

IVARO Tube Handler

Innovative automated processing
of screw cap micro tubes



IVARO TUBE HANDLER

- ✓ Relieves the strain of monotonous routine operations
- ✓ Enhanced productivity and reliability
- ✓ Maximum transparency and safety
- ✓ Ideal integration into existing lab workflows

Filling, labeling, scanning, sorting, weighing – sophisticated and sensitive laboratory processes require a precise, specialized yet flexible system. The innovative concept of the IVARO Tube Handler enables you to adapt the automation system to your applications in the best possible way.

You can equip the two standard devices IVARO FD – for filling and dosing – and IVARO AP – for aliquoting and pipetting – with specialized modules tailored to your processes. This allows you to automate even complex, manual steps in your laboratory – easily and safely.

Whether you use screw cap micro tubes, cryo tubes, micro test plates or special vessels, the IVARO adapts to your requirements and processes. Whether you work with open or closed tubes, feed tubes or closures separately or in a rack, is entirely up to you thanks to the flexible system.

The user-friendly and intuitive software helps you organize your process. It documents, manages and plans your sample processing and can be easily integrated into your existing workflow and software solutions.

The IVARO Tube Handler is the automated solution for safe, fast and reproducible processing of your samples.



IVARO FUNCTIONS



Capping

The unique Duplex Lifter design guarantees optimum process speed when tubes are to be opened or closed. The cap can be screwed on or off while your tubes are being transported. Individual closures can be supplied through a cap feeder so that also open tubes can be capped quickly and easily.



Identifying

The precise gripper arm can lift individual tubes out of any rack arrangement. The integrated scanner identifies the tube already on the way to the target position. The tube is rotated in the gripper arm to read the barcode or data matrix code at any position. The vessel can then be placed in the planned rack arrangement, or processing of the sample which has now been uniquely identified, can begin.



Labeling

The tubes are clearly identified by a variably programmable label printer. Barcodes, data matrix codes or other identification features can be printed on a label and affixed to the tube at any time. Current information such as the just determined weight or the exact time can also be part of the automated marking process. The design of the label can be easily adapted by the user.



Filling

The application-optimized dispensing channels enable convenient filling of liquids. Depending on the requirement and liquid, vessels can be filled via a tubing, piston or gear pump or using the "Positive Air Pressure" principle. This allows typical dilution or dissolution steps in the volume range of less than one microliter up to several milliliters to be carried out quickly and reliably.



Pipetting

The precise pipetting module transfers liquids from tube to tube (vial-to-vial), tube to microtiter plate (vial-to-MTP) or microtiter plate to tube (MTP-to-vial). Sensor systems such as capacity and pressure-based liquid level detection (cLLD and pLLD) and Qualitative Pipetting Monitoring (QPM) guarantee excellent pipetting results.



Weighing

The balance with a precision of up to 0.01 mg automatically performs an additional control step. The determination of sample weights or empty containers, as required for example in analytics and highly sensitive applications, is carried out fully automatically. Measurement results for each tube can be clearly documented and traced.

IVARO BASIC UNIT

The IVARO basic unit is the basis for your customized tube handler.

