

Water and nutrient analyses finally mastered

Powerful. Efficient. Confident.



Gallery Aqua Master and Gallery Plus Aqua Master discrete analyzers

The importance of contaminant and nutrient analysis



Environmental monitoring and disease surveillance

Analysis of contaminant and nutrient levels in drinking, surface, and wastewaters is essential to protecting aquatic habitats and maintaining clean drinking water supplies. Utility companies and environmental laboratories regularly measure elemental phosphorus and nitrogen in waters, along with a range of other pollution indicators, to ensure that discharge streams are compliant with regulatory standards. Wastewater nutrient analysis is also used to assess population-level infection, including SARS-CoV-2 surveillance, to support biomarker-based population size estimates.



Nutrient analysis

Determination of nutrient levels in soil, fertilizer, and plant extracts is critical for maximizing crop yield and providing effective, risk-based control of the food chain. Fertilizer manufacturers, agricultural service providers, and commercial soil-testing labs need accurate and reliable results to provide their clients with agronomic assessment and recommendations for soil augmentation.



Industrial manufacturing

Most industrial manufacturing processes, such as crude oil distillation, paper production, power generation, and high-speed microprocessor production, require large quantities of high-purity water to avoid scaling and corrosion and to maintain component functionality and reliability. For these industries, accurate monitoring of the quality of raw water intake and process waters is a necessary everyday task.

Gallery and Gallery Plus Aqua Master discrete analyzers

Master your applications with efficiency and confidence solutions

Environmental and industrial process monitoring, disease surveillance, and nutrient analysis applications all benefit from the accurate, efficient, and easy-to-use Thermo Scientific™ Gallery™ and Thermo Scientific™ Gallery™ Plus Aqua Master Discrete Analyzers. As integrated and highly-automated platforms, the analyzers provide a faster and safer turnkey alternative to traditional wet-chemistry methods. The analyzers not only improve the reliability and sensitivity of results compared to manual techniques, but they also increase laboratory productivity by freeing staff to work on other tasks. Adding to that, their automated workflows eliminate the need to handle hazardous reagents, for a safer and healthier work environment.



The limitations of traditional wet chemistry methods

Traditional wet chemistry techniques, including titrations, flow injection analysis, and other colorimetric techniques, have been used for many years to undertake nutrient analysis of drinking water, wastewater, and soil samples. However, these approaches are slow, labor-intensive and often unreliable, involving hazardous reagents that add substantial costs for waste disposal.



Time-consuming

Tests are sequential and involve complex manual methods, resulting in lengthy workflows.



Labor-intensive

Wet chemistry methods require highly-skilled technicians to operate equipment, perform analyses, and regularly maintain instruments.



Unreliable

Multiple manual steps can add significant sources of error, reducing overall measurement accuracy.



Wasteful

Workflows require large quantities of reagents and produce high-volume waste streams, increasing the testing cost-per-sample.

Automated, high-throughput water and nutrient analysis

It's what laboratories ask for

Accurate, efficient, and easy-to-use solution for confident and cost-effective results

Combining rugged hardware, custom-designed software, and simple operation, the Gallery and Gallery Plus Aqua Master discrete analyzers are built for high-throughput water and nutrient analysis. Powered by software designed to simplify water and nutrient analysis with a higher level of automation, the analyzers minimize manual errors, for less hands-on time and more walk-away efficiency.

The software includes highly sought-after features that improve usability in calibration orders, relative standard error (RSE) calculations, QC schemes, automated spiking, flexible reporting, and smartly suggested dilutions, enabling laboratories to automate test workflows following local regulations, such as United States Environmental Protection Agency (U.S. EPA) regulations.

