

Raman spectroscopy food & beverage application guide

Trusted technology for composition
analysis in a laboratory or process
environment



Applications in process and product quality

Benefit from our lab-to-process Raman spectroscopy offerings to ensure consistent product quality

Deliver consistent product quality from the beginning

Endress+Hauser helps you efficiently and consistently deliver a quality product. Raman spectroscopy is a non-destructive and highly specific chemical analysis for the laboratory or process, providing the capability for *in situ*, real-time analysis of multiple components with a single probe. Through this information, you can gain new understanding, monitor product quality, and adopt advanced process control strategies.



The Raman Rxn2 for laboratory or process development applications

Raman applications

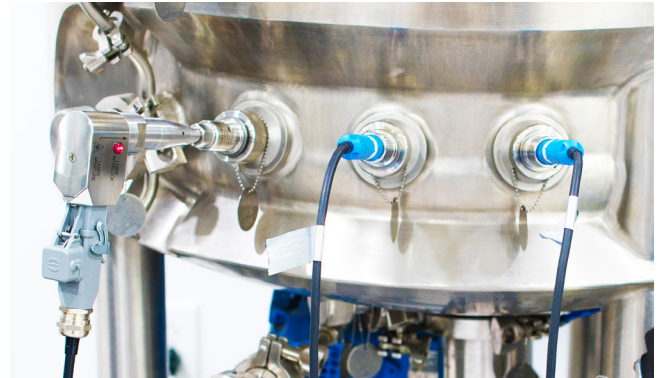
Application family	Application	Parameter	Application note title(s)
Fats and oils	Fat or oil quality in foods	Fatty acid saturation Iodine value PUFA	Fast Raman screening of unsaturation of fats in pork Raman spectroscopy at 1000 nm for chocolate measurements Screening of margarine adulteration in butter Determination of unsaturation in food oils and fats
Dairy solids	Solid dairy powder product quality	Fat Protein Carbohydrates	Raman spectroscopy for measurement of solid dairy powders
	Final semi-solid product quality	Fat Protein Pigments	Screening of margarine adulteration in butter
Meat and fish processing	Raw meat or fish grading	Fats Protein Pigments	Fast Raman screening of unsaturation of fats in pork Multi-attribute salmon quality monitoring using Raman spectroscopy
	Meat byproduct hydrolysis	Protein Fat Ash weight Bone calcium	The role of Raman spectroscopy in meat processing

Contact Endress+Hauser for additional product and process related parameters.

Applications in biotechnology

Scalable Raman technology so you can consistently deliver excellent product from lab to production

Biotechnology is the oldest and newest food production technique Biotechnology, the use of biological organisms to transform a material, has been used for thousands of years to preserve foods and beverages. Today, biotechnology encompasses fermentations and mammalian cell growth to preserve, functionalize, and create food and beverages. Modern biotechnology processes require new manufacturing approaches that include detailed scientific understanding, 24/7 process knowledge, and data-based control. Endress+Hauser uses its decades of experience in biotechnology to offer food and beverage companies in-depth product composition knowledge and statistical process control strategies based on Raman spectroscopy.



The Rxn-45 probe for clean-in-place installations

Raman applications

Application family	Application	Parameter	Application note title(s)
Plant-based, cell-based, algae, fungi, or air-based meat analogues	Mammalian cell growth	Glucose Lactate Titer VCD ...and more	Raman-based nutrient control in bioprocessing Analysis of a mammalian cell culture
	Fermentation	Sugars Alcohol Biomass ...and more	Analysis of a batch fermentation process Advanced bioprocess control
	Formulation optimization Protein ingredient	Protein crystallinity Molecular structure	In-line Raman monitoring of protein crystallization Optimizing plant-based proteins using Raman spectroscopy
Alcoholic spirits	Juice or mash production	Fructose Glucose Inulin	Contact Endress+Hauser for more information
	Fermentation	Sugars Alcohol Biomass ...and more	Analysis of a batch fermentation process Advanced bioprocess control

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