



# The next generation biobank system

**flexible, tailor-made, expandable, automated**

[askion.com](http://askion.com)

Freezing

Storage

Documentation

Accessories

Identification

Consulting

# Content

## Control rate freezing

- Defined and reproducible freezing
- Semi- to fully automated operations
- Automated documentation



## Sample storage

- Automated single vial handling
- Automated SBS Rack handling
- Sample handling at down to  $-130^{\circ}\text{C}$



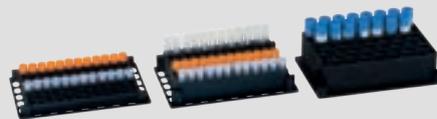
## Documentation Control

- Automated recording
- Remote Control
- Open interface to communicate with external program



## Accessories

- Automated storage for legacy samples
- Homogeneity within one freezing batch
- Safety valves for liquid nitrogen control



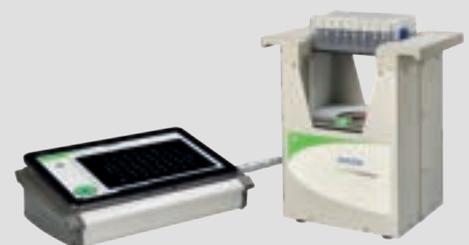
## Sample identification

- Reliable scans at temperatures between  $+24^{\circ}\text{C}$  to  $-150^{\circ}\text{C}$
- Stand alone or fully implemented
- Various connectivity opportunities



## Consulting

- Feasibility studies
- Conceptual design and implementation of the liquid nitrogen filling system
- Involving existing partners



# The next generation biobank system



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# Biobanks / cryo storage

## Introduction

In March 2009 the Time Magazine described under the title “10 Ideas that are changing the World” biobanks as instruments of science that will revolutionize modern medicine (Time Magazine March 23, 2009 | Vol. 173 No. 11).

Biobanks provide basic data for the development of new cancer therapies and the research of biomarkers and they are one of the basic requirement for promising cell therapy, too.

In addition to the growing number of stored samples, their quality and availability after decades of storage are also keys for the scientific and practical value of a biobank.

With the ASKION C-line® biobank product series, ASKION provides a modular device concept that guarantees a maximum of sample quality during freezing, storage and retrieval process.

Moreover it ensures complete traceability of the sample history/documentation.

With more than 150 installed systems worldwide the ASKION C-line® system has proven itself, since 2008.

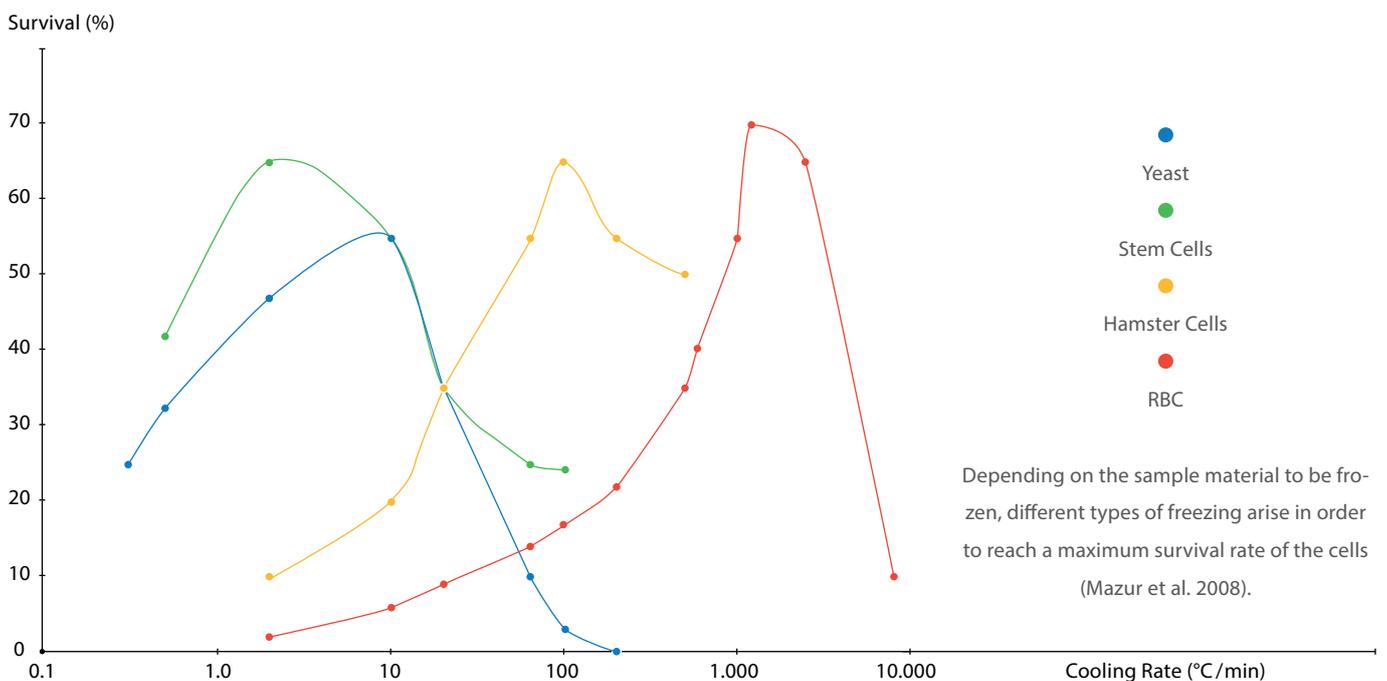
The conception of the ASKION C-line® system was done according to the major steps of the whole biobanking process. These steps are described in the following.

• Biobank are a basic requirement  
for research and therapy

# Freezing process

## First step

The first step following the sample preparation is the freezing process. On the one hand it is essential to be able to display different freezing processes according to the sample format/type (Mazur et al. 2008) that should be frozen. On the other hand it is essential to be able to control the freezing process according to the prescribed freezing curve by the sample temperature.



# Sample handling with uninterrupted cooling chain

## Best handling temperature

After the control rate freezing the frozen samples should be handled as cold as possible to avoid sample damaging processes, e. g. migratory crystal growth by repeating warm-up and freezing cycles.

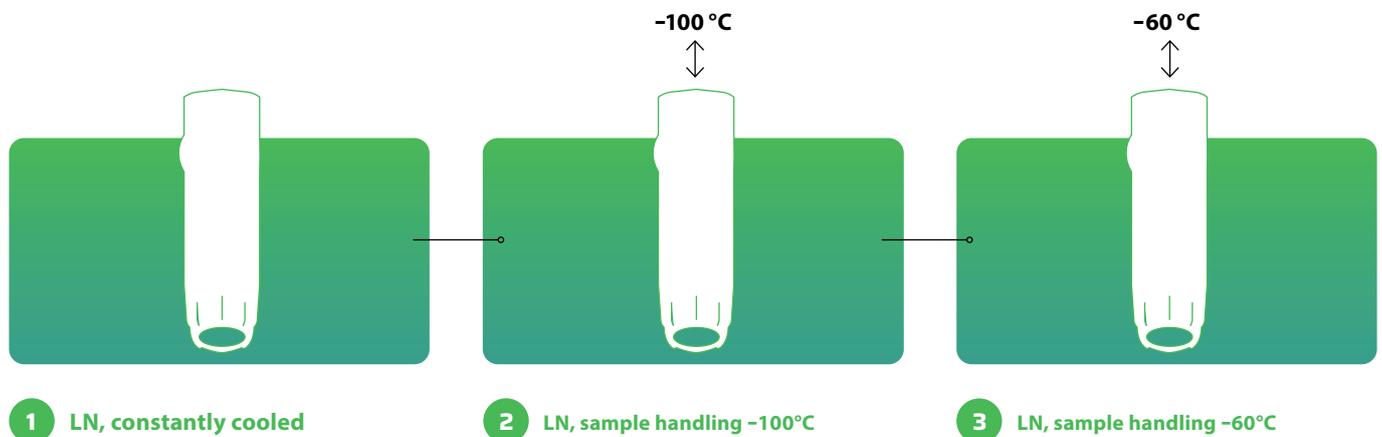
- The best handling temperature for frozen samples is below  $-150^{\circ}\text{C}$

The question now is, which temperature is the best to handle frozen samples. Experiments had been used to determine a handling temperature of at least  $-100^{\circ}\text{C}$  for frozen samples as the best (Germann et al. 2013).

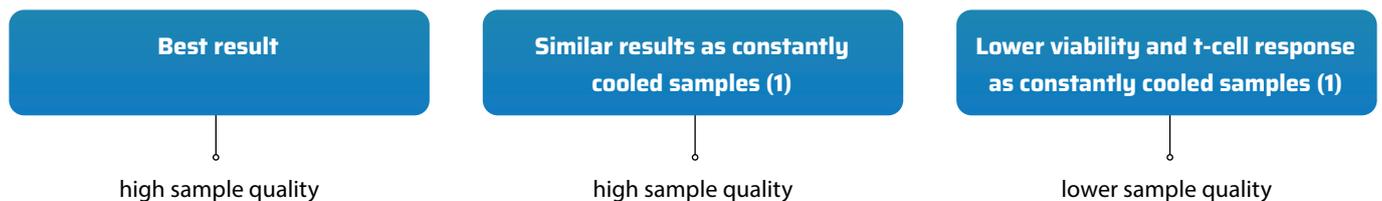
At this temperature frozen samples can be handled without any significant loss in sample quality. This applies for the transport of samples (e. g. from the place of freezing to storage/biobank) as well as for the handling within the cryo storage.

Storage

## Three aliquots of peripheral blood mononuclear cell (PBMC)



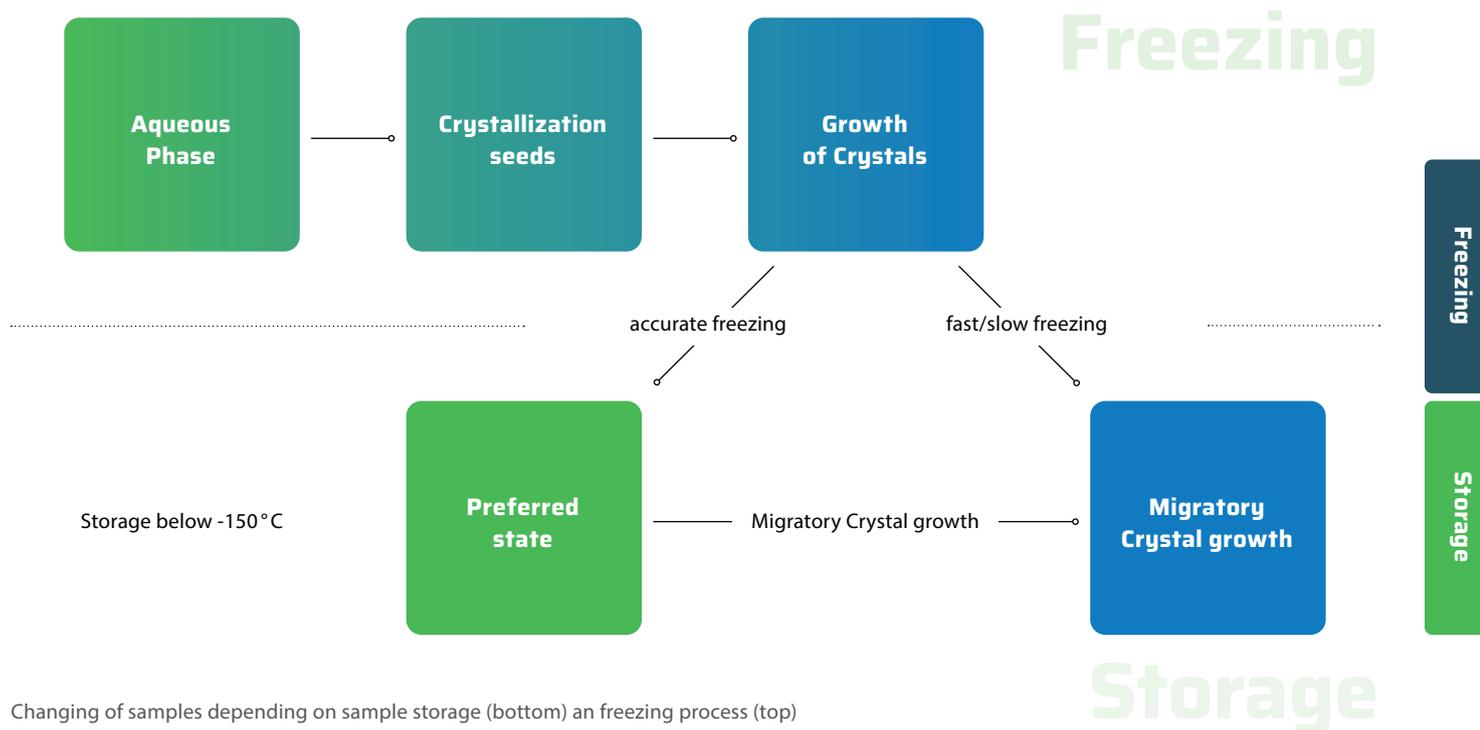
### Evaluation after thawing (recovery rate, viability, t-cell response)



Sample quality depending on sample handling, extract from: Temperature fluctuations during deep temperature cryopreservation reduce PBMC recovery viability and T-cell function Germann et. al., Cryobiology 67 (2013) 193-200

# Cryogenic storage for best possible sample quality

## Preservation of sample quality



Changing of samples depending on sample storage (bottom) an freezing process (top)

To preserve sample quality for decades sample damaging processes, as migratory crystal growth, have to be avoided. During these processes smaller crystals will transform to bigger crystals to reduce the surface energy.

