Cavro® Omni Flex.

RELIABLE OEM ROBOTICS FROM THE LIQUID HANDLING EXPERTS

Liquid handling and robotics made easy.

The Cavro Omni Flex provides OEM instrument designers with a complete solution for liquid handling tasks, simplifying the development, testing and regulatory approval of new automated solutions. Combining the proven liquid handling performance of the Cavro Omni Robot with a purpose-built chassis and worktable, it provides a modular, convenient solution for automation of pipetting and sample handling activities.

KEY BENEFITS

- **Faster time-to-market** – shorter development times using UL recognized and RoHS compliant components
- **Quality and regulatory compliance** – designed and manufactured under ISO 13485 and 21 CFR 820 standards
- **Industry proven solution** – lowering the technology risk in your development process
- **High accuracy and durability** – optimized for repetitive liquid handling tasks
- **Easily configured** – Large number of options and modules, including single- and dual-channel pipetting,plus a gripper
- **Scalable** – with three deck sizes to match your throughput needs
- **Choice of liquid handling technologies** – allowing air- or liquid-displacement pipetting on a single instrument
- **High process security** – Integrated liquid level detection and position encoder for each axis

ACCELERATING DEVELOPMENT

Time-to-market is a major consideration in today's fast-paced laboratory environment. The use of modular, verified OEM liquid handling components can dramatically shorten development cycles and reduce risk. The Cavro Omni Flex represents a comprehensive, modular liquid handling framework that can be easily integrated into almost any system, allowing instrument designers to concentrate on their applications instead of individual pipetting tasks.

COMPREHENSIVE COMPLIANCE

The need for extensive component testing can hold up the release of new products – particularly in the IVD market. The Cavro Omni Flex is designed and manufactured to the highest quality standards, including ISO13485, ISO9001 and FDA 21 CFR Part 820 requirements. The Cavro Omni Flex is a UL recognized component, and complies to Conflict Minerals REACH, and Europe's 2011 RoHS Directive.

QUALITY AND EXPERTISE

Cavro brand components have provided innovative and reliable liquid handling to instrument designers for many years. We are a world-leading supplier of OEM pumps, robotics and other liquid handling components for laboratory automation, giving you peace of mind and complete confidence in the performance, workmanship and dependability of our products. Offering robust solutions for almost any application in clinical diagnostics, life science research or analytical chemistry, Tecan Cavro components are specifically designed to offer flexible integration and rapid prototyping, allowing you to quickly and easily set up and run them. In addition, a range of complementary accessories – including valves, syringes, racks, carriers, consumables and probes – further simplify device integration and product development, ensuring we can provide the right solution for your application.

The Cavro Omni Robot is the heart of the system, offering tried and tested performance for general purpose liquid handling applications.

MODULARITY FOR FLEXIBILITY

The Cavro Omni Robot's modular design makes it easily configurable for many different applications. As part for the Cavro Omni Flex, instrument developers have a choice of three instrument widths – with 500, 750 and 1,250 mm of travel – to match their workflow needs.

FLEXIBLE PROGRAMMING

The Cavro Omni has been developed with ease of integration in mind, using a choice of command sets optimized for liquid handling for different programming environments. It can be programmed to operate in standalone mode or controlled by an external computer or microprocessor via an Ethernet connection.

ENHANCED SECURITY

Ideal for the development of IVD instruments, the Cavro Omni Robot is enabled for both capacitive liquid level detection (cLLD) and pressure-based liquid level detection (pLLD, using the Cavro ADP). Sensitivity is adjustable for both cLLD and pLLD, and both technologies can be used in combination to offer hybrid liquid level detection (hLLD) – enhancing process security and minimizing the risk of cross-contamination. Onboard tip detection further increases process security, and the ADP option can eject disposable tips at any Z-axis position to minimize the risk of aerosol contamination.

ROBUSTNESS FOR RELIABILITY

The simple design of the Cavro Omni Robot promises high levels of reliability and reduced maintenance, offering consistent performance during long hours of continuous use. Compact linear motion slides combine high precision and smooth movements, while industry-proven stepper motors and self-lubricating bearings add to the robot's durability.

PRECISION POSITIONING

Low-maintenance stepper motors and closed-loop positioning offer repeatability down to less than 0.12 mm for X- and Y-axes, ensuring that you know exactly where the pipetting probe is located at all times. Feedback signals are used to verify that the target position has been reached successfully, offering additional process security for IVD applications.