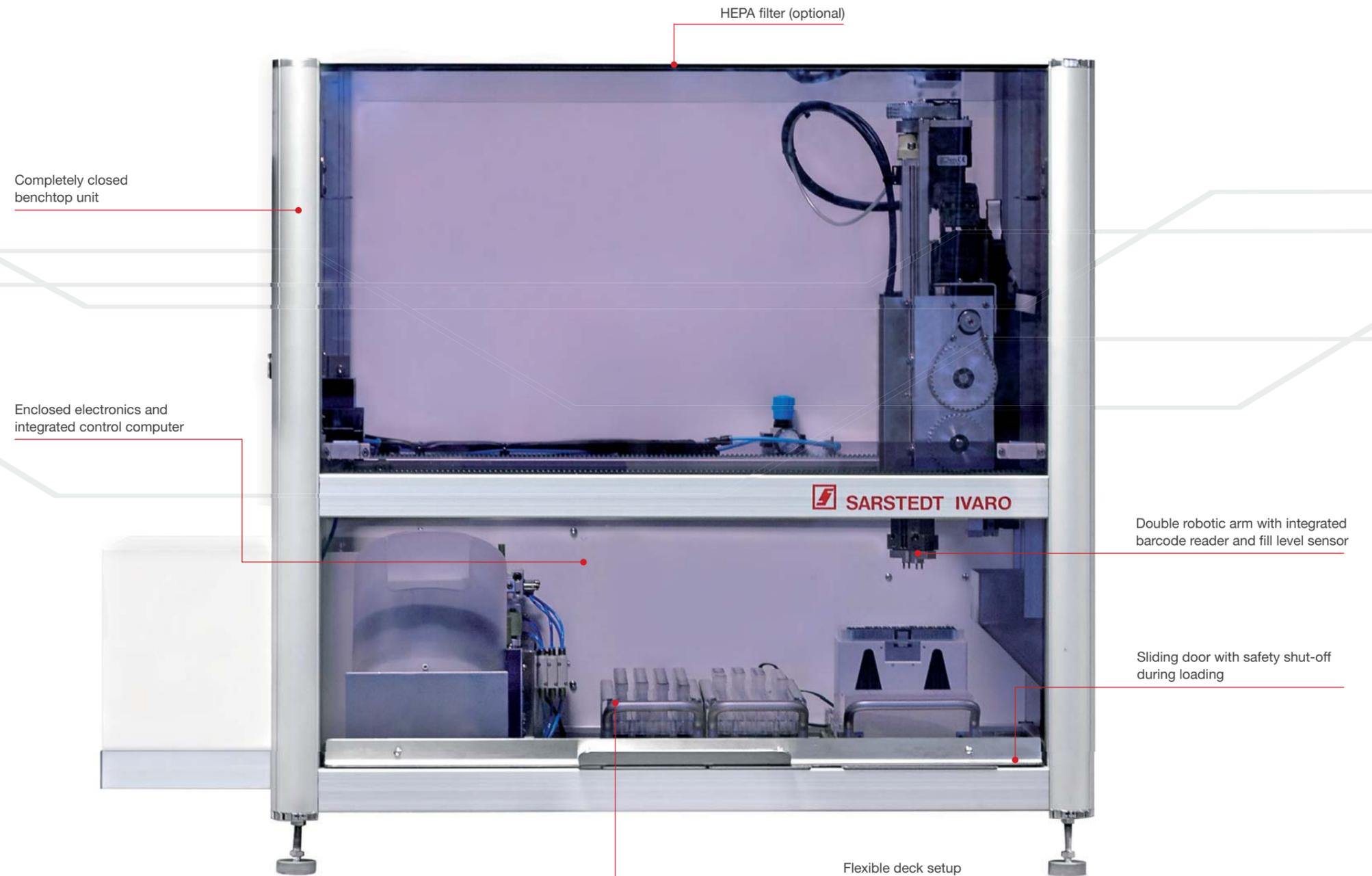
With its variable deck structure and flexible setting parameters, the IVARO Tube Handler can be individually adapted to almost all applications and workflows. Time-consuming, complex or monotonous workflows can now be conveniently handled by just one instrument.

Maximum reliability, safety and transparency are the requirements that the IVARO Tube Handler meets. Technically advanced, endlessly rotating gripper arms move your samples safely from one rack to the other. On the way, closed vessels can be decapped and recapped, the filling level in the vessel detected, and the barcode scanned. Sensors monitor loading of each individual rack.

The integrated PC system facilitates the complete documentation of each sample. The appropriate software is database-driven and intuitive to operate.

Thanks to its compact design, the IVARO Tube Handler fits even in confined spaces. The work area is completely enclosed. The sliding door can be closed with a handle. In addition to quiet operation, sensitive applications or the handling of hazardous substances can also be controlled easily and without any problem via the software. This provides you with a completely enclosed work area that protects you and your samples.

Independent, space-saving and flexible, the IVARO Tube Handler is the ideal automated solution for your workflow.





IVARO FD

OPTIMAL FILLING AND DOSING

IVARO FD is the ideal solution for filling stock solutions, buffers and other liquids into smaller containers. The preparation of samples, the production of small product series, the production of kits and other time-consuming applications are no problem with IVARO FD. Without manual effort, with optimal speed and complete documentation, IVARO FD supports you in your processes.