Analytes and parameters of interest

- Alkalinity
- Ammonia
- Chloride
- Cyanide*
- Hexavalent chromium
- Nitrate (NO₃ only automated calculation)
- Nitrate + Nitrite (TON) (enzymatic, hydrazine, or vanadium reductions)
- Nitrite
- Orthophosphate
- Silica
- Sulfate
- Sulfide*
- Total hardness
- Total Kjeldahl nitrogen (TKN)*
- Total phenol*
- Urea (Ammonia)
- Total phosphorous (TP)*
- pH & conductivity

* Third party reagent

Gallery Aqua Master discrete analyzer workflow

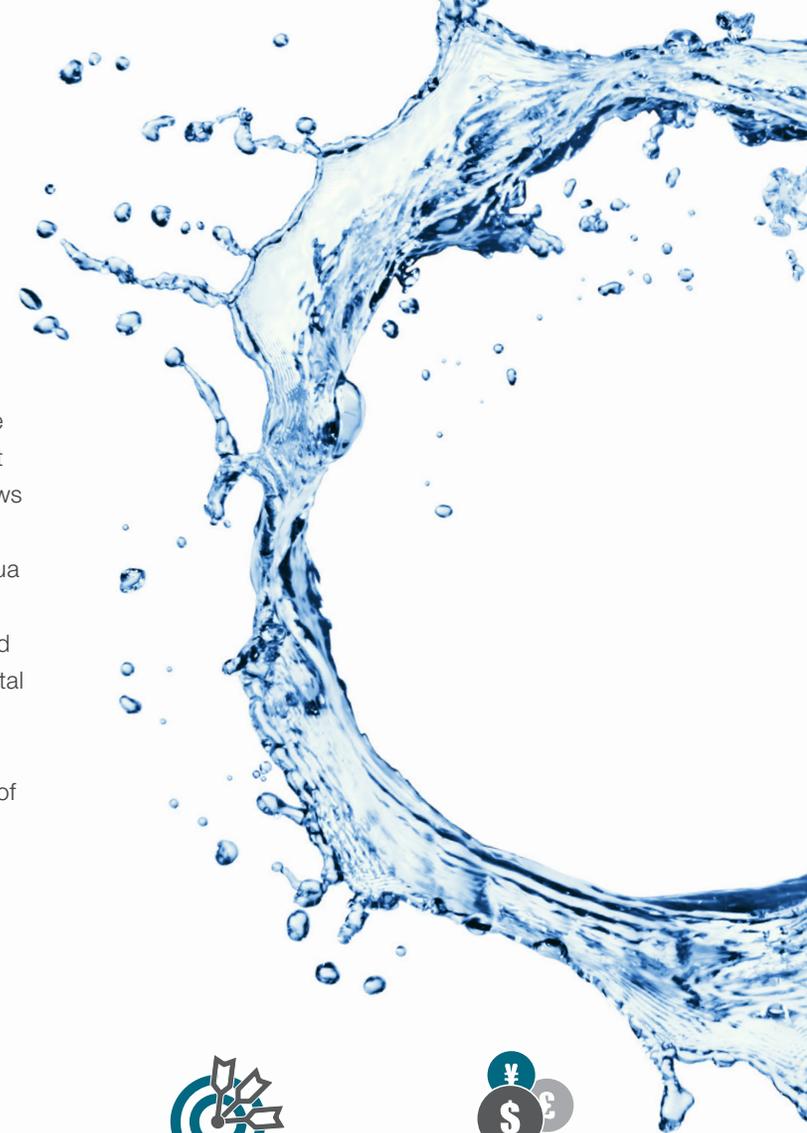


Automation offers a better way to perform analyses

As a fully-automated platform with high-throughput measurement of up to 20 parameters simultaneously, the Gallery Aqua Master analyzers ensure every test is performed according to precise, predefined workflows. These workflows require no user intervention once the premixed, ready-to-use reagents are loaded into the instrument. Automation not only improves the reliability and sensitivity of results compared to manual wet chemistry techniques, but it also boosts laboratory productivity by freeing staff to walk away and work on other value-added tasks. Simply load the samples, insert the reagent vials and leave the analyzer to do its work for up to three hours of walkaway time. By eliminating the need to handle hazardous reagents, the analyzers' automated workflows help to protect the health and safety of laboratory employees.