PARALLEL PROCESSING

Each Cavro Omni Flex can be fitted with a choice of liquid handling options, with up to two arms per instrument to allow parallel processing for increased throughput or longer walkaway times. A high payload capacity – with an optional Universal Z-axis to further increase capacity – enables the integration of various pipetting options and easy manoeuvering of labware.

Liquid displacement pipetting

The Cavro Omni Robot's single-channel liquid displacement pipetting head can be fitted with either a steel probe or disposable tip to suit various applications. Instrument productivity can be further improved by mounting two single-channel pipetting heads on the same Z-axis. Configurable to 9 or 18 mm tip spacing, this option can be used with any combination of fixed probes or disposable tips for maximum flexibility.

Air displacement pipetting

The Cavro Air Displacement Pipettor (ADP) is an air-driven pipetting option designed for integration into instruments requiring outstanding pipetting performance, built-in process security, and minimal maintenance. Compatible with a variety of Tecan disposable tips – including 10, 50, 200, 350 and 1,000 µl sizes – it also features on-board tip detection and a built-in tip ejector.


Gripper

Using the high capacity Universal Z-axis, the system can be equipped with a landscape or portrait orientation Gripper head to allow automated manipulation of standard tube or microplates formats. This option can be used to significantly enhance walkaway times for your application, by reducing the need for manual intervention during processing.

The Cavro Omni Flex provides a starting point for the development of a complete liquid handling platform, with a range of options to precisely match your system design and application needs.

SCALABLE WORKSPACE

Available in three widths – 715, 965 and 1,465 mm – the Cavro Omni Flex's rigid chassis simplifies instrument design by housing all the components and accessories required for your application in a compact footprint. The system's worktable is compatible with Tecan's broad range of carriers and racks, making it quick and easy to configure with various devices, labware items and consumables.
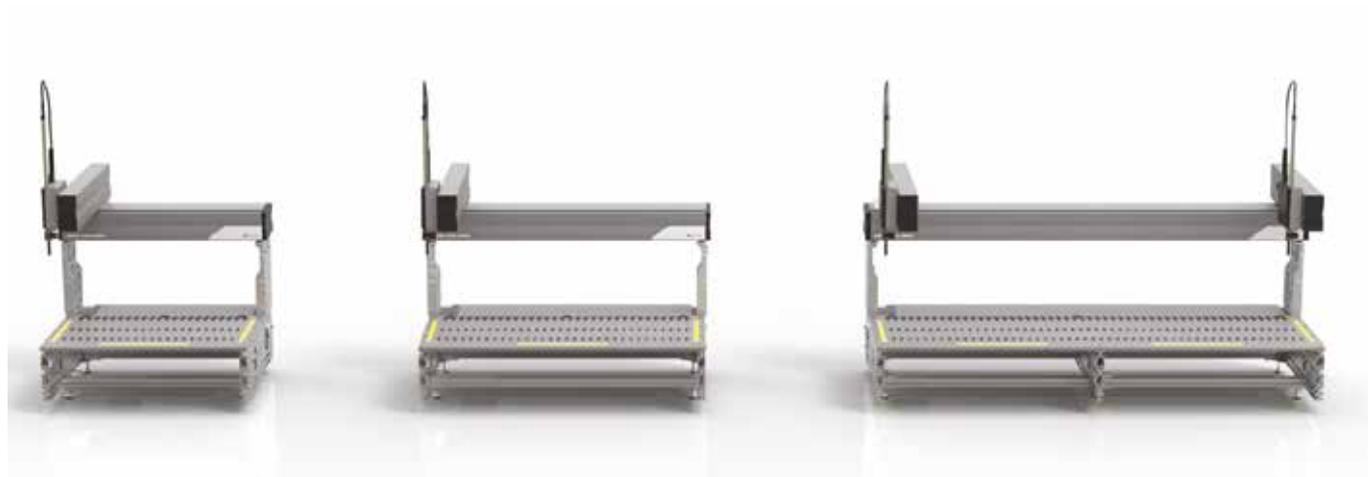
INTEGRATED POWER SUPPLY

The Cavro Omni Flex enables straightforward integration of a wide range of modules and third party devices. It features a 600W power supply, allowing a variety of devices – such as heaters and shakers – to be mounted on or under the worktable without the need for an additional power supply. A secondary mains voltage output is also available, enabling other appliances to be switched on and off through the Cavro Omni Flex.

