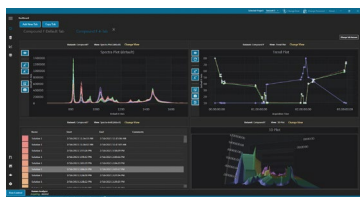


Technical Information

Raman data library 2.1

Spectra storage, organization, analysis, and multi-analyzer data collection from lab to cGxP



Application

Endress+Hauser's Raman data library is software designed to organize, read, analyze, and report on Raman Rxn spectral data. Raman data library complements the Endress+Hauser embedded Raman RunTime by providing spectra storage, organization, analysis, and multi-analyzer data collection from lab to cGxP.

Raman data library was created for users who need to visualize Raman spectra, associate it with reference data, and create univariate peak models. Users can also export prepared data for external multivariate modeling. In addition, Raman data library was created for users who need to collect and store Raman spectra according to FDA 21 CFR part 11 requirements for traceability during creation and execution of Raman-based analytical models.

Your benefits

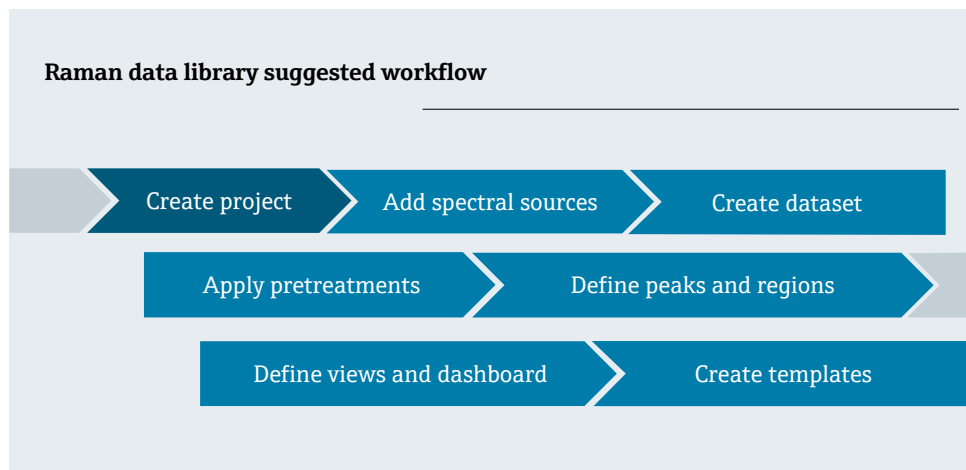
- **Data organization features:** Matches spectra to reference values, data preparation prior to chemometric modeling, searchable data storage, data integrity
- **Data analysis features:** Spectra visualization and simple analysis such as peak trending and modeling
- **cGxP option:** Meets industry standards for spectral data traceability, storage, and archival

Table of Contents

Application	4	Specifications	8
Graphic visualization of Raman data library's suggested workflow	4	Communication.....	8
Use cases	4	Database	8
Versions	5	Installation	8
Raman data library–core version	5	Installation	8
Raman data library–cGxP version	6	Supplementary documentation	8
System requirements.....	7	Quick start	8
Raman data library–core.....	7	Operating instructions	8
Raman data library–cGxP version	7	Registered trademarks.....	8

Application

Graphic visualization of Raman data library's suggested workflow



Use cases

This software is designed to fit the needs of use cases common to multiple industries:

- Real-time data import from Raman RunTime
- Project-oriented data organization
- Data matching for modeling prep
- Visualize spectral changes
- Peak and region analysis and univariate modeling
- Export to chemometric programs

cGxP use: Collect, view, store, retrieve, and archive data per FDA 21 CFR Part 11 requirements:

- User action traceability and data integrity
- View and store data from multiple analyzers and probes
- Data search, retrieval, and (basic) reports for audit support

Versions

Raman data library—core version

Raman Rxn analyzer control

- The Rxn Control area of Raman data library resembles the user interface for Raman RunTime.
- The Rxn control area interface is responsive to analyzer configuration, differing presentation of single channel, multi-channel, and Hybrid analyzers.
- Multiple analyzers can be connected, monitored, and controlled from one central place.
- Raman data library provides an interface for Raman Runtime, in which Raman Rxn analyzers can be calibrated and verified.
- Analyzer calibration reports can be accessed, and model files can be sent to the analyzer.
- The Rxn Control feature facilitates initiation and control of Raman data collection.

Data collection

- Without any user input, Raman data library can display spectra and model results from Raman RunTime and all its supported predictors.
- Raman data library connects to Raman RunTime via OPC UA.
- Raman data library provides encrypted and searchable data storage and archival.

Data fields

- Data fields are qualitative and quantitative info tagged to a spectrum.
- For quantitative analysis, the user can specify precision, units, primary method details, etc.
- Aliases can be added to reduce user error for imports, for example, Glucose = glucose.
- Data Field names follow models all the way.

Pretreatments

- Baseline correction methods, normalization, and other spectral pretreatments can be applied.
- The user defines the sequence of pretreatments.

Peaks, regions, and peak models

- Peaks can be trended by height, area, or center.
- Peaks can be assigned to Data Fields and modeled.
- Regions can be selected for principal component analysis (PCA) or multivariate curve resolution (MCR) analysis, providing insight into outliers or spectra trends without focusing on specific peaks. This is a “no model” approach to analyzing spectra.

Views

- Views define the most relevant plots for each user or use case.
- There are many options for plots, including simple datasets.
- Trend plot options include model predictions from RunTime, Raman data library peak model predictions, measured reference data, and more, for all data fields and peak selections.

Dashboards

- A dashboard is a collection of plots/views.
- Users can create preferred dashboard tabs that display 1 to 4-plot quadrants.
- The Dashboard is intended to be the main view for routine analysis at-a-glance.

