computer reboots at the end of the setup procedure

Step 2 : Start AdminTool

- Start the application program named AdminTool via Start / Program / tec5 SDACQ function library/ SDACQ32 Admin or click the Shortcut Icon (if installed)

## 2.1 Devices - Selection of Hardware

AdminTool has a twofold structure. The left window shows the individual panes, while the right shows the details of the selected pane. The entries listed in gray are not available.



Step 3: Selection and activation of operating electronics – reading of configuration data

- At first, please select type of operating electronics from the drop down list ,Select your operation electronics type':
  - 'MOE-V1' or MultiSpec<sup>Remote</sup>
  - ,PD-10401V1' or MultiSpec<sup>StandAlone</sup>
  - ,PD-PCI01V1' or MultiSpec<sup>Desktop</sup>
  - ,PD-USB01V1' or MultiSpec<sup>Desktop/USB</sup>

- Hit the *Search*-Button to start the search.

Now AdminTool tries to implement communication with the hardware.

Step 3a: For MOE based systems like Multispec<sup>Remote</sup>, the communication parameters have to be specified prior to searching for the MOE electronics.

- Select *COM-Port* in accordance to what port your hardware is linked to
- Select *,RS-232'* or *,RS485* as *Transmission protocol*, depending on the hardware version used'
- Set *Baudrate* to *,115200'*
- Push button *OK*

**Info:** The search can take a while, especially if multiple MOE electronics are connected to a RS485 bus since all possible IDs are checked.

After the search operation is finished, the number of found electronics are displayed. If the search process was successful you get the message „**1 (or more) operating electronics found and opened**“

### Light Source Operation

**Remark:** When working with MultiSpec Systems available light source module(s) will be displayed. The light source can be switched on/off by software. Please check that the toggle switch *,Shutter'* on the front plate of the light source cassette is in *,automatic'* Position.

**Note:** Only light source module(s) which are controlled by the internal I2C Bus of the standard MultiSpec systems will be displayed.

Please notice that the ignition of the D2 light source takes approx. 1 minute.

The light source can be switched on with the button *Switch lamps* (for Deuterium and Halogen) or with *Activate Flash* (for Xe flash lamp).

## 2.2 Error Messages

### Possible error sources if no communication with the hardware could be set up:

⤵ The status message „**No operating electronics found**“ is displayed. This can have the following reasons:

- MultiSpec<sup>Desktop</sup>: Double-check the installation of the PCI interface board
- MultiSpec<sup>Remote</sup>: Double-check the cable connection between PC and system
- All system: Double-check all settings and restart the PC

Please contact tec5 AG or tec5USA, Inc. in case the problem continues to exist.

⤵ You get the message „**Unable to read the front end of device....**“ followed by the status „**1 operating electronics found (1 not usable)**“. This can have the following reasons:

- MultiSpec<sup>Desktop</sup>: The PCI board was recognized, but communication between PCI and FEE board doesn't work. Double-check the cable connection between PCI board and system.
- The Front End Electronics cannot be read out for it does not comply with the new I2C bus standard (old ISA electronics respectively MOE electronics [MOE with firmware version < 1.13] (Not relevant with newer MultiSpec standard systems)