MFC BOARD

A built-in MFC board enables straightforward control of integrated devices for walkaway processing. Two versions are available, based on the same PCBA layout; a basic version with limited functionality for cost-sensitive applications, and a full version with additional connectors offering greater versatility.

HIGH QUALITY FINISH

The Cavro Omni Flex has the look and feel of a finished product, and is available in open- and closed-back configurations. The open-back configuration offer maximum workspace for your application, with pumps and additional modules mounted below the worktable and accessible via the front of the instrument for maintenance. This is complemented by a closed-back configuration with the pumps mounted at the rear of the worktable for applications requiring less on-deck capacity

STRAIGHTFORWARD COMMUNICATION

A variety of communication interfaces are available – including RS-232 and Ethernet – using a single communication bus to control multiple devices.

SIMPLE TESTING TOOLS

The Cavro Fusion software tool gives instrument designers the ability to easily connect to and operate Tecan Cavro modules for performance evaluation, offering both a straightforward graphical user interface (GUI) for basic control of the robot, and a scripting environment for writing automated scripts, bench testing, application testing and on-site troubleshooting.

A wide range of options.

The Cavro Omni Flex is available with a wide range of options and modules to match your liquid handling requirements and instrument design.

❶ SYRINGE PUMPS

The Cavro Omni Flex's chassis features mounting points for a range of Tecan Cavro 30 mm syringe pumps:

Below worktable	Behind worktable
Cavro XCalibur	Cavro Centris
Cavro XE	Cavro XCalibur
Cavro MiniWash	Cavro XE
Cavro Smart Valve	Cavro MiniWash
	Cavro Smart Valve

The system can also be used with the Cavro ADP air-driven pipetting option, or customized for use with Tecan Cavro 60mm syringe pumps.

❷ SKINS

Standard skins are available for the side panels, top valance and lower door, allowing the rapid development of prototypes and test platforms with the look and feel of a finished product. Customized colors and designs are available for production instruments (depending on order volume).
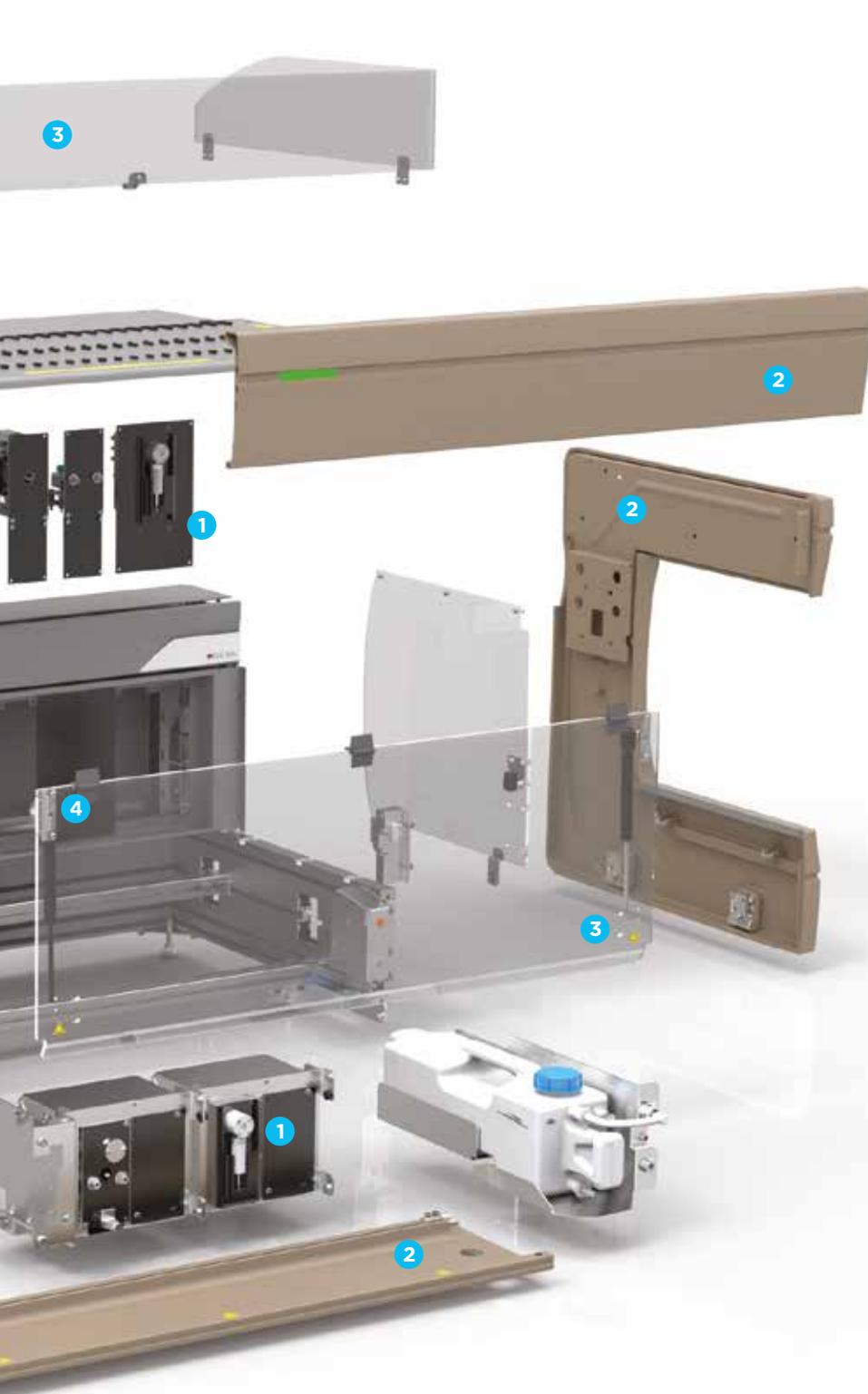
❸ SHIELDS

