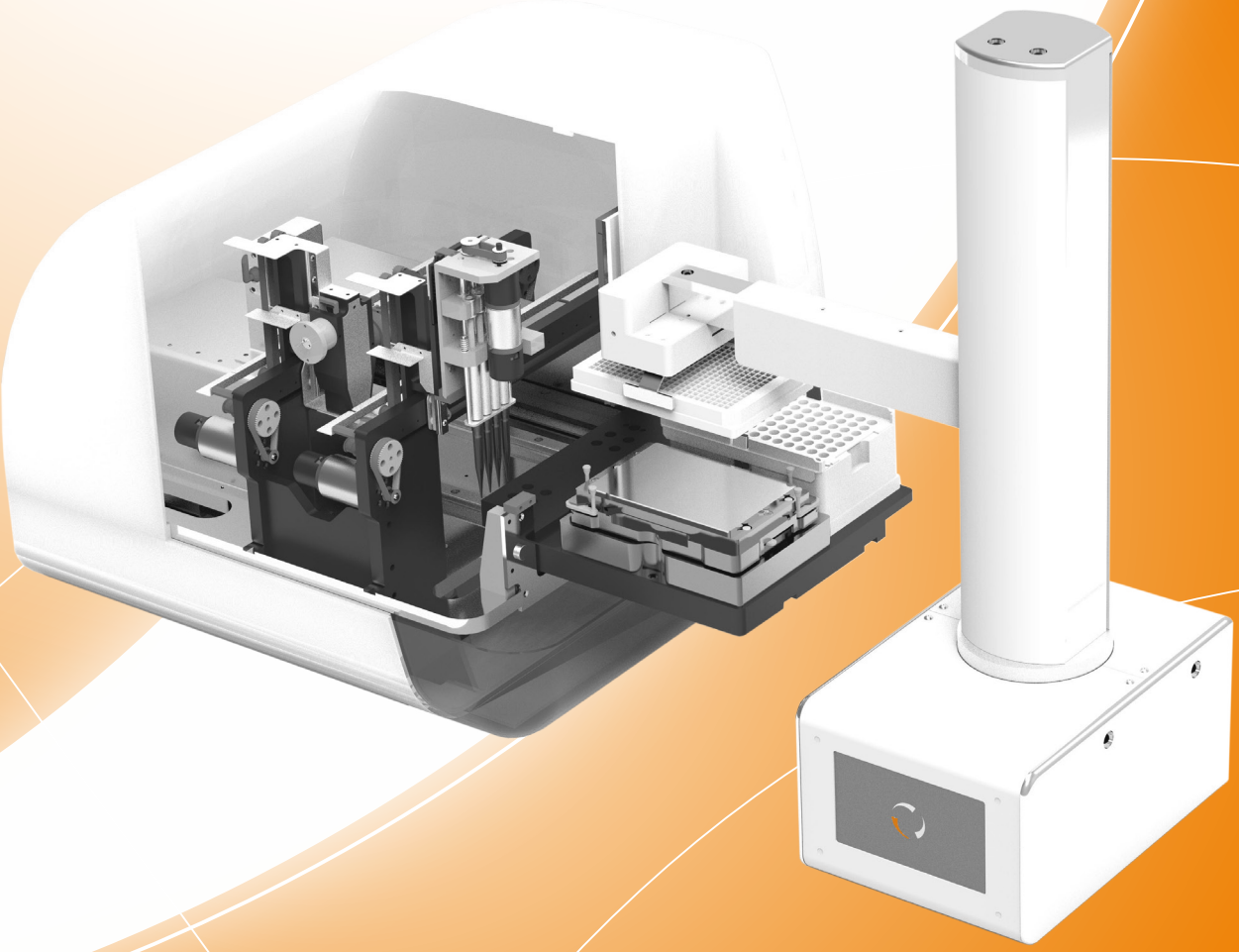
CYBERTRON®



Device Development

for medical technology and laboratory automation

CORPORATE PURPOSE
- Development
- Manufacturing
- Consulting

DEVELOPMENT PRIORITIES
- Project coordination and conception
- Design
- Electronics
- Control software
- Prototyping
- Serial production

DEVELOPMENT FIELDS
- Medical technology
- Laboratory automation
- Pipetting and dosing systems
- Kinematic systems
- Precision axes and robots
- OEM components for measuring and positioning tasks

CYBERTRON GMBH
a dynamic team of engineers, technicians and scientists develop, produce and distribute ISO-certified devices, modular components and kinematic systems in the field of medical and laboratory technology as well as industrial automation. Our developments range from classic instruments for laboratory routines (e. g. dosing, dispensing and detection units) to complex automation systems developed specifically for our customers. Each and every one of us contributes to the success of our products with our many years of experience, comprehensive technical knowledge and corresponding core competencies.

You
work in the fields of diagnostics, medical technology, biotechnology & pharmaceuticals? Then Cybertron GmbH offers you a competent, efficient and service-oriented environment in which medical and laboratory technology can be implemented in the shortest possible time. Together we determine the sustainable success of our company and our customers.

We work together with a wide variety of research institutions, medical technology and biotech industries as well as life science oriented industrial companies and can rely on an important network of specialists and service providers.

MiniDevice Platform (MDP)

The MiniDevice Platform is an OEM product for medical technology and laboratory automation for handling liquids and samples. The MDPs are equipped with fast, low-friction axis systems and high-end control units.

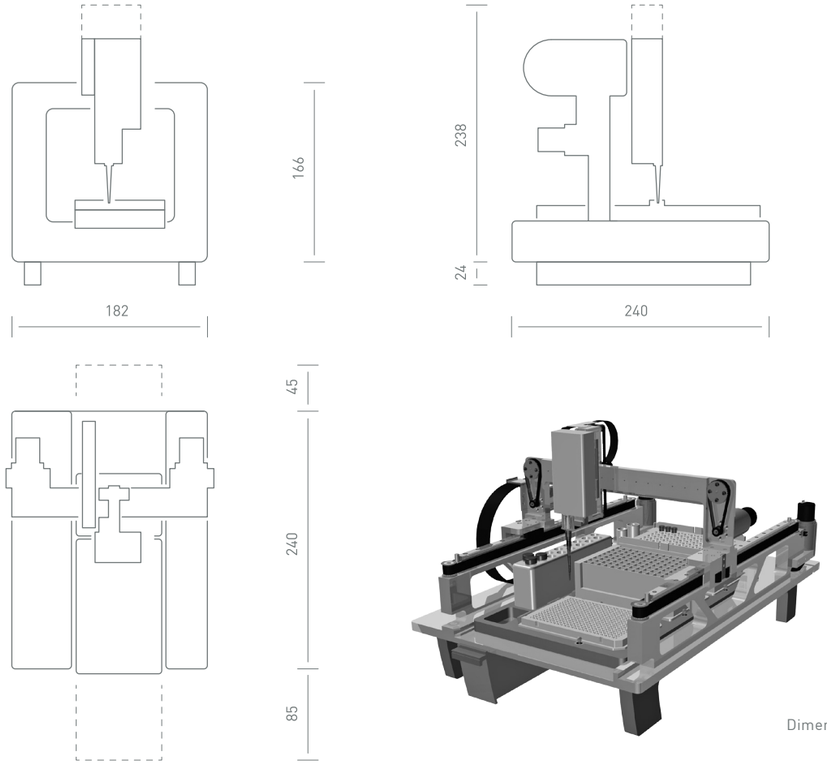
For liquid handling, up to four exchangeable heads (single or multi-channel) are available for the adaptation of our piston-driven precision dosing heads.

The dispensing heads can be equipped with Teflon/steel dispensing needles (1µl, 10µl, 100µl), disposable tips suitable for automation (20µl, 50µl, 200µl 1000µl) or dosing systems for the sub-microlitre range (>100 nL). For sample preparation of comminuted/powdered solids we also provide individually developed powder dosing heads.

Depending on the application, the working deck or MDP tray can be individually configured with the desired number of 96/384/1536 MTP slots (SPS format) and with various holders and adapters for deep well blocks, tubes (5-50 ml) and microtubes 0.5, 1, 2 ml.

