Рамановская спектроскопия

Технические характеристики

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Cobalt Overview
Management Server by Agilent

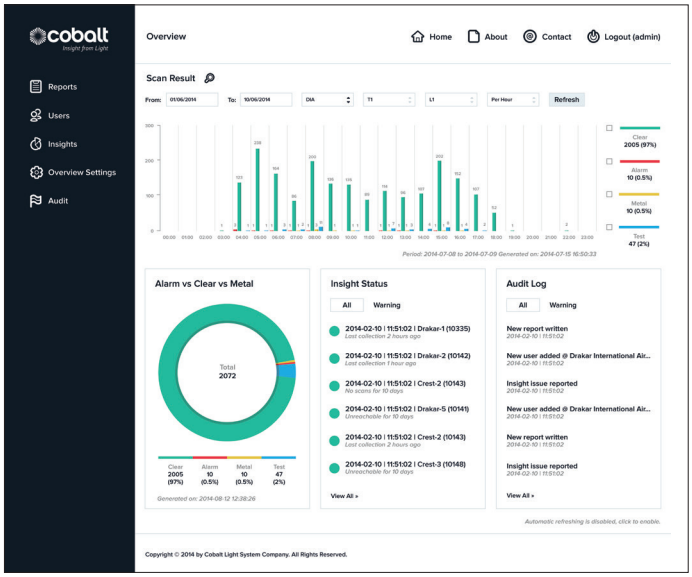
Centralized Reporting and System Management for Cobalt Insight Bottle Scanners

Supplied by Agilent, the Cobalt Overview management server provides centralized management and reporting for the Cobalt Insight range of liquid explosive detection systems. Overview monitors and reports across multiple checkpoints, terminals, and airports and is accessible through a simple and secure Web browser interface.

Compliance	Management	Accessibility
Comprehensive data reporting to aid regulatory compliance	Real-time system management	Securely accessible from any location through encrypted Web connection
Configurable with selectable levels of detail	Configurable across groups of scanners by checkpoint, terminal, or airport	Remote monitoring of system health and alarms
Data pushed to managers through scheduled e-mails	Compatible with SeMS and regulatory compliance products	Centralized control of user access
Centralized data backup and archive	Upgrades and updates deployable to individual units in a single operation	Consolidate data from multiple terminals and airport locations

Reporting

Each Insight system is continuously monitored and real-time reports can be generated by machine, group, or location. Reports can be scheduled for management review. Summaries by scanner or groups of scanners produce the data required for regulatory compliance or SeMS reporting.



Daily instrument testing summary

Deployment of Overview

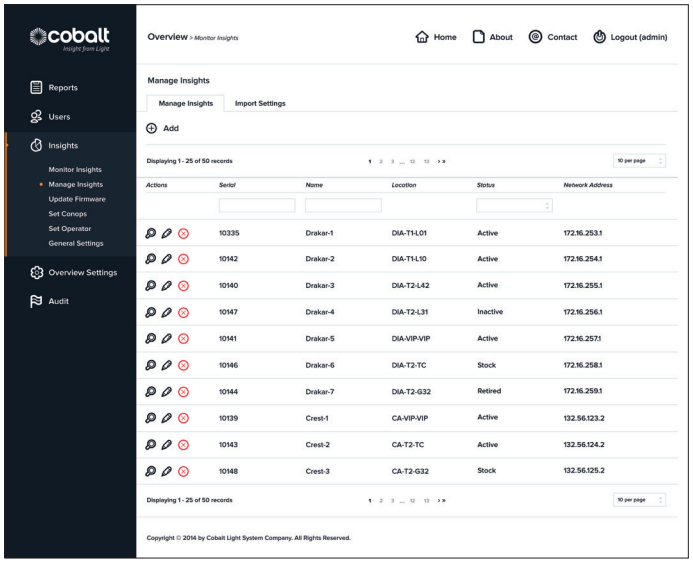
Please contact Agilent or our distributor in your region for more information about the benefits of Overview and how to deploy it at your airports.

Summary of server and IT requirements

Requirement	Minimum Required
Operating system	Red Hat Enterprise or CentOS6.5
Configuration	Apache, MySQL, and Php
Minimum PC	Dual core x86 processor, 4 GB RAM
Storage	80 GB OS, 500 GB Data partitions
Virtual machine	Compatible with virtual machine deployment
Network	Ethernet connection of instruments to server

Management

Set permissions and logins, and record access and usage from Overview's Web control interface. Permissions can be set by user group and location. System configurations can be changed as required across all or a subset of machines. Upgrades to the Insight software can be pushed to the machines from the management console, reducing system downtime.



Operational management summary

The Cobalt Insight Range by Agilent – Best-in-Class Liquids Screening

– Best detection rate available – ECAC Standard 3

– Lowest operational false alarm rate – 2% or less in EU airports

– Fast scans of all containers – within 5 seconds

– Specific threat material identified and named

– Ideal as standalone system for all containers or for alarm resolution with EDS for cabin baggage (C2 or C3)

– Approved (DfT) for containers <100ml

Supplied by Agilent, the Cobalt Insight range is the best-performing liquid explosive detection solution and is operationally proven with several hundred units in use throughout the European Union, Africa, Asia, and Australasia.

The Insight200M is the latest addition to the range. Improving upon the popular Insight100 series, Insight200M screens all containers, including metals, with best-in-class detection performance and the lowest false alarm rate of any ECAC-approved scanner. The system is also smaller and lighter than its predecessor: Insight200M fits into security checkpoint operations with the lowest resource impact and highest screening throughput of any Type B LEDS solution.

Future proof

Spatially offset Raman spectroscopy (SORS), used in the Insight range, is ideally suited to the detection of explosives and precursors as well as a range of other potential threat materials such as flammable and toxic chemicals.

Insight range deployment

- More than 70 European airports including 8 of the top 10 hubs
- Further deployments in Africa, Asia and Australasia
- Outstanding operational system reliability with MTBF >30,000 hours and availability >99.7%
- Low resource impact and improved passenger facilitation

Screens all container types including metals

Partially filled containers from 10 mL

STEBs

ECAC Standard 3 Type A kit available

Lowest false alarm rates

The Insight range has proven false alarm rates (FAR) in the field as well as in laboratory tests. Operational FARs for all containers from the first phase of LAGs screening in Europe are consistently better than 2%. Bottled water alone is especially impressive with FARs of just 1 in 4,000 bottles (about 0.02%). The new Insight200M, when tested using the standard ECAC test set, has a FAR up to 10-times lower than operationally demonstrated by the most widely used products from other manufacturers.

The Insight200M screens all common containers including colored glass, plastic bottles and tubs, cardboard and paper, metal tins and cans, Tetra Paks, and aerosols and foil pouches – all in around 5 seconds.

