Diamond SPECTRUM

PART OF TAAWON GROUP

PRODUCT CATALOG

FOOD, BEVERAGE, AND FEED

CHOICE OF EXCELLENCE

www.taawon.com

ABOUT DIAMOND SPECTRUM

Welcome to Diamond Spectrum, a member of Taawon Group – Your Premier Partner in Laboratory Solutions!

At Diamond Spectrum, we specialize in providing an unparalleled range of high-end laboratory solutions, consumables, and disposables. Our commitment revolves around delivering excellence, compatibility, and exceptional value and support.

Discover a world of reliable solutions tailored to elevate your laboratory experience. Diamond Spectrum is here to redefine standards and exceed expectations in the pursuit of scientific excellence.

OUR VISION

To be the leading partner in advancing laboratory and industrial technologies across the region, recognized for empowering innovation with a comprehensive range of reliable, cutting-edge systems and solutions.

OUR MISSION

Our mission is to empower our customers' success by delivering superior-quality laboratory and industrial equipment, with high customer satisfaction rate, enabling measurable improvements in their operational performance each year

TAAWON GROUP JOURNEY

Since its establishment, Taawon Group has grown from a local supplier into a trusted regional leader in laboratory and scientific equipment. Over the years, we have expanded our portfolio, forged global partnerships, and introduced pioneering technologies to the Middle East market. Today, our legacy is built on decades of expertise, innovation, and unwavering commitment to customer success.

2008

Taawon Founded in Jordan

2009

Diamond Spectrum Founded in Saudi Arabia

2013

Altayf Althahabi (TTSL) Founded in UAE

2019

Companies incorporated under Taawon Group

2021

Diamond Spectrum Founded in Bahrain

ASSOCIATION & GROUP COMPANIES

Taawon
Jordan

Diamond Spectrum - DS
Saudi Arabia

Altayf Althahabi - TTSL
United Arab Emirates

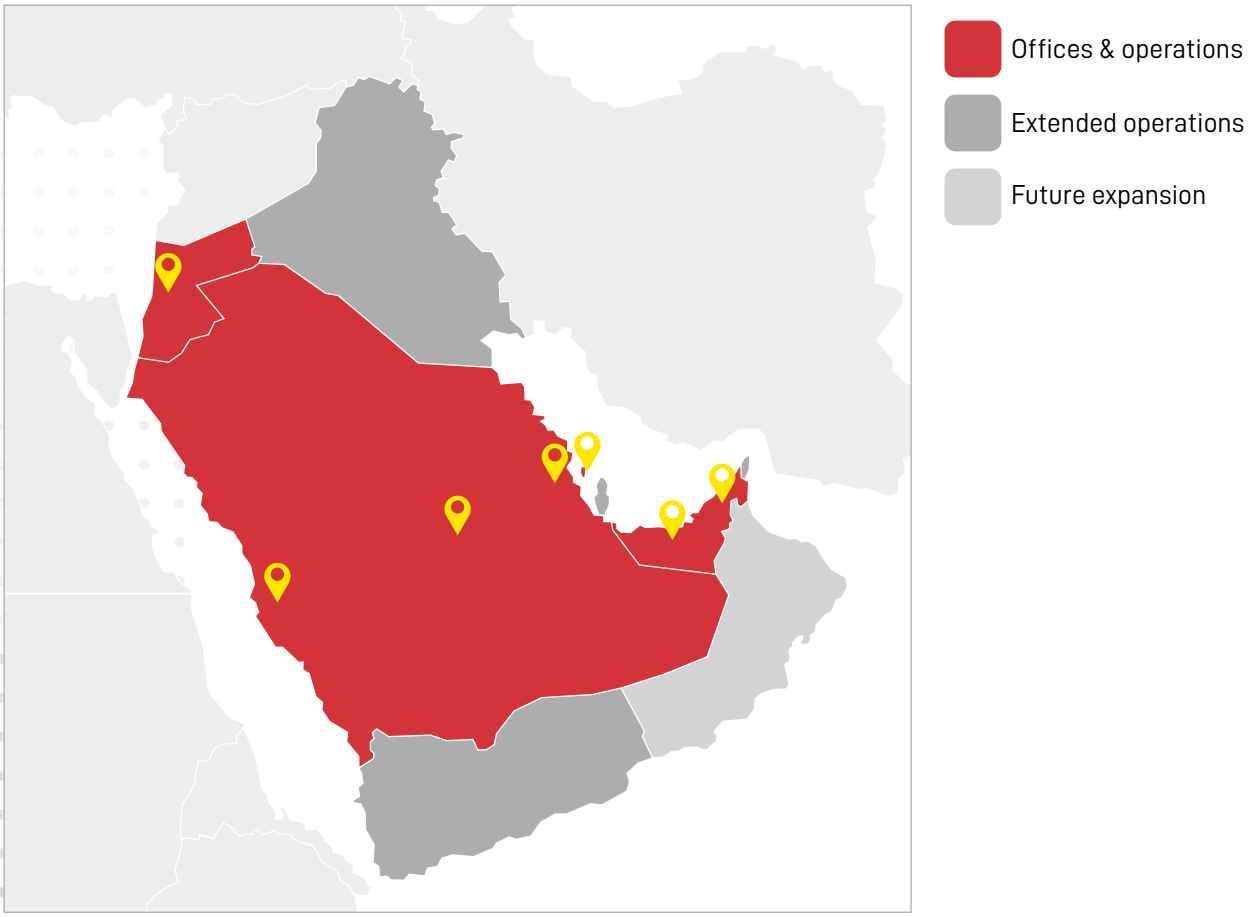
Diamond Spectrum - DS
Bahrain

4000 + customers

100 + employees

4 countries

7 offices



APPLICATIONS & INDUSTRIES

Taawon Group offers a comprehensive portfolio of laboratory, industrial, and scientific solutions designed to meet the highest industry standards and regulations in a wide variety of sectors.

Pharmaceuticals

Energy & Petrochemicals

Chemicals

Food, Beverage &Feed

Academia & Research

Nano technology

Material Testing

IVF and Life Science

Warehouse Monitoring

TABLE OF CONTENT

TABLE OF CONTENT

BÜCHI

Separation & NIR Solutions

Separation & NIR Solutions

Separation Instruments

Evaporation

- The Rotavapor® line provides laboratory evaporators with varied flask capacities (50 mL to 5000 mL) and temperature ranges (up to 95 °C for R-80, up to 220 °C for R-300).
- Modular design allows integration of vacuum interface modules and central controller units to regulate pump, condenser, and evaporator in a unified system.
- The footprint-optimized design (for example R-80: up to 1000 mL flask and compact footprint) emphasizes energy efficiency and lab-space economy.

Digestion

- The KjelDigester supports up to 20 sample positions simultaneously, with maximum temperature 450 °C and methods programmable.
- The SpeedDigester series features dual heating chambers with independent control to assure homogeneous heating and avoid foaming of critical samples, with max temperature up to 580 °C.
- Samples can be automatically transferred in rack format into autosampler units for high-throughput nitrogen/protein determination workflows.

Steam Distillation

- Steam distillation is described as a separation process where hot steam is bubbled through the sample mixture, lowering boiling points of components so they can distill at lower temperatures and avoid decomposition of heat-sensitive compounds.
- The technique is heavily used for analytes such as ammonia (from proteins), volatile acids, essential oils, alcohols, sulfite, cyanide, and formaldehyde in food, beverage, environmental and chemical testing.

Separation & NIR Solutions

Separation Instruments

Chromatography

- The "Pure Chromatography Systems" support both flash and prep-HPLC separations in one compact automated platform, with UV and ELSD detection.
- Cartridges are prefilled in sizes from 4 g to 5000 g, and columns include IDs from 4.6-70 mm and particle sizes 5-15 µm for scalability.
- Systems include safety features such as closed fraction collector bay, leak and pressure sensors, front-accessible column holders, and are designed to operate even outside a fume hood.

Extraction

- The UniversalExtractor supports six distinct extraction positions allowing individual process control for simultaneous operations of different extraction methods.
- The FatExtractor is designed for fast, compliant fat extraction with interchangeable glass assemblies and supports Soxhlet, Randall or Twisselmann techniques.
- Extraction instrument categories include pressurised solvent extractors and solvent extractors offering method reproducibility, high-speed heaters, and advanced process control.

Encapsulation

- Encapsulation is achieved via spray-drying techniques, turning aqueous or organic solutions/emulsions into dry powder particles in a single step,.
- In spray drying for encapsulation, the process allows control over particle size, and morphology (spherical, hollow, wrinkled).
- The encapsulation capability is leveraged in drying systems that incorporate designed interfaces and process parameters such as inlet temperature, feed rate, and airflow to tailor final product characteristics.

Separation & NIR Solutions

Separation Instruments

Incineration

- Incineration equipment is offered under the "Auxiliaries for Incineration" product type, which supports sample ashing and pre-incineration for analytical workflows.
- Example: The Wet Digester functions as a pre-incineration unit with a programmable heating ramp and wide temperature range up to 600 °C for improved reproducibility.
- These auxiliary units integrate into digestion/incineration workflows, supporting labs in preparing samples for quantitative elemental or ash-content analysis.

Melting Point

- The Melting Point system from BÜCHI offers determination of melting and boiling points for three samples simultaneously, with temperature range from 10 to 400 °C and compliance with USP, JP, Ph. EU standards.
- Automatic Melting Point systems provide real-time video display, automated melting/boiling point detection, ±0.3 °C accuracy up to 250 °C, and repeatability ±0.1 °C at 0.5 °C/min heating rate.
- Features include IQ/OQ qualification documentation, sample loader automation, and software for method/results management tailored to GLP/GMP environments.

