

tec5 Software Products for Spectral Data Acquisition

for Windows 2000, XP, Vista and partially Windows CE

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General

The architecture of tec5 software products for spectral data acquisition and processing is based on a modular structure. It fulfills multiple customer specific requirements and allows a flexible adaptation to different hard- and software demands.

For the various tec5 Operating Electronics, device drivers for Windows 2000, XP and Vista are available. The function library called SDACQ32MP accesses these drivers directly and provides a hardware independent collection of operations like setting parameters and acquiring spectral data. All tec5 software products are based on this basic function library. The device drivers and a test software called AdminTool are included in delivery.

For easy integration into customer specific applications, Software Development Kits for the function libraries as well as a driver library for the LabVIEW™ environment are available.

As ready-to-use software package, tec5 offers MultiSpec Pro, a state-of-the-art 32 Bit software for spectral data acquisition and processing based on LabVIEW.

MultiSpec Pro is optimized for process applications and offers various data display / processing and output options.

Alternatively, the tec5 hardware can be linked to GRAMS/AI® from Thermo Galactic by a specific driver. This spectroscopy software package can be extended by many add-on modules and complies to CFR 21 Part 11.

Device Drivers

All tec5 Operating Electronics with PC Bus Interface (PCI, USB) are supported by special device drivers. As an extension of the operating system these interrupt controlled drivers interact with the hardware, e.g. to set parameters and acquire pixel related data. These drivers cannot be accessed directly by users due to the complexity of hardware parameters and sensor operating modes. However, the drivers can be accessed by the user-friendly function library SDACQ32MP. No specific device drivers are necessary for the tec5 Op-

erating Electronics with serial interface (RS232, RS485), the standard operating system drivers are used.

Function Library SDACQ32MP

As a base for all tec5 software products the function library SDACQ32MP (*.DLL) provides many functions for setting the hardware parameters, acquiring spectral data and supporting additional hardware functions (e.g. digital I/O). The pixel related data is transferred to the application for further processing.

The function library interacts with the hardware related device drivers. The different features of the individual electronic devices in use are taken into account. The function library allows a hardware version independent acquisition of spectral data. With just one software interface, all different hardware configurations can be managed. Therefore, the application software is independent of the hardware type.

The function library can handle several Operating Electronics of the same type simultaneously (up to 6, depending on type). This allows the acquisition of spectral data from different sensors at the same time.

Each individual board of the tec5 Operating Electronics contains a memory chip (EEPROM) that stores various identification information and the calibration coefficients of the spectrometers in use. The function library can read and use this information e.g. for automatic configuration of the software.

Function Library SDPROC32 for Spectral Data Acquisition and Processing

Based upon the SDACQ32MP module the SDPROC32 library implements an interface, which provides further abstraction from the actual hardware, and a basic data processing functionality required in most spectroscopy applications.

The hardware configuration is stored in a human-readable INI file, which is created by using the integrated hardware configuration wizard. Standard processing features such as interpolation, calculation of transmittance and absorbance, channel joining are

implemented as well as data preprocessing functionality (i.e. base line correction).

The SDPROC32 library is used as the base for most of the various applications developed by tec5 (including MultiSpec Pro).

Test Software AdminTool

The AdminTool is a test program for tec5 Operating Electronics and spectrometer systems. It allows the acquisition and display of pixel related data as well as the setting of the sensor parameters (calibration coefficients, number of pixels, sensor type) and their storage to the hardware. The acquired data can be exported as an ASCII file for further data processing.

Software Development Kits for SDACQ32MP / SDPROC32

The Software Development Kits provide files and documentation in order to develop applications based upon the respective library. Specifically the programming languages C, C++, Visual Basic, Delphi (SDACQ32MP only) are supported by the SDKs including prepared files for function and constants definition. In general most common programming environments able to handle standard windows DLLs can be used. In addition, some program examples in MSVC, MSVB, Delphi (SDACQ32MP only) and C#.NET are included.

Support for Windows CE

For applications running on current Windows CE platforms (4.x and higher) a version of the SDACQ32MP library called SDACQCE is available as part of a Software Development Kit. Currently ARMV4 is supported as target.

Instrument Driver for LabVIEW

The programmer language LabVIEW™ from National Instruments is a graphical user interface for developing process application software. For the direct integration of tec5 hardware, LabVIEW™ instrument drivers are available. These instrument drivers consist of various Sub-VIs providing most of the functions of the library. In addition to these basic functions, tec5 offers a variety of Sub-VIs for processing of spectral data, e.g.:

- calculation of the wavelengths based on the calibration coefficients
- interpolation of spectral data
- determination of absorption and transmission values
- export of spectral data as ASCII and JCAMP files

Specific application examples are provided for the USB Operating Electronics. The setting of hardware parameters as well as the acquisition and processing of spectral data is shown.

Spectroscopy Software MultiSpec Pro

MultiSpec Pro, based on the LabVIEW™ programming environment, offers various data acquisition modes, data display / processing and output options.

Functionality of MultiSpec Pro basic package:

- ♦ Calculation and display of absorption-, transmission- and intensity data
- ♦ Data export in ASCII or JCAMP format
- ♦ Continuous measurement with automatic data/result storage
- ♦ Various scan and display modes (e.g. charts)
- ♦ Output of results and status messages to digital and analog I/O's (TTL / 4...20mA)

The open, modular design can be extended by additional modules matched to your requirements:

- ♦ Chemometrics module OLUP
 - The Unscrambler™ OnLine Predictor (CAMO)
- ♦ Chemometrics module NIRCAl
 - OnLine Predictor of the NIRCAl Software (Büchi)
- ♦ Chemometrics module GRAMS PLSplus/lq
- ♦ Color module
- ♦ System Control module
 - User-Management, Logfile
 - Lamp intensity monitoring
- ♦ Multichannel-Modul, for simultaneous acquisition of multiple points
- ♦ Data preprocessing module with bubble detection

Evaluation Software MultiSpec Pro Lite

As a stripped-down version of MultiSpec Pro the Lite version allows all basic features of data acquisition, data display as well as the saving of data in ASCII or JCAMP format. All tec5 Operating Electronics and systems are supported.

GRAMS/AI™ Spectroscopy Software

tec5 electronics and systems can be operated by the well established GRAMS® software package from Thermo Galactic by a special driver. The current version AI may be extended by additional modules to match customer requirements and is compliant to CFR 21 Part 11 regulations.

Customer Specific Solutions

On the basis of tec5 software modules and existing add-on modules for spectral data processing, tec5 also develops customer specific solutions.

Architecture of tec5 software modules