Built for regulated analyses

Environmental contaminants commonly analyzed include inorganic anions, cations, heavy metals, organic pollutants, and nutrients. The U.S. EPA Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) are the two most important environmental laws in the U.S. that govern water regulations. For regulated analyses, the Gallery and Gallery Plus Aqua Master discrete analyzer workflows are verified to meet the U.S. EPA-approved reference methods and international regulatory requirements for environmental wastewater and drinking water analysis. The analyzers' software provides sought-after features that enable laboratories to achieve a higher degree of workflow automation and usability when following regulated methods and international standards.



Four benefits of Gallery Aqua Master analyzer



Walkaway efficiency

Up to 20 parameters are tested simultaneously. Test workflows are highly automated for up to 350 tests per hour and 3 hours of walkaway time.



Low training needs

Easy to operate by a single technician for all expertise levels. New users can be trained easily in hours. Lab staffing issues resolved.



Reliable and compliant

Reduced manual handling errors and fully traceable results. Workflows are automated following U.S. EPA methods and international standards.



Cost effective

Reduced sample and reagent volumes (only 2–240 µL) for lowest waste generation. Consequently, a reduced cost-per-analysis (up to 20 times lower).

Software streamlines workflows and compliance

Set-it-and-forget-it productivity

The walkaway productivity of the Gallery and Gallery Plus Aqua Master discrete analyzers is powered by software that performs the required calibration orders and RSE calculations, routine quality-control (QC) schemes, automated spiking, flexible reporting, and easy rerun of samples requiring new dilution factors. These are the most sought-after features that enable laboratories to fully automate their testing workflows while following the local regulations. Even the most complicated spiking, calibration, and QC procedures can be fully automated using the Gallery and Gallery Plus Aqua Master discrete analyzers.

Choice of automated calibration method and order with RSE calculation

- Comprehensive calibration commands and flexibility.
- Ascending or descending concentration calibration orders.
- Automated RSE calculation with user-defined limits and automated error flagging if a limit is exceeded.
- Instant feedback for calibration and goodness-of-fit.

Nbr	Calibrator	Concentration axis	Response axis	Dilution 1 +
1	Cal1	Default	Ascending	0
2	Cal2	Default	Descending	0

Choosing the calibration order to meet method requirements—either ascending or descending—is fast and easy using the Gallery Aqua Master discrete analyzer software.

Flexible, automated QC procedures

- Complicated spiking, calibration sequences, and QC procedures can be automated to follow U.S. EPA methods and international regulatory requirements.
- User-configurable QC elements and procedures can be set to run at defined intervals, and at the start or end of a run.
- If multiple QC procedures must be run, their sequence is user definable.
- Each time a QC procedure is run, the software will run the user-defined control sequence appropriate for the run group.
- Automated transfer of QC data into the Gallery Aqua Master discrete analyzer's QC charts to visualize trends saves time compared to manually transferring data to other software.



Automated spiking for easy interferences identification

- Spiking series can be automatically and repeatedly performed at user-specified intervals.
- Saves time and reduces error compared to manual sample spiking.
- Automated calculation of the concentration of native and spiked samples, recovery for both spiked samples, and the Relative Percent Difference (RPD) between spiked samples.
- User-defined minimum and maximum limits for percent recovery and maximum limit for RPD.

The screenshot shows a configuration window with several tabs: 1 Messages, 2 Actions, 3 Maintenance, 4 User definition, 5 Adjustment program, 6 Water blank results, and 7 Configuration. The '7 Configuration' tab is active, showing settings for the analyzer. A red box highlights the 'Perform QC in start and end of run' section, which includes options for 'Use barcode checkdigit' and 'Report result outside of test limits'.

It's easy to define whether and how QC procedures are automatically performed.

Easy rerun of samples with new dilution factors

- Multiple samples can be rerun without having to individually define a new dilution factor for each.
- Smart suggested dilution provides multiple possibilities of automated sequential dilution.

Flexible results reporting

- Versatile results reporting, including predefined and easily customizable report templates available by test.
- Environmental laboratories can report by tests and by batch.