Drying

- Spray drying is described as a process where a liquid feed is atomised into fine droplets, exposed to a hot drying gas, evaporating the solvent to form dry powders.
- Freeze drying (lyophilization) is based on sublimation under reduced pressure, preserving structure by avoiding liquid phase formation.
- Drying and evaporation instruments include the rotary evaporators with flask size range 50-5000 mL, lift mechanism (manual or automatic) and temperature range 20-220 °C.

Separation & NIR Solutions

NIR Instruments

Portable NIR instruments

- Portable FT-NIR spectrometer covering a wavelength range of 1350–2550 nm, enabling multi-parameter compositional analysis in the field.
- Built to rugged specifications: meets MIL-PRF-2800 Class 2 standards and uses two standard Li-Ion 18650 batteries for extended battery life.
- Provides real-time results via a mobile app (even offline) and is designed for non-laboratory environments such as production areas, warehouses or external sites.
- Enables quantification of multiple functional-group parameters in a single scan thanks to the wide spectral range that covers overtones and combination bands of critical analytes.

ProxiMate™

- The ProxiMate™ is an at-line NIR (or VIS + NIR) spectrometer designed for harsh production environments, featuring stainless-steel housing and Ingress Protection rating of IP 69, enabling pressure-hose cleaning and resistance to corrosive detergents.
- Spectral configurations include a wavelength range of 900–1700 nm (NIR only) or 400–1700 nm (VIS + NIR), supporting measurement modes such as diffuse reflectance for solids and transflectance for liquids.
- The instrument supports multiple optical setups ("Up View", "Down View", or "Dual View") and sample carriers (large or small) to accommodate different sample types and measurement orientations.
- Calibration and instrument standardisation features include "AutoCal" functionality for automated calibration updating, along with factory-standardised instruments so that calibrations may be transferred across multiple units with consistent behaviour.

Separation & NIR Solutions

NIR Instruments - Manufacturing Processes

FT-NIR spectrometer

- The Rotavapor® line provides laboratory evaporators with varied flask capacities (50 mL to 5000 mL) and temperature ranges (up to 95 °C and 220 °C).
- Modular design allows integration of vacuum interface modules and central controller units to regulate pump, condenser, and evaporator in a unified system.
- The footprint-optimized design (up to 1000 mL flask and compact footprint) emphasizes energy efficiency and lab-space economy.

High speed spectrometer

- The KjelDigester supports up to 20 sample positions simultaneously, with maximum temperature 450 °C and methods programmable.
- The SpeedDigester series features dual heating chambers with independent control to assure homogeneous heating and avoid foaming of critical samples, with max temperature up to 580 °C.
- Samples can be automatically transferred in rack format into autosampler units for high-throughput nitrogen/protein determination workflows.

Ultra-fast speed spectrometer

- Steam distillation is described as a separation process where hot steam is bubbled through the sample mixture, lowering boiling points of components so they can distill at lower temperatures and avoid decomposition of heat-sensitive compounds.
- The technique is heavily used for analytes such as ammonia (from proteins), volatile acids, essential oils, alcohols, sulfite, cyanide, and formaldehyde in food, beverage, environmental and chemical testing.

METTLER TOLEDO

Laboratory Balances

Laboratory Balances

Analytical Balances

XPR Balances

- The XPR series spans from ultra-micro to high-capacity precision, covering capacities from as low as a few grams up to 64 kg.
- Micro-analytical models feature readabilities down to 0.0001 mg with typical repeatability of 0.00015 mg at 5 % load.
- Analytical models (e.g. XPR106DUH, XPR205) achieve readabilities of 0.005 mg to 0.01 mg with minimum weights (k=2, U=1 %) starting from ~0.6 mg.
- Integrated quality assurance functions like GWP Approved, StatusLight, and LevelControl actively monitor weighing conditions and enforce process tolerances.
- StaticDetect detects electrostatic charge on sample or container and issues warnings, and can be paired with ionizing modules to eliminate static effects.

XPR Essential Balances

- XPR Essential balances offer connectivity via Ethernet, 3 × USB-A, and USB-B ports for flexible data handling.
- The analytical models include a 7-inch color touchscreen (glove-compatible) for intuitive control and input.
- They feature motorized draft-shield doors that open with one touch to streamline sample access.
- Built-in quality assurance includes StatusLight, LevelControl, and MinWeigh warning to enforce process boundaries.
- Analytical versions use a hanging weighing pan with high-performance load cell for precise weighing of small samples.

Laboratory Balances

Analytical Balances

MX Balances

- MX balances feature the SmartPan weighing pan that reduces air-draft effects and accelerates stabilization.
- They include FACT (Fully Automatic Calibration Technology) for internal self-adjustment to maintain accuracy over environmental changes.
- MX models offer connectivity via USB, Ethernet, and optional Bluetooth for data transfer and system integration.
- Quality assurance tools such as StatusLight, routine test guidance, and user management support compliance workflows.
- Precision variants can deliver readabilities down to 0.01 mg, making them suitable for demanding analytical applications.

MR Balances

- MA balances cover a weighing range from 50 g up to 5 kg with readabilities as fine as 0.00001 g
- They employ a MonoBloc™ load cell and internal automatic weight adjustment for sustained high precision
- Touch control interface with guided menus and automatic calculations streamline routine weighing tasks
- Strong metal base and durable outer housing provide chemical resistance and ease of cleaning
- Communication options include USB-A and RS232, along with passcode protection to guard settings against unauthorized changes

Laboratory Balances

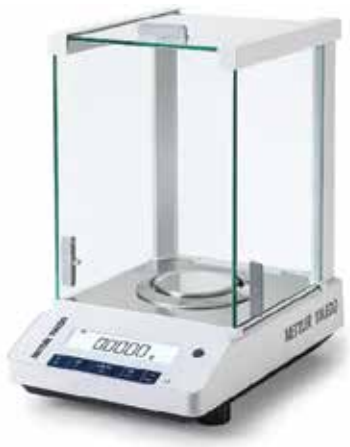
Analytical Balances

MA Balances

- MA balances support capacities from 50 g up to 5 kg with readabilities as fine as 0.00001 g
- They employ a MonoBloc™ weighing cell for reliable measurement stability
- The user interface offers built-in applications and automatic calculations to streamline weighing workflows
- The housing is constructed with a strong metal base and chemical-resistant outer shell to withstand harsh lab conditions
- Communication is enabled via USB-A and RS232 interfaces, with password protection to secure configuration settings

LA Balances

- LA balances provide readabilities down to 0.0001 g with capacities from 80 g to 4 kg
- They use a precise electromagnetic force compensation (EMFC) load cell for fast and stable weighing
- Built-in functions include dynamic weighing and piece counting to simplify common workflows
- The balances offer RS232 communication for printer, secondary display, or PC interface
- They incorporate metal base construction, overload protection, and setting locks to ensure durability and process integrity



Laboratory Balances

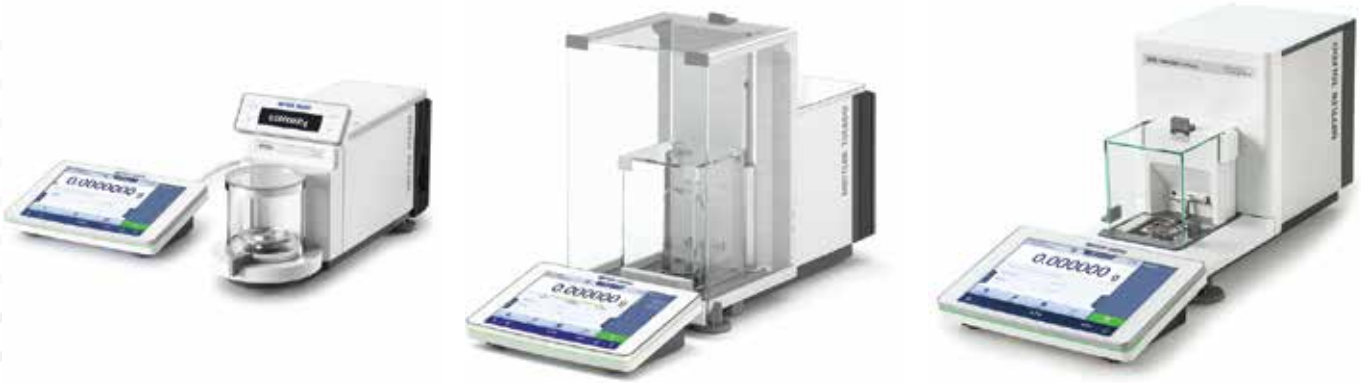
Precision Balances and Scales

- Precision balances support capacities from 120 g up to 64 kg and readabilities between 1 g and 0.1 mg
- Lower-readability models incorporate draft shields while high-capacity models use large weighing pans to accommodate bulk loads
- The SmartPan / SmartPan Pro weighing pan reduces air-draft influence, doubling speed and improving repeatability
- Connectivity options include RS232, USB, and LAN interfaces, with optional Bluetooth/WLAN support
- Construction features include metal housings, overload protection, smooth surfaces, and rounded edges for durability and ease of cleaning
- Many models offer built-in weighing applications (e.g. formulation, dynamic weighing, piece counting) to streamline processes
- Precision balances may include LevelControl which issues warnings when the balance is not properly leveled
- The MinWeigh function ensures sample weights below the minimum accuracy threshold are flagged (displayed in red) and not released
- Some balances support glove mode for operation while wearing disposable or reuseable gloves
- Capacities above 10 kg are supported by large platform models with 0-3 decimal place readability suitable for heavy and bulky items