For the automation process in sample preparation we offer the following options:

Washing stations, external pump systems, cooling/heating adapter, temp. MTP orbital shaker, Magnetic Bead Station, SPE vacuum station etc. Optional integration of UV-VIS-, FL- detection units (bottom read), biosensor technology, microfluidics and other analytical measuring techniques.



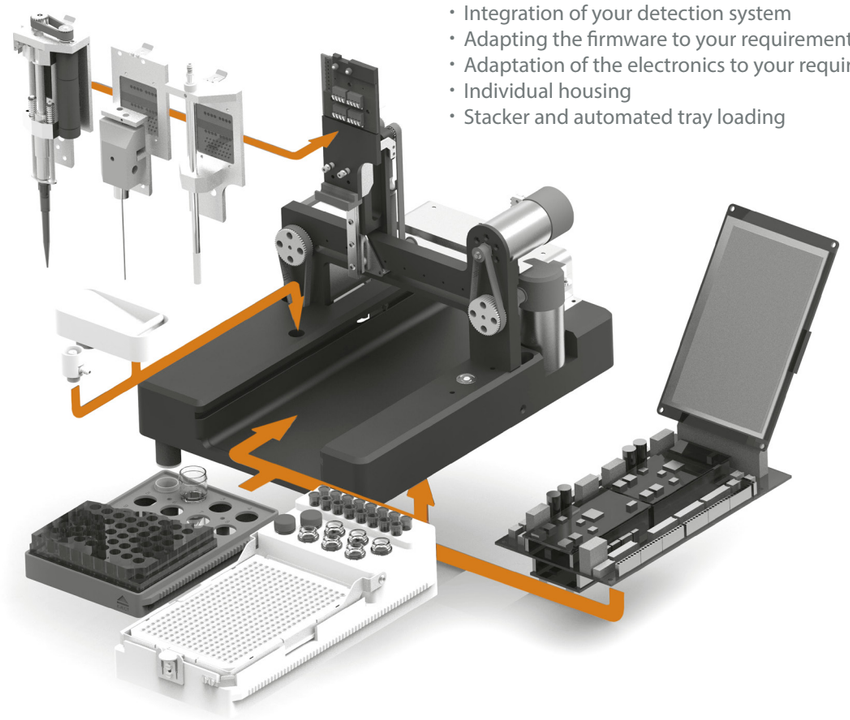
Dimensions in mm

In the periphery of the MDP, additional storage locations, stackers or devices (e. g. capping/decapping station) can be integrated, which we can access via our gripper, 360° swivel arm or conveyor belt systems. This means that the MDP can be easily adapted to any laboratory routine and existing laboratory periphery.

Don't hesitate to let us know your specific ideas for your individual sample preparation. It is our interest to show you only a few examples and to develop and manufacture your individual sample preparation or instrument development together with you.

Customization Options

- Tray size and special adjustments
- Working range in all axes, xyz
- Holes for reagents in the tray
- Additional tray for disposable tips
- Waste stations next to ports and washing stations
- Tray adaptation to MTP's, deepwells, slides
- Number of stationary ports and washing stations
- Adjusting the exchange heads and dispensing channels
- Adjusting the dosing volume
- Use of additional external pumps
- Barcode reader for samples, tubes and MTPs
- Temperature control and temperature control stations
- Shake Stations for MTPs and tubes
- Additional xz gantry for detectors
- Additional xz gantrys for additional exchangeable head
- Additional axis systems for detectors
- Dosing above, measuring below the tray
- Additional handling systems for networking
- Additional tray guide units
- Integration of your detection system
- Adapting the firmware to your requirements
- Adaptation of the electronics to your requirements
- Individual housing
- Stacker and automated tray loading

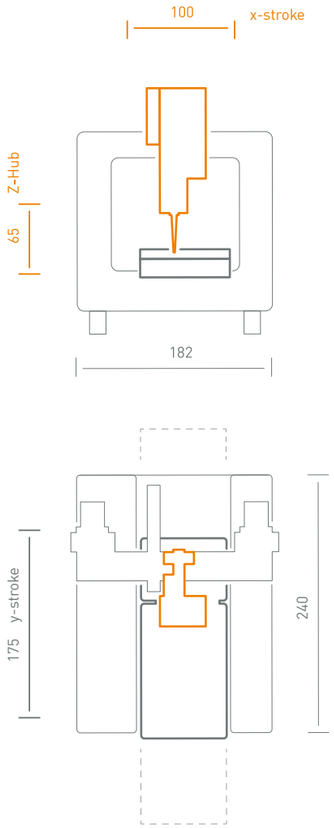


Kinematic Systems

S-Move-Sampler Variant 1

- The ***exchangeable head*** can be positioned in the xz orientation.
- The ***tray*** can be positioned in the y orientation.
- The ***tray*** is removable and externally mountable.

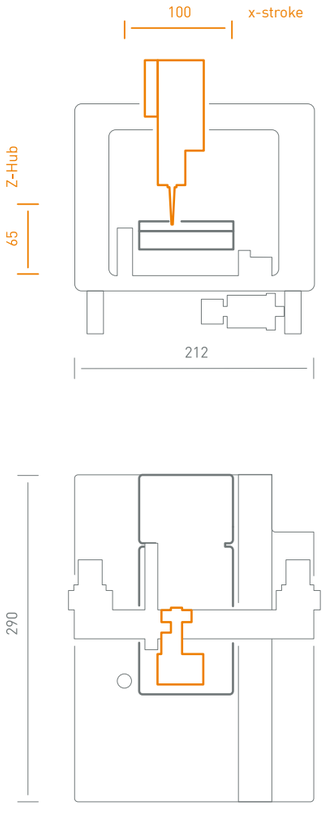
This is the most compact variant. However, active aggregates in the tray are not possible as this can be removed for the sake of user-friendliness.



S-Move-Sampler Variant 2

- The ***exchangeable head*** can be positioned in the xz orientation.
- The ***tray*** is permanently mounted on a y-axis.
- Active ***tray tempering*** is limited, optionally possible.

This variant is very compact and has a high positioning accuracy in the y-axis. The tray is permanently mounted on the positionable y-axis, the supply of electrical substructures, e. g. cooling stations or shakers, is possible to a limited extent.

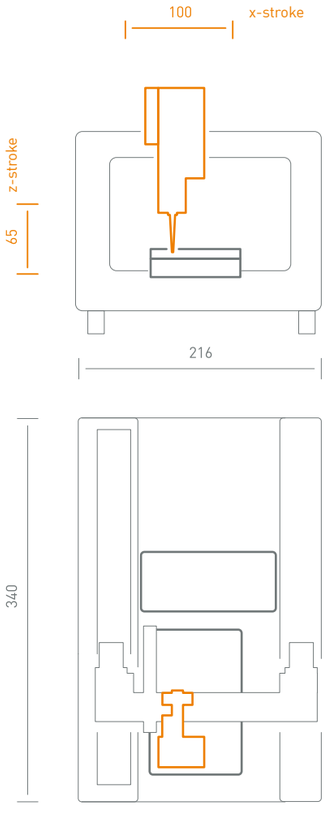


Dimensions in mm

S-Move-Sampler Variant 3

- The ***exchangeable head*** can be positioned in the xyz orientation.
- The ***tray*** is set or inserted into the working area.
- The trays can be divided in the work area.
- Active tray tempering is optionally possible.

Due to the fixed position of the trays below the exchangeable head, freely programmable in 3 axes, supply lines and hoses for e. g. cooling, shake and vacuum stations can be laid stationary.



Drive Options

The drive variants listed above are the basic platform for your future sample preparation. Some options require a variety of supply lines and tubing. In some applications, special attention must be paid to the available space and in other applications to the flexible placement of a large number of additional modules.

All possible options must be considered in accordance with the drive variant.

Example:
Reagents and tips are separated from the purification tray. The purification tray is equipped with a translucent 386 MTP. Both trays are pushed into a stationary position before processing. After the pipetting process, the wells of the plate are analyzed from below. A detection camera uses a special kinematic underneath the plate to scan every well position.