A door and side shields are available to isolate the worktable from the external environment, providing user protection and enhanced process security.

❹ SECURITY

The lower door and shields can be fitted with locks and sensors to prevent unauthorized access or interruption of the instrument during a run.

5 **WASH STATION**

Integrated probe washing allows the use of fixed pipetting probes while minimizing the risk of carry-over and contamination.

6 **RACKS AND CARRIERS**

Choose from a variety of Tecan racks and carriers to meet the needs of your application, including:

- Racks for various tube sizes
- Disposable tip racks
- Microplate racks in portrait or landscape orientations
- Deep-well racks
- Reagent racks
- Microfuge tube racks

7 **PROBES AND TIPS**

A range of high quality stainless steel pipetting probes are available to match your application needs, including wide bore, cap piercing, long, short and low volume options. The Omni Flex is also compatible with the Tecan disposable tips – with or without filters – which are manufactured to the highest quality standards for precise, reliable and safe pipetting.

8 **TASK LIGHTING**

LED illumination aids worktable set-up and routine maintenance tasks.
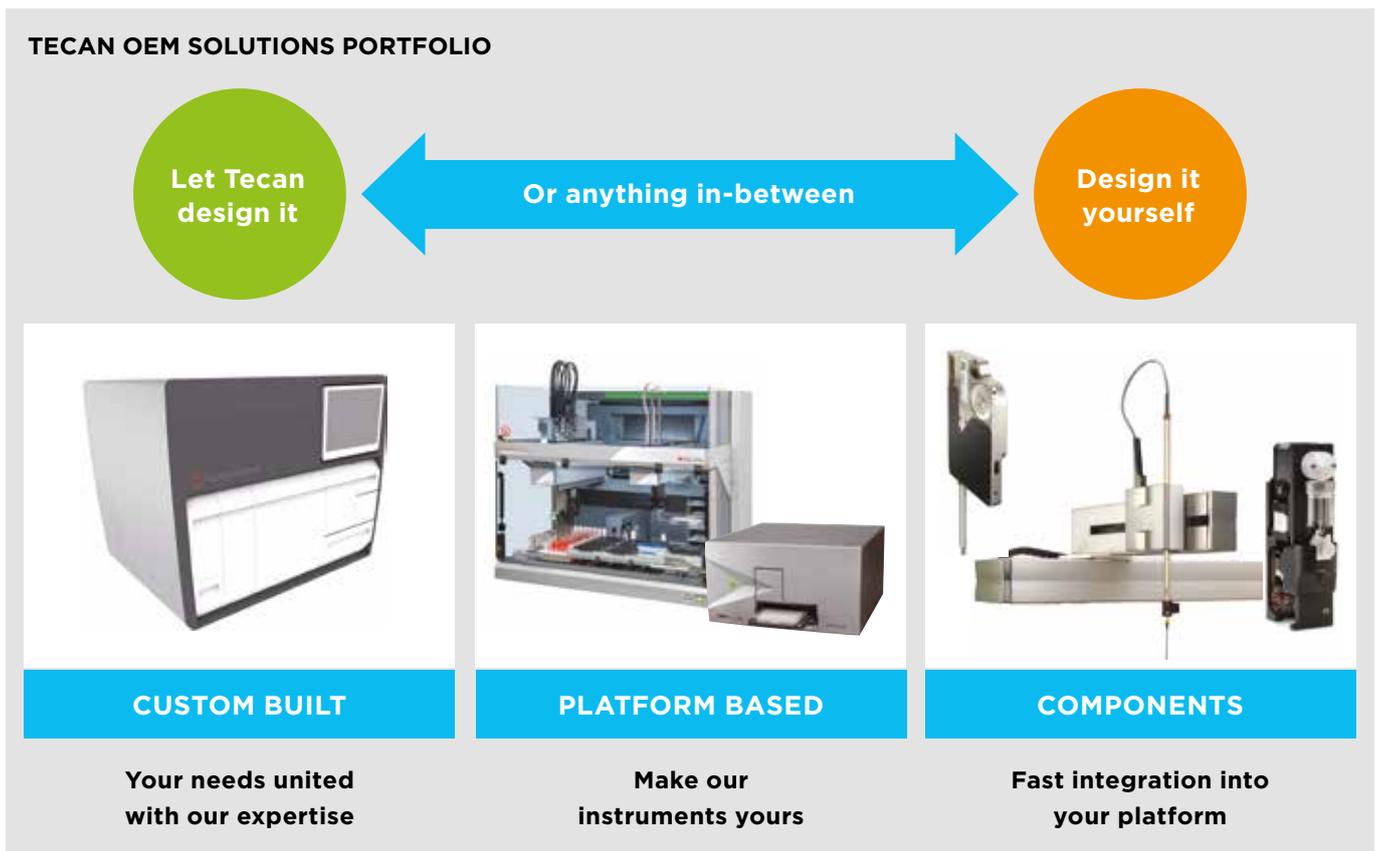
9 **USER ALERTS**

A high level status indicator light can be programmed to offer 'at a glance' instrument status checks for end users, while a built-in buzzer can provide audible alerts if there is a problem or manual intervention is required.

Customization at every level.

The Cavro Omni Flex has been developed to offer maximum flexibility in instrument design, with a range of standard options and a broad portfolio of additional devices and accessories. Its modular design allows it to be easily tailored to individual applications needs and throughputs, as well as providing a scalable solution which can grow with your product range. But we understand that even the most flexible robotic component cannot adapt to every application, and so we offer a range of customization options to perfectly match your needs. Whatever requirements you have for size, speed, volume and throughput – even labeling and finish – we can assemble the perfect combination of components to support your design.