Laboratory Balances

Microbalances

- Capacity up to 52 g with readability down to 0.1 µg, enabling measurement of samples as low as 30 µg
- High-performance weighing cells with exceptional repeatability and low minimum weight capability
- Built-in quality assurance via Tolerance Profiles and audit-proof monitoring of weighing status
- SmartView terminal design allows separation of the display from the weighing chamber for ergonomic placement
- Draft shield is cylindrical with all-round visibility and automatic (touchless) door operation
- Compact footprint minimizes space usage and supports installation in confined environments
- Intuitive touchscreen interface with guided method library and easy operation for repetitive tasks
- Internal results notepad automatically records all measurement parameters and results
- Easy removal and cleaning of draft shield components and weighing pan without tools
- Optional electrostatic ionizer modules and StaticDetect support detection and mitigation of sample charging



Laboratory Balances

Moisture Analysis Solutions

- Moisture analyzers use the loss on drying (thermogravimetric) method, combining a balance and halogen heating unit for moisture measurement.
- These analyzers deliver rapid and precise moisture content determination through advanced weighing technology and precise temperature control.
- The QuickPredict feature enables prediction of final results early, reducing measurement time for certain models.
- Connectivity is enabled via USB, Ethernet, and RS232 interfaces, supporting data transfer and integration into lab systems.
- Routine checks are simplified via SmartCal, a quick 10-minute performance test to verify overall instrument function.
- The Method Wizard assists in creating custom drying methods directly on the instrument for reproducible protocols.
- Multiple instruments (up to five) can be managed via EasyDirect™ Moisture PC software, centralizing data for visualization and storage.
- ID management supports sample tracking via barcode reader integration for some analyzer models.
- Robust construction with durable housing allows operation even under harsher industrial or laboratory conditions.
- User management and auto-lock features enforce method control and compliance in user workflows.

Laboratory Balances

Test Weights

- Test weights from 50 µg up to 5 tons cover the full calibration range for balances and scales
- Supplied in OIML and ASTM classes to meet different levels of metrological accuracy
- Available as single weights, weight sets, reference weights, and microgram weights for various application
- Manufactured from stainless steel (austenitic) with corrosion resistance for long-term stability
- Knob weights, wire weights, and sheet weights are offered for fine and micro ranges, some with adjusting cavities
- Weights come with or without calibration certificates, supporting traceability where required
- Heavy-capacity and crane weights include stackable cast iron or stainless steel designs for ton-scale calibration
- Weight sets range from 1 mg up to 5 kg (or more) in various combinations to support stepwise calibration
- Accessories such as tweezers, forks, gloves, and cleaning cloths are provided for proper handling and maintenance
- METTLER TOLEDO's GWP® Recommendation service helps select the correct weight class and value for routine verification tasks

Laboratory Balances

Software for Laboratory Weighing

Laboratory Balances

Software for Laboratory Weighing

LabX Balance Software

- LabX Balance enables centralized control of instruments, tasks, and users across a network
- SOP guidance is displayed directly on the balance terminal to enforce correct procedures
- Automatic data transfer eliminates manual transcription by sending results directly into the LabX database
- Users can define differential weighing sequences and templates to match regulatory and process requirements
- LabX supports audit-proof user management, electronic signatures, and traceable workflows

EasyDirect Balance Software

- Collects weighing data from up to 10 balances via RS232 or Ethernet.
- Records results automatically in the background for continuous logging.
- Exports data in CSV, XLSX, XML, or PDF formats.
- Provides control charts and statistical analysis for trend monitoring.
- Includes access protection to secure results and instrument settings.

Moisture Analyzer Software

- Connects up to 5 moisture analyzers in one database.
- Transfers data via USB, Ethernet, RS232.
- Supports OneClick method launch with user guidance.
- QuickPredict speeds up moisture results.
- Enables sample ID tracking with barcode support.

METTLER TOLEDO

Analytical Instruments

Analytical Instruments

Titration Solutions

Titrators

- Control the addition of titrant to determine analyte concentrations by tracking reaction endpoints with high precision
- Modular platforms allow integration with autosamplers, multiple burettes, and sensors to broaden application capabilities

Karl Fischer Titrators

- Specifically designed to measure water content in solids, liquids, and gases using volumetric or coulometric techniques
- Support water determinations from low ppm levels up to 100 % content in samples

High-throughput Titration Systems

- Include carousel autosamplers (e.g. Rondolino) to automate sample throughput for general titration tasks
- Reduce manual intervention and increase consistency across titration processes

Titration Sensors

- Robust electrodes and probes optimized for pH, redox, ion-selective, or conductivity titration endpoints
- Designed for durability and accuracy in diverse sample matrices, ensuring precise endpoint detection

Analytical Instruments

Portable pH Instruments

Seven2Go

- Offers portable measurement of pH, conductivity, dissolved oxygen, and ion concentration in one handheld unit.
- Designed with waterproof/dustproof protection (IP67) and supports storage of up to 200 measurements.
- Features temperature measurement capability with resolution 0.1 °C across range –5 °C to 105 °C.

SevenGo Duo

- Multiparameter, handheld meter supporting pH, conductivity, ion concentration, and dissolved oxygen in one instrument.
- Operates in dual-channel mode, enabling simultaneous measurement of two parameters or samples.
- Engineered for routine field and lab use with ruggedness and ease of operation in varied conditions.

FiveGo

- Portable field meter engineered to measure pH, conductivity, ORP, and dissolved oxygen for water, soil, and food samples.
- Built with IP67 waterproof/dustproof rating and an intuitive menu for quick measurement workflows.
- Offers pH measurement resolution of 0.01 and accuracy of ±0.01 across the full 0–14 pH range.

Analytical Instruments

Benchtop pH Instruments

SevenDirect

- Benchtop meter that measures pH, ion concentration, and conductivity with built-in GLP support.
- Designed for intuitive operation, featuring automatic sensor recognition and calibration reminders.
- Some models (e.g. SD20) include ORP measurement capability and use a sensor arm (EasyPlace) for consistent probe positioning.

SevenExcellence

- Multi-channel benchtop pH system supporting measurements of pH, conductivity, dissolved oxygen, redox, and ion concentration.
- Enables precise, simultaneous measurements with modular sensor inputs.
- Provides high flexibility for complex analytical workflows through parameter expandability.

NineFocus

- Modular multiparameter benchtop system allowing up to four electrochemical measurements (e.g. pH, redox, conductivity, DO) in one unit.
- Designed to handle ultra-low volume samples with high precision.

FiveEasy

- Benchtop meter engineered for pH/mV or conductivity measurements in routine analytical tasks.
- Compact design intended to provide reliable, accurate performance in a simple and economical format.
- Suitable for laboratories needing straightforward, robust pH or conductivity testing without additional functionalities.

Analytical Instruments

Portable Density Measurements

- Portable density meters use the oscillation tube (U-tube) method to measure liquid density accurately.
- They support derived parameters such as specific gravity, Brix, and concentration, converting density into meaningful units.
- Built-in temperature compensation ensures accurate readings despite sample temperature variation.
- Many models are handheld or pocket-sized, enabling measurement in the lab or field.
- Results precision is high, with three-digit resolution in density measurements.
- They can store hundreds of measurement records, enabling data logging and traceability.
- Bright, backlit displays and intuitive menus aid readability and usability in varied lighting.

Analytical Instruments

Benchtop Density Measurements

- Benchtop density meters use oscillation tube (U-tube) technology to determine liquid density and related metrics.
- They support derived scales such as specific gravity, concentration, and Brix based on the measured density.
- Automatic temperature control (or temperature compensation) is integrated to maintain measurement accuracy across varying thermal conditions.
- These instruments interface with LabX software for workflow control, data storage, and regulatory compliance.
- The “Excellence” line of benchtop density meters is positioned as an all-rounder solution for many sample types with high accuracy.
- Firmware and software features support data handling, method management, and result export in lab environments.
- These meters are engineered for stable operation in laboratory conditions, maintaining repeatability and precision across replicates.

Analytical Instruments

UV/Vis Spectrophotometry

EasyPlus UV/VIS

- Dual-beam optical design with reference detector ensures stable baseline and accurate measurements.
- Uses exchangeable XPathHolder™ cuvette carousels covering multiple path lengths, with PathDetect™ to verify selected path.
- Offers 3-in-1 functionality: spectrophotometry, color measurement (30 built-in color scales), and water analysis.
- Equipped with a xenon flash lamp (in "UV" version) for broadband UV/Vis coverage and long lamp life.
- Wavelength range spans 190 nm to 1,000 nm (for UV model), with wavelength accuracy of ±1.5 nm and resolution ≤ 0.5 nm.
- SmartLid™ enables automatic start of measurement upon closing, streamlining routine workflows.

UV/VIS Excellence

- Wavelength range from 190 to 1,100 nm, giving broad UV/VIS coverage
- Resolution better than 1.5 (toluene in hexane) with wavelength accuracy ±1.0 nm and repeatability < 0.15 nm
- Compact size (≈ 208 × 255 × 228 mm) and weight (~6.4 kg) suitable for benchtop use
- Employs FastTrack™ technology (xenon flash lamp and CCD array) for full spectrum scans in about 1 second
- No moving optical parts, enhancing mechanical stability and reducing maintenance
- Complies with pharmacopeia spec (e.g. stray light, photometric accuracy) for regulated environments

Analytical Instruments

Portable Refractometer / Brix Meter

- Measures refractive index and Brix (% w/w) with high resolution and repeatability in field or lab settings.
- Automatic temperature compensation is built in to correct readings based on sample temperature.
- Has a compact, handheld design optimized for portability and ease of use in on-site or at-line measurements.
- Offers predefined calibrations and user methods, allowing quick switch between measurement scales.
- Equipped with data logging memory, capable of storing multiple readings for later review or transfer.
- Supports digital interface connectivity (e.g. USB or similar) for exporting data to PCs or lab systems.

