ALTAYF ALTHAHABI

PART OF TAAWON GROUP

PRODUCT CATALOG

PHARMACEUTICAL SECTOR

CHOICE OF EXCELLENCE

www.taawon.com

ABOUT ALTAYF ALTHAHABI

Welcome to TTSL - Altayf Althahabi, a member of Taawon Group – Your Premier Partner in Laboratory Solutions!

At TTSL, 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

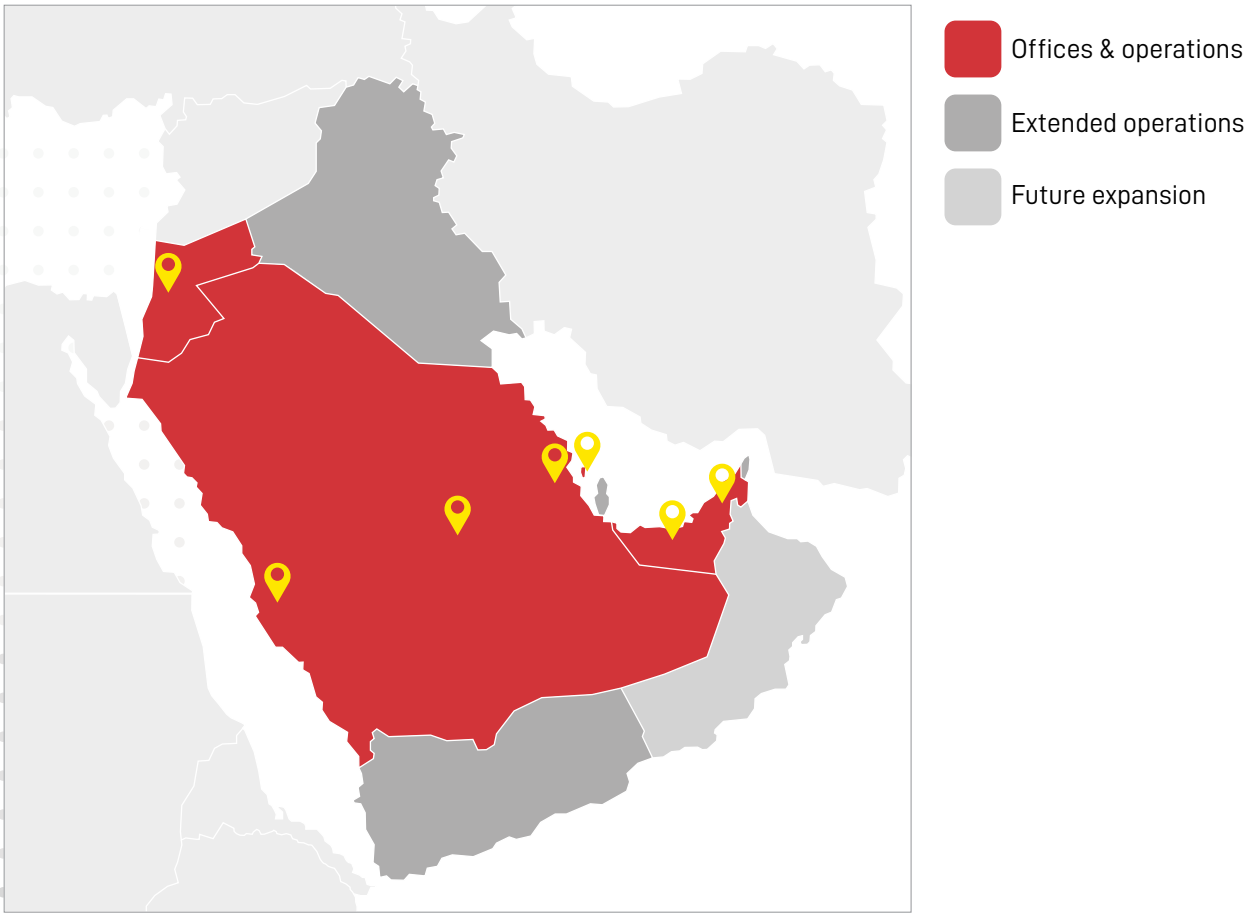
Diamond Spectrum - DS
Bahrain

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

Warehouse Monitoring

TABLE OF CONTENT

TABLE OF CONTENT

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

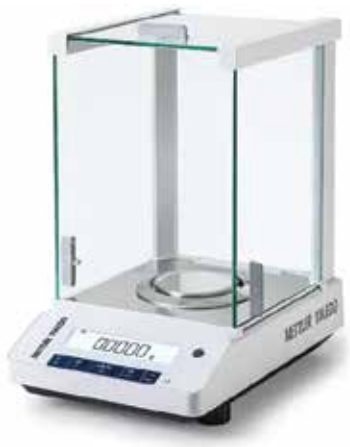
Analytical Balances

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

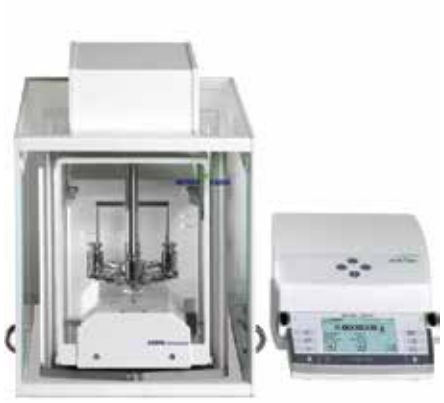
Mass Comparators

Manual Mass Comparators

- Manual mass comparators allow direct comparison of test weights against reference standards for calibration and verification.
- They provide readability down to 0.001 mg (1 µg) with excellent repeatability in differential weighing (ABA) mode.
- Models such as the AX106 support a capacity of 111 g with 1 µg readability and 3 µg repeatability at 100 g.
- Features include motorized draft shields and hanging weighing pans to minimize environmental effects and eccentricity errors.
- The weighing cell is mechanically isolated from heat-sensitive components to reduce thermal influence and improve stability.

Automated Mass Comparators

- Automated comparators carry out fully automated mass calibration to deliver very low measurement uncertainty.
- They support high capacities up to 64 kg while maintaining ultra-fine resolution down to 0.1 µg.
- Automated systems enable continuous unattended operation, increasing throughput and reducing human error.
- These comparators include secure operation features and full data traceability to maintain calibration integrity.
- Units like the AX16004 use 4-place weight handling mechanisms to automate mass comparison workflows.



Laboratory Balances

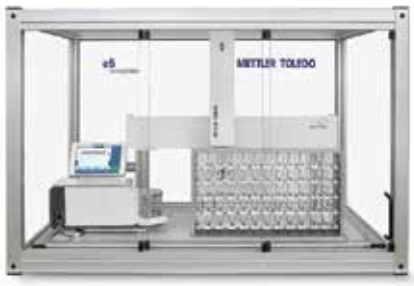
Mass Comparators

Vacuum Mass Comparator

- Vacuum mass comparators perform mass determination under vacuum or constant pressure to eliminate buoyancy effects.
- They achieve nanogram resolution, enabling detection of extremely small mass differences.
- The internal vacuum chamber isolates the test and reference weights from ambient air influences.
- These instruments are designed for use by national metrology institutes and high-precision laboratories.
- They support direct comparison of test weights to reference artefacts under identical measurement conditions.

Robotic Mass Comparators

- Robotic comparators automate mass calibration across a range from 0.05 mg up to 20 kg.
- They utilize multi-axis robotic arms and magazines capable of handling up to 100 weights.
- The weighing balance is structurally isolated from the robot to eliminate vibration transfer.
- Integrated software applies air buoyancy correction using environmental sensor data.
- Full automation removes human influence, reducing placement errors and operator variability.