These thermodynamically driven processes come to a standstill starting from temperatures below  $-130^{\circ}\text{C}$ . As nobody would like to stand close to limit at all times, a safety/buffer zone of additional 20 K shall be added.

For this reason the sample storage should take place at temperatures below  $-150^{\circ}\text{C}$  to ensure best sample quality for the entire storage period.

Another reason for the storage below  $-150^{\circ}\text{C}$  are vitrified samples (glassy, amorphous state). These vitrified samples have to

be stored below the glass transition temperature (depending on the used cryo protectant and the sample composition) to preserve the sample quality.

Once the above stated steps (freezing, handling/transport, storage) have been performed and recorded the sample quality can be analyzed using a simple overview or chart of the sample temperature profile after several years or even decades.

By doing so, it is e. g. possible to choose the best sample out of aliquots of an original sample for the final evaluation of a diagnostic assay.

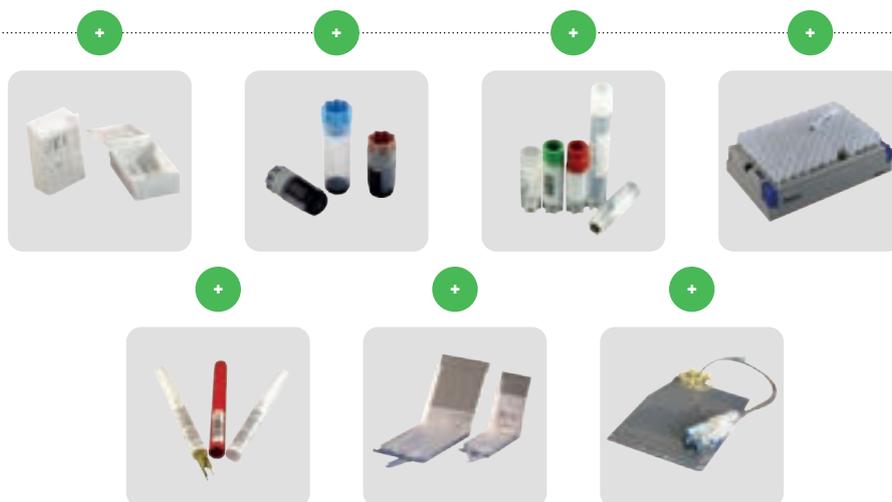
**High quality sample must be stored as cold as possible, best below  $-150^{\circ}\text{C}$**

# Modularity and individualization

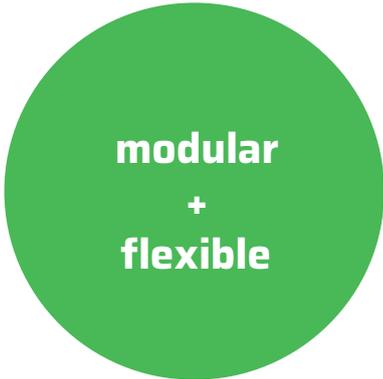
## Maximum flexibility for the operation of a biobank

The ASKION C-line® system is structured similar to a building kit. According to operator needs it is possible to prepare a tailor made solution (for example with regard to sample formats).

Storage



Picture of a tray (storage place of samples) of the ASKION C-line® hermetic storage that can be adapted to the particular sample format according to operator needs



**ASKION C-line® system is a modular and flexible system with four main components:**

- ASKION C-line® hermetic storage
- ASKION C-line® work bench
- ASKION C-line® automated work bench
- ASKION C-line® automation
- ASKION C-line® control

**Semi-automated HS200 S**

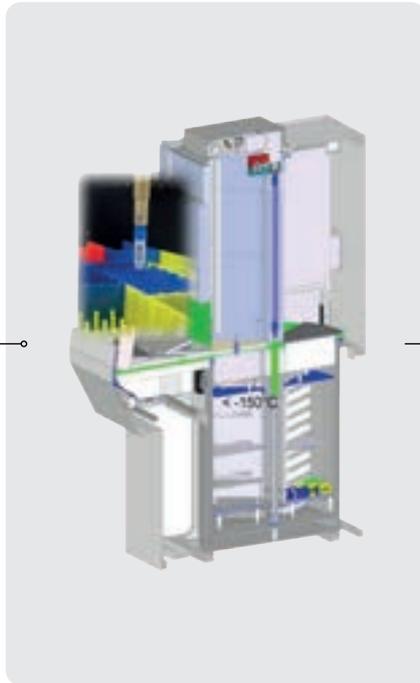
(manual sample handling below -110°C)

**Automated HS200 S**

(sample handling by Pick-and-Place robot below -110°C)

**Automated biobank, connection of several automated HS200 S**

(sample handling by Pick-and-Place robot below -110°C) by rail system



sample gripper



rail system



Storage

In field upgradeable automation components without influence/impact on the already stored samples using the example ASKION C-line® hermetic storage HS200 S

# Freezing Process

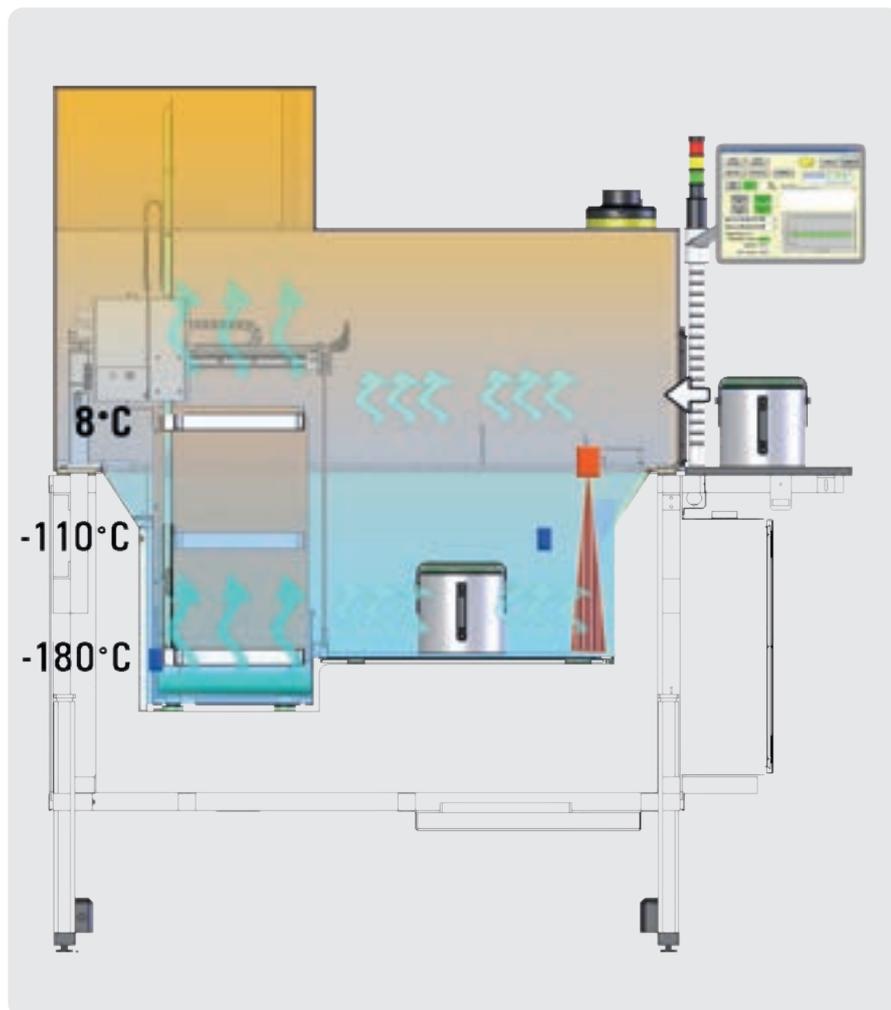


## Exact and reproducible freezing enables precise control and comparability of different freezing processes

The ASKION C-line® work bench and ASKION C-line® automated work bench allow freezing of different sample types and formats.

The freezing process is defined and reproducible by measuring the sample temperature using a reference sensor.

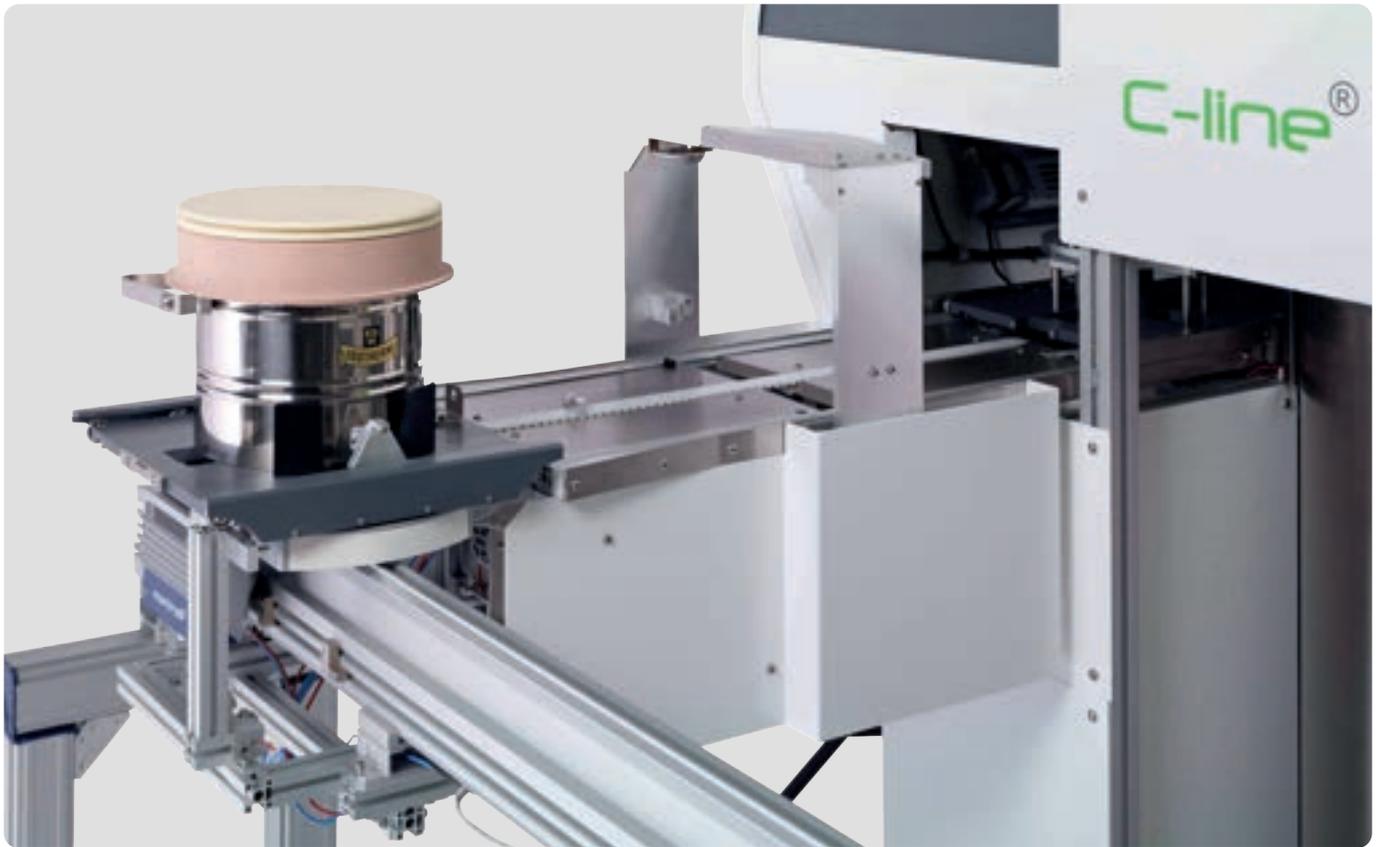
Freezing



### ASKION C-line® work bench and ASKION C-line® automated work bench

- Defined and reproducible freezing
- Sample format independent
- High accurate freezing by measuring sample temperature
- Automated parameter recording for each sample (documentation)
- Up to 6 freezing processes in parallel
- 1D/2D barcode reader
- SBS rack scanning below  $-100^{\circ}\text{C}$
- Uninterrupted cooling chain

cross section of ASKION C-line® work bench



ASKION C-line® Transport container

# Maximum Sample quality

**Uninterrupted cooling chain during sample transportation and sample handling guarantees maximum sample quality**

After the control rate freezing step, the frozen samples can be transferred by the transport container to ensure a permanent cooling chain.