Analytical Instruments

Benchtop Refractometer / Brix Meter

- Uses oscillation-tube (U-tube) technology to determine refractive index and related concentration values.
- Supports derived scales such as Brix, specific gravity, and concentration conversions based on refractive index.
- Offers automatic temperature compensation to correct measurements across varying sample temperatures.
- Designed to provide fast refractive index readings in routine laboratory workflows.
- Compact, space-saving benchtop form factor optimized for routine lab use.
- Integrated software and user interface facilitate method setup, data handling, and repeatable measurement procedures.

Analytical Instruments

Melting Point Instruments

Melting Point

- The MP80 system automatically measures melting, boiling, cloud point, and slip melting point in a single instrument.
- It supports simultaneous measurement of multiple samples (e.g. up to six) to increase throughput.
- The maximum operating temperature of the MP90/MP80 class reaches 400 °C, enabling analysis of high-melting compounds.

Slip Melting Point

- Slip melting point (SMP) refers to the temperature at which a solid (e.g. fat or wax) rises in a tube when the outer surface melts under hydrostatic force.
- The instruments on the METTLER TOLEDO melting point product line support automated slip melting point determination alongside melting, boiling, and cloud point measurements.

Boiling Point

- The MP80 / Excellence systems support automatic boiling point determination as part of their multi-point thermal analysis capability (melting, boiling, cloud, slip).
- Boiling point is measured under controlled heating ramps and detection algorithms to identify the transition temperature consistent with pharmacopeial methods.
- These instruments run parallel measurements on multiple samples, enabling simultaneous boiling point analysis along with other thermal points.

Cloud Point

- Cloud point is one of the thermal transition parameters that the MP80/Excellence melting point systems can measure, along with melting, boiling, and slip melting points.
- In cloud point determination, the instrument monitors light transmittance or turbidity changes as the sample is heated to detect the onset of phase separation.

Analytical Instruments

Dropping / Softening Point Instruments

Melting Point

- Modern systems support fully automated dropping point and softening point tests on one instrument, handling multiple samples without manual intervention.
- The DP70 model can evaluate two samples simultaneously up to a maximum temperature of 400 °C.
- The DP90 variant operates across a broader range (–20 °C to 400 °C), enabling both sub-ambient and high-temperature dropping or softening analyses.
- These instruments use video imaging and digital image analysis to detect the first drop or flow front during heating, providing automation and precision.
- The systems comply with recognized standards such as IP 396 (for grease dropping point tests)
- Performance is optimized for both dropping and softening point determination, giving more flexibility in thermal characterization of substances.

Slip Melting Point

- Softening point determination is integrated with dropping point analysis in the same instrument, allowing simultaneous measurement of both transitions.
- Instruments like the DP70/DP90 can measure softening point over a temperature range up to 400 °C (or down to –20 °C in DP90) for high-temperature materials.
- The softening point is detected by video imaging and digital image analysis, observing the first sign of sample deformation or flow under heating.
- Softening point analysis follows recognized test standards, ensuring compliance with industry thermal testing methods.
- Some systems support parallel analysis of two samples, so softening point can be measured for two specimens simultaneously under identical conditions.

Analytical Instruments

Thermal Analysis Excellence

Differential Scanning Calorimetry (DSC)

- METTLER TOLEDO's thermal analysis line includes DSC systems as one of its core techniques, alongside TGA, TMA, and DMA.
- Their DSC offerings span variants like standard DSC, high-pressure DSC, and ultra-fast (chip) DSC, enabling analysis of materials under different pressures and fast thermal cycles.

Dynamic Mechanical Analysis (DMA)

- DMA characterizes viscoelastic and mechanical properties of materials under oscillatory stress, capturing modulus and damping behavior.
- METTLER TOLEDO's DMA systems offer a wide frequency range (0.001 to 1000 Hz) and support simultaneous thermal measurement (SDTA) for combined analysis.

Hot Stage Microscopy

- Hot-stage microscopy enables visual observation of thermal transitions (e.g. melting, crystallization) while the sample is heated or cooled.
- The HS84 system combines microscopy with simultaneous DSC heat flow measurement, providing complementary thermal and visual data.

Thermogravimetry (TGA)

- Thermogravimetric Analysis (TGA) tracks mass change (loss or gain) of a sample as it experiences controlled temperature, time, and atmosphere variations.
- METTLER TOLEDO's TGA instruments include advanced models such as TGA/DSC 3+ that provide exceptional weighing performance with continuous data acquisition up to 50 million points.

Analytical Instruments

Thermal Analysis Excellence

Fast Scanning Calorimeter

- The Fast Scanning Calorimeter (Flash DSC) supports ultra-high heating and cooling rates, enabling rapid thermal transitions analysis.
- It is capable of measuring under oxygen-free (inert) conditions for precise thermal behavior characterization.

High Pressure Differential Scanning Calorimetry

- High Pressure DSC instruments allow precise control of pressure, atmosphere type, and purge gas flow rates during thermal analysis
- The HP DSC 2+ variant uses advanced sensors (FRS 6+ and HSS 9+) to ensure high performance under elevated pressure conditions

Simultaneous Thermal Analyzer (TGA/DSC)

- Simultaneous TGA/DSC instruments measure mass changes (TGA) and heat flow events (DSC) in a single run, allowing direct correlation of thermal and mass transitions.
- The TGA/DSC 3+ model supports modular sensor configurations (SDTA, DTA, DSC) and built-in gas flow control to analyze samples under defined atmospheres.

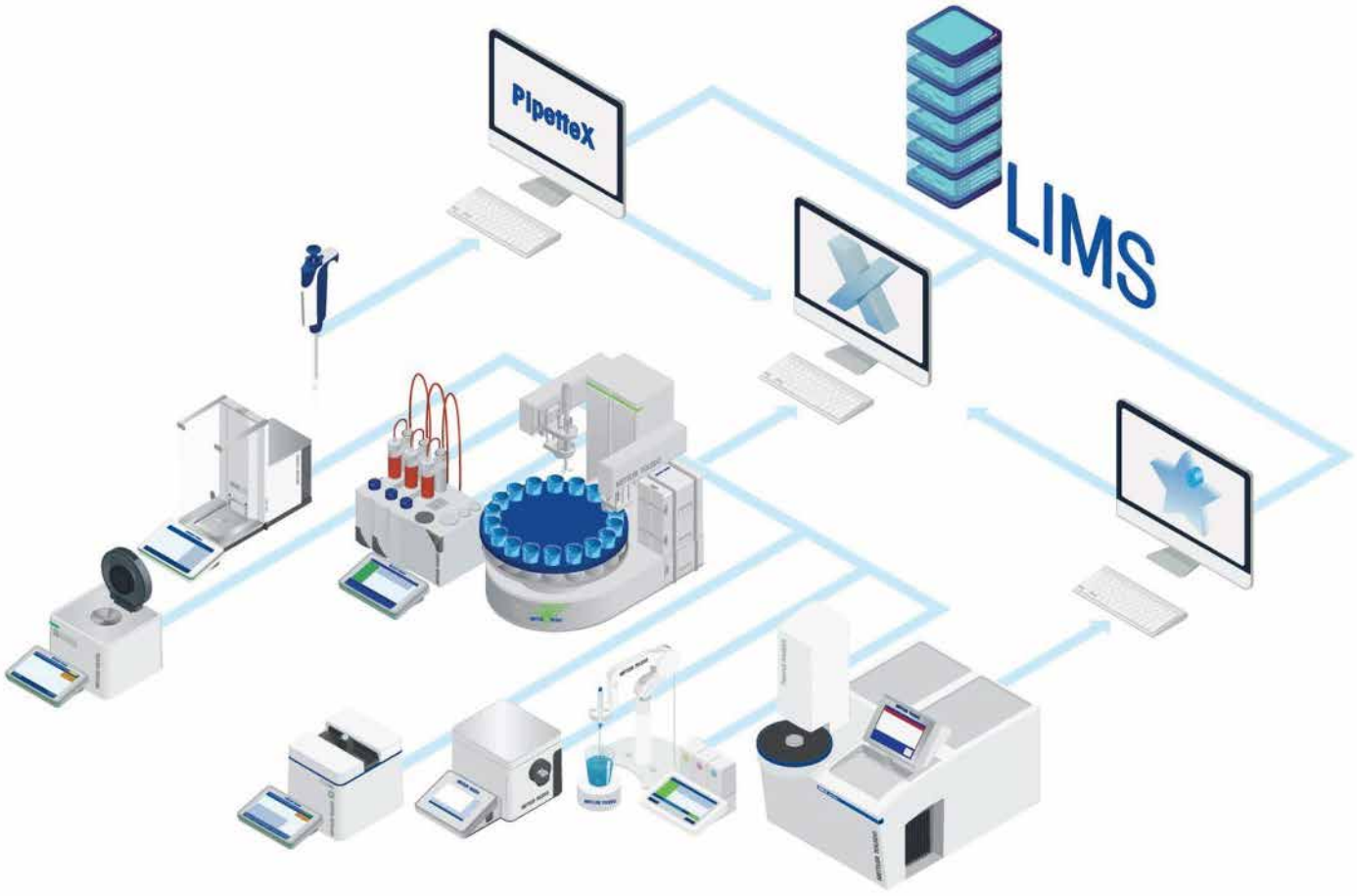
Thermomechanical Analysis (TMA)

- TMA (Thermomechanical Analysis) quantifies dimensional changes (expansion, contraction, deformation) of a material as a function of temperature.
- METTLER TOLEDO's TMA/SDTA 2+ system features Swiss precision mechanics and supports extended temperature ranges (–150 °C to 1,600 °C) with variable applied forces (e.g. in DLTMA mode).