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.

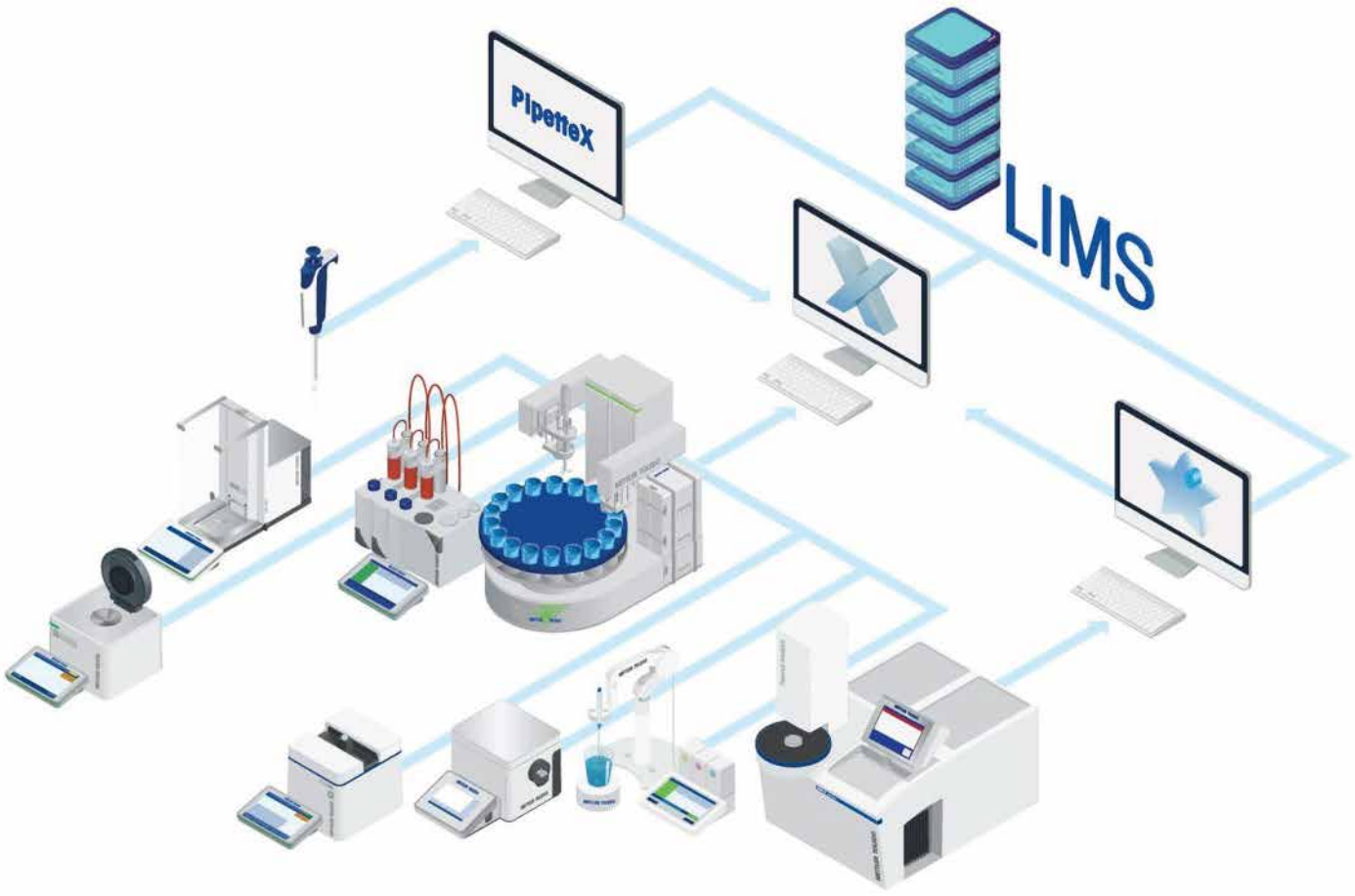
Thermomechanical Analysis (TMA)

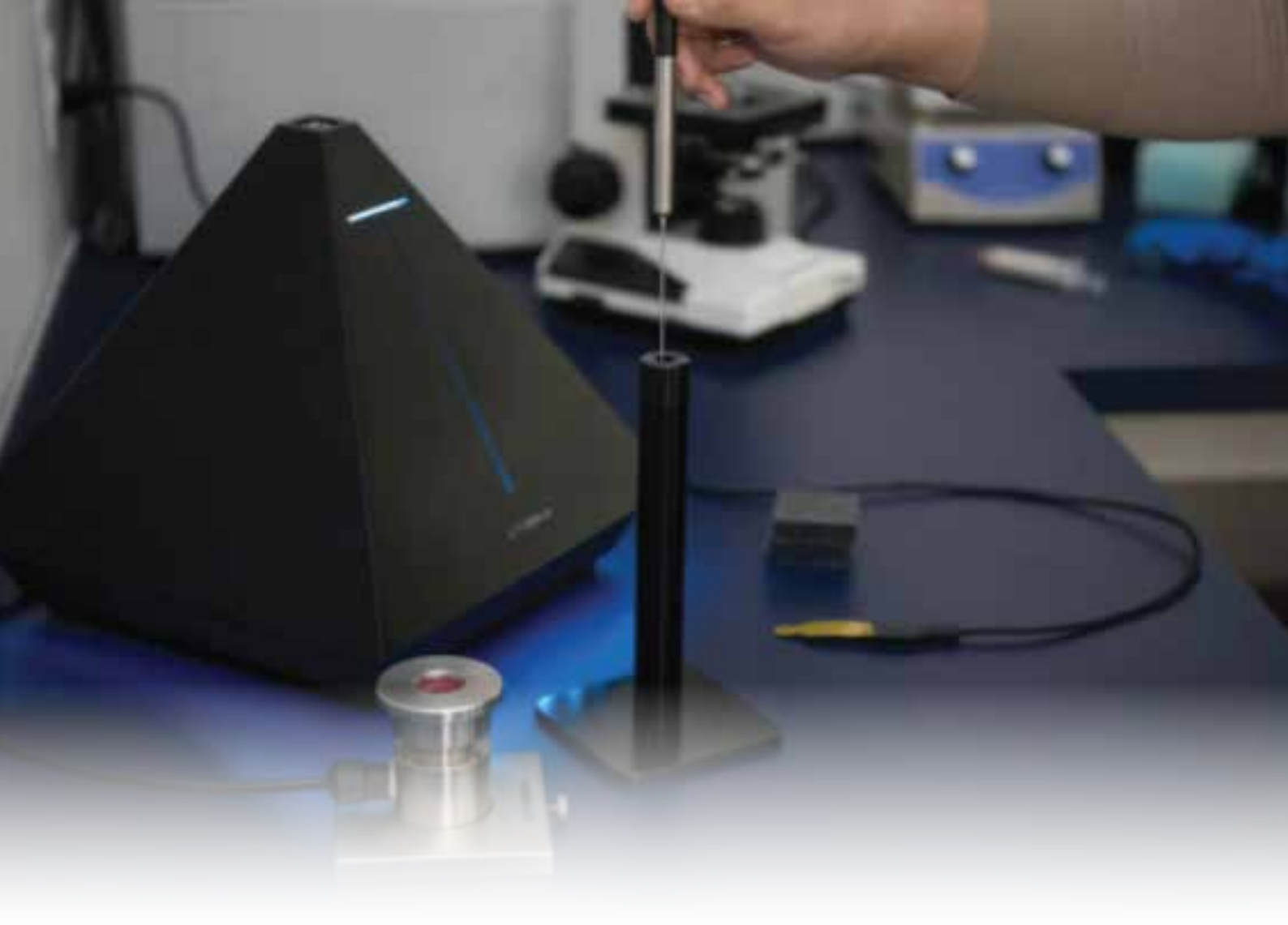
- TMA (Thermomechanical Analysis) quantifies dimensional changes (expansion, contraction, deformation) of a material as a function of temperature.
- METTLER TOLEDO's TMA/SDTA 2+ system features Swiss precision mechanics and supports extended temperature ranges (–150 °C to 1,600 °C) with variable applied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





