Laboratory Automation and Robotics

Precision meets
performance

Anton Paar offers **more than 170 analytical solutions** and is the **market leader** in digital density measurement and rheology. Based on 50 years of experience in laboratory instrumentation Anton Paar has taken a step forward to **laboratory automation**.

Anton Paar's automation solutions optimize automated workflows which address today's key topics, namely productivity, reproducibility, and precision. A **broad automation portfolio** including standard products as well as fully **customized solutions** addresses a wide range of automation tasks reaching from high-throughput automated rheometry to sample processing and fully automated quality control for beverages.

As the only **provider of both lab instruments and automation,** Anton Paar is perfectly set

to deliver outstanding performance for sensitive automated measurement tasks in industries and applications as diverse as petrochemistry, personal care products, food, and beverages.

Furthermore, Anton Paar's **global sales and service network** of subsidiaries is close to you from the project definition to execution and commissioning and offers comprehensive training, support, and tailor-made maintenance and service.

Automated solutions from Anton Paar represent trustworthy **measuring technology and automation from a single source** – where precision meets performance.

HTX platform
Fully customizable laboratory automation solution

Modular sample processor
Automatic dosing, blending, subsampling, and transferring of liquids

HTR
Rheometer automation for high sample throughput and complex sample handling and conditioning

HTR compact
High Throughput Rheometer autosampler for Anton Paar rheometers MCR 102 and MCR 302

Alab 5000
Fully automated quality control lab for beverages directly at the filling line

Automated high-throughput rheometers
HTR compact

The HTR compact series offers automated sample handling and conditioning for rheological measurements with Anton Paar's MCR 102 or MCR 302 rheometers in a lightweight benchtop design. It is the ideal choice for first-level rheology automation.

High-throughput operation

- 36 samples in two trays with 18 cups each
- Sample drawer to add vials during operation
- Rheometer and sample stage operate in parallel

Perfectly safe and accurate workflow

- Achieve lab accuracy due to mechanical decoupling of the rheometer and automation unit
- Easy sample management by using job lists
- LIMS integration (file transfer, database, Ethernet)
- Priority samples can be introduced at any time
- Four-stage programmable cleaning station (rinse, brush, clean, dry)
- Beaker gripper operates with controlled force
- Controlled halt upon emergency stop

Optional modules

- Capping/decapping of sample vials
- Different types of sample racks
- Bar code reader for sample identification
- Wide range of measurement geometries available from CC10 to CC27 including third-party T-bars and stirrers
- Ventilation for volatile and solvent-based samples

Specifications

Dimensions (W x D x H):	1570 mm x 803 mm x 1164 mm
Weight (net):	300 kg
Mains supply:	230V, 16A, 50/60Hz
Media interfaces:	compressed air, cleaning solvents
Waste disposal:	drain for liquids
Communication interface:	Ethernet

Rheometer specifications

	MCR 102	MCR 302	Unit
Max. torque	200	200	mNm
Min. torque, rotation	5	1	nNm
Min. torque, oscillation	7.5	0.5	nNm
Max. angular velocity	314	314	rad/s
Max. angular frequency	628	628	rad/s
Normal force range	0.01 to 50	0.005 to 50	N

# Automated high-throughput rheometers
HTR

The HTR automation series offers an optimized analysis workflow for rheological investigations based on Anton Paar's MCR 702 rheometer. The extensive set of features and the built-in flexibility make it the ideal choice for sophisticated and high-throughput R&D or QC work.

Maximized operation flexibility

- Up to 96 measuring geometry units (e.g. for polymer melts)
- 3 different rheological geometries (CC, CP, PP)
- Standard rack configuration holds 96 samples
- Different types of racks for pipettes, syringes, and trim blades
- Temperature-controlled sample storage (down to 4 °C)