This special LN cooled device enables a sample transfer at temperatures below  $-100^{\circ}\text{C}$ . The transport container is available in different sizes and can be combined with automation to allow an automated sample transfer at below  $-100^{\circ}\text{C}$ .



# Easier Accreditation

**Secured and complete documentation enable an easier accreditation**

By simultaneously recording of all parameters and processes for every single sample the complete and precise documentation is guaranteed (for further information see page 30 and 52, ASKION C-line® control).

These data files can be evaluated directly with the control software ASKION C-line® control or optionally retrieved by an interface to the existing IT infrastructure (e. g. LIMS).

The ASKION C-line® system meets all requirements on a modern biobank system for highest sample quality, maximum user safety, user friendliness and documentation:

- Fully automatable (single sample handling, SBS rack gripper, connectable to an fully automated biobank)
- Modular expandable and upgradable
- Uninterrupted cooling chain during all steps
- Defined and reproducible freezing
- Complete documentation of all processes for the entire life cycle of every sample

Next to the five main parts, the ASKION C-line® system includes further helpful solutions and additional components as, for example, the cryogenic SBS rack scanner (ASKION C-line® ColdEye/ColdEye+), that enables the identification of frozen samples at temperatures of –130°C and below.

All devices of the ASKION C-line® system align to internationally accepted standards. Furthermore, the individual components can be certified as medical devices (according to 93/42/EEC).

This allows, among others, the use in the field of regenerative medicine (e. g. ATMP's).

Further information on the ASKION C-line® system and its components can be found on the following pages as well as on the ASKION website ([www.askion.com](http://www.askion.com)).

You are also welcome to contact one of our worldwide contact persons.

**The ASKION C-line® system meets all requirements on a modern biobank system for highest sample quality, maximum user safety, user friendliness, documentation and corresponds to internationally accepted standards**





# Customization of the biobank

**Modularity and individualization enable the customization of the biobank configuration at any point in time**



- 1 Automated I/O unit
- 2 Touch panel PC for control
- 3 Sample storage below  $-150^{\circ}\text{C}$
- 4 Automated single sample handling at  $-130^{\circ}\text{C}$ , with optional gripper changing module
- 5 Automated SBS Rack handling at  $-130^{\circ}\text{C}$

ASKION C-line® hermetic storage HS200 M/L

The ASKION C-line® hermetic storage (HS200) is a highly efficient, fully automatable system for cryogenic storage of all types of biomaterial.

Since 2008 and meanwhile in the second generation is the HS200 the heart of the ASKION C-line® system for sample storage at highest quality. The samples are stored in the gas phase of liquid nitrogen at storage temperatures below  $-150^{\circ}\text{C}$ .

The HS200 is available in three different sizes (HS200 S/M/L). Based on an analysis of the operator requirements (for example sample throughput, storage capacity) it is possible, to build up a tailor made biobank aligning with the specific requirements.

The sample collection can be started, for example, with a small storage module (HS200 S) with a sample capacity of up to 79,000 vials. If subsequently the required sample throughput and/or sample capacity increase, it is possible, to upgrade the biobank by further HS200 modules without affecting already stored samples.

#### HS200 M/L

- Sample storage down to  $-185^{\circ}\text{C}$
- Sample handling at  $-130^{\circ}\text{C}$
- Cherry Picking robot
- Gripper changing module
- SBS Rack handling robot
- Optional fully automatable biobank
- 1D/2D Barcode reader
- SBS rack scanning at  $-130^{\circ}\text{C}$
- Uninterrupted cooling chain
- Capacity up to 1,000,000 vials per HS

# Customized storage solution



## HS200 S

- Sample storage down to  $-185^{\circ}\text{C}$
- Sample handling at  $-100^{\circ}\text{C}$
- Cherry Picking robot (optional)
- Fully automatable biobank (optional)
- 1D/2D Barcode reader
- Uninterrupted cooling chain
- Capacity up to 79,000 vials per HS
- Optional high density trays with up to 25% increased storage capacity

ASKION C-line® hermetic storage S (HS200 S)

## Modularity and individualization at any point in time

The HS200 consists of two main components, the nitrogen storage tank and the patented upper hermetic hood construction.

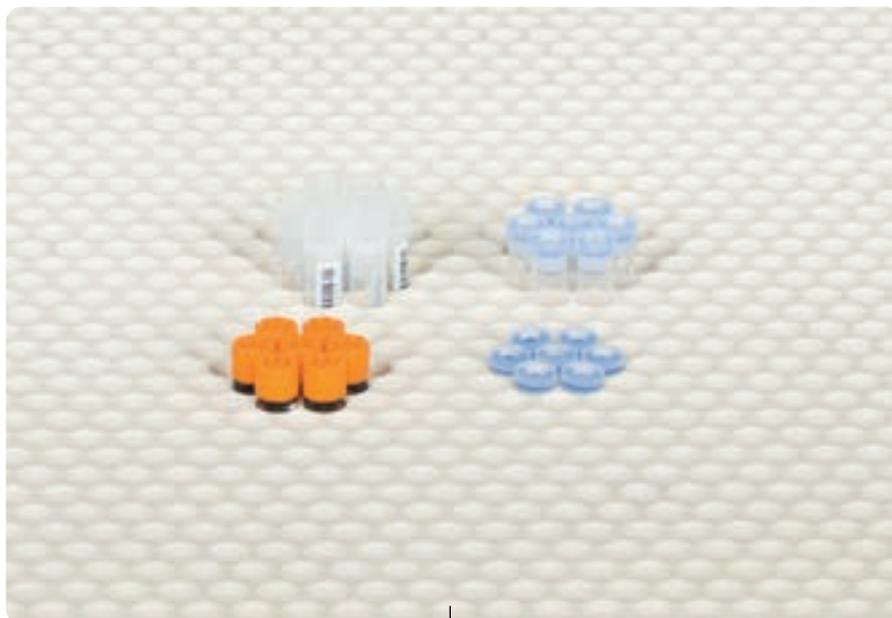
Inside the tank samples are stored on high density racks.

At the upper part, the sample handling during storage and retrieval takes place at cryogenic temperatures ( $-100^{\circ}\text{C}$ ).

In the nitrogen tank the samples are stored at the nitrogen gas phase at temperatures down to  $-185^{\circ}\text{C}$  to avoid, among

others, contact with liquid nitrogen and so the risk of cross-contamination.

The racks, in which the actual sample storage takes place, can be adapted to the chosen sample formats (vials, tissue cassettes, blood cassettes, straws, etc.).



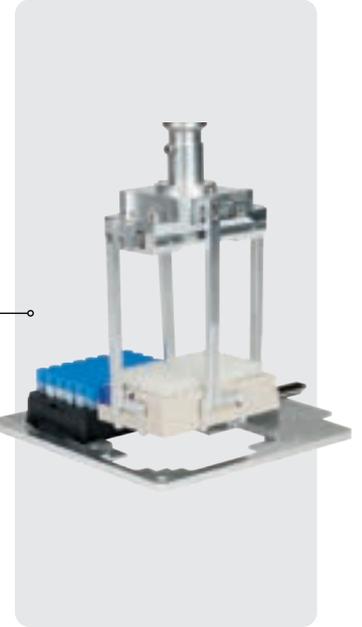
### HS200 M/L

- Sample format independent
- Customized storage trays
- Storage capacity up to 1,000,000 samples per HS
- Integrated SBS Rack reader at  $-130^{\circ}\text{C}$
- Storage down to  $-185^{\circ}\text{C}$

Tray of the HS200 M/L with samples (top) and a structure of a storage rack of the HS200 S with different levels/trays (bottom)

# Automation

## Increased sample safety and performance



Pick-and-Place-robot above a tray at an ambient temperature below  $-100^{\circ}\text{C}$  (left), gripper changing system of HS200 M/L with single gripped sample (middle) and SBS rack gripper (right)

The upper hood construction enables to restore samples at temperature down to below  $-130^{\circ}\text{C}$ .

Depending on the chosen level of automation, the storage process will be performed either manually or automated as single sample handling or in SBS racks.

- Stepwise automatable (also in field)
- Retrofittable automation tools
- Automated SBS rack and single tube handling
- Sample handling down to  $-130^{\circ}\text{C}$
- Automated recording of all parameters for each sample and system

## GMP compliance

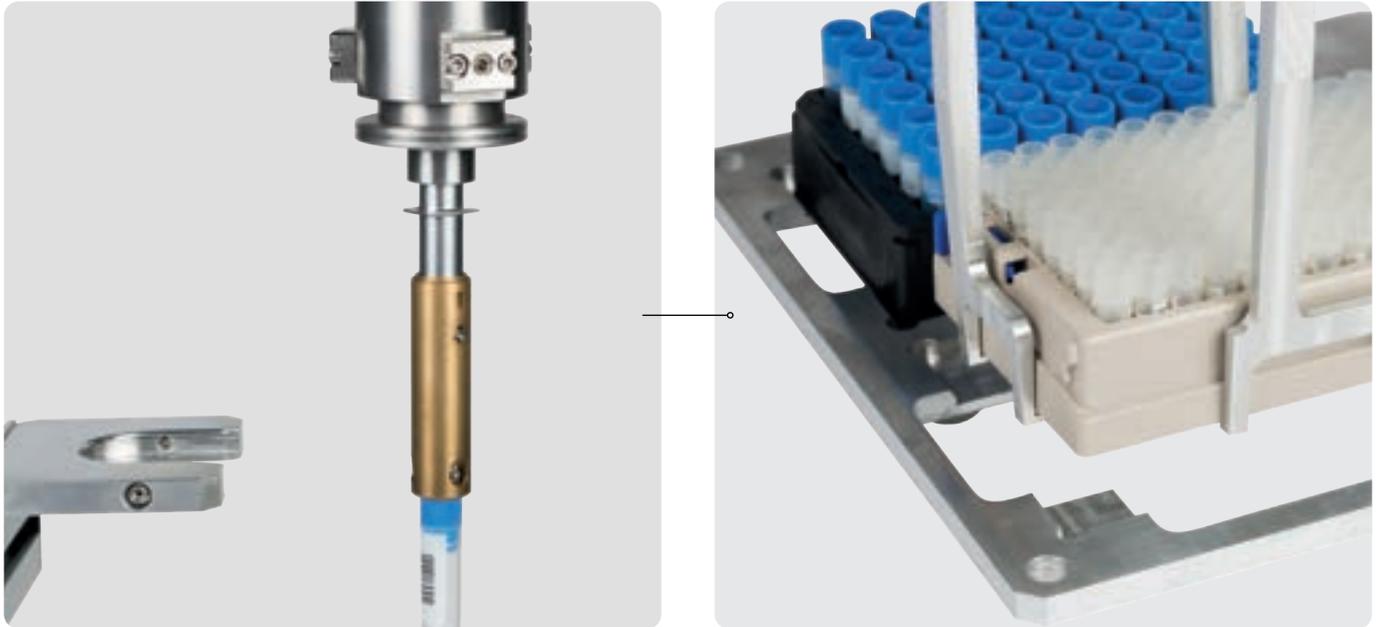
### Automated and complete documentation for each single sample enables GMP compliant working

The HS200 provides an internal barcode scanner which can identify either single samples or SBS racks. Additionally, all movements and temperatures of the samples inside the

HS200 are registered and transferred to the control software ASKION C-line® control for recording (see page 30 and 52).

# SBS Rack gripper and single vial handling robot

## Increased handling safety and sample throughput



Cherry Picking gripper with a single gripped sample (left) and SBS rack gripper (right)

With an increasing number of samples, the challenges for sample handling increase significantly. This includes both, sample data management (currently often manually using lists) and the actual sample handling (e. g. manual lifting of storage racks out of a nitrogen drum, pulling out a box and picking-up one or several samples).

In many laboratories manual operated nitrogen storage systems are still popular.

During sample retrieval, the operator has to pull out heavy storage racks on its own strength and therefore is exposed with the risk of getting in contact with liquid nitrogen as well as inhaling cryogenic nitrogen gas.