C-THERM TECHNOLOGIES Lt

Thermal Conductivity

Thermal Conductivity

Trident Thermal Conductivity Instrument

- The Trident instrument supports three transient thermal conductivity measurement methods (MTPS, TLS Needle, and Flex TPS) in a single modular platform.
- Its MTPS sensor is single-sided and provides fast, precise measurements of both thermal conductivity and effusivity with a typical measurement pulse of 1–3 seconds.
- The TLS Needle probe is designed for robust performance with granular, viscous, or paste samples, following ASTM D5334/D5930 standards.
- The Flex TPS configuration uses a double-sided sensor to simultaneously derive thermal conductivity, diffusivity, and specific heat capacity, conforming to ISO 22007-2.
- A Hot Wire (THW) probe is also supported for rapid testing of liquids and powders, operating under the ASTM D7896-19 method.
- Trident supports a wide thermal conductivity measurement range from ~0.01 to 500 W/m·K, covering materials from insulators to metals.
- It includes temperature compensation and a software system that performs data acquisition, analysis, and method control integrated in one interface.
- The system handles a broad temperature operating range from –50 °C to +200 °C, with optional extension up to 500 °C for certain sensors.

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.

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

Automated Lab Reactors In-Situ Analysis, & Modeling Software

Mettler Toledo AutoChem

Instruments for Chemical Synthesis, and R&D

Particle Size Analyzers

- The particle size analyzers provide inline measurement of particle size, shape, and count during processes.
- Their measurement range spans 0.5 µm to 2 mm, covering fine particles to coarse suspensions.

FTIR and Raman Spectrometers

- ReactIR and ReactRaman spectrometers are in-situ tools that monitor reaction progress by measuring molecular changes during the reaction.
- They provide real-time spectral data on molecular structure, composition, and kinetics directly within the process medium.

Chemical Synthesis Reactors

- The EasyMax and OptiMax reactors are automated platforms that execute reaction recipes with precise control over temperature, stirring, dosing, and data collection.
- They support reaction volumes from about 1 mL up to 1 L and temperature ranges from –90 °C to 180 °C, enabling broad synthetic chemistry conditions.

Online HPLC Analysis with DirectInject-LC

- The DirectInject-LC system converts conventional HPLC into an online technique, enabling near real-time reaction and crystallization monitoring.
- It performs fully automated sampling and injection, reducing manual intervention and improving data timeliness.

Mettler Toledo AutoChem

Instruments for Chemical Synthesis, and R&D

Automated Reactor Sampling System

- The EasySampler system performs automated, unattended sampling by taking reaction samples in situ, quenching them, and diluting them for offline analysis.
- It enables scheduled sampling and sampling triggered by process parameters, and is compatible with various chemistries including slurries and air-/moisture-sensitive reactions.

Reaction Calorimeters

- Reaction calorimeters quantify the heat released or absorbed by a chemical or physical reaction to monitor energetics and safety.
- The RC1mx model enables measurement of heat profiles, conversion, and heat transfer under realistic, process-like conditions.

RX-10 Reactor Control System

- The RX-10 control system automates jacketed laboratory reactors including heating, cooling, stirring, and dosing operations.
- It interfaces with third-party sensors and Process Analytical Technology (PAT) tools to capture and synchronize reaction data via a unified touchscreen controller.

iC Software Suite

- The iC software suite integrates the experimental workflow for automated reactors, enabling users to visualize, interpret, and report reaction data.
- It centralizes data capture from local instrumentation and transforms raw data into meaningful process insights for decision support.

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.

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.

PHARMA TEST

Testing Instruments

Testing Instruments

Galenic Instruments

Tablet Disintegration Testing

- Instruments are fully compliant with USP <701/2040>, EP <2.9.1/2.9.1.2> (and equivalents) and support A-type or B-type baskets for regular or larger samples.
- Drive mechanism uses a 24 V DC motor that moves the basket up/down by 55 mm at 30 strokes/min, with automatic stroke-rate adjustment every two seconds.
- Housing and construction: units feature stainless steel housing for GMP compliance and include heating baths with safety sensors for temperature control and over-temperature protection.

Suppository Testing

- Designed to test disintegration/time to melt (softening) of suppositories and pessaries: e.g., the PTS 3E tests three samples simultaneously with pre-set test time from 1 minute to 10 hours.
- Includes sample basket rotation: for suppositories, the basket automatically turns 180° at defined intervals in a heated water bath (≈37 °C) to meet EP monograph requirements.
- Sample bath and basket system designed for easy removal for cleaning; heater and pump system engineered to avoid contamination from fat or active material intrusion.

Tablet Hardness Testing

- These instruments are used for measuring breaking force and structural integrity of tablets per USP <1217> and EP <2.9.8> requirements.
- Dual mode options: models support either linear-force increase or linear-speed increase, with user selectable modes for consistent results and calibration validation.
- Calibration/validation: force sensors can be statically calibrated across full measuring range using traceable counterweights.

Testing Instruments

Galenic Instruments

Ampoule Testing

- Instruments (e.g., PTBA 211E) test the breakpoint/hardness of empty ampoules in line during production in full compliance with DIN/ISO 9187 standards.
- Designed to ensure no glass particle contamination upon opening by checking ampoule integrity; suitable for pharmaceutical QC of ampoule production.

Tablet Friability Testing

- Measures durability of tablets during packing, transit and handling by tumbling them in a drum with a baffle; compliant with USP <1216>, EP <2.9.7> and JP <14> standards.
- Drum configurations: single-drum (PTF 100), double-drum (PTF 200), up to six-drum (PTF 600) models available, with automated sample discharge and balance connectivity.

Powder Testing

- Instruments test bulk solids and granules for physical parameters such as flowability, tap density, apparent density and bulk volume; used in formulation and QC of powders.
- Examples include Scott volumeter for bulk density (PT-SV110) and manual powder flowability and angle of repose tester (PTG-M100).

Leak Testing

- The PT-LT100 (vacuum leak testing instrument) tests integrity of packaging such as tablet strips, blisters, small bottles by placing sample into a desiccator, applying vacuum and immersion in dye to detect leaks per USP <1146>.
- Sample performance: packaging should maintain shape under vacuum; then immersion in coloured dye with venting will reveal leak paths as dye penetration indicates integrity failure.

Testing Instruments

Dissolution Testing

Tablet Dissolution Testing Instruments

- All instruments in this category are fully compliant with USP and EP requirements; they employ the "MonoShaft™" tool system and include a full set of dissolution vessels and USP Apparatus 2 paddles.
- Models cover a range of station counts and configurations (e.g., 6-station, 8-station, 12-station, 14+2-station systems) to accommodate method development, biowaiver studies, and comparative tests.
- Some instruments include independent stirring speed control per station (e.g., the 6-station model with individual stirring speed control) for research & development flexibility.
- Specific models incorporate features such as "media addition stations" for delayed-release dosage forms to support USP/EP monographs for modified release.