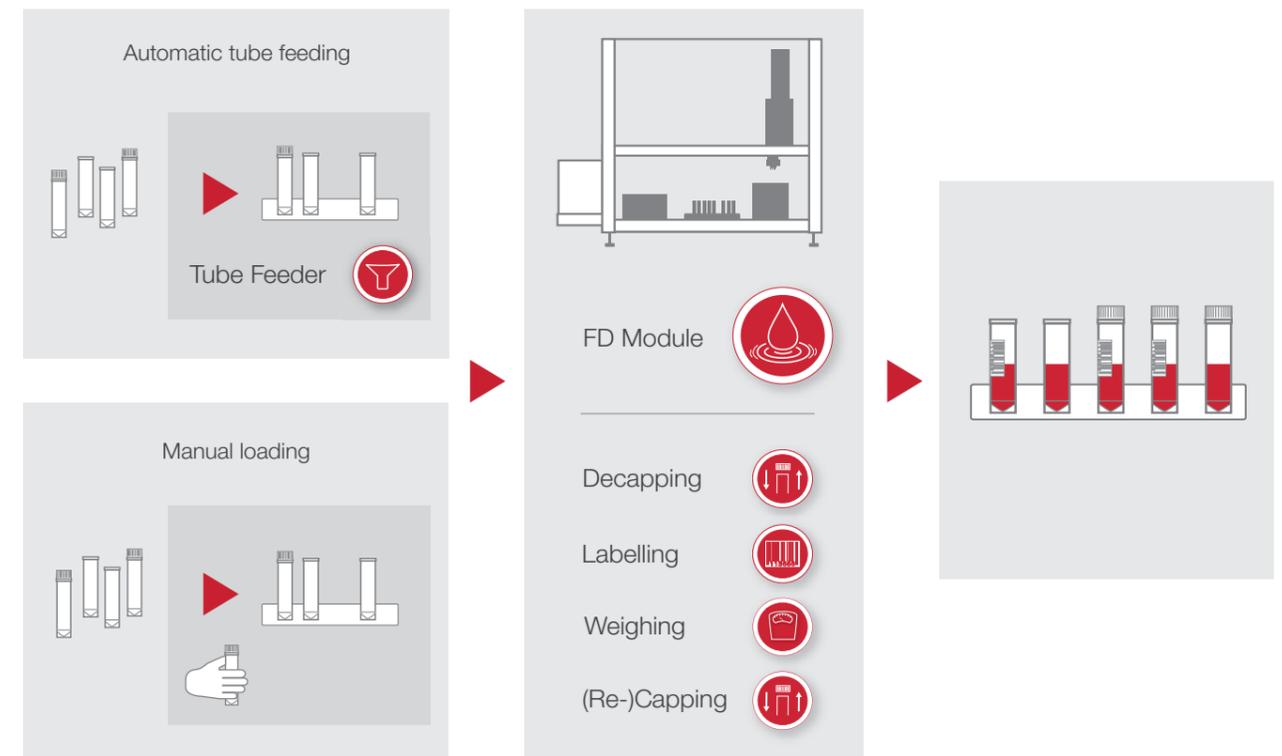
Different dosing systems can be selected for the dosing of liquids, including various highly viscous, highly volatile or critical liquids. IVARO FD allows both fast and safe dosing of

particularly small volumes from 0.1 µl, as well as filling tubes with several milliliters of liquid. A scale for additional filling quantity control and documentation is optionally available.

Multi-step and complex workflows such as filling, labeling and weighing in enclosed tubes are just as easy to implement with IVARO FD as uncomplicated filling of open tubes. Programs can be called up flexibly and easily and adapted to your requirements.

Parallel processing of several working steps enable optimal process speed, saving time and increasing your throughput.