To avoid these operator risks and support sample safety and quality at the same time, all C-line® components (ASKION C-line® hermetic storage, ASKION C-line® work bench, ASKION C-line® automated work bench) offer protection against the contact with nitrogen gas and liquid nitrogen.

The ASKION C-line® automation provides a SBS rack gripper and a Pick-and-Place-robot for single sample handling, that can be combined optionally with a gripper changing system.

These robots work in cryogenic environment of temperatures at least below  $-100^{\circ}\text{C}$  (see section ASKION C-line® hermetic storage).

The use of these robots prevent sample mix-up and all sample movements are monitored and recorded at the same time.

- Automated SBS rack and single tube handling
- Sample handling at environmental temperatures down to below  $-130^{\circ}\text{C}$
- Ergonomic and safe operation



Connection of several ASKION C-line® hermetic storages to one fully automated biobank by using the external automation (rail system with shuttle and transfer station)

# Easier storage and retrieval processes

## Modular connection in building kit principle

The ASKION C-line® automation provides an optional interconnection of single C-line® components (ASKION C-line® hermetic storage, ASKION C-line® automated work bench) through the external automation.

This external automation is based on a rail system on which a shuttle transfers samples between different modules (ASKION C-line® hermetic storage, ASKION C-line® automated work bench, ASKION C-line® transfer station).

Hereby the sample transfer takes place at temperatures below  $-100^{\circ}\text{C}$  to ensure a permanent cooling chain.

The transfer station serves as a handover stop for samples between the operator and the biobank and further simplifies the sample storage and retrieval.

To start the storage or retrieval process, the operator has to press one single button. The ASKION C-line® automation provides a step by step automatization

for small and large biobanks/biorepositories.

It can be retrofitted to existing C-line® modules in field. Due to the flexibility of the external automation several layouts (switch, curve, lifts, etc.) can be realized.

- Stepwise automatable up to a fully automated biobank
- Retrofittable automation tools

# Maximum flexibility for biobank operation

## Modularity and individualization

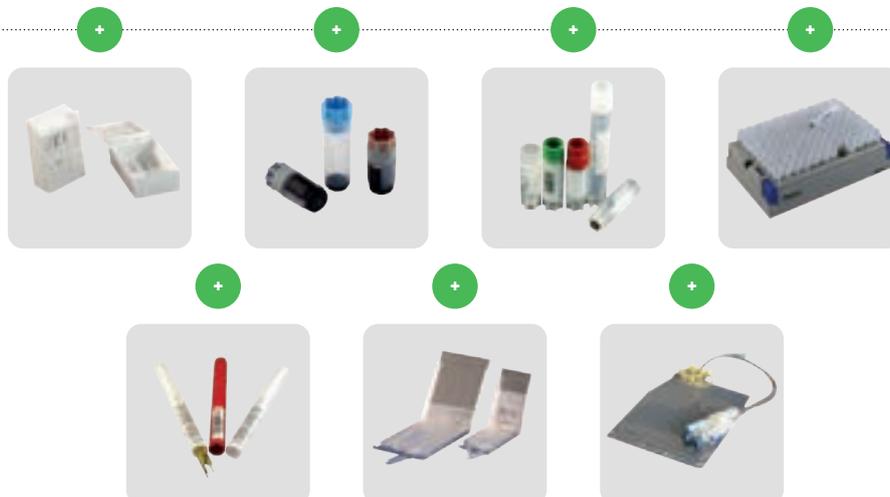
In addition to the high flexibility with regard to the storage capacity, the ASKION C-line® system provides a maximum flexibility to sample formats as well.

The useable sample formats range from vials, with different filling volume (e. g. 0.2 ml to 8.0 ml) and dimensions (e. g. 6.0 ml tissue vials), to highvolume sample

formats, e. g. blood bags, up to formats like straws or tissue cassettes. To meet the individual needs and requirements of the respective operator, the relevant C-line® components will be adapted to the used sample format.

The modularity of the system allows the extension of the useable sample formats.

- Various sample formats can be stored (vials, blood bags, straws, etc.)
- Customized storage trays
- Optional high density trays to enlarge storage capacity (up to 25% more)



The ASKION C-line® cryo rack can be adapted to various sample formats.

# Integration of existing biobanks

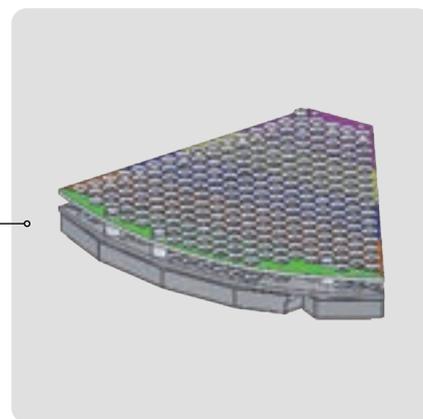
ASKION C-line® HS200



non-automatable sample to be stored



adapter with lateral 1D barcode and/or 2D barcode



tray to be stored

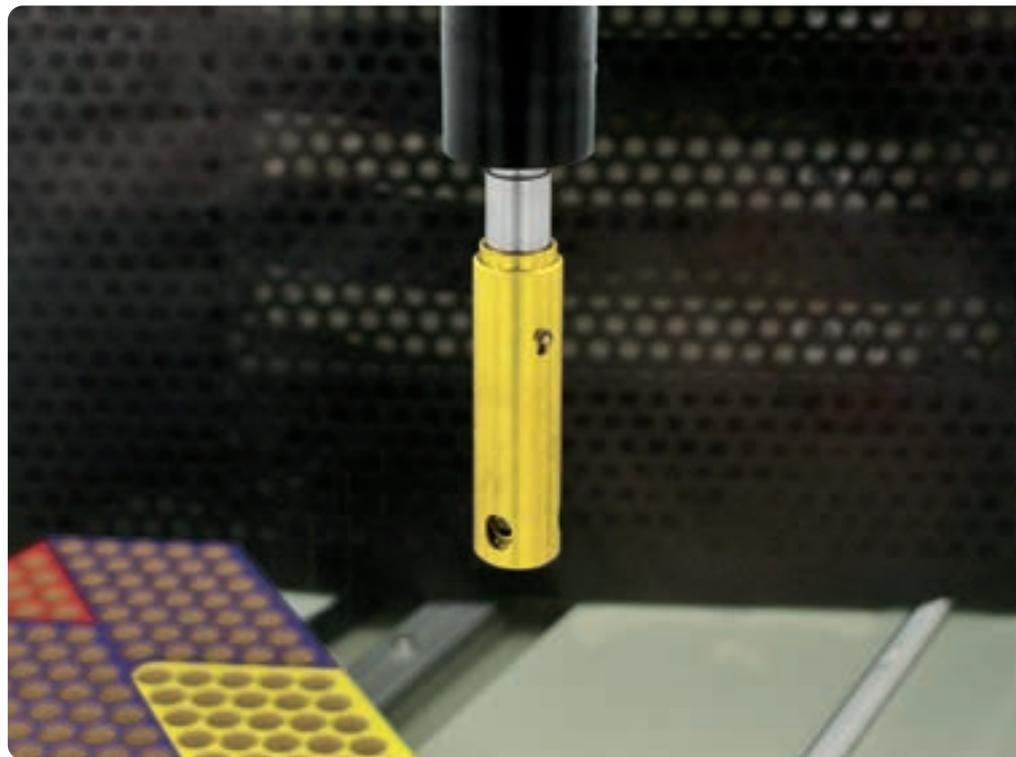
Accessories

Using the ASKION C-line® adapter for automated handling of formerly non-automatable samples



pick-and-place robot below down to  $-110^{\circ}\text{C}$

- Enables to handle all samples within one biobank fully automated
- Different sizes available
- Customized adapters



**ASKION C-line<sup>®</sup>  
adapter**

## Automation of existing and non-standard samples

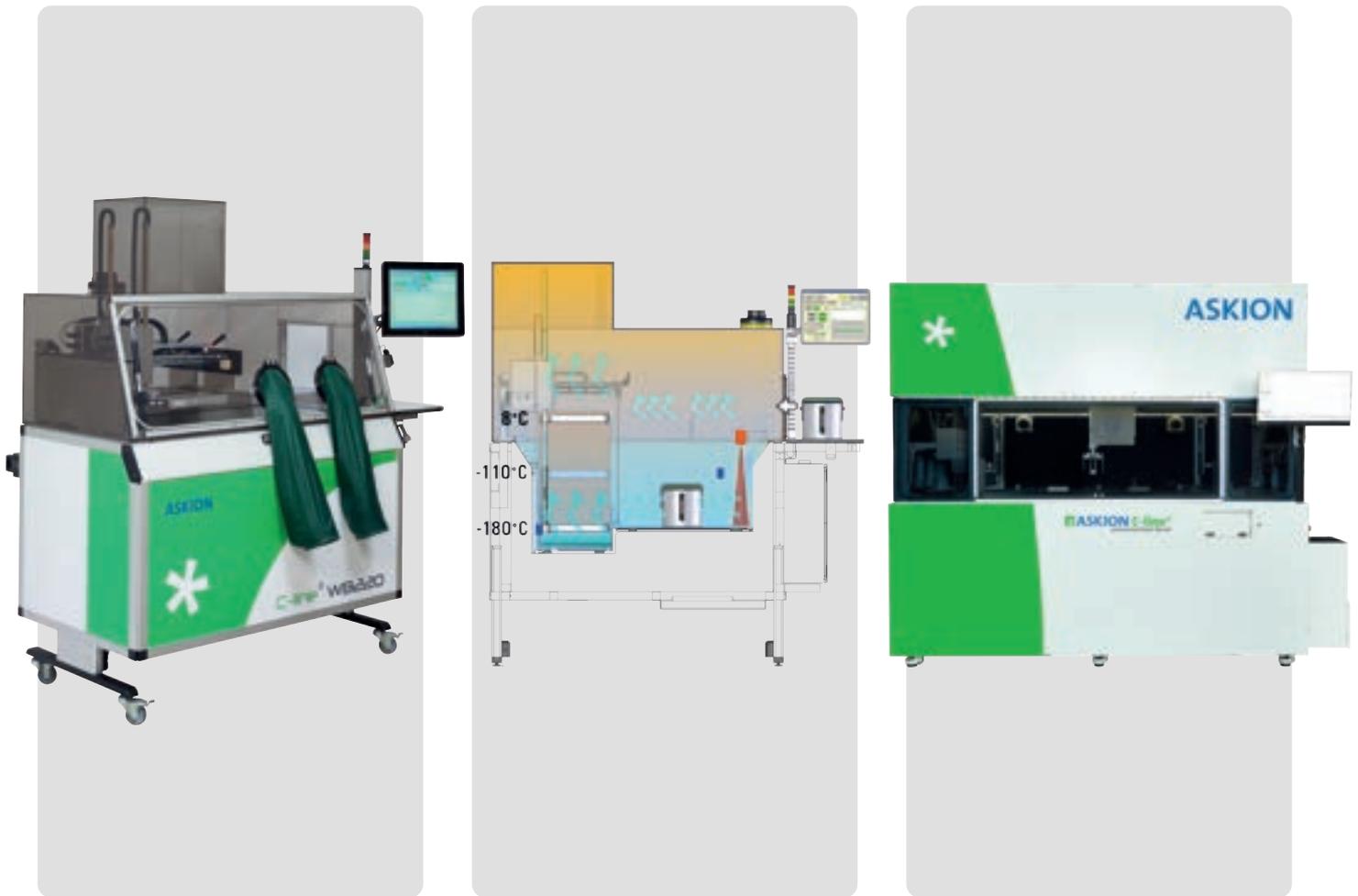
When building up a new biobank, already stored samples often have to be transferred to the new storage system.

Many times it is not possible to handle the “old” samples automatically.

To avoid the further storage of these samples in non-automated systems, it is possible to transfer them using the ASKION C-line<sup>®</sup> adapter.

According to the sample format to be stored, the ASKION C-line<sup>®</sup> adapter is available in different sizes.

It is equipped with a barcode that allows tracking and identification of the samples inside the ASKION C-line<sup>®</sup> system safely at any time.



ASKION C-line® work bench (left) and transverse section of a ASKION C-line® work bench with temperature gradient (middle) and ASKION C-line® automated work bench (right)

# Maximum safety quality

**Cryogenic working area combined  
with defined freezing**

- 1 Heated gloves
- 2 Touch panel PC to control
- 3 Integrated control rate freezer
- 4 Motor powered height adjustment
- 5 Cryogenic chamber for frozen sample handling



ASKION C-line® work bench

The ASKION C-line® work bench and ASKION C-line® automated work bench combine a cryogenic, ice-free and contamination-free working area for sample handling as well as a freezing unit for controlled rate freezing of biomaterials.