You receive the MiniDevice Platform for direct mounting as an assembly in your device. Alternatively, we can also offer completely housed devices, including all the tests prescribed by law.

Kinematic Systems

H-Move-Sampler

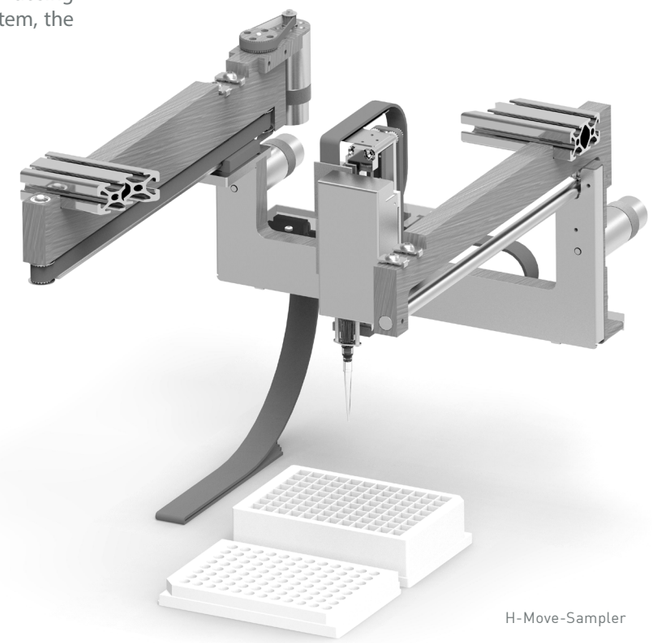
The H-Move sampler, unlike the S-Move samplers, is suspended from an appropriate body construction. The key difference is that the gantry bridge no longer has to be mounted on the base plate, thus ensuring better accessibility to the working area.
Transport systems, such as the Cybertron Tray Drive concept, can be integrated below the H-Move sampler to save space.
Due to the excellent accessibility, these structures are mainly used within flow and workbenches as well as various climatic chambers.

The standard variant of the H-Move sampler is equipped with an active Y-axis, while the gantry bridge is guided only passively supported on the other side. For larger working areas, the Y-drive is provided by means of two Y-axes, which work completely in parallel in a master-slave mode thanks to the Cybertron IQ5500 compact device control.

The Z-axis is standard equipped with a stroke of 65mm and the Cybertron change flange system for dosing heads. Thanks to the exchangeable flange system, the dosing heads can be replaced quickly and easily with a handle. Your system thus offers the highest flexibility in liquid handling, since you can freely choose between 1 - 8-channel dosing heads ranging from 50 - 1000µl. Take a closer look at the "Liquid Handling" category.

Our strength and your advantage: The OEM system offers the option of customizing the working range of all axes differently from the standard dimensions. Of course, the same applies to dosing heads, which can be tailored to your requirements.

The kinematics can be combined with our motor controls of the IQ5500 series. The H-Move Sampler, which has been designed according to your wishes, is assembled ready for use, tested and, according to your wishes, directly installed in your application or laboratory device as an OEM component.

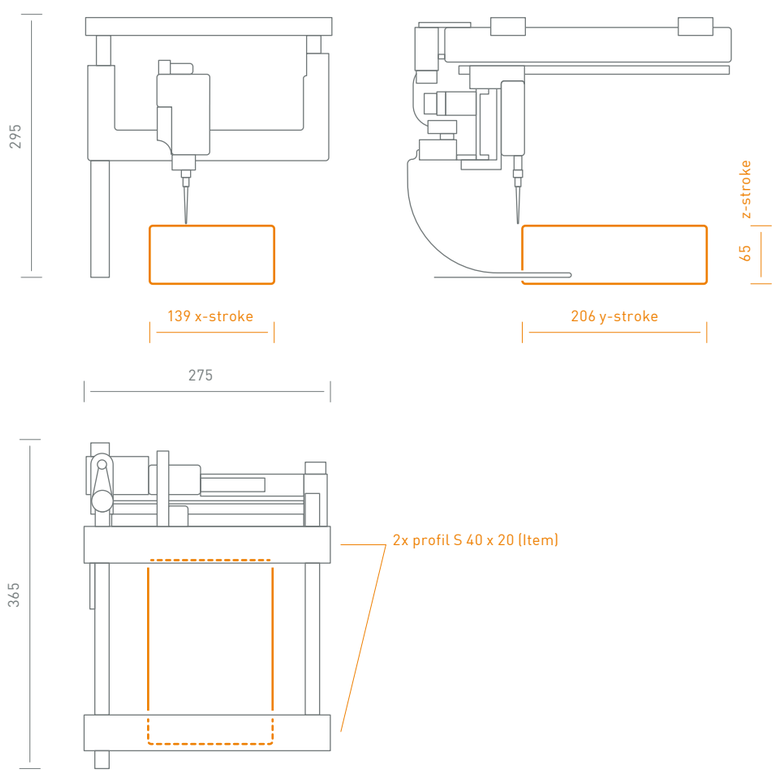


H-Move-Sampler

Technical specifications

• Dimension:	W: 275 x D: 365 x H: 295 mm
• Working range:	X-139 mm, Y-206 mm, Z-65 (optional Z-95) mm Further modifications of the sizes are possible
• Motor type:	Encoder based servomotors
• Motor control:	IQ5500-series (customer-specific controls possible)
• Supply voltage:	24V DC (IQ5500 series)
• Interfaces:	RS485, RS232, USB, I / O's (IQ5500 series)
• Adapter:	for the adaptation of 50µl to 1000µl, 1 to 8K dosing heads for pipette tips
• Z power :	15 N
• XY speed:	400 mm/s
• Z speed:	250 mm/s
• Repeat accuracy:	+/- 0,1 mm

Optional:
Combination with the Cybertron Tray Drive system for highest dynamics and process speeds as well as the possibility to freely combine different devices.



Kinematische Systeme

T-Move-Sampler

The compact OEM system has been specially developed for large-scale pipetting platforms, fraction collectors and various autosampler systems. All laboratory standard tasks in the field of liquid handling can be achieved cleanly, quickly and precisely. For example, the filling, distribution, dilution, mixing or removal of samples and reagents in and out of microtiter plates, HPLC vials and other vessels.

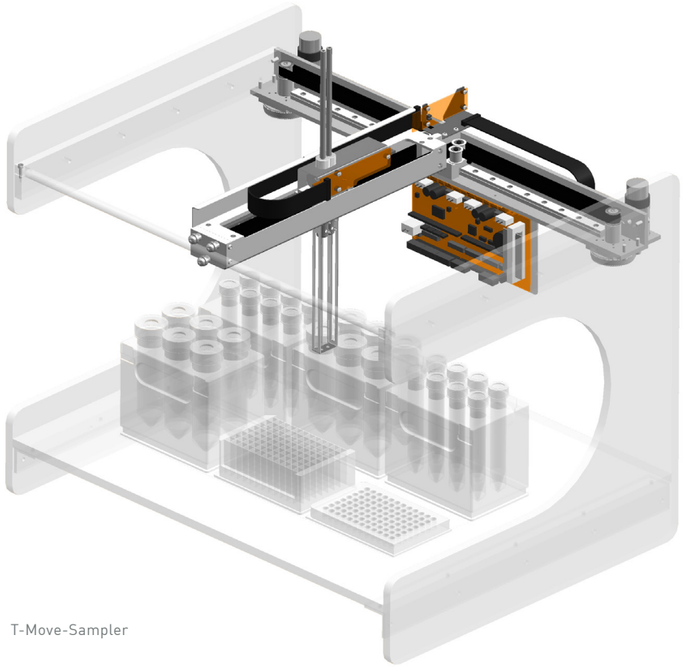
The xy drive is provided by toothed belts with stationary encoder-based servomotors, and is therefore mass-optimized, which enables speeds of up to 600 mm/s.

The freely programmable column Z-stroke has a 4 mm through-hole, through which the dosing device can be guided. The combination with a steel needle as the dosing device enables the optional integration of an automatic liquid level detection.