- ✓ Precise filling
- ✓ Short processing times
- ✓ Consistent documentation





IVARO AP

PRECISE ALIQUOTING AND PIPETTING

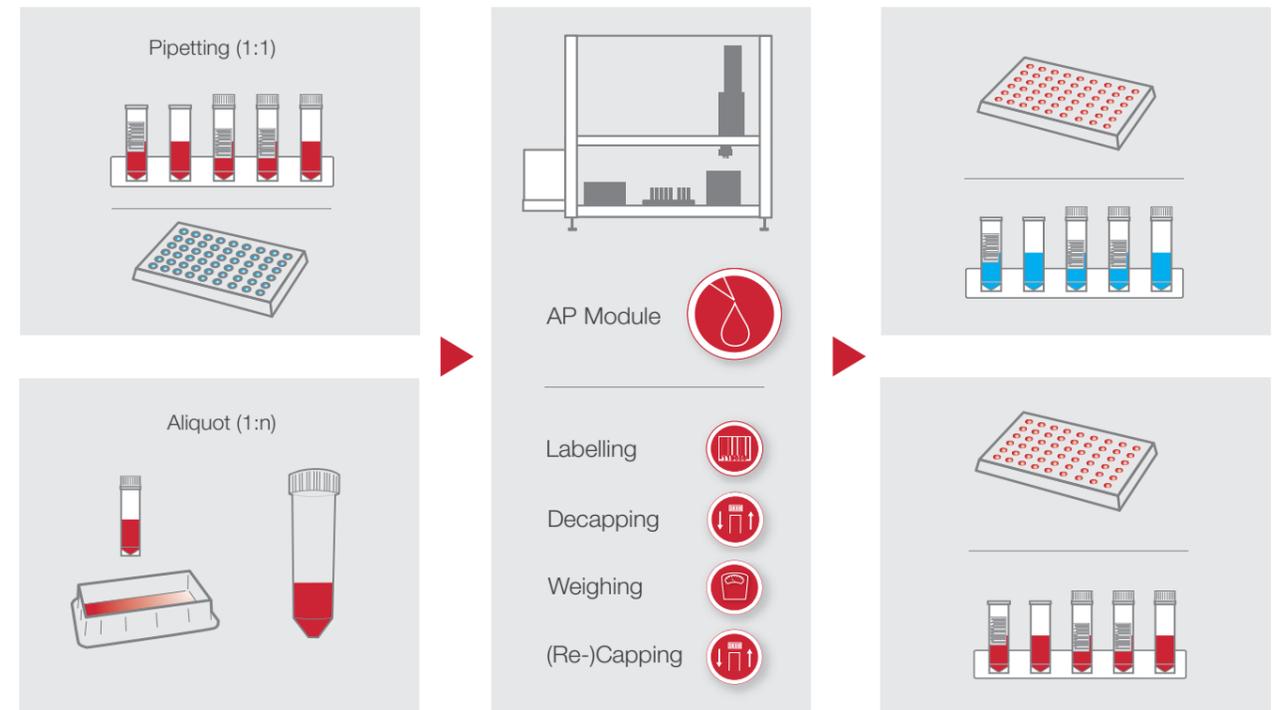
IVARO AP is more than just a liquid handler. It supports you in all types of sample preparation. Filling liquids into several identical tubes is just as easy as aliquoting samples into different containers and microtest plates, or creating dilution series.

Whether you are processing open or closed tubes, whether these are to be labeled or weighed – IVARO AP adapts to your process. Depending on the application, you can flexibly determine the use of micro screw tubes, 15/50 ml tubes or other screw cap tubes, reservoirs or plates. Complex applications can be accomplished by combining the different IVARO modules. Time-consuming, manual and monotonous workflows are carried out safely and reliably with just one instrument.

The heart of IVARO AP is the state-of-the-art pipetting system. Equipped with a capacity- and pressure-based liquid level detection system (cLLD and pLLD) as well as a precise Qualitative Pipette Monitoring (QPM) module, pipetting inaccuracies are minimized and dosing processes optimized. IVARO AP guarantees excellent pipetting results - even with volatile substances such as acetone or ethanol. In addition, IVARO AP can be equipped with a scale for precise documentation of the total filling quantity.

Precise and flexible processing of your samples on IVARO AP guarantees maximum safety and consistent documentation for any sample and aliquot.

- ✓ Reliable pipetting/aliquoting
- ✓ High flexibility
- ✓ Safe processing
- ✓ Reproducible processes



A.WARE LAB AUTOMATION CONTROL

IVARO TUBE HANDLER SOFTWARE

The modern, database-driven A.WARE lab automation control software not only controls the IVARO Tube Handler - it also forms the communication platform between you and the device.

With the possibility of defining your own sequence programs, monitoring the function of the IVARO Tube Handler and storing data in an exportable database structure, it is a reliable tool and a perfect supplement to your laboratory documentation. Thanks to secure user management, comprehensive logging and database-driven data storage, A.WARE lab automation control supports the requirements of FDA CFR 21 Part 11.

Numerous options for individual adaptation to your

requirements, such as application-related reports, selected geometry drivers and individual interfaces enable a process-optimized automation solution.

The "continuous workflow" concept ensures maximum availability and utilization of the device. A.WARE lab automation control enables simultaneous processing of different workflows for different samples. The unloading and loading of new racks while other racks are still being processed is possible without any problems.

The safety parameters monitor these processes and prevent errors. The self-organization effect ensures maximum performance of the IVARO Tube Handler. With A.WARE lab automation control it is also possible to control several IVARO Tube Handlers.

The touch-screen-optimized user interface and clear design provide an intuitive interface between the operator and the IVARO Tube Handler.

The processes can be created and changed with the easy-to-understand graphical editor. Numerous options are available for error handling, both for sequence control in the editor and in the controller. This makes it possible to recover, skip or delete steps. However, jobs can also be generated without software operation via a directory service or via variables, sensors and switches.

A.WARE lab automation control is therefore just as innovative and powerful as the IVARO Tube Handler and offers an optimal basis for reliably mastering every application.