Our experienced team can work with you to create customized components or complete systems, complementing your in-house design and engineering teams. You define your performance specifications, and we will design and build bespoke Cavro components with the precision and accuracy to meet those needs. This gives you full control of your own product development and confidence in your final products.

LABORATORY SYSTEMS ENGINEERED FOR YOU

TECAN OEM SOLUTIONS PORTFOLIO

Let Tecan design it   **Or anything in-between**   **Design it yourself**

CUSTOM BUILT	PLATFORM BASED	COMPONENTS
Your needs united with our expertise	**Make our instruments yours**	**Fast integration into your platform**

Our life sciences and diagnostics applications knowledge is unmatched among full-service OEM partners, helping you to create products that are perfectly suited to your customers' workflows.

Leading diagnostics and life science instrument providers have trusted in Tecan to develop their platforms for over 35 years, helping them to build what have become some of the most successful products on the market. From individual components complete automated solutions, OEM customers can benefit from our in-depth understanding of diagnostic and life sciences research laboratory workflows – as well as our regulatory and training expertise – supporting their instrument development from the initial design phase through to market launch.

Accelerating development.

The Cavro Omni Flex provides a highly flexible liquid handling system suitable for a wide range of applications, allowing you to develop automated solutions for everything from analytical chemistry to molecular diagnostics.

FROM PATIENT SAMPLE TO RESULT

Molecular diagnostics is one of the most dynamic and transformative areas of laboratory diagnostics today. It has become an integral and critical part of healthcare systems globally, from prevention and diagnosis to treatment and monitoring.