The cryogenic working area is cooled by selective evaporation of liquid nitrogen.

Due to the nitrogen tub (lower part of the ASKION C-line® work bench) and the special hood construction (upper part of the ASKION C-line® work bench) maximum efficiency (low nitrogen consumption) and operator safety (prevention of inhalation as well as contact of cryogenic nitrogen gas and liquid nitrogen) are reached.

Inside this cryogenic working area frozen samples can be handled at temperatures below  $-100^{\circ}\text{C}$  (e. g. resorting, identifying and scanning).

The sample handling can take place manually (ASKION C-line® work bench) or fully automatically (ASKION C-line® automated work bench). The prevention of heat input onto frozen samples is essential to preserve the sample quality.

As studies have shown, samples should be stored in the gas phase of nitrogen and should be handled and transported at temperatures of at least  $-100^{\circ}\text{C}$  to prevent negative impacts to the sample quality (Germann et al. 2013).

- Defined and reproducible freezing
- Individual freezing curves programmable
- Measurement of sample temperature
- Cryogenic working area ( $-80^{\circ}\text{C}$  to  $-130^{\circ}\text{C}$ , adjustable) to handle frozen sample
- Scanning at down to below  $-130^{\circ}\text{C}$
- Semi- or fully automated

# Exact and reproducible freezing

## Precise control and comparability of different freezing processes

The ASKION C-line® work bench and ASKION C-line® automated work bench are equipped optionally with up to six controlled rate freezers.

The individually programmable freezing curve, according to the used sample type, is realized by controlled up-and-down movement of the sample holder at a stable temperature gradient.

To regulate the freezing process the ASKION C-line® work bench uses the temperature data determined by a reference sensor of the samples to be frozen.

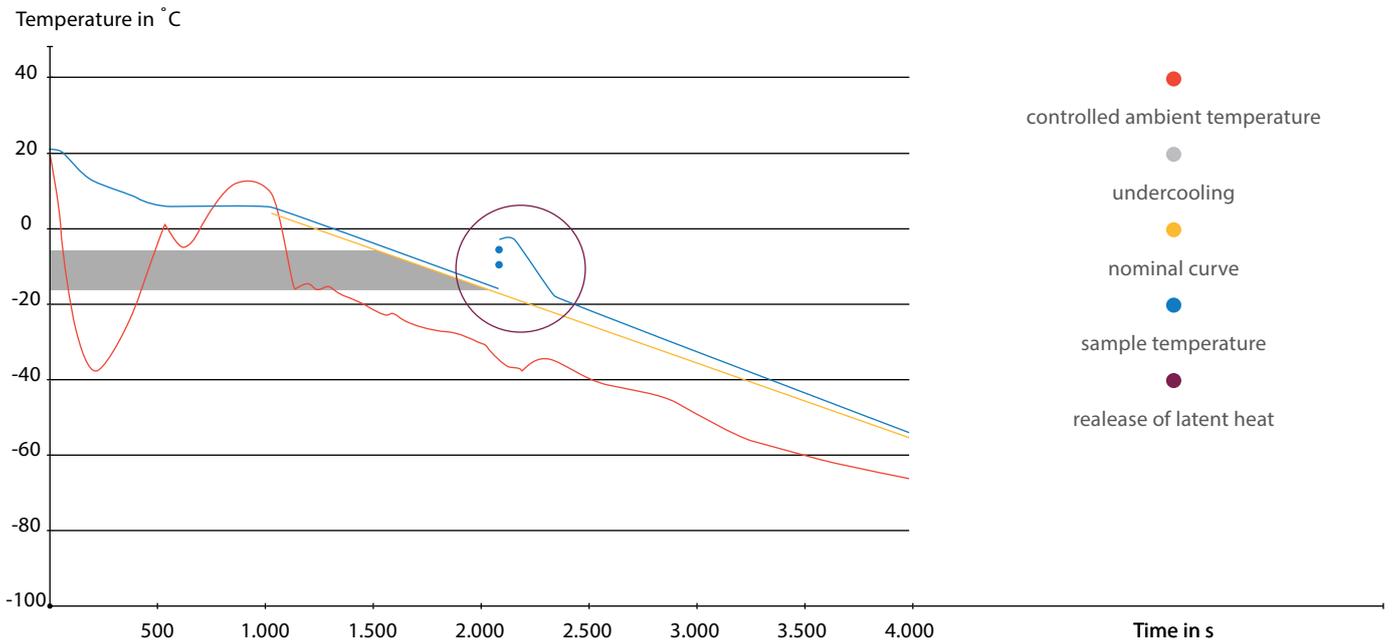
This enables a precise controlled freezing process during which the prescribed freezing curve actually applies to the sample material, despite different thermal characteristics. Additionally the temperature data for every sample will be recorded and saved.

Furthermore, the ASKION C-line® work bench and ASKION C-line® automated work bench enable the controlled triggering of the crystallization (“seeding”) to avoid an undercooling of the samples.

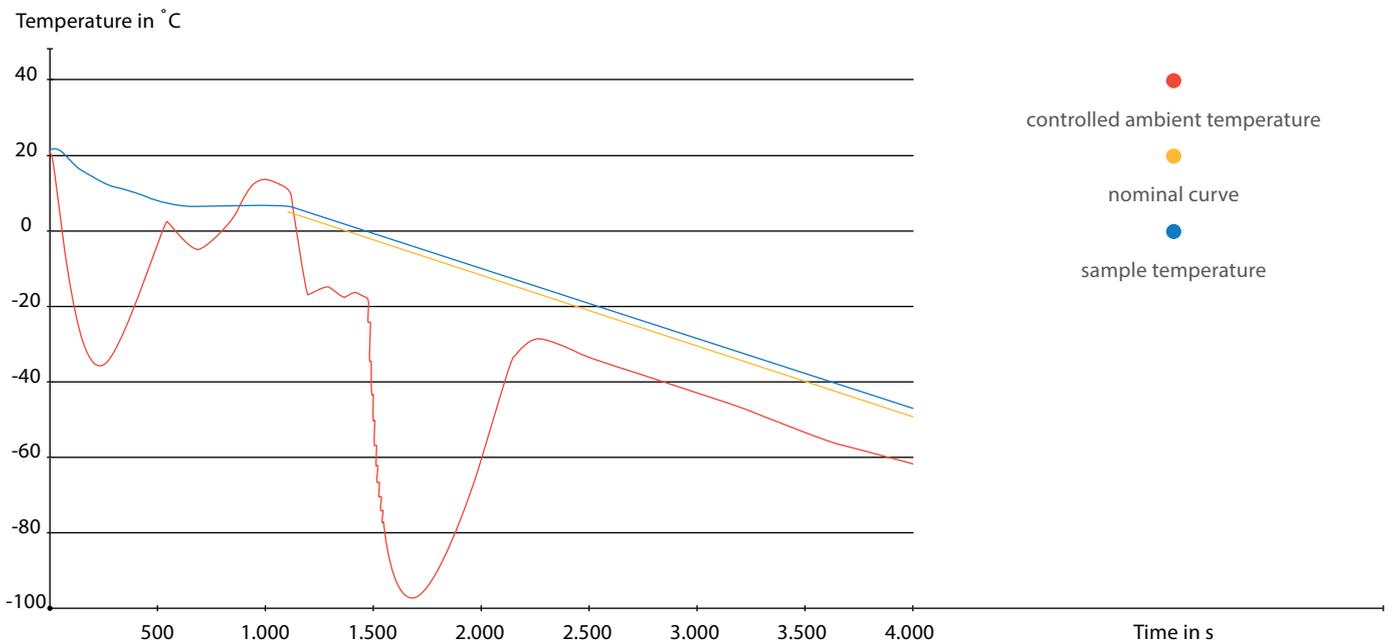
At the same time, the reference sensor guarantees the controlled crystallization by targeted compensation of released crystallization heat.

- **Maximum conformity between programmed and real (sample temperature) freezing curve**
- **Selective nucleation**
- **Avoidance of latent heat and undercooling during freezing process**
- **Parallel independent freezing processes available**

### Common freezing curves (with latent heat release and undercooling)



### Ideal freezing curves



Exemplary freezing curve for a blood bag for a standard (top) and ideal set up (bottom). By using the ASKION C-line® work bench and automated work bench the almost perfect compliance between prescribed freezing curve (orange) and sample temperature (blue) can be achieved. For the ideal freezing curve the release of latent heat (purple) or undercooling (grey) will be avoided.

# Reliable sample identification at any temperature

## Scanning at any temperatures between room temperature and $-130^{\circ}\text{C}$ without affecting the sample quality

ASKION C-line® ColdEye+ and ASKION Cline® ColdEye are the first 2D barcode scanner worldwide that operate at environmental temperatures between of  $+24^{\circ}\text{C}$  down to  $-130^{\circ}\text{C}$ .

These scanners allow the parallel identification of samples either in SBS rack or box format.

As the entire scanning process is done within a few seconds the scanning of single samples will be omitted.

ASKION C-line® ColdEye is compatible with the ASKION C-line® work bench and can be retrofitted at any time.

The standalone version is named ASKION C-line® ColdEye+ and works without the ASKION C-line® work bench, due to integrated battery and integrated analysis tool.

As the entire scanner can be put into ice, dry ice or to the vapor phase of liquid nitrogen, samples can be identified without any warming event.

**Due to this, the scanner can be used for various applications such as:**

- Inventory or sample picking of samples out of fridges on ice
- Inventory or sample picking of samples out of  $-20^{\circ}\text{C}$  or  $-80^{\circ}\text{C}$  freezer on dry ice
- Inventory or sample picking of samples out of conventional tanks at vapor phase of liquid nitrogen

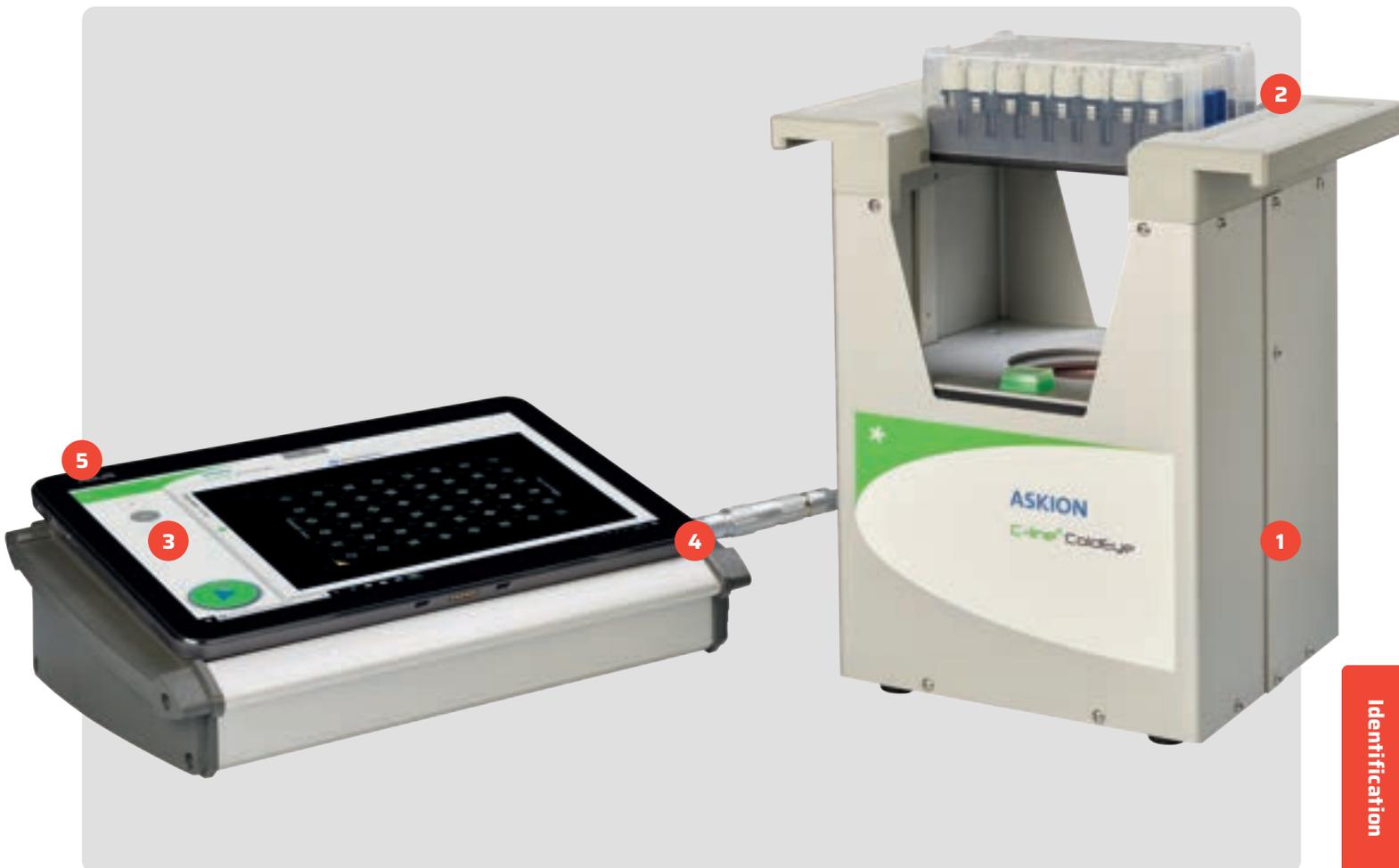
ASKION C-line® ColdEye and ASKION C-line® ColdEye+ are neither linked to one special sample format nor to one single vial manufacturer.