The screenshot shows the 'Procedure' list and 'Controls and rules' table. The 'Procedure' list has columns for 'Procedure', 'Trigger', and 'Usage'. The 'Controls and rules' table has columns for 'Control', 'Current Lot', 'Conc.', 'SD', 'Req. count', and 'Run group'. A red box highlights the 'Start of run' and 'End of run' checkboxes in the 'Trigger' column.

Control	Current Lot	Conc.	SD	Req. count	Run group
d	Default	20	1,0	1	1
c	Default	10	1,0	1	2
e	Default	30	1,0	1	all

The software enables setup of automated QC triggers, and controls and rules. If multiple QC procedures are needed, their order is set up in the "Procedure" list.

The screenshot shows the 'Report editor' interface. The 'Test results report' template is displayed, showing a table with columns for 'Sample/ctrl ID', 'Test', 'Accepted', 'Result time', and 'Result'. The 'Report editor' tab is active, and the 'Test results report' is selected.

The screenshot shows the 'Sample report' dropdown menu with the following options: Default 1, Test report, Custom, Spreadsheet report, Default, Archive window list report, Default, Results window list report, Default, and Archive window spreadsheet report, Default.

The report editor includes versatile capabilities to report test results, including report templates that can be easily customized to meet laboratory needs.



Combining simple operation with advanced technology

Automate labor-intensive and time-consuming multiparameter wet chemical analysis with a single instrument



Unique disposable Thermo Scientific™ DECACELL™ cuvettes

- Ten independent reaction cells of a DECACELL cuvette are mounted together for discrete analysis
- Reduced sample and reagent volumes (just 2–240 µL) for low waste generation and a reduced cost-per-analysis helps laboratories meet sustainability and cost reduction goals
- No carryover or cross-contamination for trusted results every time



Gallery Aqua Master discrete analyzer

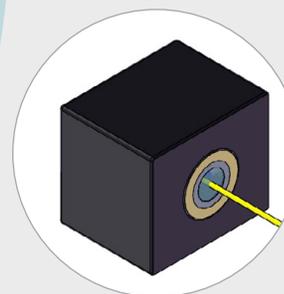
Includes a combined sample and reagent disk for a maximum capacity of 90 samples and 30 reagents, with the ability to run up to 200 tests per hour.



Gallery Plus Aqua Master discrete analyzer

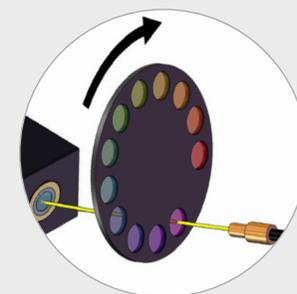
Accommodates 108 samples and 42 reagents in separate sample and reagent disks, with the capability to run up to 350 tests per hour.

Analyzer name	Description	Part number
Gallery Aqua Master discrete analyzer	Up to 200 photometric tests/hr	98610005
Gallery Aqua Master discrete analyzer with ECM unit	Up to 200 photometric tests/hr; up to 67 pH and conductivity measurements/hr	98611005
Gallery Plus Aqua Master discrete analyzer	Up to 350 photometric tests/hr	98620005
Gallery Plus Aqua Master discrete analyzer with ECM unit	Up to 350 photometric tests/hr; up to 67 pH and conductivity measurements/hr	98621005



Maintenance-free Xenon light source

- Good for years of operation, no need to change light every 3–6 months
- Energy-efficient design for cost savings
- Sensitive to the parts per billion (ppb) level



Wide range of filters

- 12 filter positions available, delivering up to 20 different chemical parameters-per-sample
- Wide wavelength coverage: 340–880 nm



Advanced software, more automation

- Calibration orders of ascending and descending concentrations
- Calculate and define relative standard error (RSE) for calibrations
- Fully automated QC procedures
- Fully automated spiking
- Smart suggested dilutions, possibilities of multiple sequential automatic dilution
- Flexible reporting by tests and by batches
- Automatic start-up and shutdown



Robust analyzer

- Minimal moving parts means less maintenance and down time
- Automated mixing that delivers proven, reproducible results
- Calibration curve stability
- **Add new samples mid-cycle** without disrupting current measurements, even greater time saving
- **Low maintenance.** Equipped with durable components for a system family average of <1 service visit per year