Offline Automated Dissolution Systems

- These semi-automated systems (e.g., DFC-series) consist of a dissolution bath, a pump and a fraction collector; they automate the sampling process at pre-programmed times.
- Sampling is performed via a PT-SP syringe pump, peristaltic pump or valve-less piston pump and the systems do not require an external PC software to initiate the sampling.
- Some systems (e.g., the DSR-M sampling robot) offer optional features like automatic media refill and dilution for increased flexibility and throughput.
- Vessel centering, full PTFE-tubing installation and either in-situ sampling probes or auto-sampling systems are included to ensure reproducible and clean sampling.

Testing Instruments

Dissolution Testing

Online Automated Dissolution Systems

- The “closed-loop” online systems (e.g., ADS-L series) integrate the dissolution bath, UV/VIS spectrometer, multi-channel pump and software (WinDiss ARGUS).
- In these systems, the sample media is circulated in a closed loop, meaning no sample volume loss over the time of the test, which improves consistency and compliance.
- Sampling probes may include in-line filters to prevent undissolved particles entering the measurement cells, and the systems support simultaneous measurement of all vessels to meet USP time requirements.
- The software controlling these systems is 21 CFR Part 11 compliant, enabling secure data handling, audit trail and integration with spectrometer and hardware components.

Media Preparation

- The PT-DDS4 media preparation and degassing system provides a combination of de-aeration, pre-heating of media to target temperatures (e.g., ~37 °C), and precise gravimetric dosing of media volumes.
- Dosing range is adjustable: the system can dispense from ~250 g to 5,000 g of medium with an accuracy of ±0.5 % (max ±1 mL), and temperature control from ~30 °C to 50 °C with ±0.5 °C accuracy.
- The system supports handling of foaming media (e.g., SDS solutions) via a curved inlet tube option to direct medium flow along the tank wall and reduce foam build-up during degassing.
- Large-capacity heated/de-aerated tank (~24 L) supports pre-heating and degassing of sufficient media to feed multiple vessels or multiple runs, reducing startup time for dissolution baths.

PHARMAG

Testing Instruments

Testing Instruments

Pilot Plant and small scale production

Pilot Plant Equipment

- The Pilot Plant System is designed for new-product development and small-batch production, using a universal motor drive (UAM) with standardized attachment flange.
- The UAM drive has a continuously adjustable speed range of 40-400 rpm, a 700 W motor, and stores up to 10 operating procedures in its menu-driven user screen.
- Contact parts and accessories (mixers, blenders, filling/dosing units) are constructed of GMP-compliant materials and are suitable for applications in pharmaceuticals, cosmetics, fine chemicals and educational settings.

Mini Tabletting Machines

- The MiniPress II (fully automated rotary tablet press) supports both gravity and force feeder systems, features pre-compression up to 20 kN and main compression up to 60 kN, and meets GMP design standards.
- Tooling options include mono-tooling (“B”, “D”, “BB”) and multi-tooling configurations, with up to 12 stations and production rates up to ~15,000 tablets/h.
- Contact parts are L316 stainless steel, turret and cam-tracks are ELNP-coated (optional L316 SS turret), and the unit includes overload protection, anti-vibration pads and safety sensors.

Mini Capsulation

- The MiniCap fully-automated capsule filling machine is bench-top size, uses PLC controls, and is designed for powder and pellet filling of hard gelatin capsules.
- It supports capsule sizes 00, 0, 1, 2, 3 and 4, with a production rate up to ~3,000 capsules/hour under specified conditions,.
- The machine uses GMP-compliant contact parts (stainless steel), includes safety features (emergency stop, front panel controls, hinged doors with safety interlock).

Rigaku

Testing Instruments

Testing Instruments

Portable Material Identification

Progeny handheld Raman spectrometer

- Uses a 1064 nm excitation laser to reduce fluorescence interference and enable analysis of colored, impure, or packaged samples.
- Spectral range covers approximately 200–2500 cm^{-1}, allowing comprehensive Raman fingerprinting for a wide range of materials.
- Spectral resolution is approximately 8–11 cm^{-1} (FWHM) in typical configurations, enabling the discrimination of subtle spectral differences among similar compounds.
- Adjustable laser output power from approximately 30–490 mW (or similar range) and exposure times from about 5 ms to 30 s to accommodate sample variety and optimize signal.
- Rugged handheld design weighing approximately 1.6 kg (3.5 lbs) and sized about 29.9 cm × 8.1 cm × 7.4 cm, with IP-68 rating for field or industrial use.
- Touch-screen user interface, smartphone-inspired, with softkeys and barcode scanner/camera integration for streamlined PASS/FAIL workflows and regulatory traceability.
- Connectivity options include USB and WiFi (and in some configurations wireless data transfer or LIMS integration) plus docking station support for charging and data synchronization.
- Designed for regulatory compliance: supports digital signatures, IQ/OQ/PQ protocols, and meets standards such as 21 CFR Part 11, FDA 1040, USP/EP for material identification workflows.

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.

AVESTIN

Homogenizers & Pressure Control

Homogenizers & Pressure Control

High Pressure Homogenizers

EmulsiFlex-B15

- Capacity: 3 to 15 mL batch
- Pressure: up to 45,000 psi (3,000 bar)
- Minimum Sample Volume: 3 mL
- Power: electrical power not required
- Air: 80 to 150 psi (5 to 10 bar)
- Dimensions [W x D x H]: 11 in x 13.3 in x 27.5 in (280 mm x 335 mm x 700 mm)
- Weight: 81 lbs (37 kg)

EmulsiFlex-C3

- Capacity: 3 L/h
- Pressure: Up to 30,000 psi (2,000 bar)
- Minimum Sample Volume: 10 mL
- Power Requirements: 115/230 VAC 50/60 Hz 1 hp (0.75 kW)
- Air Requirements: 60 to 120 psi (4 to 8 bar), virtually no air consumption
- Dimensions [W × D × H]: 15 in × 24.8 in × 28.5 in (380 mm × 630 mm × 720 mm)
- Weight: 260 lbs (120 kg)

EmulsiFlex-C5

- Capacity: 1 to 5 L/h, depending on pressure and air supply
- Pressure: Up to 30,000 psi (2,000 bar)
- Minimum Sample Volume: 7 mL
- Power: Electrical power not required
- Air: 7 cfm (200 L/min) @ 120 psi (8 bar) recommended
- Dimensions [W × D × H]: 17 in × 6.3 in × 12.6 in (430 mm × 160 mm × 320 mm)
- Weight: 55 lbs (25 kg)

Homogenizers & Pressure Control

High Pressure Homogenizers

EmulsiFlex-D20

- Capacity : 20 L/h, independent of pressure
- Pressure : EF-D20A: up to 20,000 psi (1,380 bar), EF-D20B : up to 30,000 psi (2,000 bar)
- Minimum Sample Volume : 50 mL
- Power : 380 to 500 VAC 50/60 Hz
- Air : 120 psi (8 bar) max., virtually no air consumption
- Dimensions [W x D x H] : 28 in x 24 in x 25 in (715 mm x 610 mm x 635 mm)
- Weight : 240 lbs (110 kg)