Another configuration option is the addition of a second column Z-stroke (see CAD drawing). Both columns move independently in Z-orientation and are spaced 9 mm apart to meet the standard 96-MTP dimensions.

Our strength and your advantage: The OEM system offers the possibility to customize the working area for you differently from the standard dimensions.

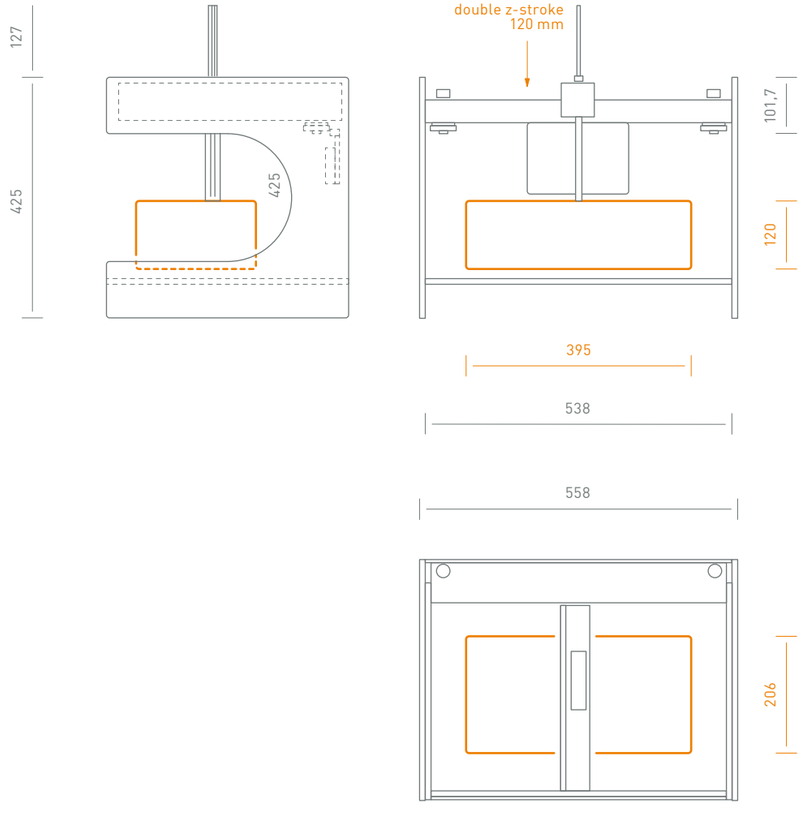
The kinematics can be combined with our motor controls of the IQ5500 series. Of course, the integration of your motor control is also possible. The module can be assembled, tested and installed as an OEM component according to your requirements.



T-Move-Sampler

Technical specifications

• Dimension:	W: 538 x D: 418 x H: 350 mm	• Number of Z-strokes:	up to 2 (independently of each other)
• Working range:	X-395 mm, Y-206 mm, Z-120 mm (optional Z-95) mm Further modifications of the sizes are possible	• Z Needle distance :	9 mm
		• Z force :	8 N
		• XY speed:	600 mm/s
		• Z speed:	350 mm/s
• Motor type:	Encoder based servomotors	• Repeat accuracy:	+/- 0,1 mm
• Motor control:	IQ5500-series (customer-specific controls possible)		
• Supply voltage:	24V DC (IQ5500 series)	*Optional:*	
• Interfaces:	RS485, RS232, USB, I / O's (IQ5500 series)	*Liquid Level Detection when using steel needles*	



Kinematic Systems

µMove Axle System

The µMove axle system is the smallest in its class and features a particularly compact design. Short overall length with simultaneous large stroke, flat overall height and wide guiding distance permit the installation of the axis system in compact devices or machines.

Drive, measuring system, ground ball screw, guides and interface modules are all integrated in the basic body. The system is wired and ready for connection to a servo motor controller.

Areas of application are mainly found in precise positioning tasks, for example: Measuring, testing and assembly tasks in micromechanics or for focusing lenses in laser technology.

Which drives do we use:
- Linear motors
- Spindle drives
- Piezo drives
- Toothed belt drives
- Rack and pinion drives

We move and position:
- Linear
- Rotatory
- In curves

We prefer:
- Servo motors

alternativ
- Stepper motors

This precision axis system is also ideally suited as a Z-stroke, e. g. for our pipetting heads.

Drive Options

In addition, we equip our axle systems with direct position measuring systems, additional limit switches, brakes and other spin inclines and guides, we also develop your individual axle system.

Our µMove and pMove axle systems are just one possible example of cost-effective and precise axis systems. In addition to spindle axis systems, we can also develop linear motors, toothed belt drives or rack and pinion drives for you.

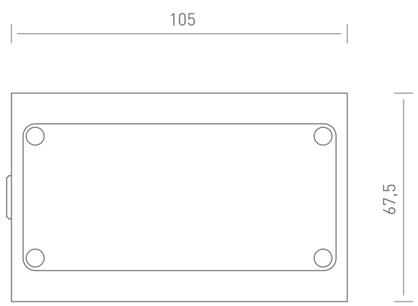
The different spindle variants available on the market allow almost any speed, accuracy and price level.

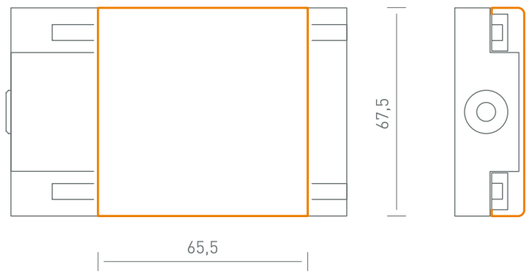
If you need high speeds but medium accuracy we suggest inexpensive belt drives. We can also map any desired motion in a kinematic system and look forward to your task. Whether step or servo motor drive, ask us!

Technische Daten

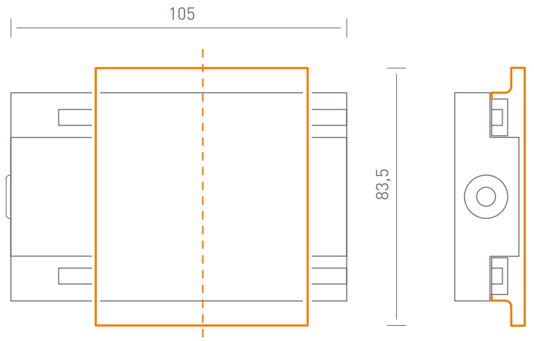
• Drive:	DC servo motor
• Repeatability:	8 µm
• Speed:	max. 25 mm/s
• Acceleration:	max. 10 ms^{-2}
• Stroke:	36 mm
• Payload:	1,0 kg
• Mass:	280 g

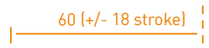
Narrow Slide





Wide Slide





Dimensions in mm

Kinematic Systems

RZ Plate Handler

[illegible] -boten.

[illegible] befüllt und entleert werden.

[illegible] realisiert, sondern weiterhin auch die Ansteuerung umstehender [illegible] and I/Os leave nothing to be desired. The RZ Plate Handler is operated directly via [illegible] for controlling [illegible] conveniently [illegible] then transferred [illegible] RS232. Program [illegible] the touch screen.
zur Ansteuerung der umstehenden Geräte können komfortabel über einen PC erstellt werden.
Anschließend werden die entstandenen Programme über die serielle Verbindung, per USB oder RS232 übertragen. Programmänderungen können auch direkt am Touch Display erfolgen.