Flexible system

- Existing methods can be modified
- Up to four different reagents can be added to a method
- Easy-to-implement Alternate Test Protocol (ATP) and new methods
- Variable incubation temperature from 25–60 °C
- Open to self-prepared and third party reagent for more method development
- **Easy to transfer** existing segmented flow test methods or photometric methods



Ready-to-use reagent kits

- Improves safety by simplifying reagent handling, avoiding exposure to highly corrosive and hazardous chemical
- More than 40 different chemistries to choose from
- Only μL of consumption per test for low cost and wastage
- Bar-coded reagent vials include lot, expiration data, and vial size data for:
 - Easy and reliable identification
 - Real-time reagent monitoring



Improved traceability

- Bi-directional LIMS connection for easy and secure data transfer
- Easy sample table import and workflow-based operation, for all user levels
- Built-in barcode readers for samples and reagents



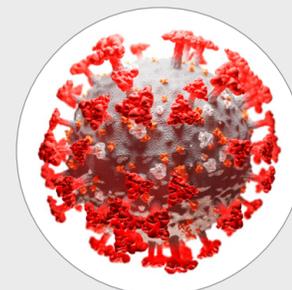
High-throughput analyzer

- Perform simultaneous photometric and electrochemical measurement techniques, including pH and conductivity
- Up to 350 photometric tests per hour
- Up to 67 ECM tests per hour



Optional electrochemical measurement (ECM) module

- Integrated parallel pH and conductivity measurements:
 - pH range: 2–12
 - Conductivity: 20 $\mu\text{S}/\text{cm}$ –112 mS/cm



Streamline SARS-CoV-2 wastewater surveillance

- Saves time by automating colorimetric and enzymatic measurements of multiple analytes simultaneously
- Ready-to-use reagents simplify workflows for enhanced speed, safety, and accuracy
- Follows internationally approved DIN, ISO, and U.S. EPA standard methods for regulatory confidence

Overcome Nitrate + Nitrite (TON) measurement challenges

Using safer enzymatic methods

Measurement of Nitrate + Nitrite (TON) is required for accurate determination of nitrate concentration in drinking water and wastewater. Methods based on cadmium reduction coils have traditionally been for TON determination. However, these methods have several limitations. Cadmium is a carcinogenic heavy metal, and the coil used in TON methods must be replaced every few measurements to reduce the risk of harmful exposure. Column regeneration requires handling additional hazardous chemicals and produces waste that must be carefully disposed of at a significant cost. These processes, as well as downstream analyses using flow injection or colorimetric analyzers, involve time-consuming, manual steps that are sources of measurement inaccuracies.

Move away from the cadmium reduction coil methods

The Gallery and Gallery Plus Aqua Master discrete analyzers support the new National Environmental Laboratories Accreditation Conference (NELAC) and U.S. EPA-approved enzymatic reduction methods for safer TON measurements. These methods use nitrate reductase to convert nitrate to nitrite and then Griess reagents are used to produce an intensely colored compound for quantification by spectrophotometry.

The discrete analyzers automate the entire analysis, delivering high-throughput results without pH adjustment of preserved samples or time-consuming cadmium packing or regeneration steps. Convenient, ready-to-use reagents eliminate the need to handle hazardous chemicals, improving safety, and removing a source of experimental error. Discrete analyzer reproducibility ensures robust measurements even when working with challenging matrices, such as saline, in compliance with 40 CFR Part 141.23, 40 CFR Part 141, NECi-N07-0003, USGS I-2547-11, USGS I-2548-11 and, NECi Nitrate-Reductase regulatory standards. The greener enzymatic method eliminates hazardous waste disposal, further reducing costs-per-analysis.