Analytical Instruments

Laboratory Software Solutions

- The Lab Software suite works to centralize control over laboratory instruments, data, workflows, and user roles.
- LabX is a core platform that manages multiple METTLER TOLEDO lab instruments in a unified software environment.
- LabX supports instrument method downloads, result collection, and audit trail generation for regulatory compliance.
- EasyDirect is a simpler software tool focused on automatic data transfer from instruments to a PC to improve data management.
- The lab software solutions are designed to enhance the performance of laboratory instruments by enabling smarter data handling and workflow orchestration.
- These software products support electronic data management, reducing manual entry and transcription errors in the laboratory.
- Lab Software supports central resource allocation and usage monitoring across lab instruments and workstations.
- The platform also underpins laboratory compliance, providing features like audit trails, versioning, and traceable records.



RAININ

Pipetting 360 +

Liquid Handling Solutions

Liquid Handling Solutions

Pipettes

Single Channel Pipettes

- Available in both manual and electronic formats with Universal-fit or LTS tip compatibility, designed for ergonomic and durable daily use.
- Deliver precise micro- to milliliter volume transfer, with optimized mechanics for smooth operation and reduced user fatigue.

Multichannel Pipettes

- Provide consistency across 8 or 12 channels, ensuring synchronized volume delivery in plate workflows
- Offered in manual, electronic, and adjustable spacer variants to adapt to varying lab format needs.

High-throughput platforms

- Instruments like the 96-channel semi-automated systems streamline 96-/384-well plate workflows with improved speed and accuracy.
- Designed to combine efficiency and ease of use for repetitive plate-based pipetting without full robotic complexity.

Repeater pipettes

- Manual versions (AutoRep) support dosing ranges from 2 µL up to 5 mL and allow multiple aliquots per aspiration cycle.
- Electronic types (NanoRep) enable precise, repeat non-contact dispensing down to sub-microliter volumes.

Electronic multichannel adjustable spacer pipettes

- The E4 XLS Adjustable Spacer models support three volume ranges (5-50 µL, 20-300 µL, 100-1200 µL).
- They allow continuous nozzle spacing adjustment to transition between tubes and plate formats efficiently.

Liquid Handling Solutions

Pipette Tips

- Pipette tips are disposable, form-fitting polypropylene tips used to ensure accurate and consistent micro-volume transfers in research workflows.
- They are autoclavable and chemically stable, preserving integrity in diverse solvent and buffer environments.
- Filtered tips are certified free of RNase, DNase, DNA, and pyrogens, and sterilized post packaging to prevent contamination.
- Low-retention tips incorporate superhydrophobic surfaces to reduce sample adherence and improve recovery of viscous or low surface tension liquids.
- Wide-orifice tips minimize shear stress and reduce flow resistance when handling delicate or viscous samples.
- Extended-length tips are designed to reach into deep, narrow vessels, enabling access in tall or narrow labware.
- Large-volume tips (10 mL – 20 mL) with macro FinePoint geometry provide accurate dispensing of bulk liquids.
- Positive displacement syringe or capillary tips suit viscous, volatile, or high-density liquids by eliminating air gap effects.
- ShaftGard 10 µL tips wrap the pipette's ejector and shaft to guard against cross-contamination in critical applications.
- Rainin tips undergo continuous quality control testing to meet rigorous cleanliness and physical specification standards.

Liquid Handling Solutions

Semi-Automated Pipetting Systems

- The high-throughput platform line comprises semi-automated 96-channel pipetting systems tailored for 96- and 384-well workflows.
- The BenchSmart 96 system supports three quick-change pipetting heads covering volumes from 0.5 µL to 1 mL.
- The MicroPro 96-channel system features "Pipetting Depth Recall" to maintain consistent tip immersion levels across wells.
- BenchSmart's interface offers touchscreen control of aspiration, dispensing, tip loading, and ejection.
- BenchSmart supports multiple pipetting modes including basic, dilute, multi-dispense, reverse, volume sequencing, mixing, and cycle count.
- Its four-plate layout is designed to minimize tip or reservoir swaps, streamlining multi-step protocols.
- The BenchSmart software allows user accounts, password protection, mode presets, and protocol memory for reproducible workflows.
- MicroPro is among the smallest 96-channel pipettors on the market, optimizing use of bench or biosafety cabinet space.
- MicroPro's precision specs include a volume range of 2–20 µL, with accuracy and precision designed to stay within low percentage error tolerances.
- Pipette tips designed for these systems use Rainin BioClean LTS technology, compatible with semi-automated pipetting performance requirements.

Liquid Handling Solutions

Pipette Management

- Pipette Management includes SmartCheck™, a tool that verifies pipette performance in less than 60 seconds.
- SmartCheck measures dispensed volume with three repeats and provides a pass/fail result against pipette tolerances.
- It works with any pipette brand dispensing between 10 µL and 1,000 µL, including individual channels of multichannel pipettes.
- PipetteX™ software automates pipette tracking, usage monitoring, and data collection for asset management.
- PipetteX is brand-agnostic, supporting pipettes from different manufacturers.
- SmartStand serves as a docking and charging station, keeping pipettes organized and ready.
- The system ensures audit readiness by maintaining detailed logs of usage, verification, and calibration.
- Regular SmartCheck use helps identify out-of-tolerance pipettes before critical experiments.
- PipetteX allows scheduling of service, calibration, and maintenance across large pipette fleets.
- Together, SmartCheck, PipetteX, and SmartStand provide a complete life-cycle management solution for pipettes.

TELEDYNE

Teledyne LABS

Elemental & TOC Measurement

Elemental and TOC Measurement

VOC & TOC Analytics

Fusion

- Photochemical oxidation with UV-persulfate chemistry is used, coupled with an NDIR detector employing Static Pressure Concentration (SPC) for enhanced sensitivity.
- Analytical modes supported include TOC (NPOC), TC-IC, TC, IC, with a detection limit down to 0.2 ppb and a maximum measurable concentration of about 4,000 ppm.
- Typical analysis time is 4–8 minutes per TOC measurement, with triplicate runs completed in 12–22 minutes.
- Auto-calibration , auto-dilution (Intellidilution), leak checks, self-cleaning cycles, and performance diagnostic tools are built in.

Torch

- Uses a combustion furnace (680 °C to 1000 °C) with a proprietary catalyst and clam-shell opening for easier access and maintenance
- Employs NDIR detection with Static Pressure Concentration (SPC) for CO_2 measurement, along with halogen scrubber to remove interfering halogens
- Analytical modes include TOC (NPOC), TC-IC, TC, and IC, with a detection limit down to 50 ppb and a maximum measurable concentration of 30,000 ppm
- Features such as autosampler (75-position), mass flow controller, auto-calibration, Intellidilution, and self-cleaning sample handling.

Lotix

- Uses catalytic combustion oxidation in the 680 °C – 1000 °C range, with NDIR detection and Static Pressure Concentration (SPC) technology.
- Measures TOC (NPOC), TC-IC, TC, and IC with a concentration range of 0–20,000 ppm using a single 0.5 mL injection; detection limit is 50 ppb.
- Typical triplicate TOC analysis time is 13–15 minutes; precision is ≤ 2 % RSD under standard conditions.
- Includes features such as pressurized sample delivery, solenoid-actuated acid dosing (50 µL ± 5 %), self-cleaning sample pathways, 30-position autosampler, real-time data viewing and more.

Elemental and TOC Measurement

QuickTrace Mercury Analyzers

QuickTrace M-7600 CVAA Mercury Analyzer

- The M-7600 CVAA analyzer achieves detection limits below 0.5 ng/L (instrument detection limit) with a dynamic range from < 0.5 ng/L to > 500 µg/L.
- It uses a double-beam optical design for superior baseline stability and includes an ozone-free, low-vapor-pressure mercury excitation lamp.
- Features a 12-roller, 4-channel peristaltic pump, enabling sample volumes from 0.5 mL up to > 20 mL.
- Supports a "high capacity mode" with analysis times under 60 seconds per sample.
- Includes a non-foaming Gas Liquid Separator (GLS) with overflow prevention and built-in smart rinse, contamination control, and over-range protection.
- Dimensions: 46 cm (H) × 20 cm (W) × 56 cm (D), weight ~35 lbs (16 kg); supports TCP/IP connectivity, autosampler integration, and multiple regulatory mercury methods.

QuickTrace M-8000 CVAF Mercury Analyzer

- The M-8000 uses the cold vapor atomic fluorescence (CVAF) technique, offering ultra-trace mercury detection with an instrument detection limit (IDL) ≤ 0.05 ng/L.
- It supports multiple analysis modes (triple mode) including no enrichment, single, or double gold amalgamation, conforming to EPA 1631 and EPA 245.7 methods.
- The dynamic concentration range spans from ≤ 0.05 ng/L up to > 400 µg/L, with linearity over four orders of magnitude.
- It includes a non-foaming Gas Liquid Separator (GLS) with overflow prevention, automatic end-of-run and inactivity standby routines, and smart rinse/contamination control features.
- The system uses a 12-roller, 4-channel peristaltic pump and accommodates sample volumes from 0.5 mL up to > 50 mL.
- Physical dimensions are 20 cm (H) × 48 cm (W) × 60 cm (D), weight approximately 16.8 kg, with interface options of RS-232 or USB.