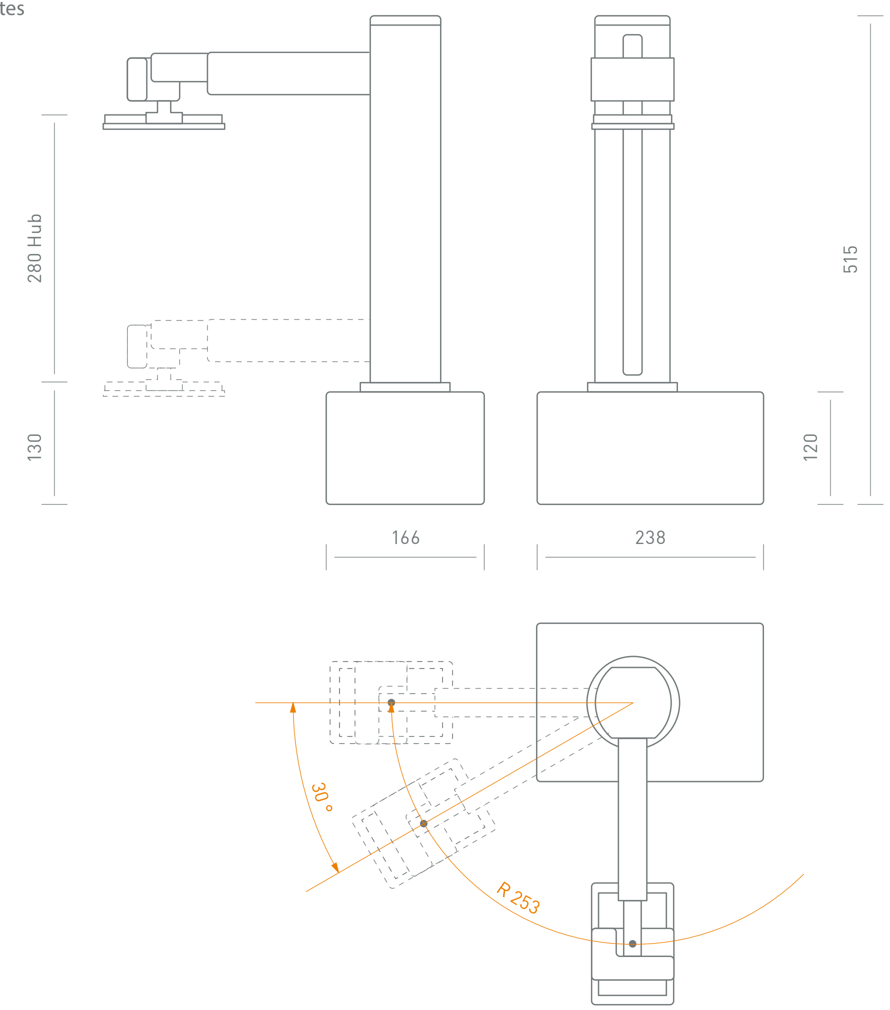
[illegible] auch über die Breitseite gegriffen werden.

[illegible] Erkennung von Stapelhöhen.
[illegible] the scope of delivery

RZ Plate Handler

Technical Specifications

- Dimension: L: 238 x W: 166 x H: 515 mm
- Supply voltage: 24V DC
- Interfaces: RS485, RS232, USB, I/Os
- Bluetooth interface and Android App
- Servo motor drives
- Working range: Phi 330°, Z-stroke 280 mm
- Speed: 200 mm/s (Z-stroke), 300°/s (Phi)
- Repeat accuracy: +/- 0.2 mm (Z-stroke), +/- 0.2° (Phi)
- Servo motor driven Parallel gripper for microtitre plates



Liquid Handling

Exchangeable head - single channel

Depending on the requirements we offer our ***standard single channel heads (1,2,3)*** with three different tip types and different dosing volumes. We have gained good experience in terms of price and quality with the ***BioRobotix tips (1)***.
In addition to the possibility of using 20, 50 and 200 µl with the same cone, these tips are also available for automatic pickup from the 96 rack.

If the price is most important, we recommend a 250 µl ***Sarstedt tip (2)***. Due to its manufacturing tolerances, however, this tip can only be used for single-channel applications (no machine tip).

Alternatively, we recommend the ***Eppendorf tip (3)***. In addition to the BioRobotix tip, we also use this high-quality vending machine tip for multi-channel heads. It is also available in a 96 rack.

Please contact us on this topic.

Exchangeable head - multi-channel

Our ***four-channel head (4)*** is just one example of possible channels and pipette collet.

Multi-channel heads of 2-8 channels can also be individually adapted to other machine pipettes and to the desired dosing volume.

Exchangeable Head Special Solutions

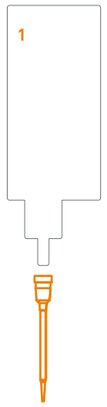
Our ***example (5)*** has two cross-flushing connections. In the ***example (6)*** the largest tip available in a 96 rack is used. With this change head we can process max. 850 µl of liquid in one dosing process. Some applications require the use of a steel needle, see ***example (7)***.

Our steel needle exchange heads can be actively equipped with our piston pump KK30 or passively with hose connection for an external pump. A large number of sample ports and washing stations according to different functional principles are available for cleaning or for pressurized applications.

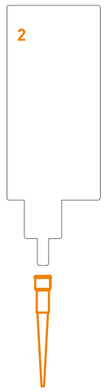
Powders can also be dosed. ***Example (8)*** is a special solution for dosing zirconia beads. With this head the powder volume to be dosed can be adjusted between 10 and 50 µl. The powder must be free flowing, non-hygroscopic and preferably antistatic. Otherwise, detailed preliminary tests are necessary.

If liquid dosages of less than 1 µl are required, we can also offer solutions together with our partners.

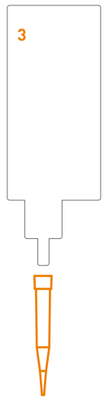
Still expertised consultation is possible.



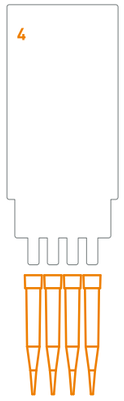
20µl, 50µl, 200µl
BioRobotix tip



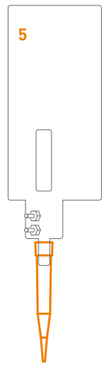
250µl
Sarstedt tip



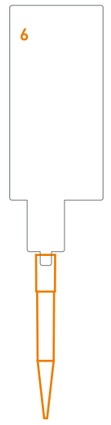
300µl
Eppendorf tip



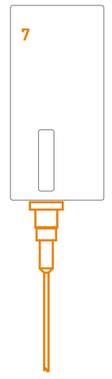
4 x parallel spikes
e. g. Eppendorf tip



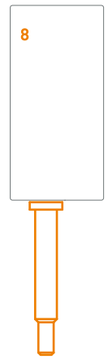
Glass syringes system
- 300 µl tips
- cross flushing



1250 µl
Eppendorf tip



Glass syringes system
- 300 µl volume
- steel needle



Powder feeder
10-50µl volume

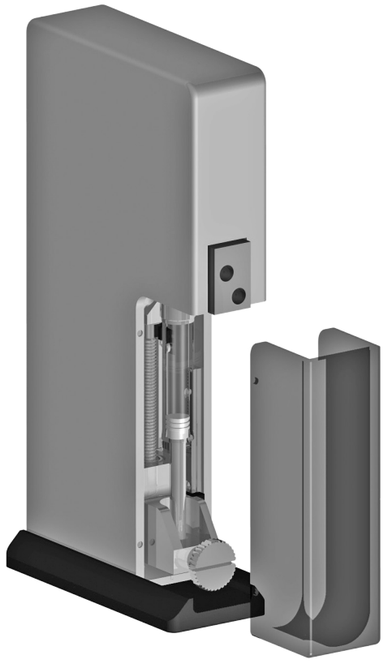
Liquid Handling

The piston pump KK30 is the consequent further development of classic piston pumps with rotary plug valve, with the advantage that the susceptible rotary plug mechanism and the rotary plug have been replaced by state-of-the-art solenoid valves.

The fluidic behaviour is based on the y-rotary plug valve. In addition to a considerably higher switching speed, these valves permit significantly higher switching cycles. Precision syringes with a dosing volume of 25 µl to 1 ml can be used.

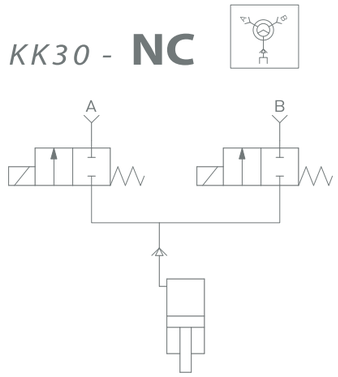
For the benefit of a compact design, the servo-motor piston stroke is 30 mm. A cascade of 8 KK30 piston pumps results in a module width of only 235 mm. High dosing precision and resolution are achieved by using high-quality components. Simplified commands, such as those used in laboratory technology for widely used pump models, are processed in the integrated control system.