Limitations of traditional cadmium reduction coil methods



Carcinogenic health risk



Costly waste disposal



Time-consuming, manual methods

Advantages of enzymatic Nitrate + Nitrite method



Green chemistry



No sample preservation or pH adjustment



Cost effective

Achieve regulatory compliance

With confidence

Regulatory compliance with confidence

All Thermo Scientific Gallery and Gallery Plus discrete analyzer methods are compliant with U.S. EPA, NELAC, and recognized international standards. Thanks to automated calibration functionality, robust analytical performance, ready-to-use buffers, and National Institute of Standards and Technology (NIST) traceable standards, laboratories can be confident their tests comply with the latest regulatory requirements. Also, industrial organizations can be assured that wastewater streams meet permissible nutrient levels.

Gallery discrete analyzers

U.S. EPA wastewater reference methods			
Analyte	Regulatory method	Analyte	Regulatory method
Alkalinity	EPA 310.2 (Rev. 1974)	Nitrate + Nitrite (TON) (Hydrazine reduction)	SM 4500-NO3-H
Ammonia	EPA 350.1 (Rev. 2.0 1993)	Nitrate + Nitrite (TON) (Vanadium reduction)	NEMI (Nitrate via manual Vanadium (III) reduction)
	SM 4500-NH3-F		
	SM 4500-NH3-G		
COD*	EPA 410.4 (Rev. 2.0 1993)	Nitrite	N07-0003 (Bypass enzymatic reduction)
Chloride	SM 4500-Cl-E		SM 4500 NO2-B
Chlorine (Total residual)*	SM 4500-Cl-G	Orthophosphate	EPA 365.1 (Rev. 2.0 1993)
Conductivity	EPA 120.1 (Rev. 1982)		SM 4500-P-E
Copper*	SM 3500-Cu-C	pH	EPA 150.2 (Dec. 1982)
Cyanide (Amenable)*	SM 4500-CN-G	Silica	SM 4500 SiO2-C
Cyanide (Total)*	EPA 335.4 (Rev. 1.0 1993)		SM 4500 SiO2-D
		SM 4500-CN-E	Sulfate
Fluoride	SM 3500-F-D	ASTM D516-16	
Total hardness	EPA 130.1 (Issued 1971)	Sulfide*	SM 4500-S2-D
Chromium	SM 3500 Cr-B		Total Kjeldahl nitrogen (TKN)*
Iron	SM 3500 Fe-B	Total phenol*	EPA 420.1 (Rev. 1978)
Nitrate + Nitrite (TON) (Enzymatic reduction)	N07-0003		
	ASTM D7781-14		
	USGS I-2547-11		
	USGS I-2548-11	Total phosphorous (TP)*	EPA 365.1 (Rev. 2.0 1993)
			EPA 365.4 (Issued 1974)
			SM 4500-P-E

* Third party reagent

U.S. EPA drinking water reference methods	
Analyte	Regulatory method
Conductivity	SM 2510-B
Cyanide (Total)*	EPA 335.4
	SM 4500-E
Cyanide (Amenable)*	SM 4500-G
Fluoride	3500-F B, D
Nitrate + Nitrite (TON) (Enzymatic reduction)	NECi Nitrate-Reductase
Nitrite	NECi Nitrate-Reductase (Bypass enzyme)
	SM 4500-NO2-B
pH	EPA 150.2
Orthophosphate	EPA 365.1
	SM 4500 P-E
	SM 4500 P-F
Silica	SM 4500 SiO2-C
	SM 4500 SiO2-D

Power your agricultural testing

With a turnkey solution

Agricultural testing is seasonal. Sample throughput requirements are very high during the growing seasons, making it challenging to meet testing demands. For example, in peak season laboratories must test thousands of soil samples each day using the Bray method to estimate the relative bioavailability of inorganic ortho-phosphate in soils.

Traditionally these tests have used a segmented flow analyzer (SFA)—a tedious technique—in which samples are run 24 hours a day over four shifts to meet demand. Operating, troubleshooting, and maintaining SFA instruments requires specialized experts that are difficult to find in a high-turnover labor market.

The high-throughput Gallery Aqua Master discrete analyzer addresses these challenges with a turnkey solution for agricultural testing. Laboratories wishing for more hours in a day will appreciate the up to three hours of true walkaway time that can be used to carry out other important tasks.