Perfectly safe and accurate workflow

- Achieves lab accuracy due to mechanical decoupling of rheometer and automation unit
- Sample management by using job lists
- LIMS integration (file transfer, database, Ethernet)
- Priority samples can be introduced at any time
- Four-stage programmable cleaning station (rinse, brush, clean, dry)
- Integrated trim tool removes excessive sample material to avoid wrong measurement results
- Visual verification of trim result
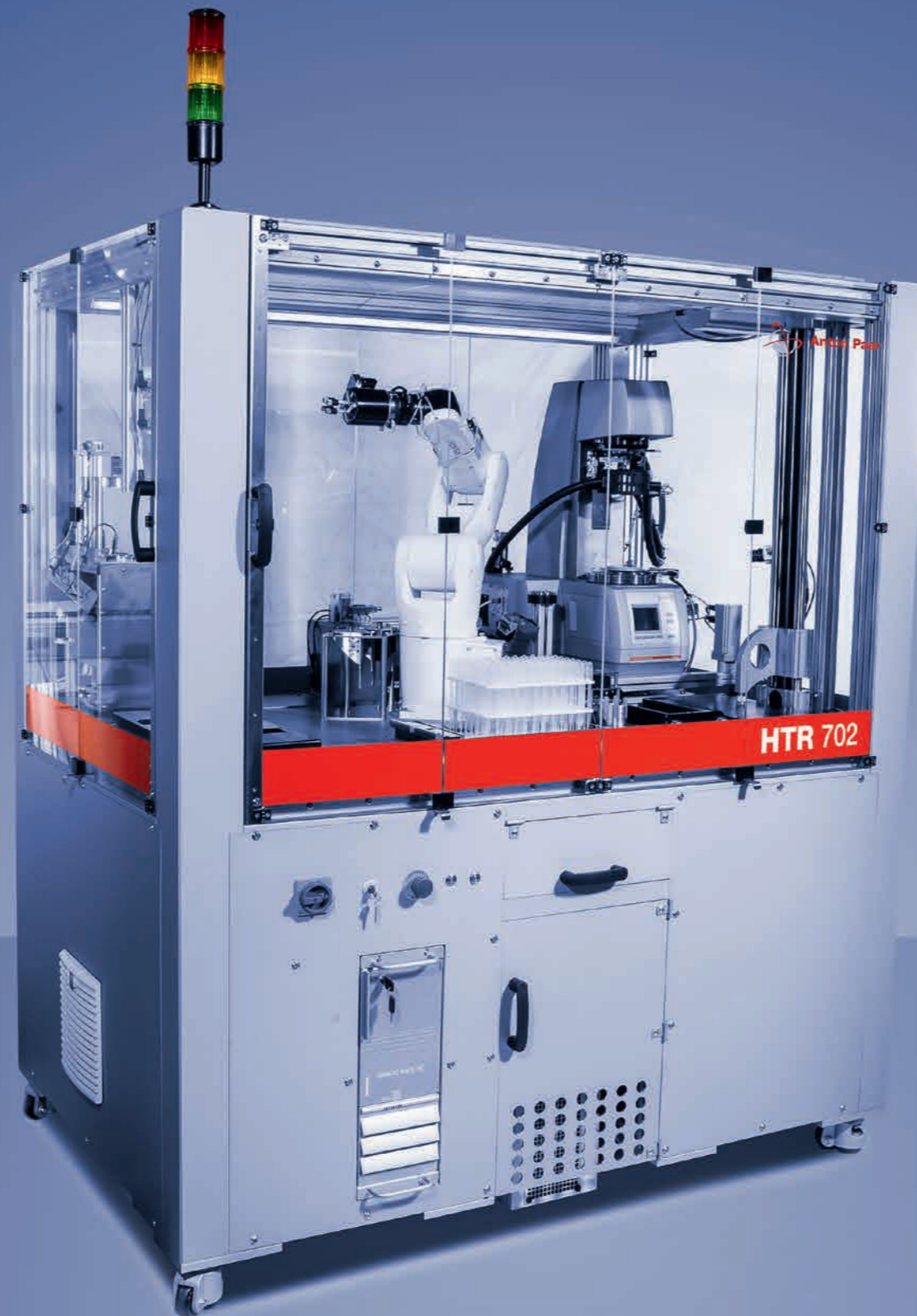
Optional modules

- Gravimetric and volumetric dosing and weighing
- pH measurement
- Capping/decapping of sample cups or vials
- Various gripper tools for samples, measurement geometries, and disposables
- Precise dosing of sample liquids via pipettes and/ or syringes
- Automatic cutting of pipette opening to reduce shear stress
- Shaker module for reproducible shaking
- Barcode reader for sample identification, process control, and logging
- Ventilation for volatile and solvent-based samples

Specifications

Dimensions (W x D x H):	1800 mm x 1200 mm x 2000 mm
Weight:	900 kg
Mains supply:	400 VAC, 16A, 50/60 Hz
Media interfaces:	compressed air, cleaning solvents
Waste disposal:	drain for liquids
Communication interface:	Ethernet

Rheometer specifications

	MCR 702 MultiDrive	Unit
Max. torque	230	mNm
Min. torque, rotation	1	nNm
Min. torque, oscillation	0.5	nNm
Max. angular velocity	314	rad/s
Max. angular frequency	628	rad/s
Normal force range	0.005 to 50	N

Automated handling of liquids and powders
Modular Sample Processor

The Modular Sample Processor carries out automatic dosing, blending, subsampling, and transferring of liquids prior to analysis.
It is available as a stand-alone benchtop unit or can optionally be integrated into complete automated workflows. With individual adaptations the Modular Sample Processor perfectly carries out any desired liquid handling operation.