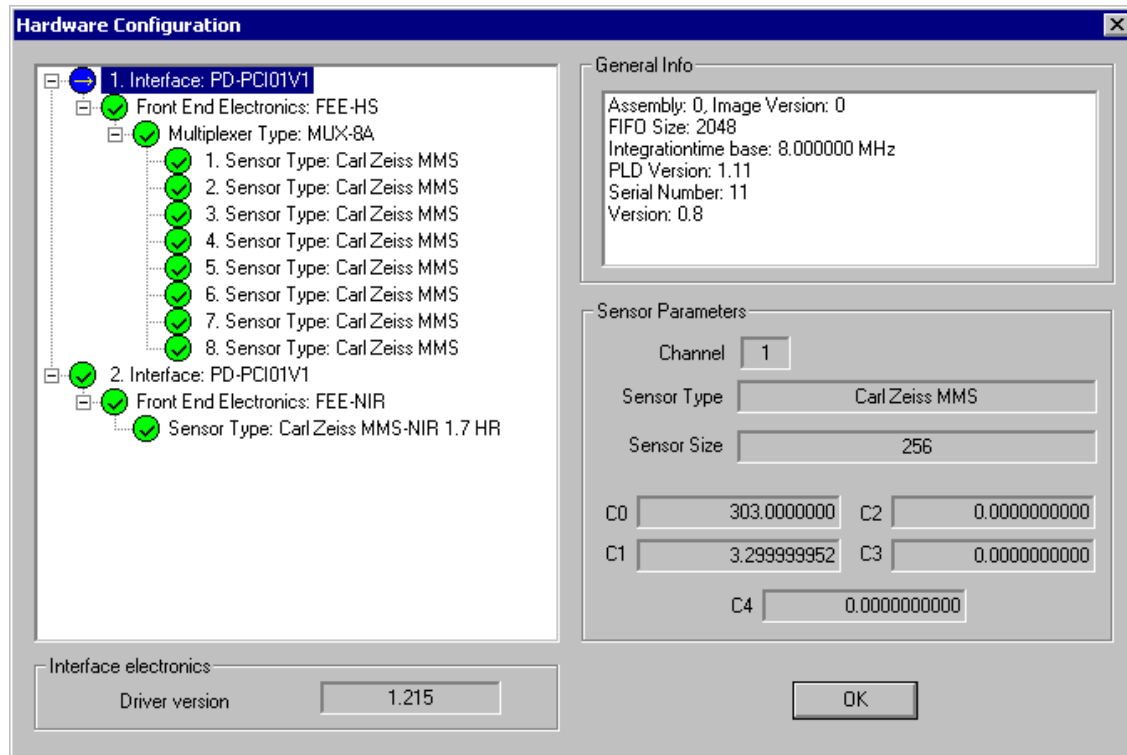
In these cases (non-PnP devices) you have to setup your hardware manually.

The screenshot shows a configuration dialog box with the following sections:

- Front End Electronics:** A list of radio buttons for selecting the electronics type. The selected option is **FEE 003**. Other options include FEE NJR, FEE HR, FEE HS, FEE HSMO, and FEE CCD.
- Multiplexer:** A list of radio buttons for selecting the multiplexer type. The selected option is **None**. Other options include MUX 4A, MUX 4P, and MUX 8A. Below this list is a **Physical channels:** spinner box set to **1**.
- Sensors:** A section with two dropdown menus. The **Type:** dropdown is set to **Hamamatsu S390X (MMS)** and the **Size:** dropdown is set to **256**.
- Buttons:** **OK** and **Cancel** buttons are located on the right side.
- Text:** A note on the right side reads: "Please specify the current hardware of interface id 1."