Category of items	FAR
All nonmetallic containers	0.7%
Water only (72 commercially available varieties)	0.02%
All containers including metals (Insight200M)	<2%

Improved Passenger Facilitation with Lowest Operating Costs of any Type B LEDS Solution

Up to 10-times lower false alarm rate compared to non-Agilent LEDS solutions →	Staff savings and passenger convenience through reduced need for searches and interviews
Orthogonal technology complements EDS for cabin baggage →	Results in low residual false alarm rates
Rapidly and accurately screens all container types →	Reduces the equipment types and the number of levels of screening needed
Intuitive operation →	Minimal training, fewer operator errors
Extremely high reliability →	Insight range consistently demonstrates >99.7% operational availability in the field

Insight200M Screening

Multi-language User Modes

Specifications

Dimensions	Width 562 mm (22.2 inches)
	Height 536 mm (21.1 inches)
	Depth 417 mm (16.4 inches)
Weight	25 kg (55.1 lb)
Types of container	Glass: opaque, colored, clear, frosted
	Plastic: opaque, colored, clear, frosted
	Cardboard and paper
	Metal containers: Tetra Paks, foil pouches, drink cans, food tins, tubes, aerosols
Container size	Any shape up to 38 cm (15 inches) high and 20 cm (8 inches) wide
	Contents from 10 mL to greater than 3 L
Contents	Liquids, aerosols, gels, and other consumer items
	Partially filled containers and small liquid volume (about 10 mL)
	Works with dense or viscous liquids, for example, honey or syrup
Safety	Class 1 laser system – interlocked
	CE marked
Power requirements	90–264 VAC, 50–60 Hz
	<200 W continuous
Connectivity	Ethernet and USB 2.0

Increase Your Reach, Not Your Costs

The Agilent Vaya Raman system tests more raw materials for the same cost and reduces the need for sampling. Vaya offers best-in-class ID testing through transparent containers, and transformative handheld testing through nontransparent containers—for the fastest possible release to manufacturing.

Powerful and reliable

- Work smarter: ID through opaque containers in seconds—no sampling booth needed; minimum material handling
- Trust your result: spatially offset Raman spectroscopy (SORS) verifies the identity of the raw material without interference from the container or liner

Fast and efficient

- Work faster: ID your materials in seconds
- Easy deployment: minimal training and fast method development—Vaya can start returning its investment quickly

Flexible and future proof

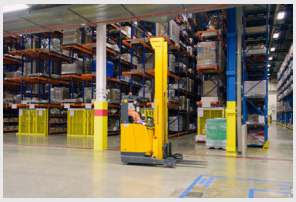
- Analysis with or without opening the container: as regulators insist on more testing for raw materials, Vaya has you covered
- Easy to use: Vaya is controlled by an intuitive, GMP-compliant, raw material ID-focused workflow

Higher Quality without Higher Costs

Regulatory requirements change, as do quality and testing needs. Vaya can improve your current testing protocols—from low volume sampling to 100% ID testing. If regulators require you to test more, Vaya allows you to develop higher-throughput testing without any additional equipment.

Do you need to reduce the resources spent on raw material testing?

With Vaya, testing can be conducted in the quarantine area by a single operator. No more unnecessary movement of containers, sampling booth cleanup, sampling consumables, and PPE for testing personnel.



Can your process cope with an increase in workload or quality?

Vaya rapidly identifies raw materials through a broad range of containers, easily adapting to higher workloads or more stringent quality requirements. Without sampling, you can test more materials for the same cost, or perform multipoint surveys of your raw material containers.

Do you use air-sensitive or sterile materials?

Performing an identification test through containers maintains raw material packaging integrity. Vaya preserves sterile/inert conditions during testing and maintains the manufacturer's original shelf life, preventing unnecessary waste.

Are you dealing with hazardous, toxic, or high potency materials?

Through-container testing eliminates exposure to potent and hazardous materials. No more suiting up—the test can be performed in the quarantine area under normal conditions.

Handle Any Container in Any Situation

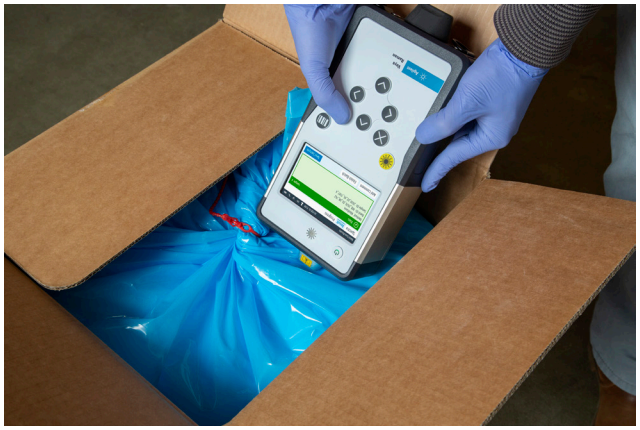
Vaya is the most flexible raw material testing solution available. From clear glass vials to brown paper sacks, Vaya automatically adapts the measurement mode to the container and contents—optimizing the Raman signal and measurement time for maximum testing speed and efficiency.

Compatible with most raw materials and containers

- Simplifies your testing process, working with most pharma and biopharma raw materials, through the container
- Uses proven analytics to achieve excellent selectivity in distinguishing chemically similar raw materials
- Agilent SORS technology, combined with an 830 nm laser, minimizes fluorescence from containers and contents

Fast and adaptable to container variation

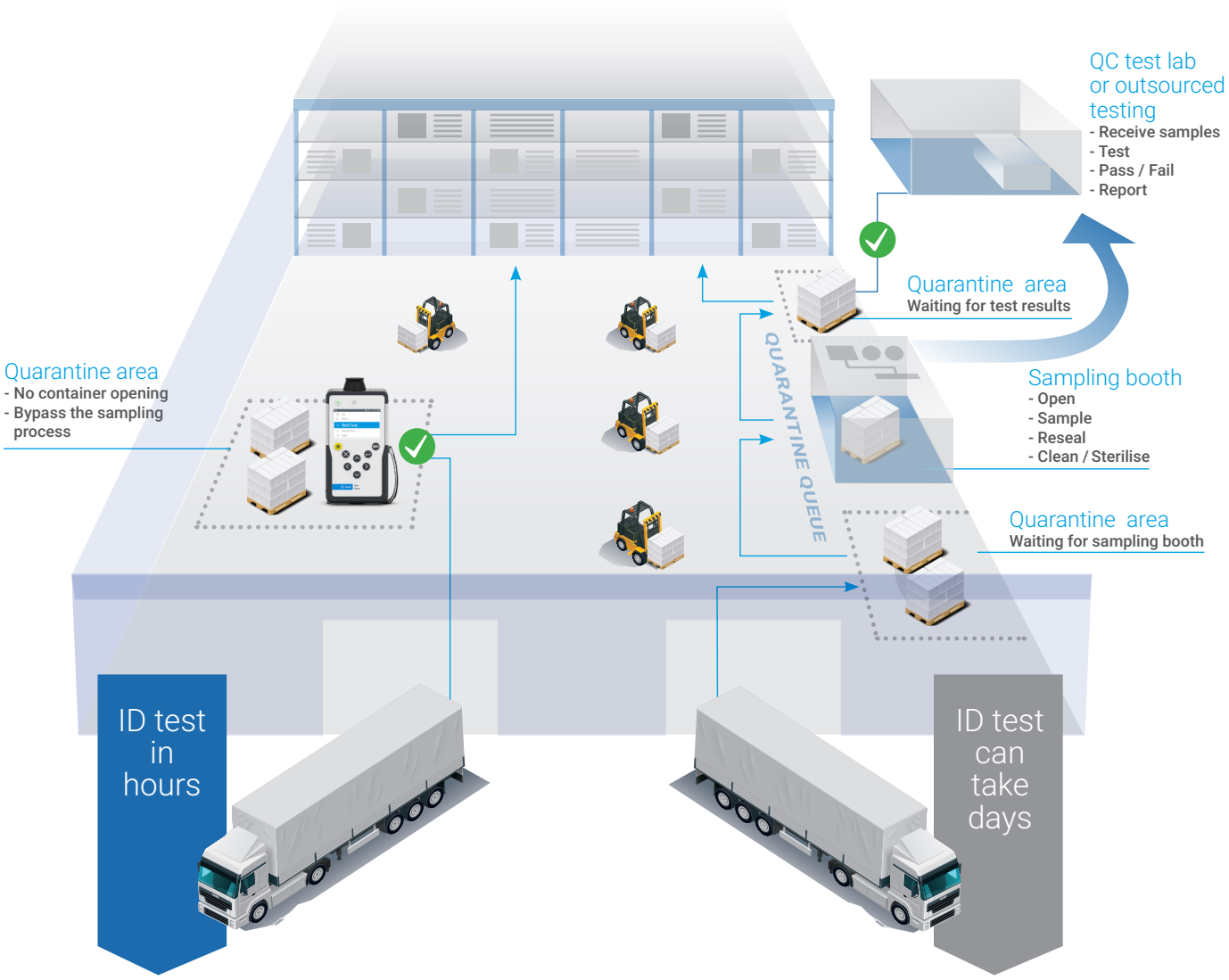
- Works faster than conventional handheld systems through transparent containers
- Easily handles day-to-day variations in plastic liner color, opacity, or thickness
- Adaptive SORS technology works with opaque containers like white or colored tubs, FIBCs or super sacks, papers bags, and amber glass bottles