Process liquids, pastes, and powder

- Viscosities up to 1000 mPa.s
- Input volumes from a few µL up to 1 liter
- Powder samples upon request

Perfectly dilute, dispense, add, and blend

- Gravimetrically controlled sample volume
- Accuracy of +/-0.9 mg
- Drip protection avoids contamination of vials

Seamlessly identify and process samples

- ID-tag-based workflow programming
- ID-tag-based process log file
- Multiple ID tag formats: bar code, data matrix, QR
- Sample management by using job lists
- LIMS integration (file transfer, database, Ethernet)
- Priority samples can be introduced at any time

Optional modules

- pH measurement module
- Capping/decapping of sample vials
- Various gripper tools
- Automatic cutting of pipette opening to reduce shear stress
- Shaker module for reproducible shaking
- Different types of racks and accessories

Open to customer-specific adaptations

- Design and interfaces adaptable to fit into existing lab workflows
- Fully customizable design upon request

Anton Paar

Modular Sample Processor

MSP

Specifications

Dimensions (W x D x H):	1545 mm x 803 mm x 1164 mm
Weight:	180 kg
Mains supply:	230 V, 16A, 50/60 Hz
Communication interface:	Ethernet
Media interfaces:	liquids for dilution, compressed air

For customized laboratory workflows
HTX automation platform

The HTX floor-standing automation platform can integrate up to ten different analytical instruments such as viscometers, density meters, or refractometers for concurrent multi-parameter analysis. Its modular concept allows fully customized workflows for sample conditioning, preparation, and measurement.

Assemble individual workflows

- Instruments include viscometers, density meters, refractometers, polarimeters, rheometers, etc.
- Optional third-party analyzers include heating ovens, analyzers with flow cells, balances, etc.
- Can be configured as a large-capacity sample processor and/or analyzer
- Ten slots available for any combination of lab instruments and/or sample racks
- Sample preparation and analyzers work independently of each other
- Multiparameter analysis within one workflow
- Redundant module configuration minimizes downtime in case of maintenance

For optional modules please see the overview table.

Simplify process control

- Intuitive, simple-to-use control software for sample and workflow management
- Sample management by using job lists
- Priority samples can be introduced at any time
- Broad variety of notification services (e.g. text messages or email)

Communicate safely

- Standard industry protocols such as PROFINET, Ethernet, CANOpen, or Profibus
- LIMS integration (file transfer, database, Ethernet)

HTV – High Throughput Viscometer

- State-of-the-art replacement of outdated Houillon viscometers based on the HTX platform
- Significantly higher accuracy
- High dynamic range with single measuring cell
- Processes up to 2500 samples per day
- Ready-made configuration based on HTX platform
- Equipped with up to six SVM-type viscometers
- Up to four sample racks with 96 vials
- Complies to ASTM D7042 standard
- Fully automatic cleaning of measuring cell
- Automatic, periodic re-calibration with standard oils
- Particle Quantification Index integration possible upon request
- Applications: used oils, lube oils, fuels, chemicals, cosmetics
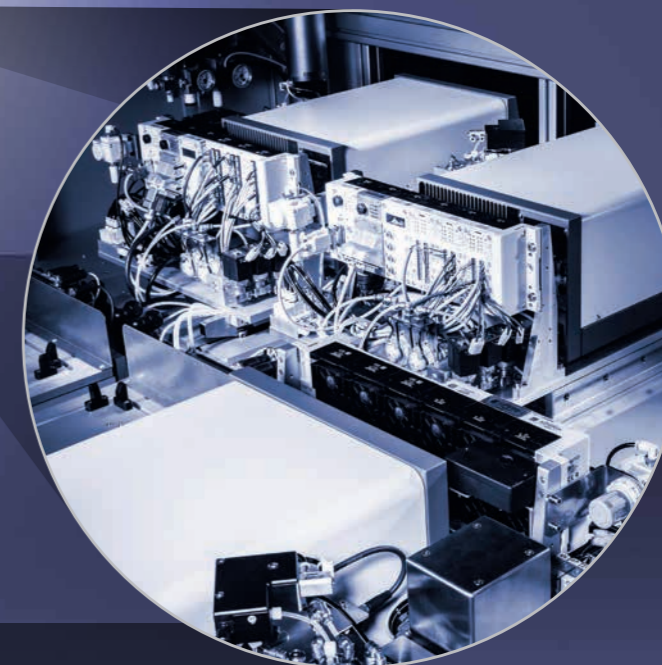
Specifications