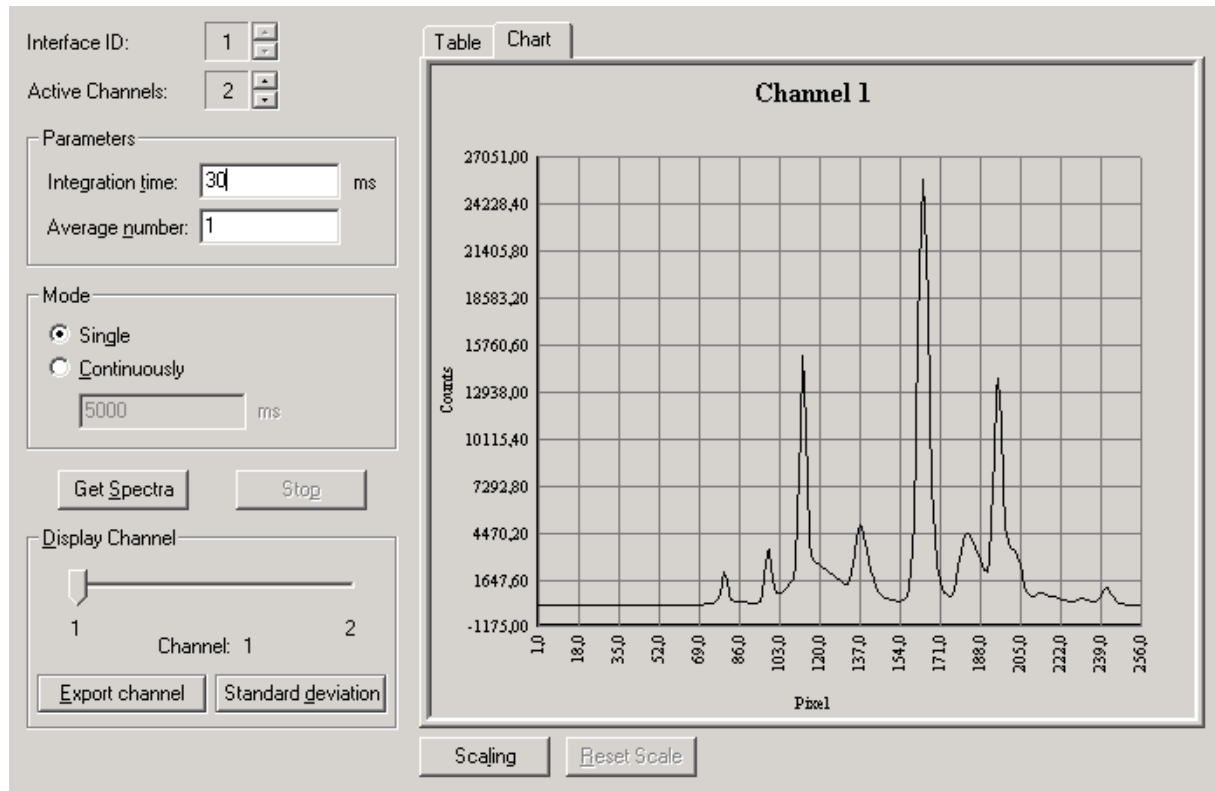
## 2.3 Show Config – Display the Current Hardware Configuration

To display an overview of the hardware components push the button *Show Config*. Click on the name any component on the left side, then the related information of the important parameters is displayed, e.g. firmware / PLD Version. In case a spectral sensor / spectrometer is attached, the saved calibration coefficients can be looked at too.



## 2.4 Measurement - Acquire Spectral Data

The *Measurement* pane provides the possibility to perform, display, and save test measurements. Please note that all data are pixel related.



In case of several operating electronics are available, please select the desired one via the *Interface ID*.

The software provides two acquisition modes. In *Single* mode spectra are acquired once from all channels. In *Continuous* mode spectra are acquired periodically with an adjustable interval time.

### Step 5: Record spectral data and display numerical or graphically

- Set integration time (i.e. 30 ms)
- Set number of spectra to average (i.e. 1)
- Set mode (single or continuous measurement)
- Set a delay time between two spectra acquisitions (i.e. 500 ms)
- Select display type ,Table' or ,Chart'
- Start acquisition via Button ,Get spectra'
- Stop acquisition via Button 'Stop' in case of continuous measurements

**Remark:** If parameter values are beyond their allowed limits, these values are automatically set to the next valid value.

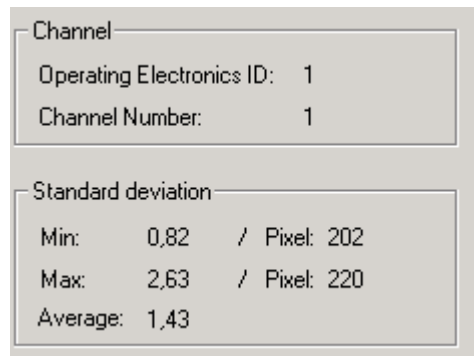
There is only one window respectively in one table to display all data. The *Display channel* slider is used to select the individual channel.