A Faster, More Cost-Effective Route to Production

Boost your productivity with Vaya. Easy to set up—easy to use. Bypass the sampling room and verify incoming raw materials directly in the quarantine area for unprecedented throughput.

Shorten the verification process—often from days to hours



Testing with Vaya:

- Simplify and accelerate the ID test protocol
- Minimal movements of raw materials
- Stock can be reduced to production needs

Testing with conventional techniques:

- Time and resource intensive ID test protocol
- Sampling booth required for sampling/analysis
- Stock is not immediately available for production

Powerful, Fast, Robust, and Reliable

Vaya combines conventional Raman with unique SORS technology for maximum sample/container compatibility. With a dedicated raw material identity testing workflow, Vaya is fast, easy to deploy, and simple to use, requiring minimal training or operator skill.

SORS optics with 830 nm laser (class 3B) for through-container measurements and fluorescence mitigation. Includes built-in autocalibration

2D-barcode reader for data input or method selection, compatible with most barcodes

Wi-Fi for data synchronization and backup

Test piece for performance qualification

Bumpers for added robustness. Vibration and drop resistant

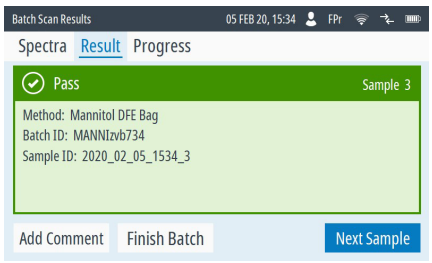
Chemical-resistant keypad for tough environments

Dedicated laser button for safe operation

Battery compartment with USB 2.0 connector: four hours uptime on a single battery

Your Complete, Fully Compliant Testing Solution

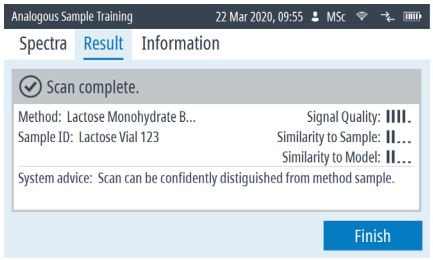
Vaya is the first handheld Raman spectrometer incorporating SORS technology for the quick identification of raw material through containers. The system is designed from the ground up to be used in GMP-compliant raw material identification processes.



Sample result screen with a clear pass

Easy to use

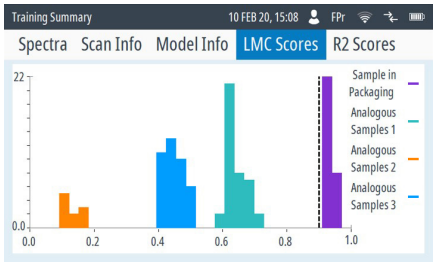
- Intuitive interface requires minimal training
- Delivers clear Pass/Fail analysis summarized in a batch report
- Self-calibrating: automatic monitoring and adjustment during measurements



Intuitive method development wizard

Dedicated raw material ID workflow

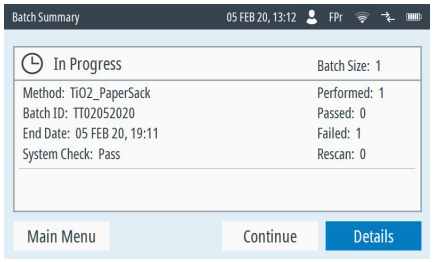
- Straightforward batch procedure for scanning and reporting
- Smart method development wizard: advises on method specificity and model robustness
- Workflow embedded instructions



Graphical method validation summary

Compliant

- Batch identification and method development with full audit trail: supports 21 CFR Part 11 compliance
- Method validation featuring library cross check, analogs challenge, and reporting
- System checks can be enforced pre- and post-batch for trusted results



Work in progress batch function

Ready to deploy

- LIMS-compatible data format: XML and PDF files for easy data parsing
- Work in Progress (WIP) function: for multishift, multiuser batches
- Methods can be transferred between instruments without rework

Data Sheet

Agilent
Trusted Answers

Agilent Vaya Raman Raw Material Identity Verification System

Product description

Designed to be used in a GMP-compliant warehouse, the Agilent Vaya Raman system accelerates the identification test by enabling raw-material testing through transparent and opaque containers. Leveraging a patented optical design and algorithm, Vaya uses spatially offset Raman spectroscopy (SORS) technology to transform the reception of raw materials.

Vaya is a self-contained, handheld, battery-powered scanner. It includes a spectrometer coupled to a NIR CCD detector, and an 830 nm laser. With its aluminum shell, Vaya is built tough for extended use in warehouses or cold rooms. With its all-around protective rubber bumpers, tough screen, and keypad, it can withstand drops during operation with minimal sustained damage. It also comes with a hand strap to decrease user fatigue during prolonged use. After use, the user can easily clean the system with ethanol or a diluted bleach solution.

An embedded Wi-Fi dongle and a secured synchronization function ensure that generated data can easily be saved on a LAN and reviewed. Further integration into corporate data systems is possible via synced, LIMS-compatible XML files.

Vaya's embedded software includes an intuitive raw material ID-dedicated workflow and wizard-based identification method development for hassle-free deployment in a GMP environment. Performance qualification (PQ) tests can be enforced during and after batch analysis to demonstrate fit-for-use and pharmacopeia compliance. Method training and validation reports can be generated to demonstrate method specificity and compliance with regulatory requirements.

Agilent Vaya spectrophotometers are manufactured according to a quality system that is certified to ISO-9001.