Dimensions (W x D x H):	2760 mm x 1600 mm x 2560 mm
Weight:	800 kg net weight
	1200 kg with 6 modules
Mains supply:	400VAC, 16A, 50/60Hz
	11 kW with 6 modules
Media interfaces:	3x solvent (toluene, ethanol, isopropanol), compressed air
Waste disposal:	drain for liquids, waste bin for solids, ventilation for fumes
Communication interface:	Ethernet

# Automated QC of beverages directly at the line
Alab 5000

Alab 5000 is a fully automated quality control lab which continuously measures all key parameters of beers, soft drinks, and mineral water right after the final filling. It consists of four modules: one for piercing and shaking, one for the beverage analysis, one for weighing in order to determine the net content, and a torque module to measure the opening torque and the application angle. Its modular design and small dimensions make it a perfect fit for both new installations and existing production lines. Alab 5000 can also be seamlessly used with Anton Paar's Davis 5 software solution supporting real-time control of the complete production process.

Perfectly reproducible results

- Integrated air conditioning to provide a lab environment
- Automatic shaker functionality ensures reproducible equilibration of the sample
- Direct measurement of many different types of packages with the piercing module
- Automated data acquisition and documentation

Rely on production within specifications

- Proven high-accuracy Anton Paar packaged beverage analyzing systems (PBA) determining CO_2, O_2, density, °Brix, alcohol, sugar inversion, TPO, and pH)
- Monitors key package parameters such as torque and net content
- Continuous reference measurements to monitor, adjust, and calibrate the process equipment
- Seamless integration into Anton Paar's Davis 5 software solution
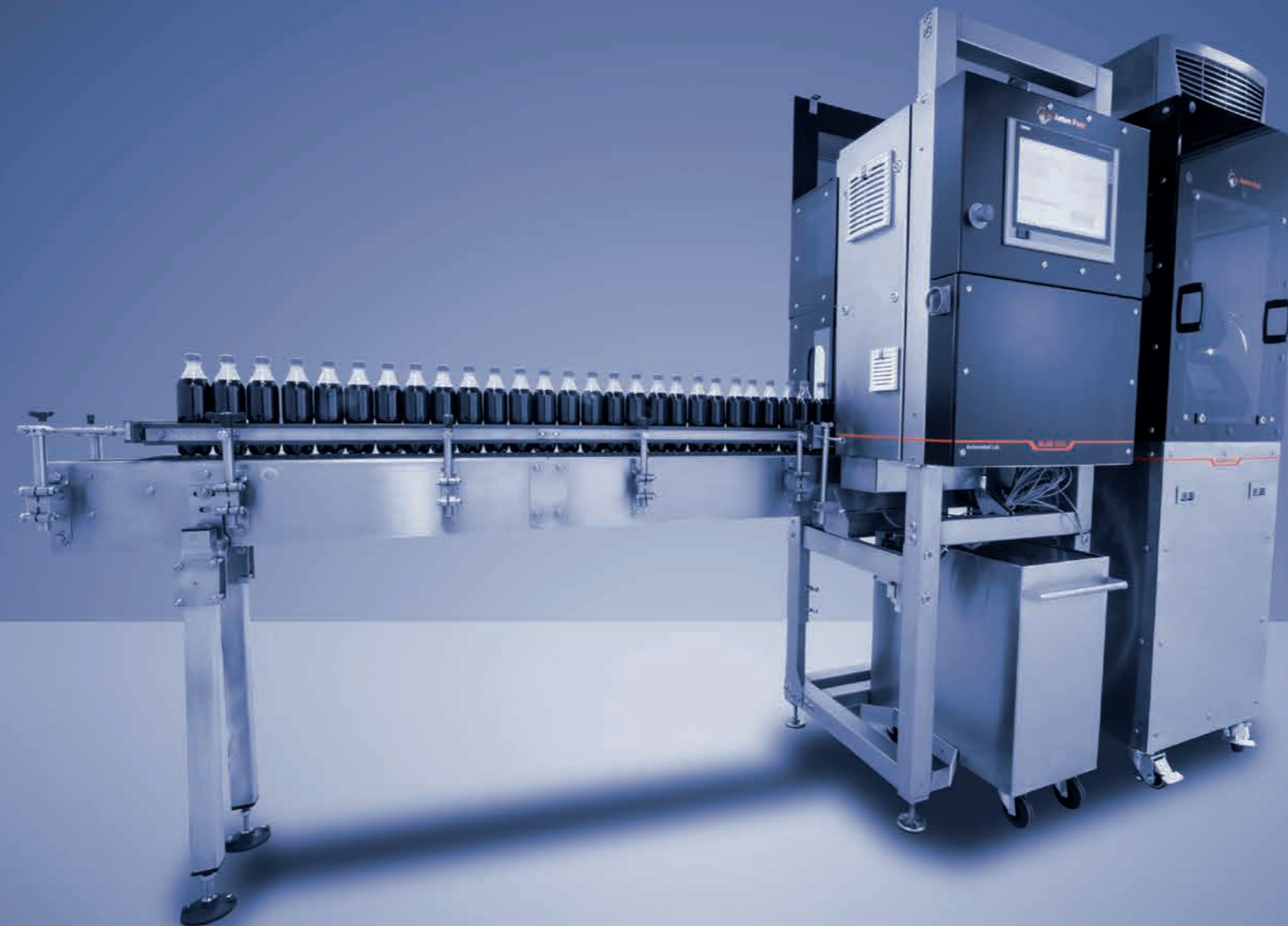
Adapt system configuration to actual needs