FEDEGARI AUTOKLAVEN AG

Microbiology Lab Solutions

Microbiology Lab Solutions

Sterilizers and Washers

FVG – VERTICAL LAB STERILIZER

- Equipped with an integrated steam generator and automatic water feed pump, enabling the sterilization under saturated-steam conditions.
- Features chamber volumes of 50 L (FVG1), 75 L (FVG2) and 140 L (FVG3), with chamber and lid constructed of 316L stainless steel with mirror-polished sanitary finish, operating up to 3.5 bar g pressure and 140 °C temperature.
- Includes a horizontal swivelling lid with pneumatic "rotate-and-seal" gasket, a heat-recovery system, and a TSC 09 microprocessor controller.

FVA/A1 – VERTICAL LAB STERILIZER

- Designed for demanding applications (food, bio-pharma, cosmetics, microbiology, packaging) with chamber capacities of 75 L, 140 L and 188 L, built with 316L stainless steel chamber and lid.
- Features an automatic vertical sterilizer configuration with modular construction, a patented pneumatic seal for the horizontal swivelling lid.
- Employs the DCS20 process controller allowing full programmability (30 customizable cycles), Ethernet interface for remote monitoring, user-friendly display positioning.

FOB – BENCHTOP LAB STERILIZER

- Benchtop series offering four chamber dimension options: 47 L (FOB2-TS single door), 75 L (FOB2S-TS double door), 90 L (FOB3-TS single door), 122 L (FOB3S-TS double door), enabling flexibility for lab environments.
- Construction uses 316L stainless steel for chamber, pneumatic valves and hydraulic components with electropolished finish; features patented pneumatic gasket for door seal and optional safety device to prevent door opening under unsafe conditions.

Microbiology Lab Solutions

Sterilizers and Washers

FOB4 – STAND-ALONE LAB STERILIZER

- Offers larger capacity stand-alone configuration with chamber volumes of 147 L (FOB4-TS single vertical sliding door), 210 L (FOB4S-TS), and 226 L (FOB4L) with double vertical sliding door for pass-through applications.
- Internal 316L stainless steel plates serve as a heat-exchanger system for steam pre-heating and chamber cooling (via cold softened water).
- Built-in safety features such as a thermal blocking system to prevent door opening under hazardous conditions, and control via a DCS 20 process controller supporting 30 customizable cycles in a multi-user environment.

FOB5 – STAND-ALONE LAB STERILIZER

- Designed for large-volume sterilization, with chamber volumes from 362 L up to 729 L (various configurations) and single or double vertical sliding doors.
- Features two high–efficiency internal 316L stainless steel plates functioning as a heat-exchanger system for steam pre-heating and chamber cooling.
- Equipped with the Thema4Lab process controller (GAMP5-compliant), vertical positioning of filters to avoid frequent rupture, and full accessibility to technical area from front/lateral.

FGW – LAB GLASSWARE WASHER

- Uses a dedicated steam generator to enhance washing performance of greasy or sticky soils; steam penetrates hard-to-reach areas and reduces detergent and water consumption per cycle.
- Equipped with a conductivity meter on the drain line to monitor water purity and terminate the process automatically when the set-point is reached, minimizing utility consumption.

BINDER

Microbiology Lab Solutions

Microbiology Lab Solutions

Incubation and Plant Growth

CO2 incubators

- Temperature range: from ambient +4 °C (or +6 °C) up to +50 °C; humidity up to ~90-95 % RH; CO_2 control range 0–20 vol. % with IR sensor technology.
- Features hot-air sterilisation up to +180 °C, seamless stainless-steel deep-drawn inner chamber, double-pan humidification with condensation-protection, and USB/ethernet data logging.

Cooling incubators

- Temperature range: from +4 °C (or 0 °C) up to +100 °C (or higher) using compressor or Peltier cooling; APT.line™ pre-heating chamber technology ensures uniformity (e.g., 0.3 K at 37 °C).
- Additional features: adjustable fan speed, inner door made of safety-glass, class 3.1 independent temperature safety device (DIN 12880) with visual/ acoustic alarm, USB data interface.

Standard incubators

- Temperature range from ambient +5 °C up to +100 °C (or specific models +30 °C to +70 °C) with convection type options.
- Convection and control features: adjustable exhaust-air flap, controller with timer functions, inner door of tempered safety glass, class 3.1 independent temperature safety device per DIN 12880.

Drying and heating chambers

- Situated in gravity convection or forced convection configurations (Series ED, FD, FED etc.), offering temperature ranges from ambient +5 °C (or +7 °C above) up to +250–300 °C, with homogeneous temperature distribution via APT.line™.
- Equipped with USB or Ethernet connectivity for data logging, intuitive controllers (LCD display) and energy-efficient design.

Microbiology Lab Solutions

ULT STORAGE

Ultra-low temperature freezers

- Temperature range: –90 °C to –40 °C, enabled via a powerful cascade compressor cooling unit and climate-neutral refrigerants R-290 and R-170.
- Thermal insulation uses long-life vacuum insulation panels (VIPs), and interior components (chamber, shelves, inner doors) are made entirely of stainless steel, rust-proof and durable.
- Energy efficiency: energy consumption at set-point –80 °C and ambient temperature ~21 °C is approx. 7.9 kWh/day for the UF V 500 model; sound pressure level ~47 dB(A) at normal operation.
- Safety and monitoring features include zero-voltage alarm contact for external alarm systems, Ethernet interface and USB data-logger for exporting measured values in open format; two Ø 28 mm access ports at rear.
- Mechanical design: ergonomic door handle, innovative door gasket concept to reduce ice build-up, optionally water-cooled versions available, and permitted load per compartment about 50 kg (110 lbs) with standard three stainless-steel shelves (max up to 13).

INTEGRA

Microbiology Lab Solutions

Microbiology Lab Solutions

Media Preparation and Filling

MEDIACLAVE 10/3 (Media sterilizer) and MEDIAJET (Petri dish filler)

- The MEDIACLAVE range covers two capacities: the "10" model supports 1–10 L medium volume, and the "30" model supports 3–30 L volume.
- In the MEDIACLAVE, a magnetic stirrer offers selectable speeds of 50–200 rpm and reversible rotation direction to ensure homogeneous mixing across a wide viscosity range.
- The MEDIACLAVE supports sterilization temperature range from 30 °C up to 122 °C with dispensing temperature down to ~20 °C, and a typical full cycle (for 15 min sterilisation) takes ~65–75 minutes depending on model.
- For the MEDIAJET Petri-dish filler: dosing range per dish is 1.0 mL to 99.9 mL; dosing reproducibility approx. 1 % (at 15 mL); maximum dosing rate 500 mL/min.
- The MEDIAJET supports a standard filling rate of about 900 dishes per hour (up to 15 mL) and a turbo mode reaching ~1,100 dishes per hour (up to 24 mL).
- MEDIAJET accommodates Petri-dish diameters Ø 90 mm (standard) and the "vario" version supports Ø 90, Ø 60 and Ø 35 mm dishes; the carousel capacities are 360 or 540 dishes depending on model.
- The MEDIACLAVE provides process documentation and validation: it records digital log files with electronic signatures (21 CFR Part 11 / EU GMP Annex 11), and features USB or printer output for archiving.
- The MEDIAJET features a UV-C lamp (≈ 2.1 W at 253.7 nm) spanning the filling rotor for enhanced bactericidal activity and clean environment.

Microbiology Lab Solutions

Aspiration Systems

VACUSAFE (Safe-Aspiration System)

- Combines an integrated vacuum pump, collection bottle, overflow protection and hydrophobic filters (0.45 µm or 0.2 µm) into one closed aspiration system.
- Vacuum regulation knob and built-in level sensor detect when the collection bottle is full, automatically shut off the pump and alarm.
- Compatible for use in BSL-1 to BSL-3 laboratories, with self-closing connectors, shatter-proof bottle, low noise (< 50 dB(A)).

VACUSIP (Portable Aspiration System)

- A compact, bench-top aspiration system with an integrated silent vacuum pump, capable of operating without an external vacuum source.
- Achieves vacuum of –250 mbar ±20%, liquid flow of 2.3 mL/s (with 40 mm stainless steel tip), noise emission < 50 dB(A) at 1 m, and supports seating on any bench.
- Equipped with hydrophobic filter for aerosol protection, all liquid-contacting parts are autoclavable, and hand-operator includes pressure-sensitive flow regulation.

VACUBOY (Vacuum Hand Operator)

- Hand-held vacuum aspiration tool that connects to any vacuum source via silicone tubing and accepts a wide range of adapters (constituent multi-channel adapters, Pasteur pipette adapters, disposable tip ejectors).
- Ergonomic touch-sensitive button on the hand operator allows precise vacuum regulation and smooth control of liquid aspiration; equipped with anti-drip system.
- All adapters and hand operator components are autoclavable and designed for safe use with bio-hazardous liquids; system supports integration with the VACUSAFE collection system.

Microbiology Lab Solutions

Microplate Dispenser

WELLJET Reagent Dispenser

- Volume dispensing range spans 0.5 µL to 9,999 µL, enabling a wide spectrum from very small to moderate-volume reagent aliquoting.
- Compatible with multiple micro-plate formats: 6, 12, 24, 48, 96, 384 and 1536 wells (both shallow and deep versions); supports plate heights of 5–64 mm (manual mode) and 9–25 mm (stacker mode).
- Physical and electrical specs: Dimensions for dispenser unit are 20 × 46 × 29 cm (W×D×H), weight approximately 8.8 kg, mains input 100-240 VAC, 50/60 Hz, power consumption ~100 W, noise emission <60 dBA.
- User interface and integration: High-resolution 17.8 cm (7) touchscreen, Ethernet interface with API commands available, optical sensor detection method, and non-contact dispensing technology.