Technical Specifications	
Laser Excitation Wavelength	830 nm
Laser Power Output	Adjustable up to 450 mW (Class 3B)
Spectral Range	350 to 2000 cm^{-1}
Spectral Resolution	on average <14 cm^{-1} (measured according to ASTM E2529/EP 2.2.48)
Stability Over 24 Hours	<±1 cm^{-1}
Power Supply	Lithium-ion battery pack >4 hours operation time
Operating Temperature Range	–5 °C to + 35 °C
Relative Humidity	Up to 95% noncondensing at +30 °C
Weight	1.86 kg with battery, 1.62 kg without battery (test piece fitted)
Size	257 × 127 × 60 mm (test piece fitted)
Barcode Scanner and Supported Barcodes	Most 1D and 2D barcodes
Connection	Wi-Fi (IEEE 802.11 WLAN) and Ethernet (IEEE 802.3/ RJ-45 via ethernet dongle)
Operating System	Windows 10 O.S.
Certification and Compliance	21 CFR Part 11, UPS <1120> and EP 2.2.48, USP<1058>, USP<1225>

Agilent RapID Raman – Through-Barrier Raw Material Identity Verification

– 100% identity testing for all incoming containers

– Faster identity testing workflow

– Reduced operator time and sample-handling booth usage

– No contamination – better for quality and operator exposure

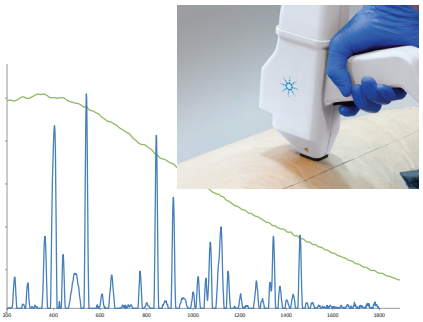
– Compatible with most containers, active pharmaceutical ingredients (APIs), and excipients

Lower costs and streamline your QC workflow

Raman is the most practical technique for raw material identity verification but it often requires a sampling step, which limits its ease and speed of use. Unique to Agilent, our proprietary spatially offset Raman spectroscopy (SORS) technology enables identification of most common materials through unopened opaque packaging, unlike conventional handheld Raman devices. The Agilent RapID Raman system is the fastest way to verify pharmaceutical raw materials and the most cost-effective means for high throughput or 100% testing.

ID verification with SORS – Raman without barriers

Conventional Raman works well for raw materials verification, but it needs line-of-sight of the contents. That means you must be able to see clearly through the container. With most packaging, conventional handheld Raman instruments don't work. In contrast, SORS scans through containers such as paper sacks without opening and sampling in a booth.



Multilayer paper sack containing dextrose

SORS (blue spectrum) gives a high-quality spectrum of the sack's contents – conventional handheld Raman only measures fluorescence from the container (green spectrum)

The RapID system eliminates the logistical and handling steps of moving, opening and sampling each container and avoids quarantining, sampling booths, and clean-up. RapID fits into the quality control (QC) workflow of a busy warehouse and meets regulatory requirements.

Compatible with most common excipients and containers, the RapID system's 830 nm SORS technology avoids fluorescence from most containers and contents, making it ideal for use in oral solid dose, biopharmaceutical, and parenteral preparations manufacturing, and for testing through a wide variety of packaging.

Agilent RapID nose adapters

Magnetic adapters enable fast measurement of many container types.
**Other adaptors and sizes are available or custom-made*

Identify Raw Materials on Receipt

Most containers arriving in a pharmaceutical plant are nontransparent, for example, sacks, tubs, bottles, and barrels. These packaging materials are incompatible with conventional Raman and a sampling step is often required. The time and resource impact of the sampling step often reduces the benefit of the fast Raman identity measurement.

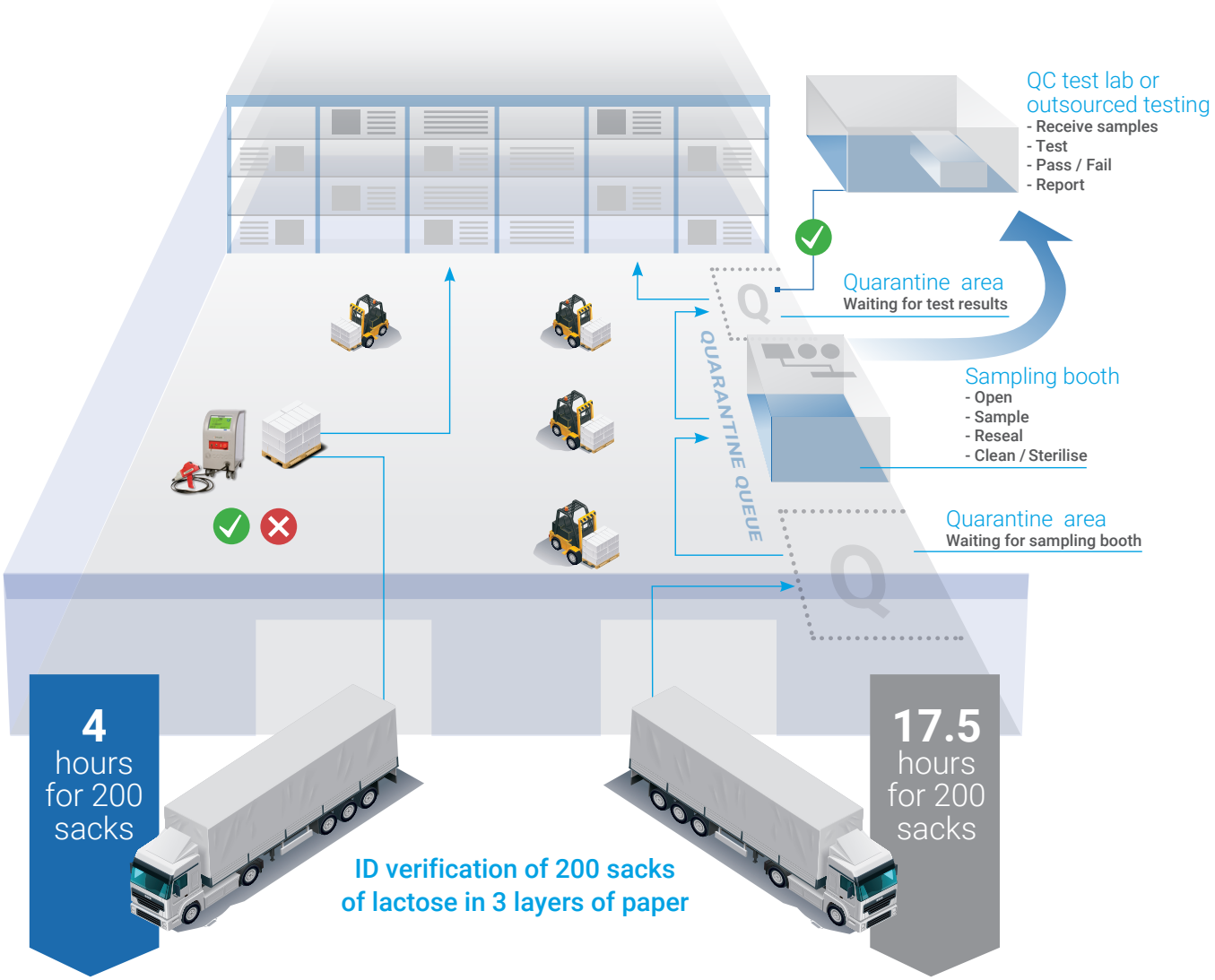
The RapID system avoids sampling, meaning that goods can be tested quickly in the warehouse on receipt, without quarantining, risk of exposure, or contamination.