The export of data is handled only channel by channel too. The selected / displayed channel is saved. Format is ASCII with a header as an option. Please use *Export channel* button.

In case of a multiplexer please check first, that the number of physically available channels (number of spectral sensors) matches the settings of *Active Channels*. Then you can use the *Display channel* slider to select individual channels.

**Note:** The test software AdminTool currently supports only the simultaneous operation mode. When the operating electronics is equipped with a MUX you need at least 2 spectrometers attached! Otherwise you will get error messages.

You may also calculate the standard deviation of the current channel by clicking the *Standard deviation* button. The software acquires 20 spectra and calculates the standard deviation. The results are shown in an additional window:



## 2.5 Sensors - Setting the Parameters for the Sensor Modules

The *Sensor* pane shows the configuration of the sensor channels for each interface. You may also change the values for the calibration coefficients, the array length (number of rows and binning area in case of a CCD), and type of sensor / chip if required and appropriate. These data are saved to the EEPROM chip, which is part of the FEE board.

The screenshot shows a software window for sensor configuration. It is divided into two main sections: 'Interface' and 'Sensor coefficients'.  
The 'Interface' section contains the following fields:  
- Interface ID: 1 (with up/down arrows)  
- Sensors: 1  
- Sensor type: Carl Zeiss MMS  
- Sensor length: 256  
- Sensor physical rows: n/a  
- Sensor binning areas: n/a  
To the right of these fields are three buttons: 'Change', 'Apply', and 'Cancel'.  
The 'Sensor coefficients' section contains:  
- Sensor Nr.: 1 (with up/down arrows)  
- C0': 300,00000000  
- C1': 3,000000000  
- C2': 0,0000000000  
- C3': 0,0000000000  
- C4': 0,0000000000  
- A 'Load ...' button.  
To the right of the coefficient fields is a warning box with a yellow triangle icon containing an exclamation mark. The text in the warning box reads:  
'The calibration coefficients are stored on the EEPROM chip as floating point values. This can lead to minor deviations between the stored and the set values.  
Starting only with the 5th number after the decimal point, such deviations do not affect the specified wavelength accuracy of the sensor.'

At first, the interface electronics has to be selected. *Sensor type* and *Sensor length* have to be the same for all chips operated by one operating electronics. *Sensor physical rows* is normally 1 (see CCD below for exceptions). A configuration of different sensor types controlled by one electronics is not supported yet. The wavelength calibration coefficients are individual for each spectrometer channel.

In case of a CCD sensor, the number of physical rows differs from 1. Here the number of vertical pixels have to be entered. The tec5 electronics further allows to operate the CCD in various binning modes. The parameter *Sensor binning areas* has to be set accordingly. In case of no binning (2D image mode) this value has to equal the number of rows.

**Remark:** Please check that the correct calibration coefficients are stored. Compare the stored values with the C0' to C4' values on the Carl Zeiss certificate. Please note that you have to use the 'prime' coefficients. This certificate you find enclosed in the spectrometer box or attached to your operating manual (see as well next paragraph). In case of multiple spectral sensors, the parameter *Sensor No* enables you to select the individual ones.

**Remark:** The calibration coefficients are stored on the EEPROM chip as floating point values. Because of this, minor deviations between the stored and the set values can occur. These deviations, starting only with the 5<sup>th</sup> number after the decimal point, do not affect the specified wavelength accuracy of the sensor.

If you want to modify a setting click the *Change* button. You may select another sensor type/size from the list or enter new coefficients. You may also load them from an **csv** file supplied by the vendor.

To apply your changes click the *Apply* button, otherwise click *Cancel*.