Molecular biology technologies – such as nucleic acid amplification, next generation sequencing and microarrays – pose significant operational and financial challenges for clinical diagnostic laboratories, typically requiring long and laborious test procedures which are prone to human error. Automation of molecular diagnostic workflows can help labs to address these challenges, increasing their testing capabilities and providing more targeted healthcare.

The Cavro Omni Flex is ideal for instrument developers looking to create fully automated molecular diagnostics solutions, combining proven liquid handling performance with advanced process security and sample logistics options.

Highlights include:

- **Faster time-to-marke**t – using validated components
- **Precision pipetting** – from <1 µl to >1,000 µl
- **Quality and regulatory compliant** – to global, regional and national standards
- **Advanced liquid level detection** – minimizing the risk of carry-over
- **Enhanced process security** – including full audit logs
- **Controlled environment** – protecting end-users from exposure to hazardous patient samples
- **Knowledgeable application support** – backed by over 35 years of diagnostics expertise

Configure your Cavro Omni today. Visit **www.tecan.com/omniflex** to learn more.

SPECIFICATIONS

POWER REQUIREMENTS

Operating voltage	100 to 240VAC, 50/60Hz.
Maximum power current consumption	10A (Including 3A for power output receptacles)

COMMUNICATIONS

To host	TCP/IP
To other Cavro devices	Tecan CAN
Protocol	TCP/IP

MOTOR DRIVER TECHNOLOGY

Axis Control	Stepper Motor Drive
X/Y-axis:	Closed loop positioning with step loss detection based on linear encoder feedback
Z-axis:	FOC closed loop control based on rotary encoder feedback. Provides full servo capabilities including adjustable force control. High efficiency

PROCESS SECURITY

Liquid Level Detection	Capacitive Liquid Level Detection
	Highly variable sensitivity (117 levels)
	Pressure-based Liquid Level Detection*
	Hybrid Liquid Level Detection*
Pressure Monitoring	Available with optional ADP

SOFTWARE AND PROGRAMMING

Evaluation software	Fusion
Command set	PC-based command processor interface or embedded one-letter command set

ENVIRONMENTAL

Operating temperature	10 to 35 °C (50 to 95 °F)
Storage temperature	-20 to 60 °C (-4 to 140 °F)
Relative humidity	30 to 80 % at 35°C (95 °F)

MECHANICAL

Travel length	(Note: Restrictions apply depending on configuration.)
X-axis (Single arm):	500, 750 or 1,250 mm (19.7, 29.5 or 49.2 in)
Y-axis:	300 mm (11.8 in)
Z-axis:	210 mm (8.27 in)
Overall dimensions (approximation)	
Width:	715, 965 or 1,465 mm (28.1, 38.0 or 57.7 in)
Depth:	638 mm (25.1 in)
Height:	1047 mm (41.2 in)
	(Standard Z, from top of flexible mesh sleeve to bottom of the chassis including feet)
Maximum payload for each axis	
X-axis:	6.6 kg (incl. Y- and Z-axes)
Y-axis:	3.2 kg (incl. Z-axis)
Z-axis:	1.5 kg (Universal Z)
	Tecan tip options (Standard Z / Dual Z)
Cap piercing	Yes
Accuracy for each axis	
X/Y/Z-axis (bidirectional at the tip):	X: ±0.3 mm, up to 1,000 mm travel
	X: ±0.4 mm, up to 1,250 mm travel
	Y: ±0.3 mm
	Z: ±0.4 mm (Standard Z / Dual Z)
	Z: ±0.25 mm (Universal Z)
X/Y-axis (bidirectional at the carriage):	X: ±0.2 mm
	Y: ±0.2 mm
Repeatability	
X/Y/Z-axis (bidirectional at the tip):	X: ≤0.2 mm
	Y: ≤0.2 mm
	Z: ≤0.4 mm (Standard Z / Dual Z)
	Z: ≤0.15 mm (Universal Z)
X/Y-axis (bidirectional at the carriage):	X: ≤0.12 mm
	Y: ≤0.12 mm
Resolution	
X-axis:	0.02 mm
Y-axis:	0.02 mm
Z-axis:	0.0219 mm (Standard Z / Dual Z)
	0.011 mm (Universal Z)
Maximum speed	
X-axis:	800 mm/s (31.5 in/s)
Y-axis:	600 mm/s (23.6 in/s)
Z-axis:	600 mm/s (23.6 in/s)

* with ADP option only

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