- Identification of samples in SBS rack format or boxes
- Reliable scanning between  $+24^{\circ}\text{C}$  and  $-130^{\circ}\text{C}$
- Identification of e.g. 96 samples within less than 5 seconds
- Compatible to ASKION C-line® work bench
- Retrofittable
- Standalone version available
- Sample format independent

- 1 Scanning engine
- 2 Sample holder
- 3 Integrated analysis tool
- 4 Integrated battery
- 5 Access point via USB, HDMI, LAN, WLAN



ColdEye+ with samples ready to scan at room temperature (left) and ongoing scanning at dry ice (right)



Identification

ColdEye+

# Central administration unit

## Management and documentation of your biobank

ASKION C-line® control is the central administration unit of the biobank. It consists of the two elements ASKION C-line® control server and ASKION C-line® data station.

The data station functions as user interface from which sample data can be recalled as well as storage and retrieval orders can be created and started. Furthermore, the unit provides the essential information on the state of the biobank.

The server application manages and controls all processes and data centrally, including regular backups. Moreover, it is the communication interface to all ASKION C-line® devices. The ASKION C-line® control server can also be implemented to existing external IT infrastructures (e. g. LIMS) by an open interface. This data can be exchanged and the biobank can be controlled by the existing IT infrastructure.

The data management of every single sample is done by ASKION C-line® control.

This means, that for every sample inside the C-line® system all parameters are recorded for the complete sample life cycle. These data can be recalled for every sample at any time and therefore allow maximum transparency and control. Also sample data with additional and individual information can be added (e. g. age, gender, disease, etc.) to simplify the later search for the target samples.

### **Simplified and fast retrieval based on completely recorded sample life cycle**

- **Sample data management**
- **Connectable to external programs (e. g. LIMS/HIS)**
- **With one software different biobanks/locations can be controlled**
- **Customized software adaption**
- **Access control**

## Open Interface

### Easy integration to existing infrastructures

In the event that an appropriate data management (LIMS/HIS) does already exist, ASKION Cline® control is able to communicate with this system using the open interface CCI (C-line® Control Interface).

The CCI is not limited to the communication with LIMS/HIS and can in general communicate with any type of external software (e. g. pipetting platform).

This enables the complete integration of the ASKION freezing and storage solution into the overall process of the laboratory, beginning from sample acquisition to preparation up to controlled freezing and storage.

# Software adaption for workflow optimization

## Tailor made to your needs

With software adaptations and additional programs (e. g. wizards) it is possible to include and realize individual user requests (e. g. storage management of third-party providers).

ASKION C-line® control



CCI



LIMS/HIS – Communicate with external software (e. g. LIMS/HIS)



Sample Data Management



Operator Interface (data station)



Pathology



OP



Biobank

ASKION C-line® control is the control center of the complete ASKION C-line® system. It provides the sample and storage management and records all parameters of every sample and of the entire system (also in different places). Due to the open interface (CCI) ASKION C-line® control is able to communicate with external programs (e. g. LIMS/HIS). The operator can manage and control the biobank by ASKION C-line® data station (user interface). Unauthorized access is prevented by a user rights management.

# Impact factors to biobank/ biorepository planning's

## Best way to establish a state of the art biobank/biorepository

To plan and establish an biobank/biorepository is one of the most challenging tasks you can face with. The person or team who is in charge of this process has to consider several aspects such as for example technical, ethical and logistical.

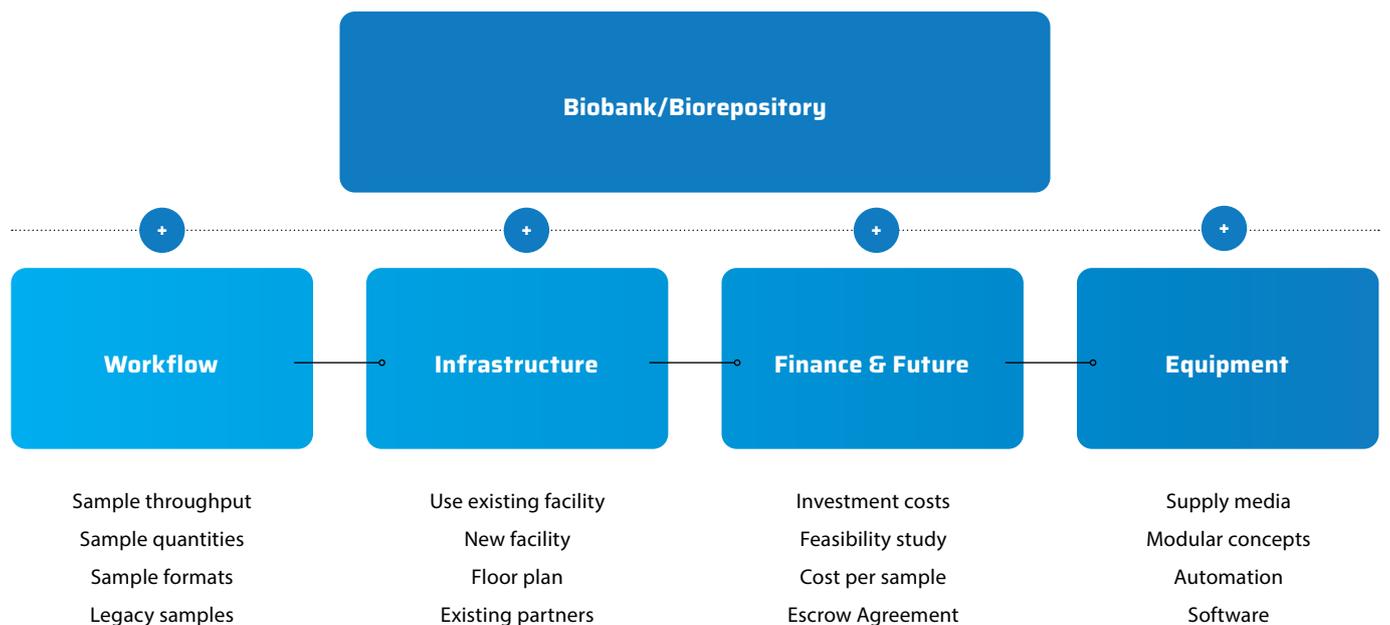
As if that were not enough, each aspect is separated into additional topics. One example is the infrastructure.

Under this aspect the person(s) have to decide e. g. if an existing building can be used or if a new one is required, which floor plan can be realized, if all partners are already known to adapt or establish the facility or not.

As this decisions already interact with other aspects, e. g. finances, it becomes even harder to find the best solution.

Due to this, ASKION offers a consulting service to evaluate the best suitable solution for every project.

## ASKION will be happy to assist you during the planning and the realization of implementation of your biobank/biorepository



Selection of factors that will impact biobank/biorepository planning's

# Consideration on current and future challenges

## Best way to establish a state of the art biobank/biorepository

To identify the best suitable and sustainable solution, ASKION can support operators to establish a biobank.

Hereby ASKION considers the existing and future challenges.

**Together with the operator ASKION analyzes and guide through the major topics, including but not limited to:**

- Workflow planning
- Expected sample throughput

- Analyses/advises on local infrastructure
- Provision of suitable floor plans (2D/3D)
- Support during commissioning and approval
- Involving existing partners
- Feasibility studies
- Conceptual design and implementation of the liquid nitrogen filling system
- Risk analysis
- Support with regulatory requirements
- Implementation as a partial or an all-in-one service

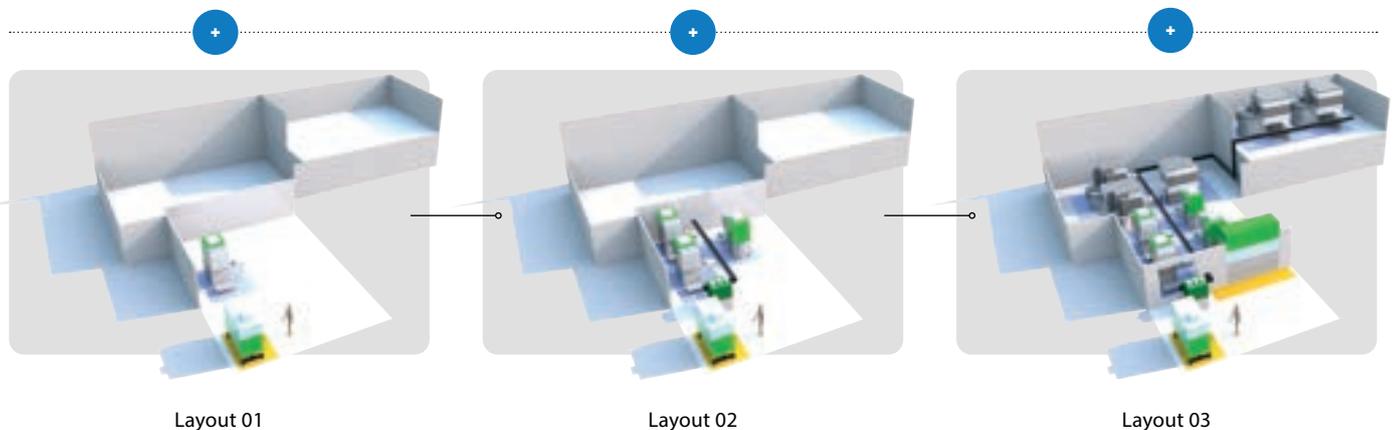
- What is current state and what is expected in 1, 3 and 5 years?

Out of all these parameters ASKION will prepare an individual proposal for the biobank/biorepository operator.

Afterwards, the project can be fully or selection wise realized by ASKION and your partners.

## ASKION C-line® system – the automated and modular system that grows with your biobank/biorepository requirements

### Biobank/Biorepository



Layout 01

Layout 02

Layout 03

Exemplary biobank proposal to match existing challenges and future expectations





# Technical data

**short description**



## ASKION C-line® hermetic storage S (HS200 S)

Since 2008 the ASKION C-line® system, with the first generation of hermetic storage (HS100) as main component, has proven to be a reliable system solution for high-quality biobanking.

Built on this technology, the next generation of the storage system - the HS200 - offers a higher level of automation together with a significantly improved handling. These features are implemented in any device, from semi- to fully automated operation.

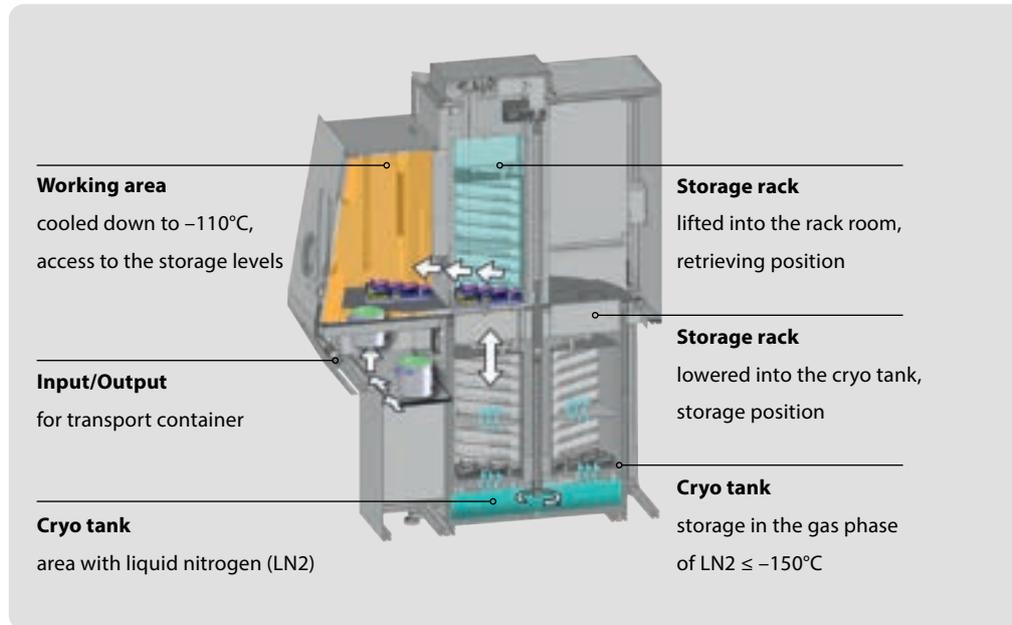
All configurations, from a single device up to a fully automated biobank system, can be realized due to the step-by-step upgrade of the HS200 in combination with the external automation (see page 54 & 55).