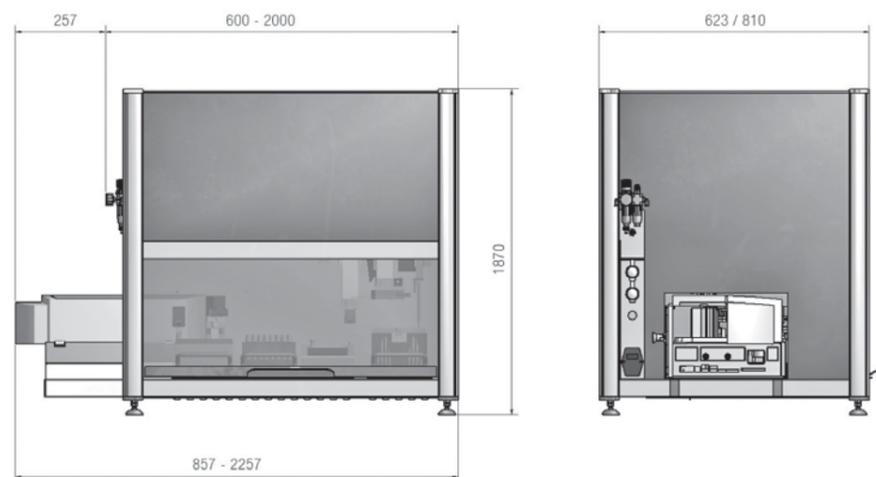
ated solutions
applications
tion & operation

MORE THAN A PRODUCT – A SOLUTION

With an IVARO Tube Handler you do not simply purchase a device, but a solution. We are your partner for the conception of automated solutions and the design of applications. We support you with helpful documentation for installation and operation qualification (IQ/OQ), user training and routine device maintenance. IVARO devices can be used even in regulated environments such as GLP or GMP.

In addition, a maintenance and service contract protects you against unexpected operating costs and minimizes ordering effort. At the same time, system downtime is reduced to a minimum. Software updates that are otherwise subject to a fee are included with a maintenance contract, as is free application support for questions and problems relating to the application.

TECHNICAL SPECIFICATION



IVARO BASIC UNIT

DIMENSIONS

	Unit size 1	Unit size 2
Height	750 mm	870 mm
Depth	623 mm	810 mm
Width	600 - 2000 mm* (depending on requirements)	600 - 2000 mm* (depending on requirements)

*With the printer module, the unit width increases by 257 mm.

HARDWARE

	Monolifter	Duplexlifter Variant A	Duplexlifter Variant B
Vertical gripper arm, continuous rotation	1x	1x	2x
Horizontal gripper arm	-	1x	-
Filling level sensor, ultrasound	optional	optional	optional
Depth sensor for the detection of the rack load	1x	1x	1x
PC system (integral)	yes	yes	yes
Integration of pipetting unit	yes	yes	yes

SOFTWARE

A.Ware - lab automation control software

DOCUMENTATION

IQ/OQ - IQ and OQ templates tailored to the selected system (optional)

IVARO MODULES

LABEL PRINTER

Print resolution	600 dpi
Print speed	up to 150 mm/s
Print width	up to 54.1 mm
Elements	Text, bar code, 2D Code, images

CAP FEEDER

Loading capacity	500 pcs.
Separation speed	10 caps/min
Cap type	Caps for SARSTEDT screw cap micro tubes

PIPETTING UNIT

Pipetting range	1 µl - 1000 µl
Pipetting modes	Individual pipetting and aliquoting
Process monitoring	Qualitative Pipette Monitoring (QPM)
Liquid Level Detection (LLD)	LLD, print / LLD capacitive

Pipetting specification**

Volume	Precision (CV)	Accuracy (R)
10 µl	5 %	+/- 5
100 µl	2 %	+/- 5
1000 µl	1 %	+/- 5

Sample	HAMILTON verification solution
Pipette tip type	1200 µL HAMILTON ZEUS verification tip (conductive) for each individual measurement
Verified by	12 Measuring points per volume and pipetting module

DISPENSING PUMPS

	Peristaltic Pump	Syringe pump
Volume range	40 µl	5 µl ... 12.5 ml
Volume depending on	time	syringe size
Protection against cross contamination	hosing exchange required	washing steps required
Chemical resistance:	++	+
Suitable for viscous liquids:	+	++
Investment costs:	↓	↑
Operating costs:	↓	↑
Accuracy:	+	++
Speed:	++	+

WEIGHING CELL

Weighing range	220 g
Readability	0.1 mg
Reproducibility (standard deviation)	≤± 0.1 mg
Depending on ambient conditions and unit setup	

** The values indicated are based on the following settings:



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