EmulsiFlex-C50

- Capacity: 15 to 50 L/h, depending on pressure and air supply
- Pressure: up to 30,000 psi (2,000 bar)
- Minimum Sample Volume: 25 mL
- Power: 100 to 240 VAC 50/60 Hz (for control panel)
- Air: 45 cfm (1,275L/min) @ 90-120 psi (6-8 bar)
- Dimensions [W x D x H]: 24 in x 21 in x 10.2 in (610 mm x 530 mm x 260 mm)
- Weight: 176 lbs (80 kg)

EmulsiFlex-C55

- Capacity: 55 L/h
- Pressure: EF-C55A: up to 20,000 psi (1,380 bar), EF-C55B: up to 30,000 psi (2,000 bar)
- Minimum Sample Volume: 100 mL
- Power Requirements: 208/230 V, 400 V, 460/480 VAC, 575/600 VAC, 50/60 Hz
- Dimensions [W × D × H]: 26 in × 26 in × 29.5 in (660 mm × 660 mm × 749 mm)
- Weight: 440 lbs (200 kg)

Homogenizers & Pressure Control

High Pressure Homogenizers

EmulsiFlex-C160

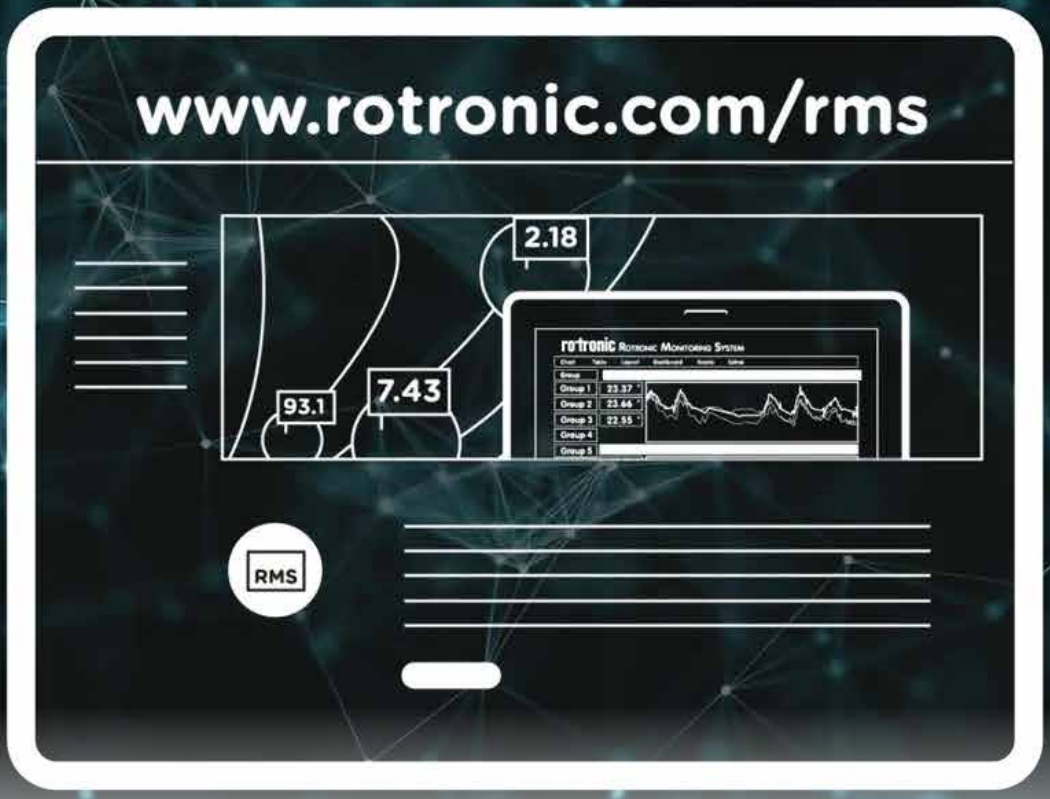
- Capacity: 160 L/h
- Pressure: EF-C160A: up to 20,000 psi (1,380 bar), EF-C160B: up to 30,000 psi (2,000 bar)
- Minimum Sample Volume: 250 mL
- Power: 380 to 500 VAC, 400 VAC, 460/230 VAC 50/60 Hz
- Air: 120 psi (8 bar) max., virtually no air consumption
- Dimensions [W x D x H]: 46 in x 39 in x 63 in (1,170 mm x 990 mm x 1,600 mm)
- Weight: 1,200 lbs (550 kg)

EmulsiFlex-C500 & EmulsiFlex-C1000

- Capacity: 500 or 1,000 L/h
- Pressure: EF-C500A/C1000A: up to 20,000 psi (1,380 bar), EF-C500B/C1000B: up to 30,000 psi (2,000 bar)
- Minimum Sample Volume: 5 L
- Power: 380 to 500 VAC 50/60 Hz
- Air: 120 psi (8 bar) max., virtually no air consumption
- Dimensions [W x D x H]: 62 in x 59 in x 62 in (1,575 mm x 1,500 mm x 1,575 mm)
- Weight: 3,300 lbs (1,500 kg)

Automatic Pressure Control with Digital Display

- This accessory can be added to any continuous Emulsiflex model without modification.
- The user sets the pressure, which will be maintained and displayed on the touch-screen HMI during the entire process time.
- The set pressure is maintained even if the product properties change during homogenization.



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

PARTICLE MEASURING SYSTEMS
a spectris company

Operational Environment Monitoring Systems

Operational Environment Monitoring Systems

Contamination Monitors

Airborne Particle Counter

- PMS offers airborne particle counters and monitors designed for cleanrooms and controlled-environments, including both remote and portable instruments.
- The airborne monitors support compliance with standards such as ISO 14644 and USP 788, providing data for clean manufacturing in semiconductor, pharma, optics and aerospace industries.
- Solutions include instruments for very small particles (down to 10 nm in some cases for chemicals or water) as part of airborne contamination monitoring systems.

Liquid Particle Counter

- PMS liquid particle counters detect and count particulate contaminants suspended in liquids (such as deionised/ultra-pure water, chemicals) for high-precision industries.
- Example: The LiQuilaz® II S Series offers optical liquid particle counting with sizing sensitivity as low as 0.2 µm and supports flows up to ~80 mL/min in batch or in-line operation.
- Another example: The Ultra DI® 20 liquid particle counter detects particles as small as 20 nm in ultrapure water systems.

Microbial Particle Counter

- PMS provides microbial contamination monitors (active air samplers) for cleanroom environments, compliant with regulations such as EU GMP Annex 1 and ISO 14698.
- Example: The BioCapt® Single-Use microbial impactor operates at flow rates of 25–50 L/min (and 100 L/min version), supports continuous viable monitoring and reduces reliance on settle plates.
- Example: The MiniCapt® Pro remote microbial air sampler features HEPA-filtered exhaust, small footprint, PoE (Power over Ethernet) connectivity, and integrates into facility monitoring systems for aseptic manufacturing.

Operational Environment Monitoring Systems

Contamination Monitors

Gas Particle Counter

- PMS offers gas particle counters and monitors for compressed gas and process gas applications, as part of their contamination monitor portfolio for air, liquid and gas.
- These gas-phase monitors integrate into clean manufacturing environments (e.g., semiconductor, photonics, aerospace) for contamination control of process gases.
- While specific models/details are less explicit on the landing page, the site confirms coverage of gas contamination monitoring solutions alongside airborne, liquid and molecular.

Molecular Particle Counter

- PMS provides airborne molecular contamination (AMC) monitors (e.g., the AirSentry® II series) that detect molecular species such as chlorides, acids, amines and ammonia in air at sensitivities down to ~70 ppt (parts per trillion).
- These monitors are available in configurations such as Point-of-Use, Multi-point Manifold and Mobile Systems.
- The AMC monitors integrate with central software platforms for data acquisition and analysis, enabling real-time actionable data in ultra-clean manufacturing environments.