Common parameters tested in soil, fertilizer, and plant extract samples using the Gallery Aqua Master discrete analyzer

- Ammonia
- Boron*
- Calcium
- Chloride
- Cyanide*
- Fluoride
- Hexavalent chromium
- Magnesium
- Nitrate + Nitrite (TON) (enzymatic, hydrazine, or vanadium reductions)
- Nitrite
- Orthophosphate
- Potassium
- Silica
- Sulfate
- Sulfide*
- Total hardness
- Total Iron
- Total Kjeldahl nitrogen (TKN)*
- Total phosphorous (TP)*
- pH & conductivity

* Third party reagent

Optional integrated ECM module

Parallel pH and conductivity testing in waters and soils

Electrochemical pH and conductivity measurements are important in wide range of environmental and industrial-testing applications. The Gallery and Gallery Plus Aqua Master discrete analyzers support an optional electrochemical measurement (ECM) module. The ECM module provides simultaneous pH and conductivity testing in parallel with the analyzers' full range of photometric measurements. The module's two electrodes work in series, enabling up to 67 electrochemical, along with up to 350 photometric, tests per hour.



ECM module benefits for pH and conductivity testing in waters and soils



Water

Measure pH to:

- Protect equipment from acid corrosion
- Detect viral activity

Measure conductivity to:

- Quantify total dissolved solids
- Protect against scale build-up
- Ensure environmental discharge standards are met
- Create detailed inorganic profiles for regulatory compliance



Soil

Measure pH to:

- Determine soil reaction (i.e., soil acidity/alkalinity) to optimize crop yields
- Assess microbial activity

Measure conductivity to:

- Determine soil salinity
- Assess nutrient mobility

Save time, reduce errors

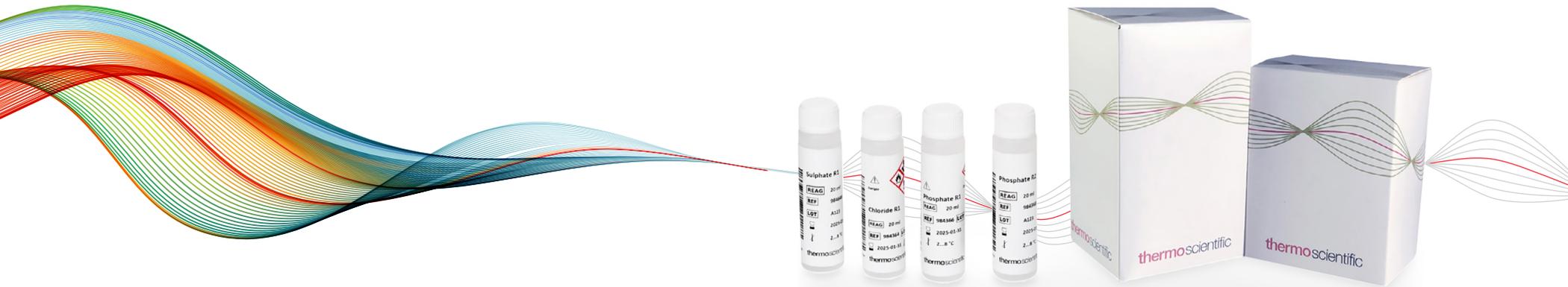
With ready-to-use reagents

Save time by eliminating reagent preparation with ready-to-use Thermo Scientific™ Gallery™ Discrete Analyzer Reagents and Enzymatic Kits specifically developed for environmental and industrial applications. Enzymatic assay kits are accessible to any user, including users without specialized scientific backgrounds. The system reagents and assay kits are ready to use, saving technician time and reducing errors.

Environmental testing

Choose from 40 ready-to-use Gallery discrete analyzer system reagent kits for environmental testing of water, including clean water, wastewater, soil and sludge digests, effluents, and saline. The kits include reagents in 20 mL barcoded vials, allowing the necessary identification data, such as lot and expiration date, to be read automatically by the discrete analyzers'

barcode reader. Automated dilutions make it possible to apply methods for a wide range of analyte concentrations and the test applications are based on recommended standard water and wastewater methods used in most countries. A wide range of calibration standards ensures traceable results.