Maintain sterility, avoid exposure and contamination risks

Identify through the packaging

- Avoid sampling booths and quarantine delays
- Reduce QC lab turnaround times and expensive outsourced testing
- Maintain sterility, prevent cross-contamination
- Preserve shelf life of unopened products
- Avoid user exposure to high potency APIs

Comparison of Agilent's RapID Raman to a Conventional Raman ID Verification Workflow for 200 sacks



Agilent RapID Raman

- No opening or re-sealing containers
- One logistical movement to the warehouse
- Sample-to-warehouse averaging 1.2 minutes per sack - 200 sacks completed in <1 shift

Sampling and Conventional Raman ID verification

- Requires opening and re-sealing containers
- Multiple logistical movements to the warehouse
- Sample-to-warehouse averaging 5.25 minutes per sack - 200 sacks completed over 2-3 shifts

Sample and Container Compatibility

Material/Container Combinations	Measurement Times
Mannitol three-layer paper sack	20–30 seconds
2.5 L amber glass bottle with acetic acid	5 seconds
Lactose in 1 ton supersack	10 seconds
Acetaminophen in plastic bottle	5 seconds

Oral solid dose

- Sugars such as mannitol, lactose, dextrose, and glucose
- Microcrystalline cellulose (MCC), hydroxypropyl methylcellulose (HPMC), and croscarmellose sodium
- Magnesium stearate
- Active pharmaceutical ingredients (APIs)

Parenteral preparations

- Sterile liquids such as phenol
- Salts such as $MgCl_2.6H_2O$, $CaCl_2.2H_2O$
- Amino acids

Biopharmaceuticals

- Growth media
- Polysorbates 20–80
- Buffers such as tris(hydroxymethyl) aminomethane

Extending the possibilities of Raman identification

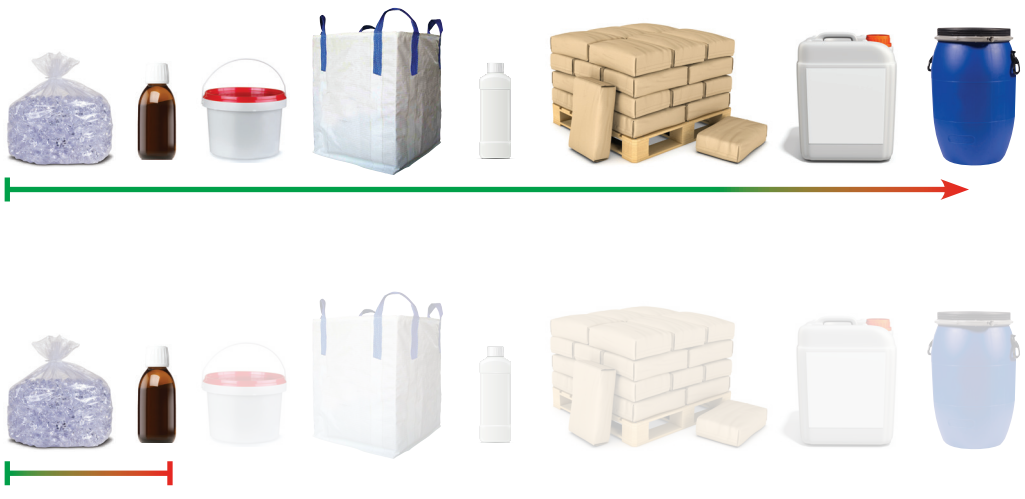
The RapID system does everything conventional handheld Raman systems do but adds the capability to identify materials through colored glass, opaque plastics, flexible intermediate bulk containers (FIBCs), and multilayer paper sacks. RapID even works through some blue barrels.

Agilent RapID Raman

The RapID system works with most containers, including multilayer paper sacks.

Handheld Raman identification

Conventional Raman systems work with clear plastics and in some cases, can work with amber bottles. Most other containers need to be opened for direct access to the material.

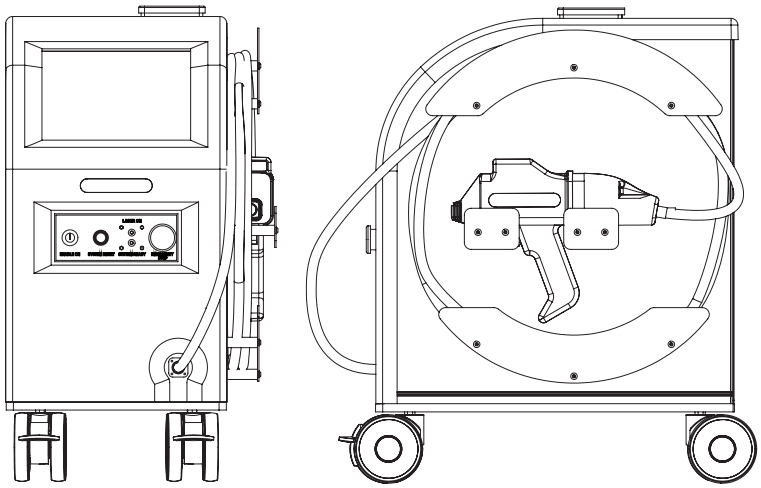


The Agilent RapID Raman – Portable Through-Container Identification of Raw Materials

RapID software

The RapID system's intuitive software is 21 CFR Part 11 compliant. The system can become part of your wired or wireless network with Windows-managed user logon credentials, shared folders and printers, data synchronization and automated backups, output for LIMS systems, and managing data security.

In routine use, the workflow is optimized for streamlined batch testing, optionally using bar codes for material identification, recording batch information and ensuring that all containers are measured with no accidental repeats. Adding new materials takes minutes, ensuring reliable performance for exceptional ID verification of a wide range of raw materials through most types of containers.



Specification	Description
Dimensions	Width 394 mm (15.5 inches) Height 693 mm (27.3 inches) Depth 630 mm (24.8 inches)
Laser	Class 3B 830 nm
Power	90–132/180–264 VAC, 47–63 Hz
Software	Includes RapID software 21 CFR Part 11 compliant
Hardware	Touch-screen operated Integral bar code scanner (1D and 2D)
Connectivity	Domain/network through RJ-45 or WiFi USB 2.0


Door Unlocked
Ready
Laser On
Door

Agilent TRS100 Raman – Streamlined Quality Control

Fast – Test hundreds of intact tablets or capsules in minutes

Simple – Quantify active pharmaceutical ingredients (APIs) and polymorphs in a single measurement

Low cost – No need for sample preparation, consumables, or skilled testing resource

Compliant – Regulatory approved methods for content uniformity, assay, and identification

TRS100 for quality control and development

The Agilent TRS100 Raman system is ideal for fast assay of tablets, capsules, and other dosage forms. Transmission Raman technology from Agilent enables simple method-development and deployment in QC applications. It is easy to implement in analytical laboratories and production areas, and has regulatory approvals for content uniformity (CU), assay, and identification (ID) applications.