Software

- PMS offers contamination-monitoring data management software that displays real-time and historical data for all PMS particle counters.
- The software supports regulatory compliance (e.g., EU GMP Annex 1, USP 788) for cleanroom contamination monitoring and provides reporting.

PARAMETER
GENERATION & CONTROL

Operational Environment Monitoring Systems

Operational Environment Control Systems

Walk-In Stability

Parameter Humidity Control Rooms

- Temperature range from -30 °C to +60 °C, with humidity control from 10 % to 90 % RH (limited by a 5°C dewpoint).
- Relative humidity constancy of approximately ±0.5 % RH, and uniformity of ±0.5 % at specified conditions.
- Modular insulated panel construction, factory-tested prior to shipment for temperature- and humidity-controlled performance.

Parameter Cold Rooms & Freezers

- Cold Rooms: Designed with a split-system refrigeration loop (evaporator + condenser + control loop) to reliably maintain temperatures above 2 °C while preventing coil freeze via auxiliary surface control loops.
- Freezers: Split-system design engineered to maintain freezing conditions down to -30 °C, with "need to defrost" smart cycle control for efficiency.
- Uniformity and constancy (Freezers): Temperature uniformity and constancy of about ±0.5 °C even during defrost cycles; modular insulated panels; factory tested.

Operational Environment Control Systems

Walk-In Stability

Horizontal Conditioners

- RH (relative humidity) control constancy of ±0.5 % for models such as the 800-1,200 CFM unit.
- Temperature control constancy of ±0.1 °C for the 800-1,200 CFM model.
- Relative humidity uniformity of ±0.5 % in the same 800-1,200 CFM model.
- Built throughout with 316 stainless steel construction.
- Utility requirement example: For the 800-1,200 CFM model, domestic 208/230 V, 3-Phase, 60 Hz, 39 FLA and 24.4 RLA.
- Dimensions & weight example: For the 800-1,200 CFM model: 80 wide × 49 deep × 43 high, weight 1,300 lbs; shipping weight ~1,500 lbs.
- Maximum enclosure size for that model: 2,800 cu.ft; and maximum room size (with 8-foot ceiling) up to 16 × 22 (subject to caveats).

Vertical Conditioners

- RH control constancy of ±0.5 % for the 800-1,200 CFM vertical model.
- Temperature control constancy of ±0.1 °C for the same model.
- Relative humidity uniformity of ±0.5 % for the same model.
- Built with 316 stainless steel construction throughout the chamber.
- Utility requirement example: Domestic 208/230 V, 3-Phase, 60 Hz, 35.5 FLA and 20.7 RLA.
- Dimensions & weight example: 33 wide × 42 deep × 96 high; weight ~1,200 lbs; shipping weight ~1,400 lbs.
- Maximum enclosure size for that model: 2,800 cu.ft; maximum room size (with 8-foot ceiling) up to 16 × 22 (subject to ambient/heat-load/makeup-air conditions).

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-time 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

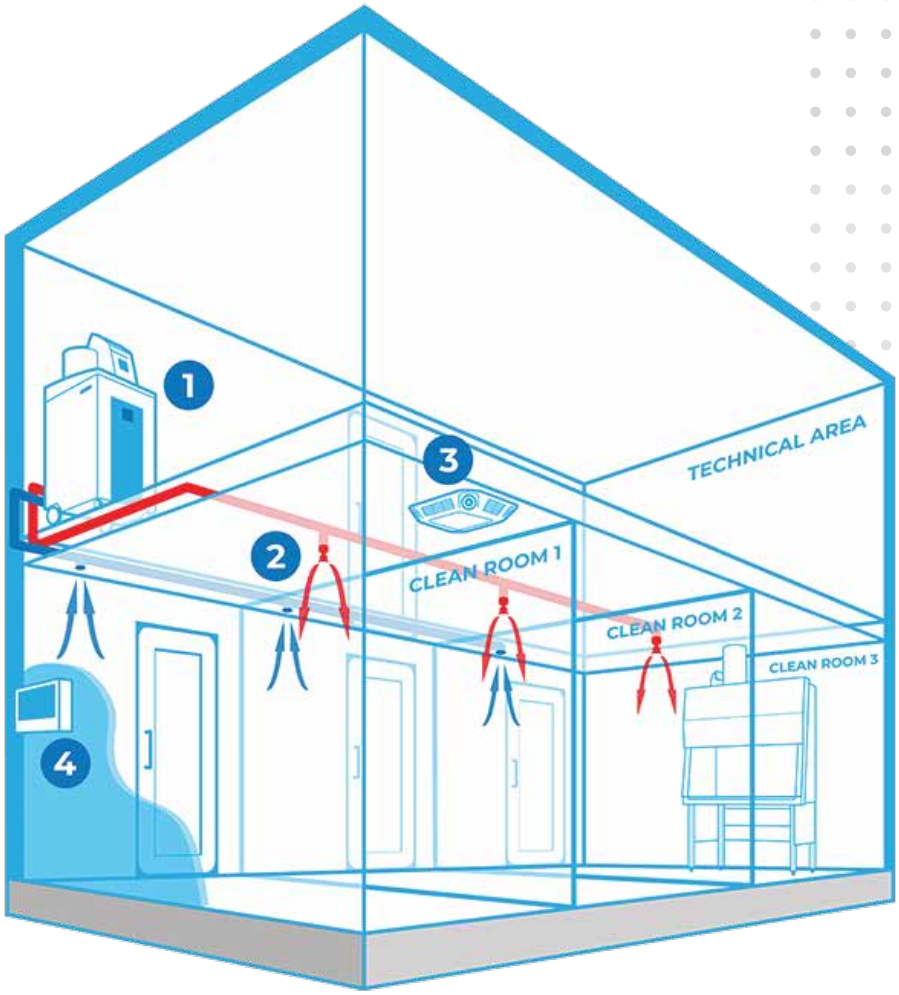
- Available in three sizes with interior volumes of 12 m^3 (WIC1), 18 m^3 (WIC2) and 24 m^3 (WIC3); temperature range 10 °C to 50 °C, humidity range 20 % to 90 % RH, temperature accuracy ±1.5 °C, humidity accuracy ±2.5 % RH.
- The climate-generating unit is installed outside the chamber body to minimise 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).



bioquell

An Ecolab Solution

Operational Environment Control Systems

Operational Environment Control Systems

Risk Reduction Solutions

Bioquell ProteQ

- Modular design tailored for room- and zone-decontamination covering areas up to 400 m^3 per unit.
- Built-in aeration module included; optional wireless aeration units stored within the frame for cycle-time optimisation.
- Wireless networking and remote lectern control enable cycle monitoring outside the decontamination space.
- Dual-function system combining both vapour generation and aeration in one integrated unit.
- Validated for a 6-log sporicidal kill using Bioquell's 35% hydrogen peroxide sterilant.
- Suitable for use in both small laboratories and large biopharmaceutical manufacturing areas, including GMP/GLP cleanrooms.
- Designed for retrofit or new-install environments with minimal structural modification required.