Learn more about ready-to-use Gallery discrete analyzer reagents and enzymatic kits

Benefits of using Gallery discrete analyzer reagents



Reduced cost per analysis

The unique low-volume cuvette guarantees the smallest reagent consumption (2-240 µL), minimizes reagent waste, and reduces reagent costs. Optimized kit sizes and onboard stability further minimize the waste produced and increase cost efficiencies.



Traceability

Each vessel is barcoded with important data including reagent identification, volume, lot, and expiration date. The Gallery discrete analyzers' built-in barcode reader improves traceability and continuously monitors reagent consumption to provide real-time reagent status.



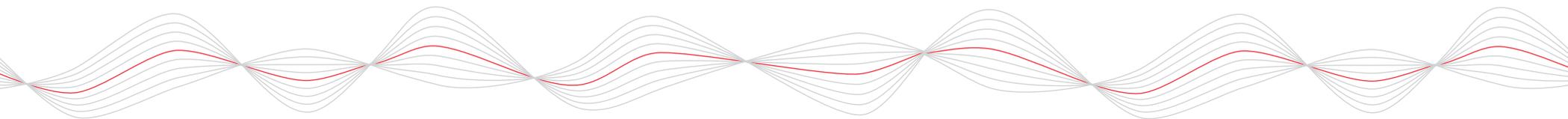
Efficiency

The ready-to-use reagents ensure the Gallery discrete analyzers are easy to use and automated, eliminating extra preparation steps and simplifying testing to provide both time and cost savings.

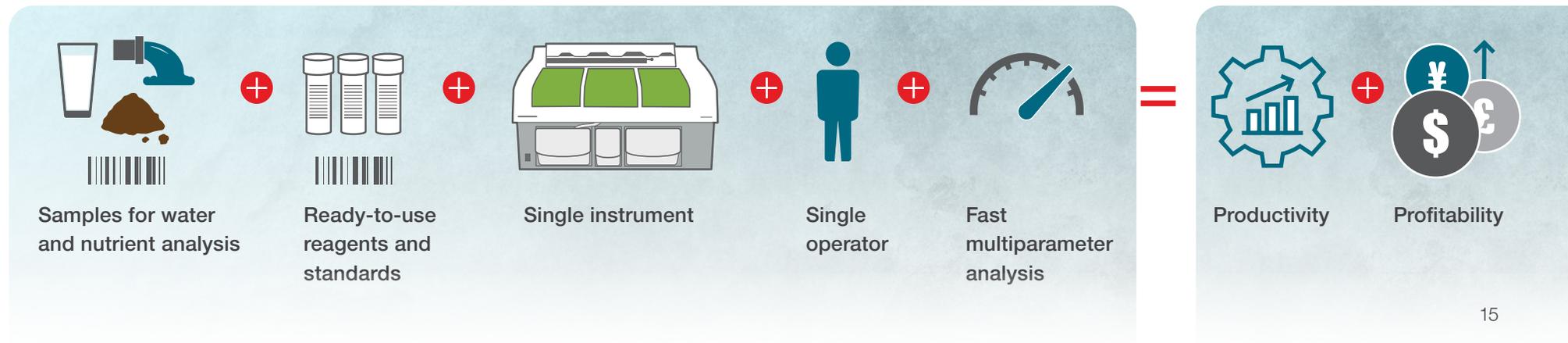


Accuracy and reproducibility

The reagents are ready to use, reducing errors due to manual steps and ensuring confidence in the quality of results.



Water and nutrient analyses finally mastered





Protecting your investments: unparalleled laboratory services

Unity™ Lab Services provides a single source for integrated lab service, support, and supply management. Our customized service offerings and world-class service experts have the flexibility and experience to effectively address your laboratory's business needs. We provide a complete portfolio of services and support solutions designed to help you improve productivity, reduce total cost of ownership, and ensure performance throughout your laboratory—from instrument and equipment acquisition to disposition.

unitylabservices.com

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