- High throughput
- Nondestructive
- Capsules and coatings
- No sample preparation

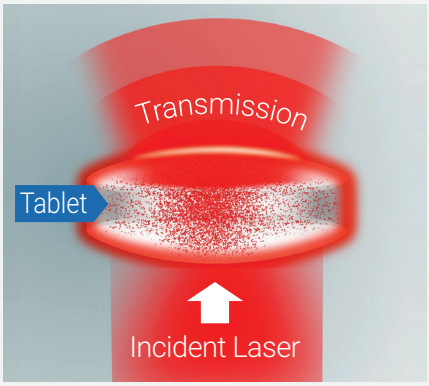
TRS100 measurements take seconds per sample and produce rich information for accurate quantitative analysis of intact samples. Routine applications include release testing, formulation development, and in-process control monitoring. Transmission Raman spectroscopy (TRS) is highly chemically specific and sensitive to low concentrations of APIs and excipients but insensitive to interference from water or moisture, tablet density, tablet coatings, or capsule shells.

Alternative to wet chemistry

Using a single TRS100 system, an operator can complete CU, assay, and ID analyses—for batch release—in minutes, speeding up your QC workflow. There are no sample or standards preparation steps, no solvents or consumables, and batch tests can be finished as part of a normal working day. TRS100 system trays can hold up to 300 coated tablets or intact capsules, glass vials, powders, and more. Using TRS methods for CU, assay, and ID saves significant cost per batch. A TRS100 system can be deployed near a tablet press for near real-time QC results and release testing. Also, formulations with multiple APIs can be assayed in a single measurement for an even greater reduction in cost and analyst time.

What is TRS?

Transmission Raman spectroscopy, unlike near-infrared spectroscopy (NIRS), is not an absorption technique. This means TRS can measure through most sizes of coated or uncoated tablets and colored gel capsules . Raman spectroscopy produces a feature-rich spectrum that can be used to separately quantify API, polymorph, and excipient components in one fast scan.



TRS quantification has:

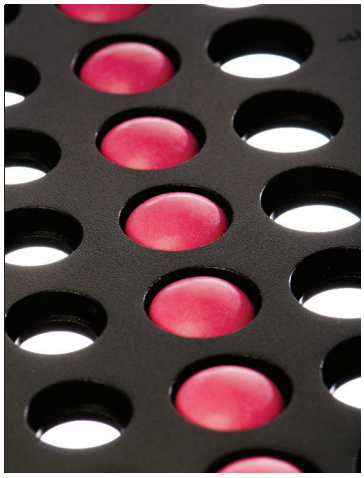
- Low or no sensitivity to moisture, particle size and thickness variation
- Easy-to-interpret sharp spectral features
- Low limit of quantification
- Sensitivity to the sample bulk

CU, Assay, ID, Polymorph Quantification, and Formulation Development

– Analyze up to 300 samples on a single tray

– Flexible sample presentation

Tablets



Coated tablets

Capsules

Powders

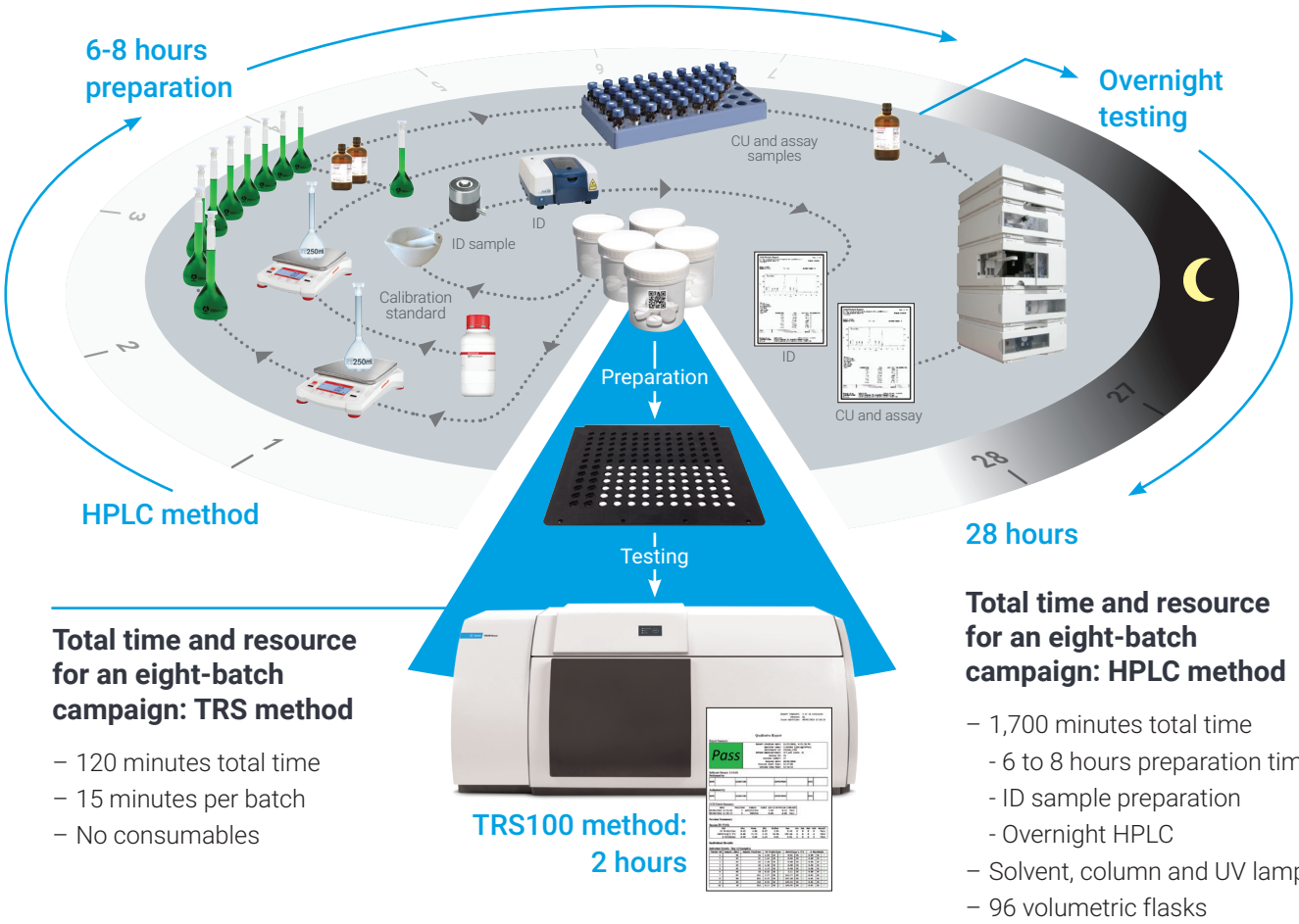
Liquids and gels

Microtiter plates

Transform your End-Product Testing

Content uniformity, assay, and ID – faster, leaner, lower cost

TRS is a proven alternative to wet-chemistry analytical methods, needs no consumables or solvents and only basic analytical skills. A single TRS100 system CU test can often be completed in around 15 minutes, which enables a high throughput for QC testing and low resource usage by avoiding sample-preparation.