- Flexible design comprising four individual modules
- Small dimensions of modules enable easy transportation and installation in existing facilities
- Perfectly fits into existing conveyor belt layouts requiring minimum extra space
- Distributed placement of individual modules along production lines (e.g. delayed torque measurement)

Available configurations

- Standard setup includes analytical and pierce and shake modules
- Torque and weighing modules
- Other measurement parameters upon request

Specifications

Dimensions (W x D x H):	730 mm x 940 mm x 2270 mm One module
Weight:	180 kg
Mains supply:	400VAC, 32A, 50/60Hz
Media interface:	cleaning solvents, compressed air
Waste disposal:	drain for liquids, waste bin for packages
Communication interface:	Ethernet

Reference projects

Subject	**Rheological testing of plant material**	**Rheological investigation of polymer melts in R&D**	**Goods-in quality control of coatings**	**In-process product quality control**
Customer	A start-up R&D and production plant for vegan food	A leading polymer supplier in the Middle East	A leading global supplier of automotive components	A multinational producer of cosmetics and toiletries
Samples	Preconditioned plant material	Various types of polymer melts	Water-based paint and varnish	Toothpaste
Solution	HTR High Throughput Rheometer	HTR High Throughput Rheometer	HTR compact	HTR compact
Modules	MCR 502 rheometer, capper/decapper, cleaning unit, pipette handler, cooled sample storage, solvent trap, trim tool	MCR 502 rheometer, vacuum gripper, sample storage, measurement systems storage, trim tool	Standard configuration, sample racks, temperature units	Customized configuration, sample drawer, infrared temperature measurement, T-bar as stirrer
Challenge	Optimize workflow to avoid shear stress during sample treatment potentially resulting in compromised sample properties	Optimize workflow in order to avoid system contamination due to stringing of the melted polymer sample after the measurement	Design and implement intuitive and simple GUI in order to significantly reduce new operator training period at times of high operator fluctuation rate	Utilization of customer beakers and stirrer instead of Anton Paar standard; develop robust detection method to ensure consistent start conditions according to customer SOP