Bioquell Qube – Pharmaceutical Isolator

- Configurable isolator platform with built-in hydrogen peroxide vapour decontamination technology achieving a validated 6-log sporicidal reduction on exposed surfaces.
- Available in 2-glove, 4-glove or 6-glove configurations with up to two material transfer ports/Rapid Transfer Ports (RTPs).
- Constructed of hard-wearing polypropylene body and 316 stainless steel floor (scratch-resistant surface) for cleanroom use.
- Decontamination cycles as short as ~20 minutes (depending on load/configuration) enabling rapid turnaround.
- Designed to install via 800 mm (32 in) door frame with no or minimal HVAC connection in positive pressure setups.
- Integrated environmental monitoring options including particle-counting (viable & non-viable) and remote data logging to support compliance (e.g., 21 CFR Part 11).

Operational Environment Control Systems

Risk Reduction Solutions

Bioquell SeQure

- Achieves validated 6-log sporicidal kill on exposed surfaces using Bioquell's 35% hydrogen peroxide sterilant (EPA Reg. No. 72372-1-86703).
- Automated, pre-programmed decontamination cycles optimized for high throughput and minimal manual setup.
- Adaptable for retrofit mounting on nearly any wall surface in either new-construction or existing installations.
- Integrates an aeration module (e.g., catalytic breakdown of hydrogen peroxide vapour) for efficient cycle termination.
- Real-time automated cycle-prediction engine assists validation and minimizes downtime.
- Suitable for viral/bacterial vector work, biocontainment units and research areas where compact footprint is required.

Bioquell L-4

- Mobile hydrogen peroxide vapour generator designed for equipment, enclosures and full-room/zone decontamination (up to ~250 m^3 with optional distribution head).
- Operates at ambient (room) temperature; no extended de-humidification phase required prior to start of cycle.
- Fully validated including IQ, OQ, GCD, PQ and cycle recording (thermal printer and real-time data options) with up to 300 pre-programmed cycles stored.
- Connects to external equipment or distribution accessories (e.g., isolators, pass-throughs, freeze-dryers, incubators, rack washers) for flexible application.
- Remote start/stop and integration testing available for building management and automation systems.
- Uses Bioquell's hydrogen peroxide vapour sterilant to achieve validated bioburden reduction across all exposed surfaces.
- Compact mobile footprint enabling positioning adjacent to target area; suitable for equipment decontamination or room/zone deployment.

Operational Environment Control Systems

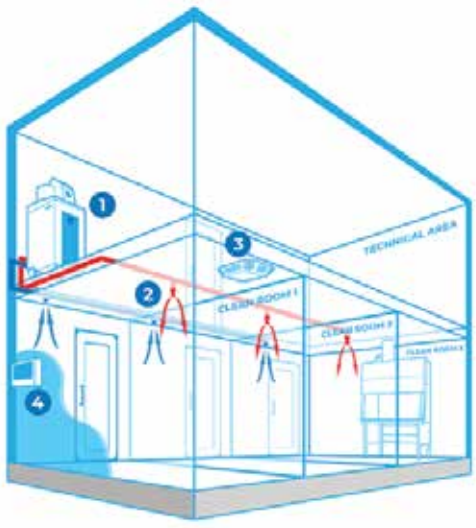
Risk Reduction Solutions

Bioquell IG-2

- Fixed, built-in hydrogen peroxide vapour generator engineered to integrate into process equipment, isolators, filling lines, transfer chambers or plant zones.
- Provides validated 6-log sporicidal kill for every exposed surface during each cycle.
- Remote-control touch-screen interface located remotely for user convenience; remote hose lengths up to 3 m for flexible placement of components.
- Custom engineering support provided to adapt the system to specific equipment/process setups, ensuring seamless inclusion in workflow.
- Integration with building management systems (BMS) and automation available to support data logging and compliance.
- Compact footprint while maintaining high capacity decontamination; designed for minimal interruption to surrounding operations.

Bioquell Integrated Building Decontamination System

- Fully integrated, facility-scale solution designed for routine or frequent decontamination of zones.
- Vapor distribution via the building's HVAC system or dedicated pipe network enables efficient delivery and evacuation of hydrogen peroxide vapour across multiple rooms.
- Reducing risks from trailing cables or door-sealing errors.
- Scalable and custom-designed to your facility; validated to achieve a 6-log bioburden elimination standard.
- Connectivity to building management systems (BMS) for monitoring, logging, automation and compliance.
- Designed for minimal workflow disruption.
- Suitable for GMP biopharmaceutical manufacturing, filling suites, biomedical facilities and biosafety/containment labs requiring routine decontamination of multiple zones.



Operational Environment Control Systems

Consumables & Related Accessories

Bioquell IG-2

- Rapid chemical indicator verifying 6-$\log_{10}$ bioburden reduction (G. stearothermophilus) in rooms ≥ 10 m^3.
- Features reactive ink strip that changes colour on exposure, providing instant visual confirmation.

Bioquell IG-2

- Indicator card for small enclosures (< 10 m^3) calibrated to 6-$\log_{10}$ kill during H_2O_2 vapour cycles.
- Delivers immediate visual results by comparing reactive and reference ink strips after each run.

Bioquell IG-2

- Inoculated with G. stearothermophilus spores to verify validated 6-$\log_{10}$ reduction performance.
- Placed at test points, exposed to vapour, then incubated to confirm complete decontamination.

Bioquell IG-2

- High-purity 35 % aqueous hydrogen peroxide formulated for Bioquell vapour systems.
- RFID-tagged bottles ensure traceability and compatibility with validated cycle parameters.

Bioquell IG-2

- Optical reader that quantifies Bioquell CI colour change and records digital results.
- Provides automatic data storage and traceable reporting of 6-log kill verification cycles.

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.

Air Techniques
INTERNATIONAL

Operational Environment Validation Systems

Operational Environment Validation Systems

Photometers and Accessories

2i iProbe Plus Scanning Probe

- Large 4.3-inch colour touchscreen, compatible with existing 2i photometer base units without firmware update ("plug and play") and supports password protection/encryption for 21 CFR Part 11 compliance.
- Ergonomic handle (with finger grooves and thumb-rest), upstream/downstream/clear valve controls on the probe (patented), and a "10-second rewind" function to exclude accidental alarm events.

2i, 2i-N Aerosol Photoameter

- Portable, rugged digital aerosol photometer suitable for in-situ filtration system testing; the 2i-N variant has a sealed sample train for hazardous/nuclear environments and is compatible with ASME N511 / 510 / 509 / AG-1.
- Technical specifications: size ~ 33 cm × 25.7 cm × 15.2 cm (13 in × 10.1 in × 6 in); weight ~8.6 kg (19 lb); power input 100-250 V AC, 50/60 Hz auto-adjust; flow control 1 cfm (28.3 lpm) ±5 %.
- Dynamic measurement range from 0.0001 mg/m^3 (µg/l) up to 120 mg/m^3; accuracy of ±1 % of readings (0.01 % to 100 %); repeatability ±0.5 % of readings >0.01 % to 100 %.

Heavy Duty Photometer Cases

- Ruggedized transport/storage cases with hard-plastic waterproof/crushproof/dustproof shell, telescoping handle and wheels, and custom foam cut-outs designed to secure the 2i photometer, generator, accessories during transport.
- Configurations include multiple sizes: e.g., part 9300258 (fits 2i + iProbe; no wheels) at 58 cm × 48 cm × 23 cm, ~4 kg empty; part 9300243 (fits 2i + iProbe + thermal printer; with wheels) at 53 cm × 62.5 cm × 33 cm, ~10 kg empty.
- Designed for "all-in-one" job-site transport: accommodates photometer, generator (5D or 4B/4BL), iProbe, thermal printer and accessories.