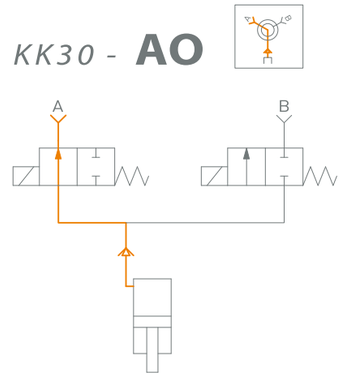
- Dimension: L: 173 x W: 29 x D: 92 mm
- Supply voltage: 24 V DC
- Interface: RS232, RS485
- Syringe drive (piston stroke): 30 mm
- Piston: 25 µl, 50 µl, 100 µl, 250 µl, 500 µl and 1 ml
- Hose connections (A and B channel): 1/4 "-28 UNF (standard)
- Servo motor-driven piston positioning (no stepper motor)
- Precision recirculating ball bearing guide and ball screw

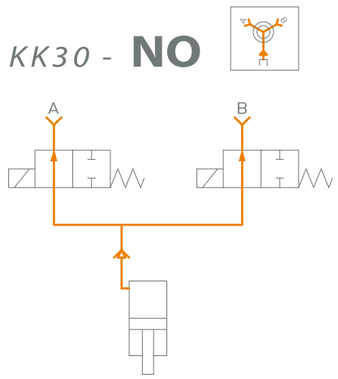


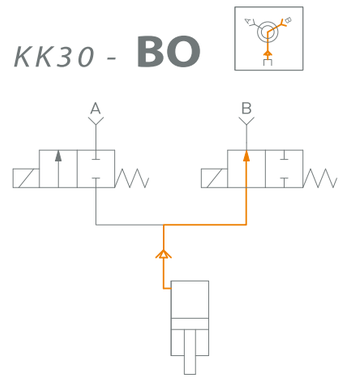
Piston Pump KK30

Fluidic Diagram









Device Control

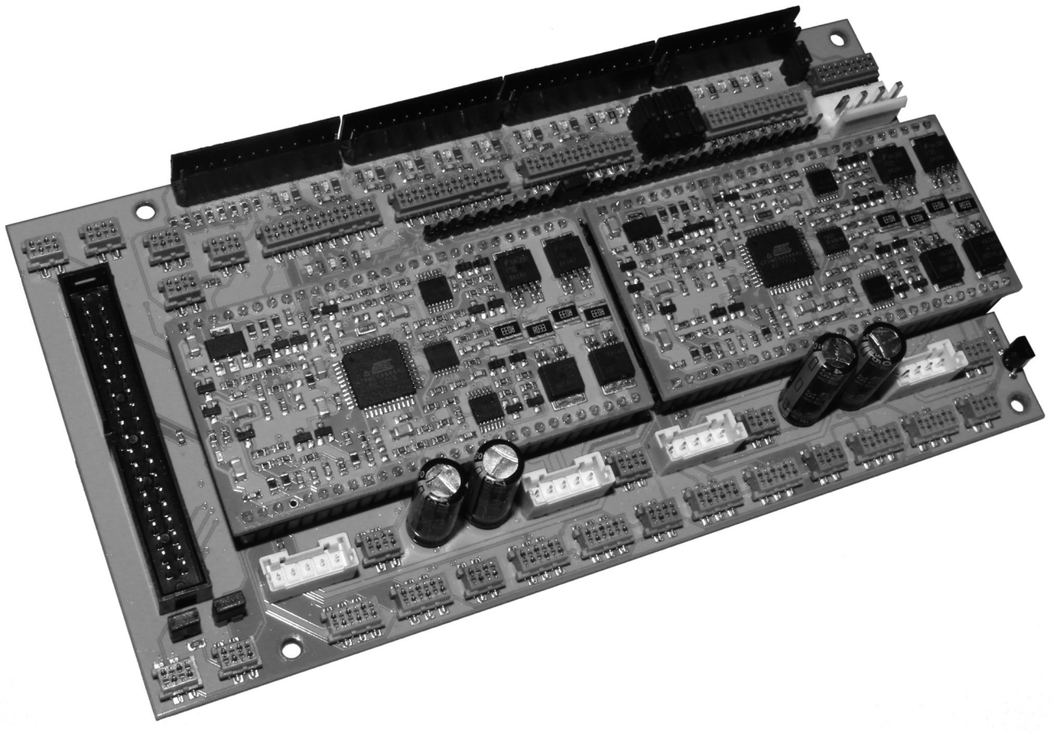
IQ5500 - Motion-/Task Management Tool

In addition to the modular upgradeability of up to four control channels, the device control system offers an extensive selection of analog and digital interfaces.

An optional colour display with touch screen or the control via mobile phone or network, leaves no operator wishes unfulfilled. Simple and powerful programming results in impressive results after a short training period. The IQ5500 represents the consistent further development of all currently used motor controllers and is tailored to the requirements of our customers in terms of operation and comfort from the equipment development as well as from the laboratory.

Today the circle of users already ranges from biotechnologists to device designers.

Shortened development times for complex control tasks, with which devices can be programmed at considerable speeds, characterize the control system.



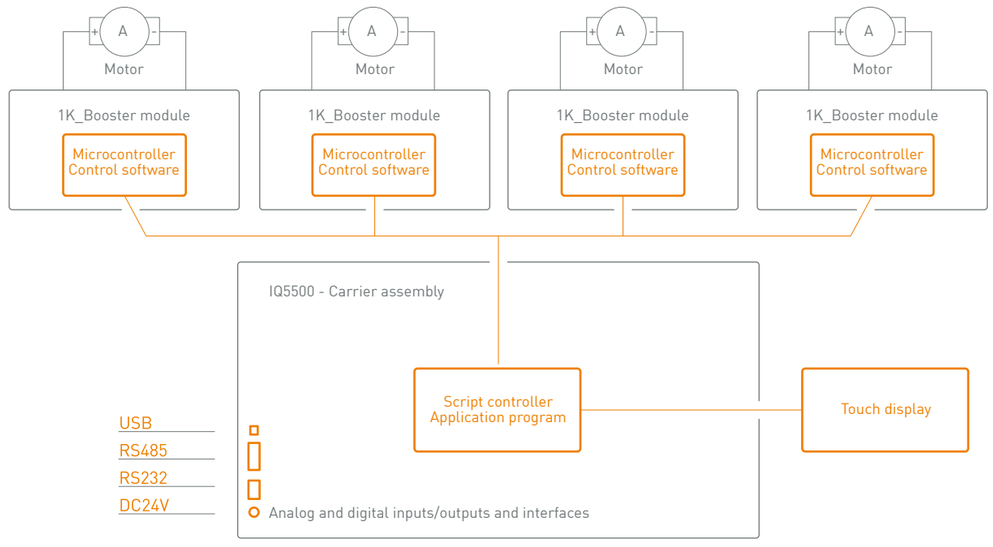
IQ5500 Carrier board with 4 pieces of 1K_Booster modules

Application IQ5500 System

The applications are usually created via PC. The resulting programs are then transferred via a serial connection, USB or SD card. Small changes can also be made directly in the control system via a connected display.

The special feature of the IQ5500 system is the strict separation of motor control and application program:
Each motor is controlled by its own driver module with a powerful microcontroller. The motor control takes place independently on the basis of the set parameters - independent of the other motors and in particular independent of the application program on the controller.
The controller uses the common bus to set the desired driving characteristics for each motor module - such as speed, acceleration, target coordinate, PID values - and then starts driving one or more modules.
The communication between controller and driver modules takes place in clear text and is documented in detail. As a result, the application can be as complex as needed - there are no dependencies with regard to time behaviour or resource consumption between the program and motoring.
In addition to floating point arithmetic, the interpreter used offers many additional commands for the simple design of a user interface on a connectable LCD display with touch surface, such as sliders, buttons, different fonts and text sizes.
The IQ5500 carrier board can accommodate up to four driver modules and can therefore be individually adapted to the actual task. The combination of e. g. servo and stepper motors with additional Peltier temperature controllers can be realised on a single carrier board. All peripheral components and motors are connected to the carrier board.