Subject	**Wear monitoring of used oil samples**	**Subsampling of urine specimens for drug testing**	**Chemical testing of rubber specimens**	**Inline quality control of beverages**
Customer	A global player in petrochemistry	A governmental drug testing lab	A leading global producer of tires	A global player in the beverage industry
Samples	Used oil/crude oil	Biohazardous organic samples	Rubber samples	Soft drinks
Solution	HTV High Throughput Viscometer	Tailor-made automation solution based on Modular Sample Processor	Tailor-made automation solution based on Modular Sample Processor	Alab 5000 Automated beverage lab
Modules	Six SVM modules, two sample trays, two PQI modules, LIMS interface	Sample drawers, capper, shaker, syringe dispenser, weighing unit, video surveillance, sample racks	Sample rack, capper, gravimetric dosing unit, filter handling, waste disposal, dilution unit	Pierce and shake module, analytical box, weighing and torque unit
Challenge	Replace formerly used Houillon viscometers with a more precise, state-of-the-art SVM viscometer which also represents the new standard in used oil testing; optimize cleaning procedures and measurement cycle time	Provide traceable subsamples without human interaction and risk of manipulation (tamperproof); integration of subsampling station into a fully automated drug testing laboratory	Handling of highly flammable solvents and risk assessment of the overall solution; fully automatic utilization of disposable filter elements	Rugged design to withstand typical production environments of bottling facilities with CIP/SIP cycles

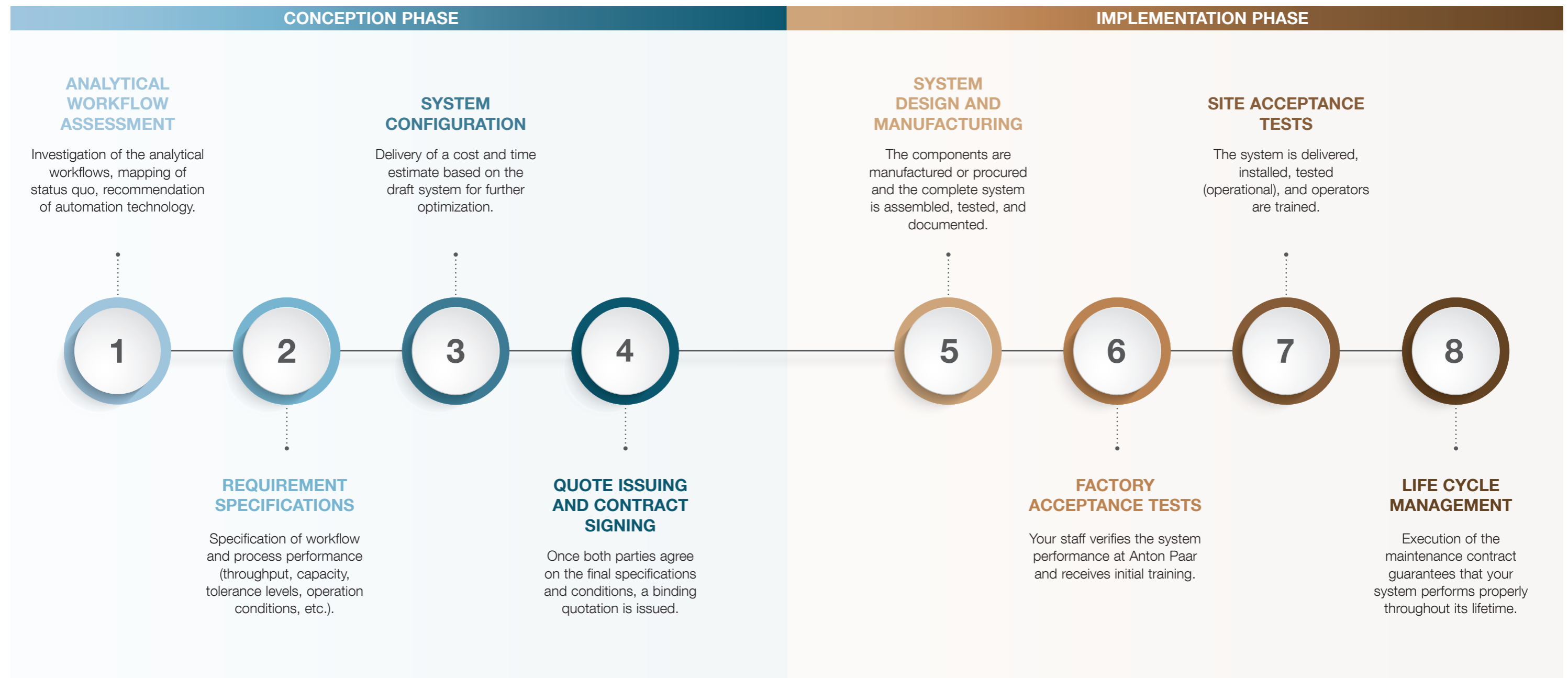# Tailor-made automation – solutions made for you

Making complex workflows run well

There is nothing available off-the-shelf which meets your demands for automation? Anton Paar offers tailor-made automation solutions in one go for all industry segments. With its expertise in-house Anton Paar can either customize an existing automation system or design a completely new automated workflow based on your specific requirements.