Tescan

Electron & X-ray Microscopy Solutions

Electron & X-ray Microscopy Solutions

Scanning Electron Microscopes (SEM)

Tescan VEGA

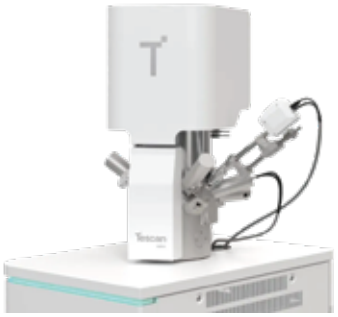
- Tungsten filament SEM with no apertures, simplifying user setup and lowering maintenance burden.
- Uses Wide Field Optics™ and 2× SEM navigation to minimize alignment overhead and speed sample observation.
- Integrates EDS directly in the interface, allowing morphology and elemental analysis in a single environment.

Tescan VEGA compact

- Compact analytical SEM with a large chamber capable of accommodating industrial-scale samples under true high vacuum.
- Employs In-Flight Beam Tracing™ for rapid beam optimization and setting of imaging conditions.
- Uses Essence™ software with EDS overlay tools to correlate morphology and composition within a unified interface.

Tescan MIRA

- FEG-SEM (Schottky source) modular platform suited for high-current, high-resolution imaging.
- Supports multiple techniques (EDS, EBSD, CL, STEM, nanoprototyping) via scalable detector integration.
- Utilizes In-Flight Beam Tracing™ and Wide Field Optics™ to accelerate beam setup and navigation.



Tescan MIRA XR

- Ultra-high-resolution (UHR) SEM platform combining BrightBeam™ optics, Wide Field Optics™, and Dual Essence ™ EDS.
- Offers macro-to-nano automated navigation, beam optimization, and automated column alignment.
- Supports challenging sample types (non-conductive, outgassing) via MultiVac™ and Auto LowVac Aperture.

Electron & X-ray Microscopy Solutions

Scanning Electron Microscopes (SEM)

Tescan CLARA

- Field-free UHR SEM platform optimized for imaging delicate, magnetic, or charging samples with minimal artifacts.
- Incorporates energy-filtered, in-column multi-detector design for simultaneous topography and composition contrast in a single scan.
- Supports modular hardware and open scripting workflows for correlative and in-situ experimentation.

Tescan MAGNA

- Uses TriLens™ immersion optics to maintain sub-nanometer resolution at longer working distances and on tilted surfaces.
- Employs contrast-selective detectors (TriSE™, TriBE™) to produce clear SE/BSE contrast with minimal signal mixing.
- Enables STEM-in-SEM capability, allowing nanoscale characterization without switching instruments.

Tescan TIMA

- Automated mineralogy SEM combining high-throughput SEM-EDS with integrated mineral identification and textural analysis.
- Uses four EDS detectors and spectral summing to detect trace and low-abundance minerals.
- Offers unattended data acquisition, automated classification, and spatial linking of compositional and structural data.

Electron & X-ray Microscopy Solutions

Focused Ion Beam-Scanning Electron Microscopes (FIB-SEM)

Tescan AMBER

- Automated Ga FIB-SEM platform combining BrightBeam™ field-free SEM optics with Orage™ Ga ion beam and full automation of lamella preparation workflows (including lift-out).
- Supports both inverted and planar sample preparation, nanoprototyping, and gentle final polishing (with optional Argonne Gentle Ion Beam for < 200 eV polishing).

Tescan AMBER X

- Universal plasma FIB-SEM combining Mistral™ Xe plasma FIB with BrightBeam™ UHR SEM to handle both bulk volumetric milling and delicate TEM lamella prep.
- Capable of curtaining-free, high throughput milling with Xe while retaining Ga-level precision for sensitive sample prep.
- Facilitates complex multimodal workflows (EDS, EBSD, ToF-SIMS, Raman) in a unified instrument.

Tescan SOLARIS

- Dedicated Ga FIB-SEM configured for fully automated, high-precision TEM sample prep in semiconductor devices
- Incorporates Triglav™ SEM, AutoTEM Pro™ software, and OptiLift™ nanomanipulator for repeatable lamella preparation in planar, inverted or top-down geometries
- Offers AI-driven workflows, precise end-pointing, overnight auto-alignment, and unattended batch processing

Tescan SOLARIS X

- Plasma FIB-SEM platform for high throughput failure analysis and Ga-free sample preparation, combining Mistral ™ Xe plasma FIB with UHR SEM imaging
- Provides artifact-free "TRUE X-sectioning" using Rocking Stage cross-sectioning capabilities in heterogeneous stacks and materials

INSTRON

Materials Testing Systems

Materials Testing Systems

Universal Testing Systems

6800 Series Universal Testing Systems

- Delivers force capacity from 0.02 N to 300 kN with load measurement accuracy of ±0.5% of reading down to 1/1000 of the load cell capacity using 2580 Series cells.
- Features such as auto-positioning, specimen protection, increased axial stiffness, collision mitigation, and compatibility with advanced accessories and automation modules.
- Supports expansion to up to 13 channels plus analog I/O and digital I/O, with removable handset controls and optional smart-close air kit for safer grip actuation.

3400 Series Universal Testing Systems

- Covers force range from 0.025 N to 300 kN, achieving ±0.5% accuracy down to 1/250 of load cell capacity (and ±1.0% down to 1/500).
- Designed for routine mechanical testing and quality control, with features such as collision mitigation, safety coaching, and optional smart-close air grip kit.
- Frame styles include single column and table models, offered in extra height variants to support testing of high elongation specimens.

Automation for Universal Testing Systems

- Provides modular or turnkey automation solutions (e.g. AT2, AT3, AT6, CT6, automated carousel, cobot integration) to automate specimen loading, test execution, and data collection.
- Designed to enhance throughput, repeatability, safety, and workflow efficiency, allowing operators to focus on analysis rather than machine operation.
- Automation modules can integrate with existing systems and accessories, supporting multiple test types (tension, compression, flexure, shear) in one workflow.

Materials Testing Systems

Universal Testing Systems

5980 Series Universal Testing Systems

- Rated for force capacity up to 600 kN, with load measurement accuracy of ±0.5% down to 1/1000 of load cell capacity using 2580 Series cells (and ±0.4% at certain ranges with other cells).
- Built for high strength material testing with increased axial stiffness, compatibility with automation and accessories, removable handset, specimen protection, and automatic gain adjustment.

Industrial Series Universal Testing Systems

- Uses hydraulic drive systems to deliver force up to 2000 kN, with testing spaces and frame stiffness suitable for large, high-strength specimens.
- Load measurement accuracy of ±0.5% down to 1/500 of load cell capacity, featuring specimen protection, automatic gain adjustment, removable handset for ergonomic control.
- Select frames (e.g. DX, HDX) provide dual test spaces enabling tension and compression/bending/shear testing without needing fixture changes when switching modes.

Specialty Systems

- Custom solutions engineered for application-specific requirements, such as the Curved Needle Testing System for puncture and bend testing of surgical needles per ASTM F3014.
- Customization includes frame geometry modifications, specialized safety shielding (light curtains, debris shields), high-speed frames, and tailored fixtures to accommodate unique specimen shapes or test protocols.

TTSL
ALTAYF ALTHAHABI
PART OF TAAWON GROUP

Taawon
Jordan
+962 6 5155 477/8
+962 77 748 5466

Diamond Spectrum
Saudi Arabia
+966 12 6919 740
+966 12 61 62 243

Altayf Althahabi - TTSL
United Arab Emirates
+971 4 514 5813
+971 52 575 7156

Diamond Spectrum
Bahrain
+973 32 225 691
+973 17 223 187