A free and customized configuration of the storage racks is possible and independent from sample format, e. g. straws, vials, blood bags, etc.

The user can choose which format he/she wants to use. The sample management system ASKION C-line® control ensures the access to all relevant storage data at any time (see page 52).

- All sample formats possible, e. g. straws, vials, blood bags
- Hermetic storage with cryogenic working room down to  $-110^{\circ}\text{C}$  in the gas phase of LN2
- Two operator ports with heated gloves
- Sample storage in the gas phase of LN2 down to  $-185^{\circ}\text{C}$
- I/O Gate for storage containers
- Uninterrupted cooling chain
- No intake of moisture into the cryogenic working room, the HS200 remains ice-free
- Integrated barcode scanners for easy sample identification
- Modular upgradeable up to a fully automated biobank
- The storage and retrieval processes are controlled and documented by ASKION C-line® control
- Controlled environmental conditions ensure low temperature differences during storage and guarantees high sample quality

- 1 Closed design to avoid uptake of moisture
- 2 Cryogenic working room down to  $-110^{\circ}\text{C}$
- 3 I/O Gate for transport container
- 4 Sample storage in the gas phase of LN2 down to  $-185^{\circ}\text{C}$



### Specifications

Dimensions (width x depth x height)  
 Weight (fully loaded)  
 Operator access  
 Input/Output unit  
 Barcode scanner

125 x 180 x 245 cm  
 840 kg  
 two operator ports with heatable gloves  
 motorized, for cryogenic transport container  
 integrated scanners for lateral and/or bottom, 1D and 2D barcodes

### Temperatures

Temperature range working room  
 Time to reach working temperature  
 Storing temperature

adjustable from  $-80^{\circ}\text{C}$  down to  $-110^{\circ}\text{C}$   
 15 min (to  $-100^{\circ}\text{C}$ )  
 down to  $-185^{\circ}\text{C}$ , in the gas phase of LN2

### Control

Display  
 Connection to LIMS/HIS

5,7" LCD Terminal  
 available by ASKION C-line® control interface (CCI)

### Storage of samples

Racks and trays  
 Static LN2 consumption  
 Effective LN2 consumption  
 Dwell time safe storage temperature in case of LN2 interrupt monitoring

six racks (customizable), different types depending on sample format, motorized lift system with automatic rack and tray positioning  
 8 kg/24 h (storage without sample handling)  
 18 kg/24 h (on average, depending on the usage rate of the device and the environmental conditions)  
 up to 72 h until achieving a temperature up to  $-130^{\circ}\text{C}$  (depending on filling level)  
 integrated, automatic LN2 level controller, cryo tank monitoring system with alarm function and external alarm interface

### Electrical connections

Electrical connections

110/230 V, 50/60 Hz, 16 A, Standby < 1.5kWh/24 h

### Coolant

Coolant  
 Pressure LN2  
 Environmental conditions

liquid nitrogen LN2  
 1.0 – 1.5 bar  
 15 to  $25^{\circ}\text{C}$ , 15 to 60 % humidity (non condensing)

# HS200 M/L

- 1 Automated I/O unit
- 2 Touch panel PC to control
- 3 Sample storage below  $-150^{\circ}\text{C}$
- 4 Automated single sample handling at  $-130^{\circ}\text{C}$ , with optional gripper changing module
- 5 Automated SBS Rack handling at  $-130^{\circ}\text{C}$

## ASKION C-line<sup>®</sup> hermetic storage (HS200 M/L)

Due to the operation of a biobank the amount of stored samples is growing continuously. As a result, the demand on storage capacity rises as well. To fulfill these requirements, ASKION has completed the ASKION C-line<sup>®</sup> product family by two additional storage modules, the HS200 M and the HS200 L. Both are based on the established ASKION C-line<sup>®</sup> hermetic storage HS200 S.

The HS200 M and the HS200 L can handle single samples by using the cherry picking robot like the HS200 S and both systems are additionally equipped with an automated gripper changing system and an SBS rack gripper. This combination provides maximum flexibility of the storage system. Handling of samples from different vendors is possible as well as handling whole SBS racks and SBS caching.

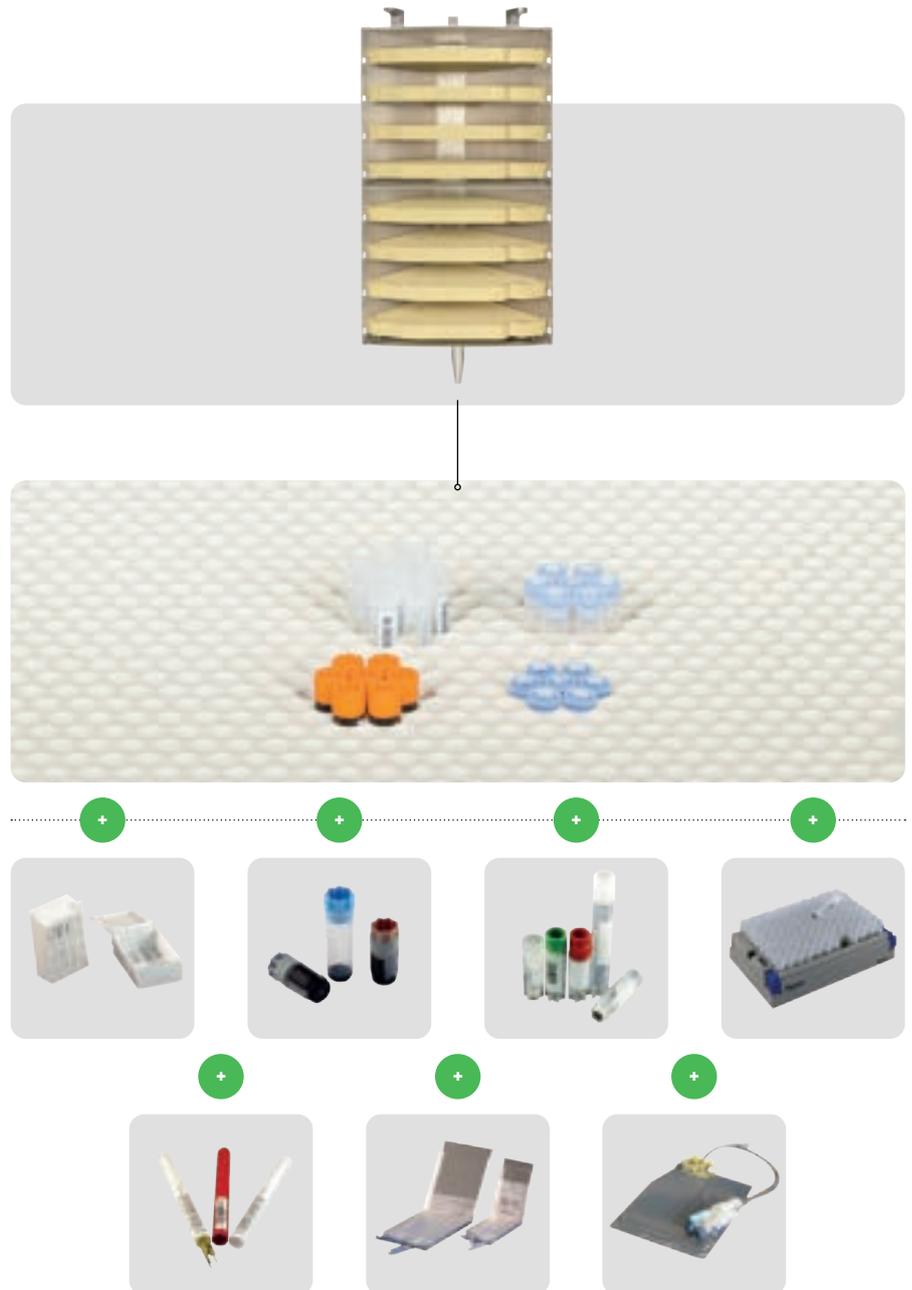
Due to the possible temperature down to  $-130^{\circ}\text{C}$  inside the working room, the system guarantees high sample quality during the whole storage process.



- All sample formats possible, e. g. straws, vials, blood blags
- Hermetic storage with cryogenic working room down to  $-130^{\circ}\text{C}$  in the gas phase of LN2
- Cherry picking and SBS rack handling robot
- Sample storage in the gas phase of LN2 down to  $-185^{\circ}\text{C}$
- I/O Gate for storage containers
- Uninterrupted cooling chain
- No intake of moisture into the cryogenic working room, the HS200 remains ice-free
- Integrated SBS rack scanners for fast sample identification
- Modular upgradeable up to a fully automated biobank
- The storage and retrieval processes are controlled and documented by ASKION C-line<sup>®</sup> control
- Controlled environmental conditions ensure low temperature differences during storage and sample handling and guarantee high sample quality

	<b>HS200 M</b>	<b>HS200 L</b>
<b>Specifications</b>		
Dimensions (width x depth x height)	350 x 250 x 270 cm	450 x 350 x 320 cm
Weight (fully loaded)	3,500 kg	8,000 kg
Operator port	only for service	only for service
Input/Output unit	fully automated connection station for cryogenic transport container	fully automated connection station for cryogenic transport container
Barcode scanner	SBS rack scanner (ColdEye) & lineær scanner for cryogenic transport container	SBS rack scanner (ColdEye) & lineær scanner for cryogenic transport container
<b>Temperatures</b>		
Temperature range working room	adjustable from -80°C down to -130°C	adjustable from -80°C down to -130°C
Storing temperature	down to -185°C, in the gas phase of LN2	down to -185°C, in the gas phase of LN2
<b>Control</b>		
Display	24" LCD Terminal	24" LCD Terminal
Connection to LIMS/HIS	available by ASKION C-line® control interface (CCI)	available by ASKION C-line® control interface (CCI)
<b>Storage of samples</b>		
Racks and trays	16 racks (customizable), different tray types depending on the sample formats, motorized lift system with automatic rack positioning	32 racks (customizable), different tray types depending on the sample formats, motorized lift system with automatic rack positioning
LN2 consumption	65 kg/24 h, depends on the usage and environmental conditions	96 kg/24 h, depends on the usage and environmental conditions
Dwell time safe storage temperature in case of LN2 interrupt monitoring	up to 120 h until achieving a temperature up to -130°C (depending on filling level) integrated, automatic LN2 level controller, cryo tank monitoring system with alarm function and external alarm interface	up to 120 h until achieving a temperature up to -130°C (depending on filling level) integrated, automatic LN2 level controller, cryo tank monitoring system with alarm function and external alarm interface
<b>Electrical connections</b>		
Electrical connections	110/230 V, 50/60 Hz, 16 A, Standby < 1.5 kWh/24 h	110/230 V, 50/60 Hz, 16 A, Standby < 1.5 kWh/24 h
<b>Coolant</b>		
Coolant	liquid nitrogen LN2	liquid nitrogen LN2
Pressure LN2	> 1.5 bar	> 1.5 bar
Environmental conditions	15 to 25°C, 15 to 60 % humidity (non condensing)	15 to 25°C, 15 to 60 % humidity (non condensing)

cryo rack



**ASKION C-line<sup>®</sup>**  
hermetic storage

Special storage racks, which are available for various sample formats, are used for the storage of samples inside the ASKION C-line<sup>®</sup> hermetic storage. The retrieval of the storage racks out of the cryo tank into the rack room/sample working area is done using a motorized lift system.