Peristaltic Pump

DOSE IT Peristaltic Pump

- Dose volume and flow rate: Capable of dispensing from 0.1 mL up to 9,999 mL, with flow rate range approximately 0.6 mL/min up to 5 L/min, depending on tubing diameter.
- Tubing compatibility: Accepts silicone tubing with an inner diameter range from 1 mm to 8 mm, enabling broad flexibility in volume, speed and application.
- Physical and interface specifications: Dimensions ~203 × 210 × 191 mm (H×W×D), weight ~3.5 kg, interface includes 2× RS-232 ports, input voltage 100-240 VAC, 50/60 Hz.
- Pump head and precision features: Flip-top pump head for quick tubing exchange; with 1 mm tubing, dose volumes >0.5 mL at CV <1% and flow rates ~0.6–52 mL/min; 6 mm tubing can achieve >15 mL dose volumes with flow rates ~16–1634 mL/min.

Microbiology Testing

Microbiology Testing

Sample Preparation

Sample Preparation

- Achieves ±0.1 g weighing accuracy, supported by an integrated high-performance balance and dual-pump system for consistent flow control.
- Delivers fast processing with dilution speeds of up to 500 mL/min, ideal for high-throughput microbiology and food testing workflows.

Innoculation

- Delivers high reproducibility with an electronically regulated pump system that ensures exact deposition of 50–1000 µL sample volumes across the plate.
- Achieves accurate CFU enumeration with its three plating modes (Constant, Exponential, and Independent), optimized for food, cosmetic, clinical, and environmental microbiology labs.

Colony Counting & Zone Reading

- Equipped with a high-resolution 5-megapixel camera and full-spectrum LED dome illumination, eliminating shadows and ensuring uniform imaging across all media types.
- Utilizes advanced AI-driven image analysis capable of detecting colonies as small as 0.05 mm, with automatic differentiation of colors, shapes, and densities for accurate CFU counting.

Slide Stainning

- Processes up to 20 slides per run across 10 reagent stations + 1 drying station, enabling fully programmable staining workflows.
- Uses a robotic arm with precise XYZ motion to ensure consistent immersion time and reproducible staining across histology, cytology, and microbiology protocols.
- Built with sealed reagent tanks (300 mL each) and a controlled agitation system, reducing cross-contamination while maintaining homogeneous staining quality.

Testing Instruments

Testing Instruments

Cap Testing

Cap Torque Test

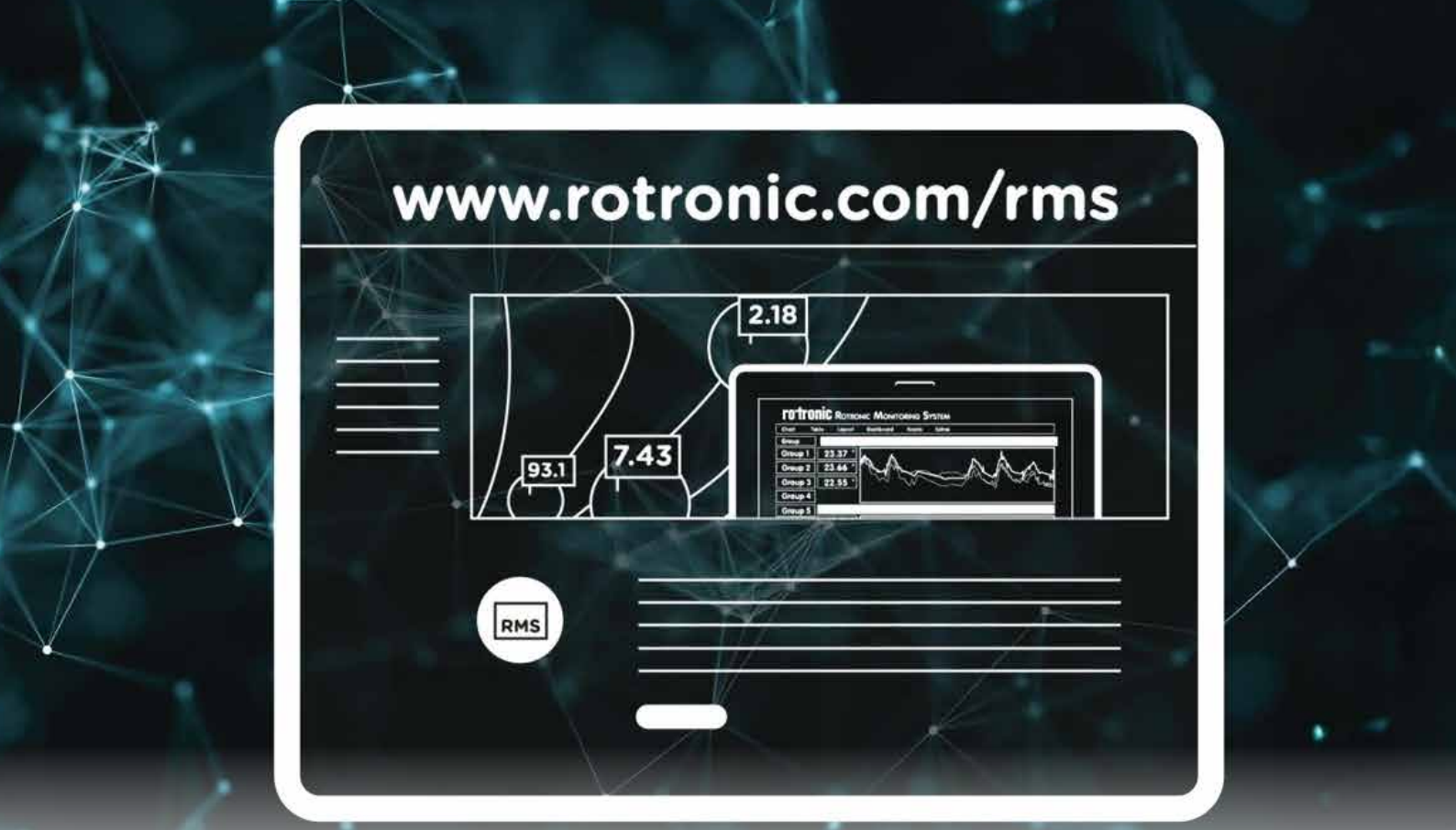
- Offers a full range of closure torque testing solutions—from manual handheld units to fully automatic torque testers designed for child-resistant and standard closures.
- Automatic models (e.g., ST-LAB6/7) include features such as programmable top-load force control, release torque testing without breaking seal integrity, and application angle measurement.
- Desktop and wireless models support quick-lock platforms, Bluetooth connectivity to smartphones/tablets, and mobile HMI displays for dose/torque measurement.

Capping Machine Test

- Supports dynamic in-line testing of capper machines including closure torque, capper chuck torque, top-load force testing and spring-load evaluation on crown corks, ROPP and crimp capping machines.
- Smart Bottle modules (e.g., SB-T, SB-F, SB-TF) permit wireless monitoring of torque/time and force/time on running production lines without stopping the capping machine.
- Interchangeable neck thread fitments and dummy bottles for accommodating different container sizes/shapes enable flexible integration into various capping lines.

Smart Load Cells

- Wireless Bluetooth load-cell systems that convert a smartphone (Android or iOS) into a display/interface for measuring a wide range of tensions/compressions.
- Available in capacity ranges from 100 kg up to 10 tons for S-beam models, and supports specialized testers.
- Data acquisition features include measuring modes (single/double peak, continuous), wireless data transfer, graphing (torque/force vs time), high-frequency sampling, and on-device storage prior to PC export.



rotronic

MEASUREMENT SOLUTIONS

A PST BRAND

Operational Environment Monitoring Systems

Operational Environment Monitoring Systems

Monitoring and Measurements

Humidity Monitoring

- Measures relative humidity with high accuracy and fast response time.
- Enables calculation of dew/frost point and other psychrometric parameters.
- Offers analog (4–20 mA) and digital (RS-485) outputs for control systems.

Temperature Monitoring

- Uses Pt100 sensors in 3- or 4-wire configuration for precision.
- Suitable for production, storage, and transport monitoring.
- Supports continuous digital logging and calibration.

CO2 Monitoring

- Measures CO_2 alongside temperature and humidity.
- Designed for real-time monitoring under regulated conditions.
- Integrates into modular monitoring systems for IAQ and incubators.

Differential pressure Monitoring

- Uses thermal mass-flow or diaphragm sensors for high sensitivity.
- Accuracy ±1 % FS; response time < 1 s.
- Ideal for cleanrooms and critical environments.

Operational Environment Monitoring Systems

Monitoring and Measurements

Pressure Monitoring

- Integrates process-pressure sensors into RMS.
- Supports analog (4–20 mA, 0–10 V) and digital (Modbus, OPC UA) outputs.
- Enables centralised pressure monitoring and control.

Water Activity Monitoring

- Measures free water (aw = 0...1) using HygroClip sensors.
- Fast reading time (≈ 5 min) with temperature stability.
- Indicates product stability and microbial growth risk.

Dew Point Monitoring

- Calculated from humidity and temperature.
- Indicates saturation temperature of air or gas.
- Essential for preventing condensation and corrosion.

O2 Monitoring

- Uses MSRS technology for trace oxygen measurement.
- No reference air needed; barometric compensation included.
- Provides analog and RS485 Modbus outputs.