Total time and resource for an eight-batch campaign: TRS method

- 120 minutes total time
- 15 minutes per batch
- No consumables

Total time and resource for an eight-batch campaign: HPLC method

- 1,700 minutes total time
  - 6 to 8 hours preparation time
  - ID sample preparation
  - Overnight HPLC
- Solvent, column and UV lamps
- 96 volumetric flasks

High Throughput Testing - QC During Manufacture

The TRS100 system's sample-handling trays can hold up to 300 tablets, enabling high-throughput automated quantitative testing at the point of manufacture, whether effective in-process control monitoring or real-time release testing (RtRT).

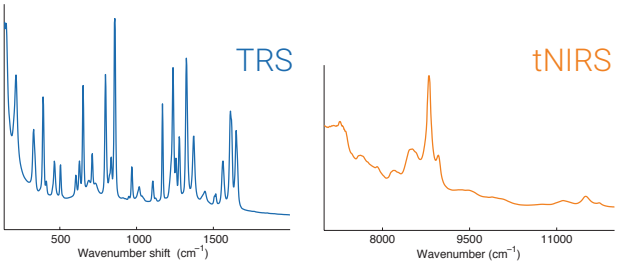
- Large 'n' testing*
- IPC monitoring
- Process validation
- Real-time release testing

** Large 'n' testing extends CU testing to ≥100 tablets or capsules.*
See Ph. Eur Chapter 2.9.47, Demonstration of Uniformity of Dosage Units Using Large Sample Sizes.

Method Development

Spectroscopic techniques, such as near-infrared spectroscopy, can be challenging for quantitative method development. TRS has several advantages over other techniques:

- Spectrally-rich features with high chemical specificity
- Fast method development using ICH and regulator-driven processes
- Development using a lean calibration design of experiments (DoE)



TRS spectrum with discrete API and excipient features, compared with transmission near-infrared spectroscopy (tNIRS) for the same three-API product.

Regulatory Approvals

CU, assay, and ID methods are approved for releasing commercial batches of products using the TRS100. CU and assay methods are developed as an alternative (secondary) method to the primary reference method – typically LC.

- Regulatory approvals achieved following International Committee on Harmonization (ICH)* and spectroscopy guidance†
- Equivalency demonstrated with primary reference methods

For methods other than CU, assay, and ID, other regulatory guidance may apply.

** ICH Q2 (R1), Q8, Q9, and Q10.*

† FDA's Development and Submission of Near-Infrared Analytical Procedures Guidance for Industry, and EMA's Guidance on the Use of Near-Infrared Spectroscopy by the Pharmaceutical Industry and the Data Requirements for New Submissions and Variations.

Measuring Low-Dose APIs and Polymorph Content

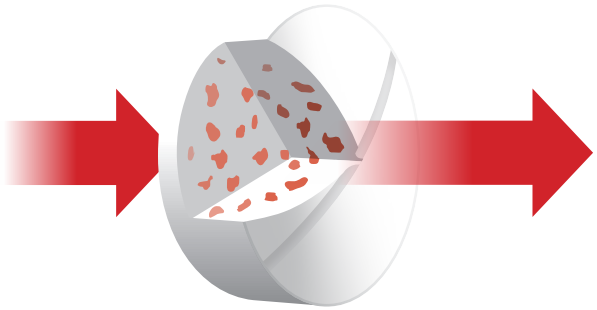
TRS is highly sensitive to APIs, which is ideal for quantification of low-dose drug products. Limits of detection (LOD) can be 0.1 to 1% w/w with limits of quantification (LOQ) in a similar range. TRS works well with low-dose API, polymorph, and salt-form analysis, and stability studies.

Residual polymorphs in intact tablets

Most means of residual polymorph analysis quantification are destructive, slow, and expensive.

- Low-energy "phonon mode" region measures crystalline vibrational modes directly
- TRS has high sensitivity to polymorphs down to 0.1 to 1% – comparable with solid-state nuclear magnetic resonance (ssNMR) – in a fraction of the time
- Recrystallization may occur in hotspots throughout the tablet – TRS quantifies the intact dosage form, sampling the entire tablet volume, including any hotspots
- No sample preparation or risk of form conversion
- Low cost per test

Method* (w/w)	LOQ	Time per sample
Powder X-ray diffraction (pXRD)	2.5 to 10%	About 1 hour
Solid-state nuclear magnetic resonance (ssNMR)	<1%	Greater than 24 hours
Agilent TRS100	<1%	About 10 seconds



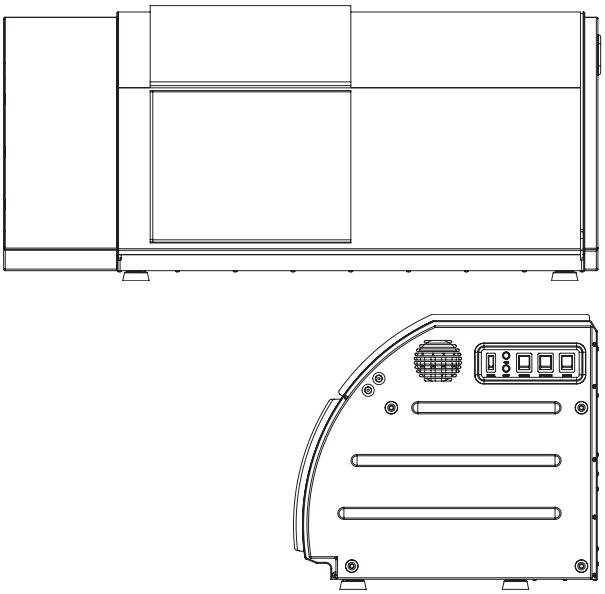
Polymorph hotspots of recrystallized API in a tablet – why TRS bulk-averaging works

**Data from Kumar et al, American Pharmaceutical Review, 19(1), February 2016.*

Quantitative Pharmaceutical Analysis

TRS100 Compliance

Designed exclusively for quality control, analysis, and testing in pharmaceutical manufacturing, working to the industry's strict regulatory requirements. Integrated sample-handling for minimal operator interaction. Automatic calibration using NIST and ASTM-approved standards. Meets relevant USP, EP, and 21 CFR Part 11 requirements.



Specification	Description
Dimensions	Width 1124 mm (44.3 inches) Height 521 mm (20.5 inches) Depth 575 mm (22.6 inches)
Regulatory	21 CFR Part 11 compliant Meets relevant USP and EP guidance
Laser	Class 1 laser 830 nm
Power	90–264 VAC, 50–60 Hz
Software	Requires Windows 7 Pro or Windows 10 Supplied with Agilent ContentQC analysis and management software Integrated Eigenvector Solo chemometrics engine
Sample trays	Standard trays for common capsule and tablet sizes Customizable tray designs accommodate any sample Optional Beam Enhancer technology available for increased speed and sensitivity

Agilent Resolve Raman – Handheld Through-Barrier Identification

Insight – Detect through opaque and colored barriers

Safe – No need to open or disturb containers

Fast – Accurate identification of chemicals and mixtures in about 1 minute, no sample preparation, or consumables

Rugged – Built to withstand tough environments

User-friendly – Large buttons, simple interface, designed for use in protective clothing

A new capability for hazardous materials, explosive ordnance disposal, and law enforcement

The Agilent Resolve Raman system is the world's only handheld Raman system that enables true through-barrier identification of hazardous or contraband materials. Resolve rapidly detects and identifies materials from comprehensive libraries including explosives, precursors, toxic industrial chemicals, chemical warfare agents, and narcotics. Unique to Agilent, our proprietary handheld spatially offset Raman spectroscopy (SORS) technology enables positive identification through a wide range of sealed nonmetallic containers, barriers, and packaging.