The compact dimensions of the carrier board coupled with powerful programming and a modular approach to assembly open up an almost unlimited range of applications for the IQ5500 in the field of device control.



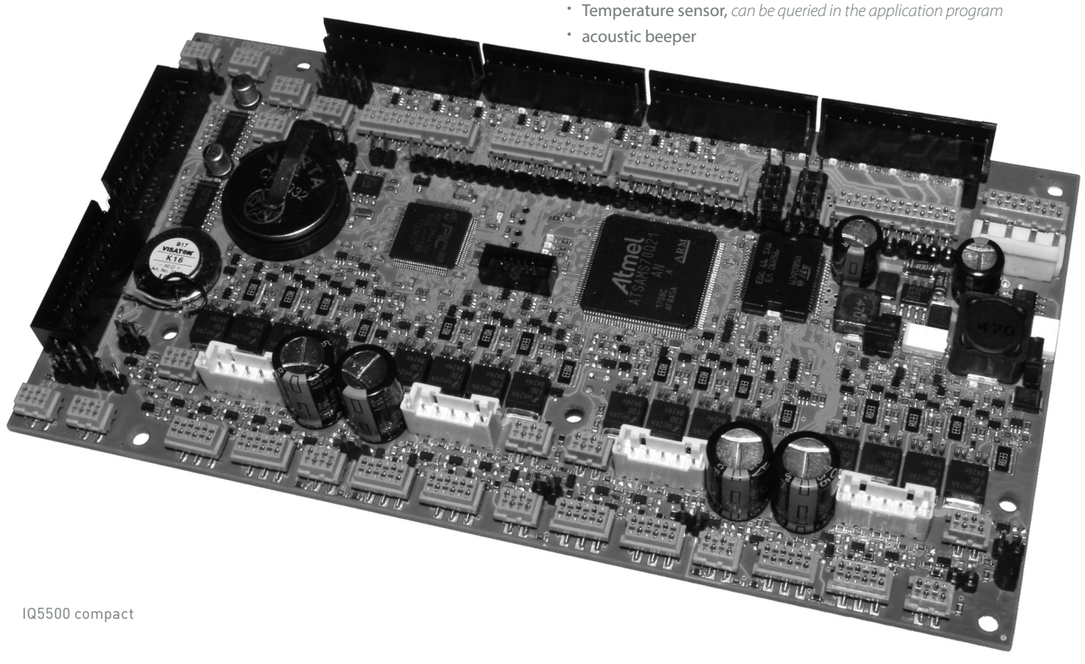
Device Control

IQ5500 compact

The IQ5500 compact is a special further development that is designed to control devices with up to 4 motors in a space-saving and cost-saving manner. 4 pieces of 1K_Booster modules are already integrated in the IQ5500 compact device control system.

Technical Specifications

- Dimension: 170 mm x 90 mm
- Number of 1K_Booster modules: 1 - 4
- Power supply: 12 bis 24VDC
  (if required, a separate connection for the supply of the outputs with different voltage is possible)
- Controller: 32-bit microcontroller with script interpreter
- Digital in: 8x with 24V *alternative with 3,3V*
- Digital out: 8x with 12V or 24V (max. 0.5V),
  alternative with 3,3V (max. 1mA)
  - Plug-in connectors for In- and Output
  - LED status display
- Analog in: 8 A/D inputs (10 bit) 0 - 3.3 V
- PWM (IQ5500): 3 PWM outputs
- PWM (IQ5500compact) 5 PWM outputs
- Counter 1 counter input
- Interfaces: 3 x RS232 / RS232 3.3 V
  - Connection for connector boards for spatially separated routing of the interfaces
  - Optional Bluetooth and WLAN via connector board
  - Connection for TFT touch panel 5 "or 7", 800x600 with 262k colours
  - I2C-, SPI-, infrared interface
- Real time clock with backup battery
- Temperature sensor, *can be queried in the application program*
- acoustic beeper



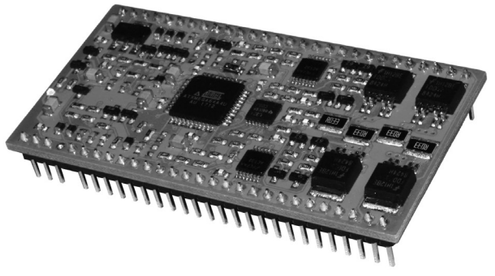
IQ5500 compact

Driver module 1K_Booster

The 1K_Booster driver module controls one motor at a time. This can be a brushed or brushless DC motor, a stepper motor or a peltierelement for temperature control applications.

Technical Specifications

- Dimension: 75 mm x 39 mm
- Outputs:
  - 4x connections for motor windings with 4x bridge circuits
  - MOSFET driver
  - PWM 20 kHz
  - Motor voltage: 12 - 24 V
  - Current per output: 4 A continuous / 6 A peak
  - servo current monitoring function
  - servo overload function
  - servo synchronous operation of the motors
- Inputs:
  - via the carrier board
  - for an optical quadrature-coded incremental encoder with or without index pulse
  - for three Hall commutation sensors of brushless motors
  - for two reference/limit switches
- Microcontroller:
  - Powerful
  - Factory integrated firmware
  - can be updated via carrier board if required
  - plain text control protocol with open documentation



1K_Booster module

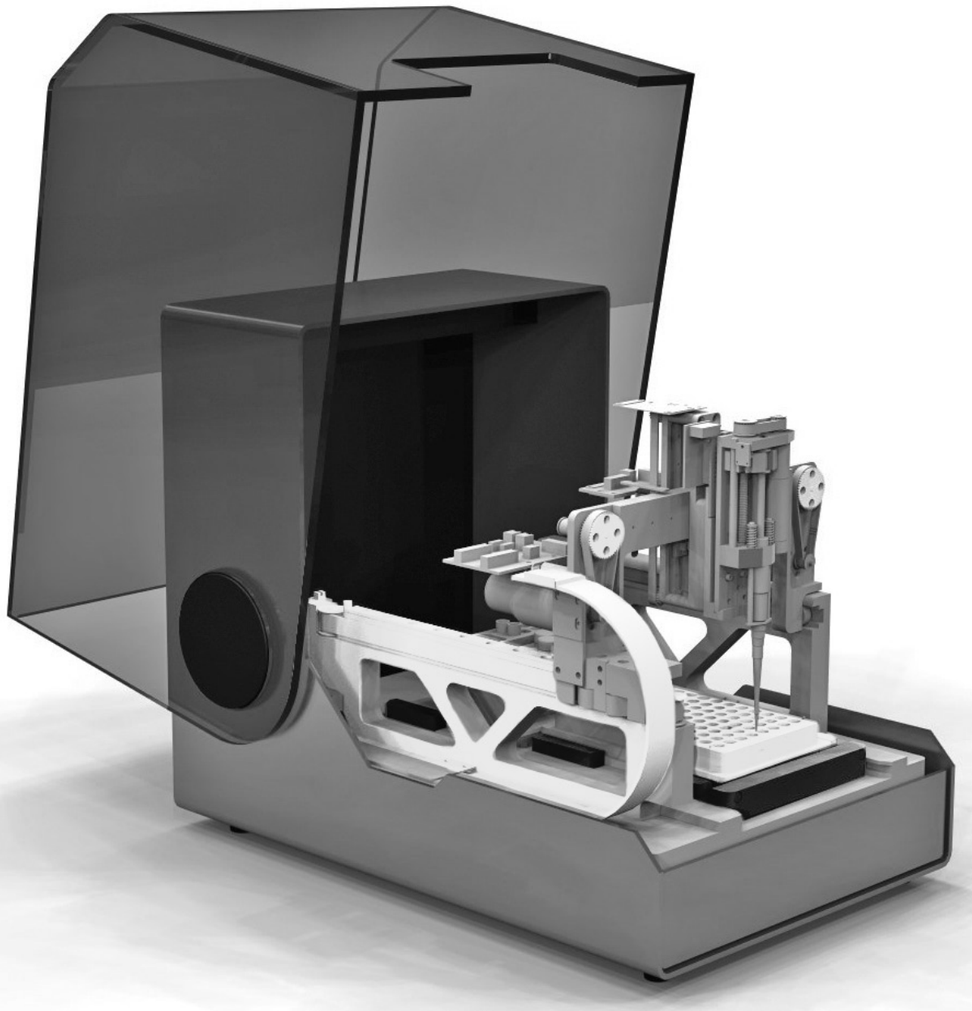
App Control

Characteristics:

- Intuitive user interface
- Saving and loading of positions
- Manual and automatic approach to stored positions
- Creating and managing entire program sequences

Devices

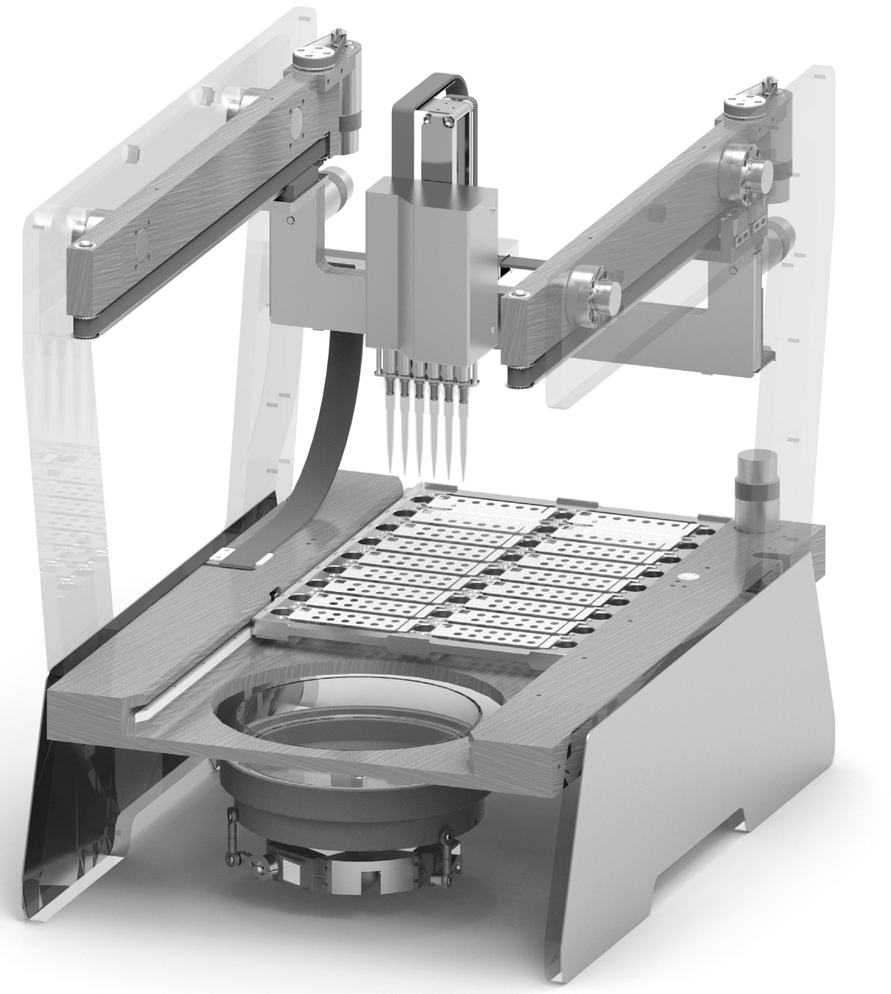
PCR sample preparation



Stripe Tester

3D Scanner Kinematics

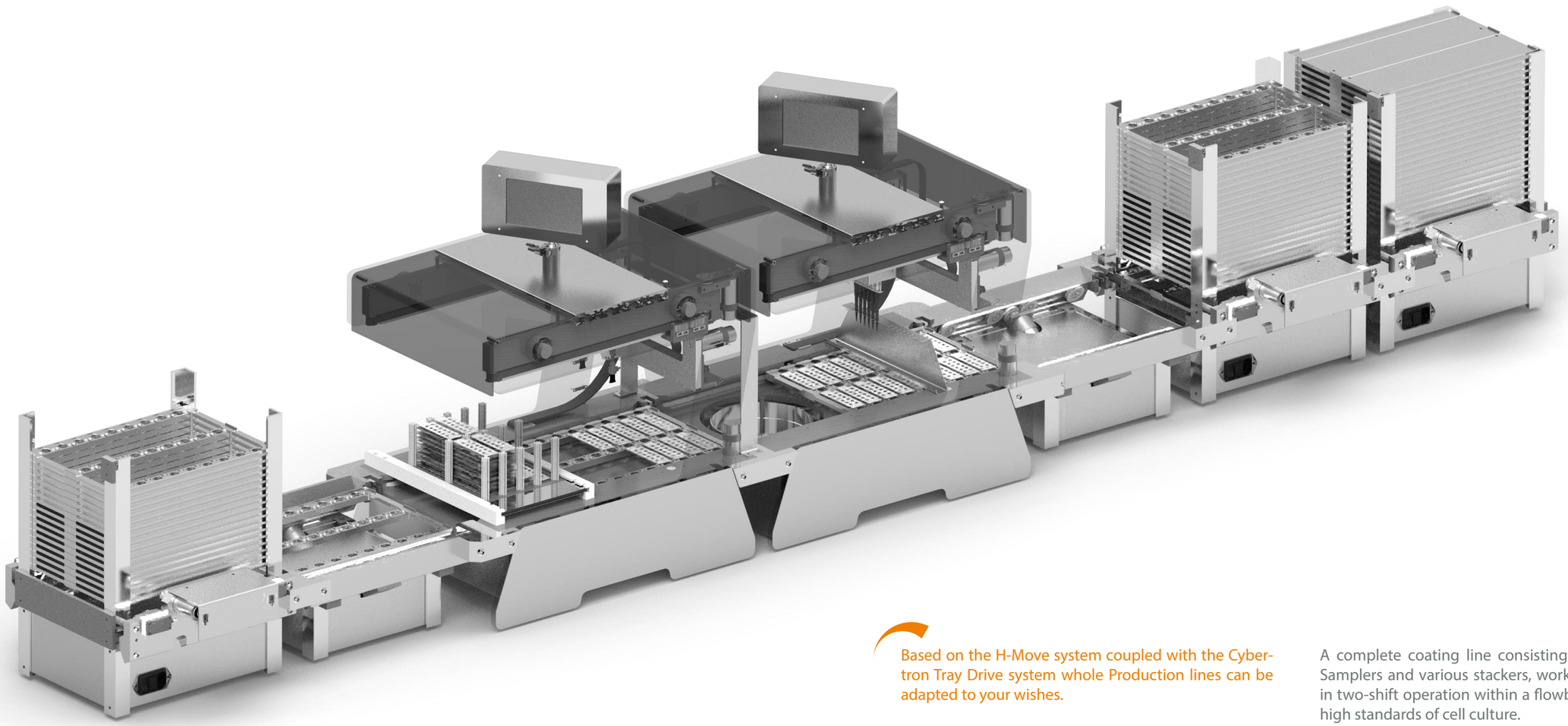
Customer example H-Move-Sampler



Laboratory equipment based on the H-Move-Sampler have already been realized within the field of laboratory automation.

As a customer example a slide coating system is shown. Thanks to the master Slave Y dual drive coupled with the Cybertron Tray drive system a workspace of approx. DIN A4 is achieved within a small foot print.

Customer Example H-Move-Sampler Production Line



Based on the H-Move system coupled with the Cybertron Tray Drive system whole Production lines can be adapted to your wishes.

A complete coating line consisting of two H-Move-Samplers and various stackers, works at the customer in two-shift operation within a flowbench to meet the high standards of cell culture.

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Our company is certified
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