**Note:** Changes of sensor parameters of a MOE device require a reset in order to take affect. If you leave the sensor pane or switch to another device ID, you will be asked if the MOE device shall be reset.

## 2.6 Calibrate - Creation of Calibration File for Multi-Channel Operation Based on Multiplexer

Different spectral sensors – even of the same type – vary in their optical features.. In case of a multi-channel operation with multiple spectral sensors (i.e. one dedicated for referencing) sample and reference channels should be calibrated in respect to each other. Then the calibration data can be used to determine the transmission / absorption values.

AdminTool generates such calibration data and saves it as a file, which can be further used by the application software.

You can set the integration time manually or automatically. The optimal value will be at about 80 % of the saturation level.

**Note:** This calibration is not used by the AdminTool. Therefore, the *Calibrate* dialog is not required for using the AdminTool.

The screenshot shows a 'Calibrate' dialog box. It is organized into two main sections: 'Channels' and 'Measurement'.  
The 'Channels' section is divided into two columns, labeled '1' and '2'. Each column contains two dropdown menus: 'Interface ID' and 'Channel Number'. In column 1, both are set to '1'. In column 2, 'Interface ID' is '1' and 'Channel Number' is '2'. A 'Calibrate' button is positioned to the right of these columns.  
The 'Measurement' section is located below the channels. It features an 'Integration time' field with two radio buttons: 'Auto' (which is selected) and 'Manual'. The 'Manual' option has a text input field containing the value '30' followed by 'ms'. Below the integration time field is an 'Average number' field with a text input field containing the value '10'.

**Remark:** For automatic control of the lamp source unit the shutter switch on the front panel has to be on "automatic"

### Warnings:

The warning „not enough light“ will show up, if you can not reach the saturation level with the maximum integration time possible.

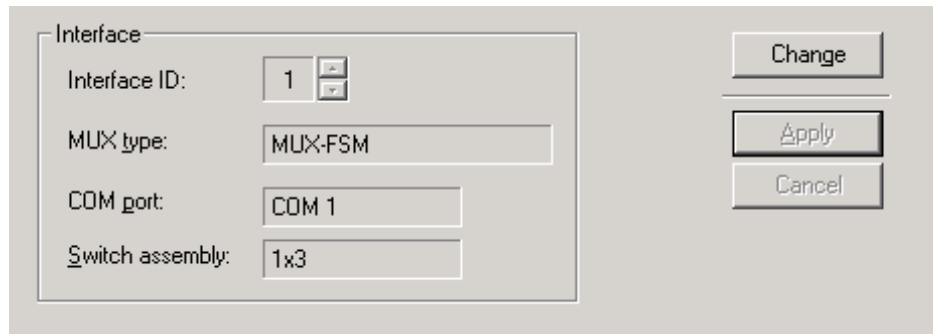
The warning „too much light“ will show up, if you reach the saturation level even with the minimum integration time possible.

## 2.7 MUX-FSM – Setting Parameters for a Fiber-optical Multiplexer

The pane *MUX-FSM* allows to set the parameters for a fiber-optical multiplexer. Push the Change button to enable selections.

To do so, first the *MUX type* has to be selected (MUX-FSM). Then the *COM Port* to which the multiplexer is linked has to be named. Finally, the number of optical multiplexer channels has to be set (*Switch assembly*).

The Apply button saves the settings.



The image shows a software configuration dialog box titled "Interface". It contains four input fields and three buttons. The "Interface ID" field is a spinner box with the value "1". The "MUX type" field is a text box containing "MUX-FSM". The "COM port" field is a text box containing "COM 1". The "Switch assembly" field is a text box containing "1x3". To the right of the input fields are three buttons: "Change", "Apply", and "Cancel".

Field Label	Value
Interface ID:	1
MUX type:	MUX-FSM
COM port:	COM 1
Switch assembly:	1x3

Buttons: Change, Apply, Cancel