Hazardous materials

Search and law enforcement

Military and explosive ordnance disposal

Customs, borders, mailroom, and checkpoint screening

A New Capability in Chemical, Narcotic and Explosive Detection

The Agilent Resolve Raman system differs from conventional handheld Raman identification systems, which typically only operate with line-of-sight to the sample under investigation.

The system works in three modes:

Through-Barrier mode

Identifies through nonmetallic, sealed containers such as colored and opaque plastics, glass, paper, wrapping, sacks, and fabrics

Surface Scan mode

Line-of-sight measurements, similar to conventional Raman identification systems.

Vial Holder mode

Quickly identifies materials contained within glass vials in a custom holder.

Configure your own libraries

- Explosives and precursors
- Narcotics and new psychoactive substances ; including a wide range of Fentanyl derivatives
- Hazardous and toxic materials
- Household products and less common chemicals
- Chemical agents
- Create, manage, and deploy your own libraries

Identify through containers including:

Colored plastic

Colored glass

Paper

Sacks

Packaging, cardboard, and fabric

True Through-Barrier Detection and Identification

Conventional handheld Raman systems are typically limited to operation through clear plastic bags or clear glass vials. If materials are concealed behind thicker, colored, or opaque barriers, it might be necessary to open and take a sample. In hazardous material response scenarios, opening or disturbing containers can increase risk to the operator and, sometimes, the public. Taking samples can also unnecessarily disturb crime scene evidence.

The Resolve system's through-barrier capabilities enable response teams to identify container contents early in an operation, before escalation. This allows information about the situation to be gathered quickly and efficiently, enabling better critical decision making.

Identification through sealed containers

Safer operation – Keep hazards contained

Efficient – Removes the need to take samples, move objects, and waste valuable time in personal protective equipment (PPE)

Preserves evidence – Crime scenes remain intact with containers undisturbed

Make decisions faster – Get complete, accurate information earlier in the operation

Versatile measurement tools

The Resolve Raman system can do everything conventional handheld Raman systems do—point-and-shoot and vial holder measurements—but adds the capability to identify materials through barriers.

Surface Scan mode

Vial Holder mode

Increasing the power of handheld Raman identification

Agilent Resolve Raman

Resolve extends through-barrier capability to work with a wide range of non-metallic containers.

Conventional Raman identification systems

Conventional Raman systems require line-of-sight so work with clear plastic bags and vials, and some translucent packaging.

Intuitive Interface – Clear Results

The Resolve system combines a tough handheld unit with a simple, user-friendly interface. Ruggedized and hardened, the system is built to withstand harsh environments. The software interface is simple to use—full system control requires only seven large, responsive buttons, which are ideal for gloved use, even in Level A PPE. Operational managers can fully customize workflows, laser-arming passwords, and the format of results and associated metadata.

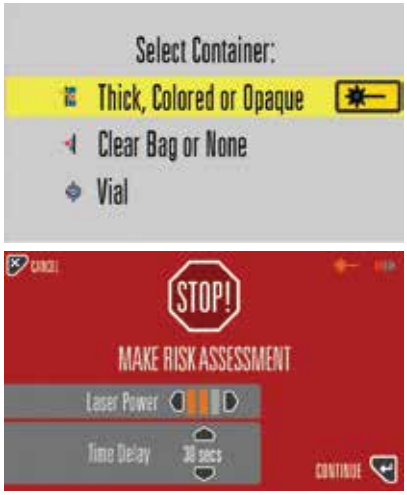
Removable nose cone for contact and noncontact scan modes – in-field calibration and performance check is built into a protective nose cap

Large 12 cm (4.7 inch) display – clear, high contrast graphics for use in all light conditions

Large buttons with positive feedback – designed for gloved use

Li ion battery pack for up to 4 hours' continuous use

All accessories, cables and chargers are supplied within a hard transport case

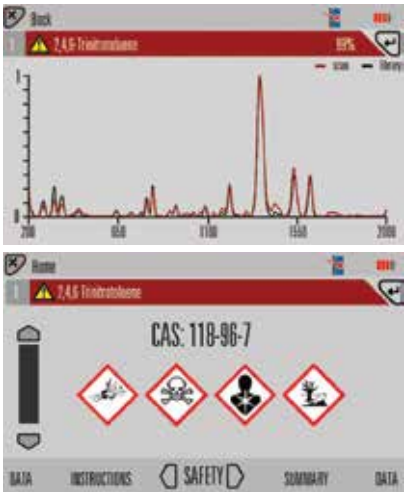


Measurement

Conduct through-barrier, surface, or vial holder scans. Measurements typically take about 1 minute (or less in some modes of operation). Operators can reduce laser power and set a scan delay where necessary.

Results

Display results as BEST match only, ALL results or user-defined PRIORITIES only.

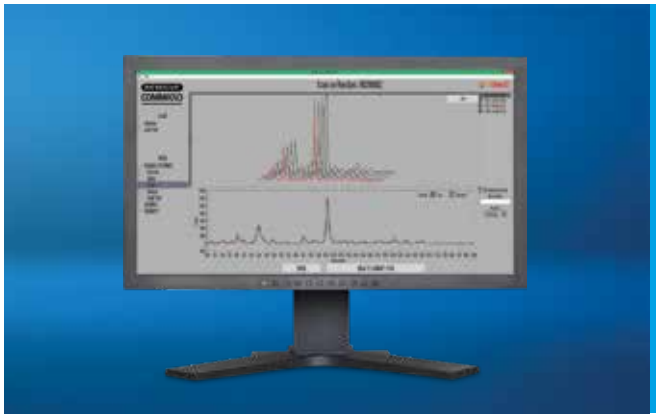


Analysis

Interrogate any result to see spectral views and simple, user-friendly chemical data.

Overplot and compare library spectra. Search by chemical name or CAS number.

Agilent Resolve Raman – Handheld Through-Barrier Identification of Hazardous Materials, Explosives, and Narcotics



Available soon: Agilent Resolve Command – centralized system management

- Manage passwords and default system settings
- Create, manage, and deploy libraries
- Centrally store and assess scan data
- Manage software updates

*Partial functionality available now. Please inquire for details.

Specification	Description
Dimensions	Width 155 mm (6.1 inches) Height 290 mm (11.4 inches) Depth 73 mm (2.9 inches)
Weight	2.2 kg (4.9 lb) including battery
Modes of operation	Through-barrier scan Surface scan (conventional point and shoot Raman) Vial Holder mode
Additional benefits	830 nm laser – allows scanning of fluorescent materials Unique optics – safer operation with sensitive samples
Safety	Scan delay Adjustable laser power (475 mW maximum)
Survivability	Shock, drop, and vibration tested to international and military standards (further details available on request) IP67 – ingress protection against dust and water
Accessories	Calibration piece, laser safety glasses, shoulder strap, and carry case Two Li ion battery packs and one single-bay charger Vial holder
Power requirements	Rechargeable Li ion battery Mains adaptor
Connectivity	USB 2.0 External power
Export data	Data files for offline analysis Evidential reports and image files Reachback files for specialist support

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