Templates

- Templates remember all pretreatments, analysis, and view settings and can be applied to new datasets.
- If pretreatments, peak analysis, and views are saved to a template, a user can go straight from dataset creation (new Raman RunTime batch or SPC import) to the Dashboard to view results.

Dataset analysis

- Users can import spectra and reference data and can analyze the created datasets through a tabbed workflow.
- Analysis can be done in real-time, or data can be exported for post-treatment analysis.

- Datasets can be combined for analysis or modeling within Raman data library, or for export to external multivariate data analysis (MVDA) software.
- Generic exports (.csv and .spc), GRAMS IQ™ (.cfl), and SIMCA® (.usp) are supported.
- All spectra can be exported without pretreatments (default) or with pretreatments.
- Time-based trends are not applicable for all datasets.
- Outliers can be selected from the box and trend plots.

Multivariate curve resolution (MCR)

- MCR covers a wide span of algorithms designed for mixture analysis by expressing the original data as an estimate of pure component information.
- Calculated pure component spectra and trends can be displayed within Raman data library.

Principal component analysis (PCA)

- PCA is used to reduce the number of variables of a large data set, while preserving as much information as possible.
- In Raman data library, PCA's primary function is for the user to observe trends in datasets that may not be obvious from viewing the spectra plots or individual peak trends. It can also be used to identify and exclude outliers.
- *PCA models cannot be saved to a Raman data library model (for implementation in Raman RunTime), but PCA analysis is saved as part of a dataset template.*

Raman data library—cGxP version

Raman data library can be FDA 21 CFR Part 11 compliant when installed with the cGxP Setup installer and qualified via IQ/OQ (executed by Endress+Hauser) and PQ (executed by customer). When installed in cGxP mode, the program facilitates collection, storage, and organization of Raman spectra so that spectra may:

- Act as calibration set data for quantitative Raman model development as part of a validated analytical solution, or
- Act as data input into validated models used for predictions of process or sample properties.

Raman data library allows for storing spectral data in a secure database, performing calculations on the spectral data, and displaying spectral data and its associated metadata.

- All features available in the regular version are available in the cGxP one.
- For the cGxP version, all actions are traceable so sign in, sign out, and user management is required.

To change from Raman data library core to the cGxP version, the program must be reinstalled.

Role-based user access

Raman data library cGxP features native user management. An administrator with the Users Manager role can create and manage users, including assigning user roles. User credential authentication can be tied into Microsoft Active Directory.

A user can be given multiple roles, and the user-role functionality offers flexibility to implement site-based user groups.

Role	Actions Allowed
Data Remover	Remove datasets, spectra, data fields, and projects
Data Operator	<ul style="list-style-type: none"> ▪ Import, export, and edit data ▪ Search for spectra ▪ Apply and export models ▪ Add comments
Data Approver	Approve datasets
System Settings Manager	Modify system settings
Spectral Sources Manager	<ul style="list-style-type: none"> ▪ Add and edit spectral sources ▪ Restart and shut down an analyzer

Role	Actions Allowed
Projects Manager	Add and edit projects
Users Manager	Add, edit, and disable users
Analyzer Calibrator	Calibrate a Raman Rxn analyzer
Analyzer Verifier	Verify a Raman Rxn analyzer
Analyzer Operator	Start, stop, and pause dataset acquisitions
Analyzer Collection Settings Manager	Change dataset acquisition settings
Analyzer Settings Manager	<ul style="list-style-type: none"> ▪ Add and change model files ▪ Change intensity calibration files ▪ Change verification standards

System requirements

Raman data library is a 64-bit Microsoft Windows program that runs on Microsoft Windows™ 10 or 11 Professional.

Raman data library–core

Operating system

Microsoft Windows 10 or 11 (Professional 64-bit)

Hardware

- Processor type: Intel Core i5 or equivalent processor
- Main memory (RAM): 16 GB
- Hard disk capacity: 10 GB or higher, depending on database size
- Screen size (desktops): 24" or more with a resolution of 1920 x 1080 or greater, and appropriate display scaling settings
- Screen size (laptops): 13" or more with a resolution of 1920 x 1080 or greater, and appropriate display scaling settings

Microsoft .NET Framework version 4.7.2 is also required.

Raman data library–cGxP version

Operating system

Microsoft Windows 10 or 11 (Professional 64-bit)

Hardware

- Processor type: Intel Core i5 or equivalent processor
- Main memory (RAM): 16 GB
- Hard disk capacity: 10 GB or higher, depending on database size
- Screen size (desktops): 24" or more with a resolution of 1920 x 1080 or greater, and appropriate display scaling settings
- Screen size (laptops): 13" or more with a resolution of 1920 x 1080 or greater, and appropriate display scaling settings

Microsoft .NET Framework version 4.7.2 is also required.

Specifications

Communication

Communication to Raman RunTime is through OPC UA. HTTPS protocol is also used to transfer certain files between Raman RunTime and Raman data library, such as model files.

Database

Raman data library uses a secure embedded database. The database SQLite, provided by a third party, provides a full-featured relational database management system (RDBMS).

Installation

Installation

Administrator privileges are needed for installation and configuration of Raman data library.

Supplementary documentation

Quick start

KA01717C Raman data library Brief Operating Instructions

Operating instructions

BA02563C Raman data library User Operating Instructions

BA02564C Raman data library Administrator Operating Instructions

Registered trademarks

- Microsoft™ is either a registered trademark or a trademark of the Microsoft Corporation in the United States, other countries, or both.
- Windows™ is either a registered trademark or a trademark of the Microsoft Corporation in the United States, other countries, or both.
- All other trademarks listed in this document are the property of their respective owners.

www.addresses.endress.com