HygroGen2 - HG2-S - Humidity Generator

- The unit generates a highly stable reference environment with a standard range of 5 to 95 %RH and 0 to 60 °C.
- It features a 2-liter chamber that can calibrate up to five (or six with certain configurations) probes simultaneously and includes integrated software (HW4/HW5) (FDA 21 CFR Part 11 compliant)

Operational Environment Monitoring Systems

Rotronic Monitoring System (RMS)

- The RMS is modular hardware plus web-based software: data loggers record values from both Rotronic and third-party sensors and send to a secure database accessible via PC, Mac, tablet or smartphone.
- Supports multiple deployment modes: on-premise installation, public cloud (SaaS) and exclusive cloud versions with validated environments for regulated use.
- Designed for regulatory environments: compliant with GAMP5 (software category 4, hardware category 1), supports FDA 21 CFR Part 11, EU Annex 11 and EU Annex 15 requirements.
- Provides integration of third-party devices via analog input, MODBUS TCP, JSON API and can export data via CSV, PDF, OPC UA and MS SQL.
- Offers real-time notifications: alarms and alerts can be sent via e-mail, SMS, telephone calls; user configurable for warning vs alarm, delay, hysteresis.
- Built-in audit trail and full data integrity: system logs actions, changes, hardware replacements, calibration data; read/write access only, no delete rights in cloud-hosted mode.
- Scalable from single measurement point installations up to systems with several thousand measurement points across multiple locations.
- Supports measurement of many parameters: temperature, relative humidity, carbon dioxide, oxygen, differential pressure, analog voltages/currents and digital inputs.
- Data loggers available with PoE, 24 V supply and backup battery; wireless versions also offered to reduce cabling and risk of data loss.
- Automated and customizable reporting: functionality includes batch-release reports, deviation reports, calibration/validation reports and mapping reports (e.g., DIN 12880, NF X 15-140, USP 1079, WHO Supplement 8).

BMS and EMS	**Environmental Storage**	**Pharmacy & Drugstore**
Warehouse Monitoring	**Incubators Monitoring**	**Cold Chains Temperature**
Food and Tobacco	**Cleanrooms**	**Cold Storage Temperature**
Data Center Monitoring	**Compressed Air Systems**	**IVF Labs**

BINDER

Operational Environment Control Systems

Operational Environment Control Systems

Standard incubation and Plant Growth

Cooling incubators

- Temperature range: from +4 °C (or 0 °C) up to +100 °C (or higher) using compressor or Peltier cooling; APT.line™ pre-heating chamber technology ensures uniformity (e.g., 0.3 K at 37 °C).
- Additional features: adjustable fan speed, inner door made of safety-glass, class 3.1 independent temperature safety device (DIN 12880) with visual/ acoustic alarm, USB data interface.

Standard incubators

- Temperature range from ambient +5 °C up to +100 °C (or specific models +30 °C to +70 °C) with convection type options.
- Convection and control features: adjustable exhaust-air flap, controller with timer functions, inner door of tempered safety glass, class 3.1 independent temperature safety device per DIN 12880.

Growth chambers

- Provide defined climate conditions with temperature and humidity control plus LED lighting modules for plant growth; e.g., temperature range 10 °C to 50 °C (KBF series) or up to +50 °C with humidity 10-90 % RH (KBF PRO series).
- Modular design: basic units (climate chambers) can be retrofitted with LED plant-light modules (16 strip-lights, warm/cool white + dark red phytochrome channel) and optional CO_2 gassing (0.05–1 vol. % CO_2).

Operational Environment Control Systems

Drying and Tempering

Safety drying chambers

- Safety concept meets the DIN EN 1539 standard, with replaceable fresh-air cartridges and symmetrical airflow to handle solvent-containing specimens.
- Temperature range from ambient +10 °C (or +10 °C above ambient) up to approx. +300 °C, with APT.line™ pre-heating chamber technology.
- Silicone- and dust-free stainless-steel inner chamber, 60 mm insulation thickness, 2-point door closure, and defined ventilation exhaust.

Drying and heating chambers

- Situated in gravity convection or forced convection configurations (Series ED, FD, FED etc.), offering temperature ranges from ambient +5 °C (or +7 °C above) up to +250–300 °C, with homogeneous temperature distribution via APT.line™.
- Equipped with USB or Ethernet connectivity for data logging, intuitive controllers (LCD display) and energy-efficient design.
- Adjustable exhaust air flap (in many models), class 2 independent adjustable temperature safety device (per DIN 12880).

Vacuum drying chambers

- Designed for gentle, residue-free drying of materials with solvents (non-flammable: Series VD; flammable: Series VDL with explosion-proof interior), with temperature range from approx. ambient +9 °C up to +220 °C.
- Features include digital display and control of both pressure and temperature, program-controlled drying monitoring with automatic ventilation at end of process, and internal data logger for open-format export (USB/Ethernet).
- Excellent heat transfer via large thermal conducting plates and patented expansion racks, stainless-steel interior.

Operational Environment Control Systems

Environmental Simulation

Constant climate chambers

- Temperature range 0 °C to +70 °C and humidity range 10 % to 80 % RH for the standard KBF series; expanded models (KBF PRO) achieve -20 °C to +100 °C and 10 % to 98 % RH.
- Use of inverter-compressor cooling with climate-neutral refrigerant (R-600a) and APT.line™ pre-heating chamber technology.
- Features stainless steel interiors with telescopic racks, adjustable fan speeds, door-heating to prevent condensation, and optional light modules.

Dynamic climate chambers

- Designed for rapid temperature changes with temperature ranges from -40 °C to +180 °C, and in extended low-temperature models down to -70 °C.
- Equipped with intuitive touchscreen controllers supporting time-segment programming, real-temperature programming, heated viewing windows, and LED interior lighting.
- Cooling technology uses climate-neutral refrigerants (e.g., R-744) and models support external relay contacts, integrated water-tank for humidity models, and programmable condensation protection.

Walk-in-chambers

- Available in three sizes with interior volumes of 12 m^3 (WIC1), 18 m^3 (WIC2) and 24 m^3 (WIC3); temperature range 10 °C to 50 °C, humidity range 20 % to 90 % RH, temperature accuracy ±1.5 °C, humidity accuracy ±2.5 % RH.
- The climate-generating unit is installed outside the chamber body to minimise disruption to interior conditions during service and maintenance.
- Floor-mounted chamber has lockable door with LED illumination and motion sensor, stainless-steel interior and optional accessories like heavy-duty shelving up to 11 levels, additional access ports and strip curtains.

Operational Environment Control Systems

ULT STORAGE

Ultra-low temperature freezers

- Temperature range: –90 °C to –40 °C, enabled via a powerful cascade compressor cooling unit and climate-neutral refrigerants R-290 and R-170.
- Thermal insulation uses long-life vacuum insulation panels (VIPs), and interior components (chamber, shelves, inner doors) are made entirely of stainless steel, rust-proof and durable.
- Energy efficiency: energy consumption at set-point –80 °C and ambient temperature ~21 °C is approx. 7.9 kWh/day for the UF V 500 model; sound pressure level ~47 dB(A) at normal operation.
- Safety and monitoring features include zero-voltage alarm contact for external alarm systems, Ethernet interface and USB data-logger for exporting measured values in open format; two Ø 28 mm access ports at rear.
- Mechanical design: ergonomic door handle, innovative door gasket concept to reduce ice build-up, optionally water-cooled versions available, and permitted load per compartment about 50 kg (110 lbs) with standard three stainless-steel shelves (max up to 13).

KAYE
SUBSIDIARY OF AMPHENOL

Operational Environment Validation Systems

Operational Environment Validation Systems

Thermal Validation Systems

Wired Validation Systems

- Multi-channel wired system (up to 48 inputs) for high-precision thermal validation.
- Supports multiple thermocouple types with scan speeds of 48 channels/sec.
- Includes a dedicated console with integrated validation software and data management.

Wireless (RF) ValProbe RT System

- Real-time wireless data logging via 2.4 GHz RF link between loggers and base station.
- Measures temperature from –85 °C to +140 °C with sampling from 1 s upward.
- Provides live monitoring, validation software integration, and 21 CFR Part 11 compliance.

ValProbe Data Loggers Standard

- Stand-alone wireless loggers for temperature, humidity, and pressure mapping.
- Sampling interval from 1 s to 12 h with up to 10,000 data points per sensor.
- Designed for ovens, freeze-dryers, and stability chambers in regulated environments.

Real-Time Wireless

- RF loggers stream data live to a base station for continuous validation monitoring.
- Operates across –85 °C to +140 °C and 0–5 bar with robust dual-antenna communication.
- Ethernet connectivity and audit-trail software ensure data integrity and regulatory compliance.

Operational Environment Validation Systems

Thermal Calibration Systems

Kaye LTR/HTR Drywells

- Cover temperature ranges from –90 °C to +420 °C depending on model.
- Stability ±0.01 °C and uniformity ±0.1 °C for precise calibration.
- Support up to 48 thermocouples and operate in dry-block or liquid-bath mode.

Kaye CTR Liquid Baths

- Temperature range –25 °C to +140 °C with 0.01 °C stability and 0.02 °C uniformity.
- 2.5 L tank for up to 10 probes simultaneously.
- Uses compact Peltier cooling, stainless housing, and universal power input.

Kaye IRTD Temperature Standard

- Range –196 °C to +420 °C with ±0.025 °C accuracy and 0.001 °C resolution.
- 200 Ω platinum RTD in Inconel 600 sheath, 101 mm immersion depth.
- Traceable to NIST/PTB and integrates with Kaye validation systems.

Kaye Humidity Calibrator

- Generates 5–95 % RH for up to 8 probes simultaneously.
- Compact (≈3.2 kg) unit with USB data download and touch control.
- Uses dual flow-mixing for fast and stable humidity setpoints.

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