How ideas take shape

You can rely on one single competent partner throughout the whole life cycle of your tailor-made automation solution. Anton Paar offers modular solutions which allow you to stay flexible and adapt your system to future requirements.

Together with you, Anton Paar develops the most beneficial automation solution for your workflow, from the first idea up to the final implementation at your facility.

CONCEPTION PHASE	IMPLEMENTATION PHASE

ANALYTICAL WORKFLOW ASSESSMENT

Investigation of the analytical workflows, mapping of status quo, recommendation of automation technology.

SYSTEM CONFIGURATION

Delivery of a cost and time estimate based on the draft system for further optimization.

SYSTEM DESIGN AND MANUFACTURING

The components are manufactured or procured and the complete system is assembled, tested, and documented.

SITE ACCEPTANCE TESTS

The system is delivered, installed, tested (operational), and operators are trained.

1   2   3   4   5   6   7   8

REQUIREMENT SPECIFICATIONS

Specification of workflow and process performance (throughput, capacity, tolerance levels, operation conditions, etc.).

QUOTE ISSUING AND CONTRACT SIGNING

Once both parties agree on the final specifications and conditions, a binding quotation is issued.

FACTORY ACCEPTANCE TESTS

Your staff verifies the system performance at Anton Paar and receives initial training.

LIFE CYCLE MANAGEMENT

Execution of the maintenance contract guarantees that your system performs properly throughout its lifetime.

Automation functionalities

Alab 5000		HTR compact	HTR	Modular Sample Processor	HTX	Alab 5000
		Rheometer autosampler for high sample throughput	Rheometer automation for high sample throughput and complex sample handling and conditioning	Modular sample processor for automatic dosing, blending, subsampling, transferring of liquids	Measurement of viscosity, density, concentration of liquids, automated and expandable for other parameters	Automated beverage analysis directly at the filling line
Gravimetric & volumetric dosing and weighing	Precise sampling and diluting of samples; gravimetric control and calculation of the sampled volume; the value is used for subsequent analysis. Used for liquids with low to medium viscosity.	○	●	●	●	○
Filling and cleaning (flow cell)	Programmable filling and cleaning cycles for analytical instruments equipped with a flow cell. Usable for all kinds of liquid solutions (inorganic and organic).	○	○	○	●	○
Four-stage cleaning station	Cleaning in four steps which are individually programmable. Cleaning with organic solvents and/or water, brushing and drying with hot air.	●*	●	○	●	○
pH measurement	Integrated pH measurement to detect the pH in addition to analytical determinations from exactly the same sample. Equipped with automatic 3-point calibration, cleaning routine, and resting position.	○	●	●	●	○
Capping/decapping	Automatic closing and opening of each sample vial.	●	●	●	●	○
Gripper	Different gripper tools are available depending on your sample containers and for pipettes. The grippers detect if the sample container or pipette is lost or cracked during transfer.	○	●*	●	●	○
Dispensing	Precise dosing of sample liquids via pipettes and/or syringes.	○	●	●	●	○
Pipette cutting	Depending on the type of sample the pipette opening is cut to the required extent; defined via the software.	○	●	●	●	○
Piercing	Piercing of PET bottles, glass bottles, cans.	○	○	○	●	●*
Shaking	Reproducible shaking of samples before sampling and analysis.	○	●	●	●	●*
Sample cooling station	Cooling of samples down to 4 °C to avoid changes in sample properties, especially for sensitive samples and samples with volatile components.	○	●	○	●	○
Sample racks	Different types and sizes of sample racks are available. Customization of racks due to individual needs is possible on request.	●*	●*	●	●	○
Disposable racks	Different racks for pipettes, syringes, caps, trim blades are available.	○	●	●	●	○
Measurement accessories rack	Different types of racks with measurement accessories (e.g. rheological geometries) are available to support even measurements with samples which are not cleanable.	○	●*	○	●	○
Sample identification (bar code/Data Matrix/QR)	For overall tracking of the sample and individual sample treatment within the workflow.	●	●	●	●	●

* included as standard

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