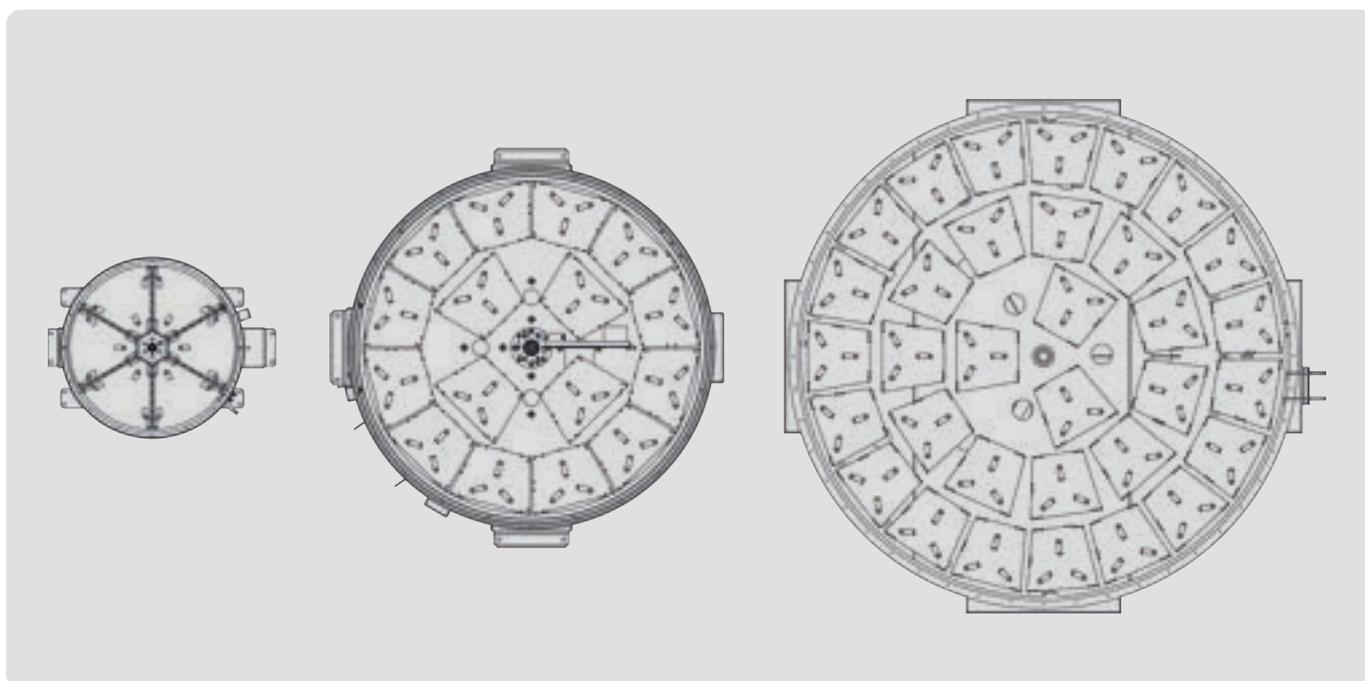
The available storage racks are independent of the sample format and they are individually configurable, e. g. for straws, vials, tissue or blood cassettes. Different sample formats can be combined in one HS200.

- Freely configurable storage racks per hermetic storage
- Motorized lift system
- Number of levels depends on customer specifications
- Storage structure depends on the sample formats
- Individual layout is possible
- Can be certified as medical device according to medical device directive 93/42/EEC

HS200 S

HS200 M

HS200 L



	HS200 S	HS200 M	HS200 L
<b>Capacity*</b>			
Vial 9 mm/0.30 ml	78,000	258,700	821,700
Vial 9 mm/0.50 ml	62,800	197,800	608,600
Vial 9 mm/1.00 ml	47,100	121,700	395,600
Vial 13 mm/1.80 ml	21,100	64,500	172,000
<b>Tissue vial</b>			
Tissue vial 17 mm/2.0 ml	15,600	53,900	149,000
<b>Goblets</b>			
Goblets á 15 straws 0.25 ml	85,000	199,400	685,600
Goblets á 12 straws 0.50 ml	68,000	159,600	548,500
Goblets á 10 straws 0.50 ml	56,600	133,000	457,100
<b>Other formats</b>			
Other formats	on request	on request	on request

\* The actual capacity depends on the used format/manufacturer

## internal automation

### ASKION C-line® HS200 internal automation

All versions of the ASKION C-line® HS200 storage system allow, due to the internal automation, fully automated cryogenic sample storage and retrieval processes at temperatures down to -130°C.

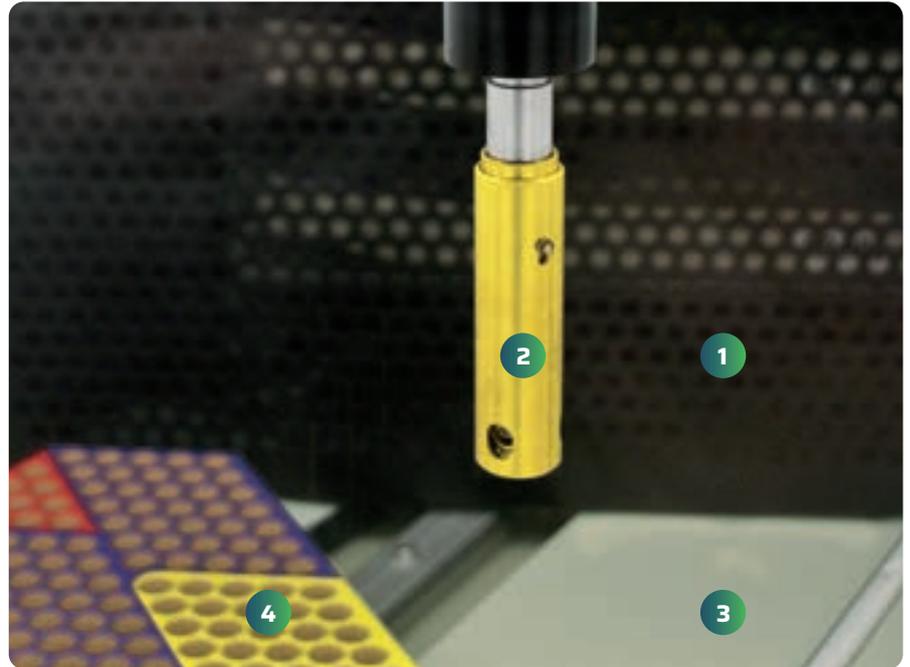
A pick-and-place-robot inside the HS200 S and an additional SBS rack robot at HS200 M and HS200 L give maximum flexibility for several tasks and workflows.

Together with configurable storage racks for all systems the customer can select his/her sample formats of choice.

Furthermore, different sample formats from several vendors can be handled in the same storage due to the integrated gripper changing system at HS200 M/L.

Next to the storage devices, the automated work bench (aWB) is equipped with CP and SBS Rack handlings robot as well.

The ASKION C-line® control sample management system controls the automated order processing of storage and retrieval, administrates the storage data, monitors the storage system and provides the interface to external LIMS.



- 1 Safety gate to avoid loss of samples
- 2 CP gripper for automated single vial handling
- 3 Sample handling area at -110°C (inside HS200 S)
- 4 High density storage tray

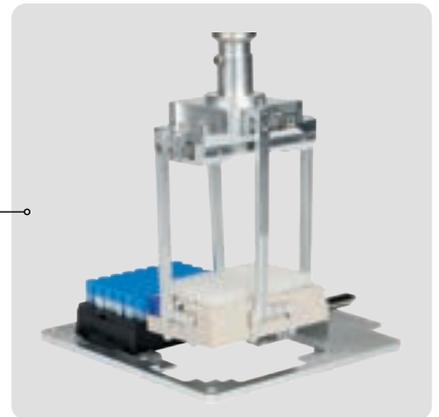
- Fully automated sample storage and retrieval
- SBS rack storage in HS200 M and HS200 L
- SBS rack caching function at HS200 M/L
- Sample formats from several vendors are supported, e. g. vials, straws
- Sample handling in temperature range down to -130°C in the gas phase of LN2
- Uninterrupted cooling chain and minimized temperature differences during the whole storage and retrieval process
- Integrated barcode scanners for safe sample identification and monitoring
- Integrated scanner in SBS rack format (ColdEye) in HS200 M and L
- Cherry picking gripper (CP) and SBS rack gripper (at HS200 M and L)
- Gripper changing system supports handling of samples from different vendors (HS200 M and L)
- Deliverance tool enables handling of iced samples
- Storage and sample handling controlled by ASKION C-line® control



Equipped with gripper changing module



Equipped with Cherry picking gripper



Equipped with SBS Rack gripper

**Retrieval time**

Retrieval time

10 vials within approx. 2 min, 96 samples (SBS rack) in approx. 25 min (depends on the distribution of the samples among the whole hermetic storage)

**Temperature**

Temperature

Temperature at sample handlings area adjustable from -80°C down to -130°C

**Coolant**

Coolant

liquid nitrogen

Climate conditions

+15 to +25°C; 15 to 60 %

Freezing

Storage

## ASKION C-line® external automation

ASKION-C-line® external automation – the flexible solution lifts your biobank up to a new level of integration and automation.

The ASKION C-line® external automation connects the ASKION storage systems HS200 and automatic workbench aWB to a flexible and gradually expandable biobank solution adaptable to the customers' requirements regarding capacity and spatial conditions.

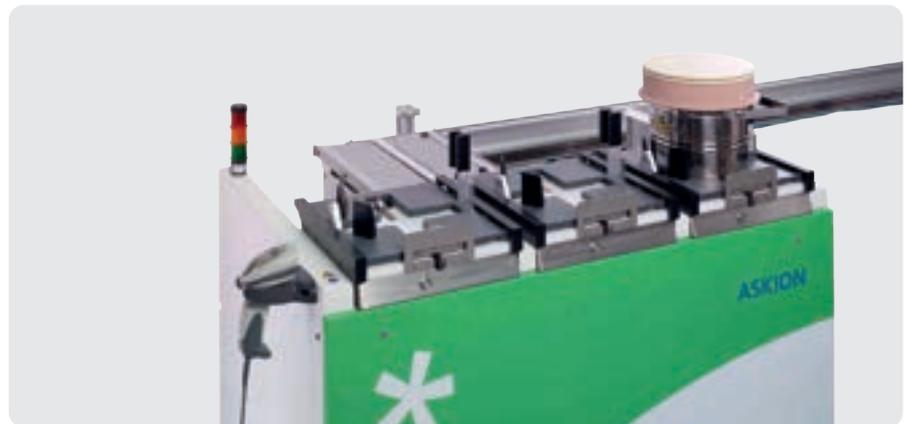
A rail system connects the ASKION devices independent from their positioning in the facilities. The ASKION C-line® transfer station is the user interface to the whole biobank system. All storage and retrieval processes start and end here.

The user just has to place or pick LN2 cooled transport containers inside/from the transfer station and push the start button.

The further process is done automatically by the ASKION C-line® system and the customer gets a message when it is finished.



Shuttle with transport container waiting in front of the connecting station to transfer samples into the HS200



Transfer station with 3 parking slots, to simplify storage and retrieval processes

- Fully automated transport of samples
- Modularly expandable
- LN2 cooled transport container for uninterrupted cooling chain during transport
- Transport orders handled and monitored by ASKION C-line® control
- Rail system adaptable to specific spatial conditions
- Can be retrofitted at existing systems



- 1 Interconnected storage modules
- 2 Transfer station – user interface to transfer into or out of the biobank
- 3 Connecting station – automated I/O Gate
- 4 Rail system for automated sample transfer

**Specifications**

Transfer station  
 Dimensions  
 Weight  
 Rail system  
 Configuration  
 Route length  
 Rail height  
 Shuttle speed  
 Time docking/undocking

**Storage of samples**

Monitoring

**Electrical connections**

Electrical connections

three ports for transport containers  
 100 x 80 x 130 cm (transfer station)  
 approx. 150 kg  
 monorail system with ride-on shuttle  
 flexible 2 routing to connect spatially distributed ASKION devices  
 no restrictions  
 approx. 80 cm above the floor  
 0.4 m/s  
 28 s to transfer station, 25 s to HS200

monitored by ASKION C-line® control, visual and acoustical alarm

110/230 V, 50/60 Hz, 10 A Standby ~ 1.5k Wh/24 h

## ASKION C-line® work bench

The ASKION C-line® work bench is the flexible operating area for all manual sample handling activities in a cryogenic environment.

The main part is a well-spaced working area, which may be equipped by two (WB220) or three (WB230) automated and monitored freezers.

It can be used for defined and reproducible freezing of biological material such as cells, blood components, tissue, semen, oocytes, samples for DNA/RNA analysis, etc.

The freezing and the uninterrupted cooling chain is monitored during the whole process.

Each freezer works independently from each other and provides maximum flexibility for the customer's workflow.

Free adjustable freezing curves guarantee highest possible sample quality for different cell material.

A barcode based sample management system for sample tracking is available as well as the connection to the users LIMS via ASKION C-line® control.

The ASKION work bench is also obtainable without freezers in combination with a maximized manual working space (WB200).



- 1 Heated gloves
- 2 Touch panel PC to control
- 3 Integrated control rate freezer (optional)
- 4 Motor powered height adjustment
- 5 Cryogenic chamber for frozen sample handling

- Cryogenic working area with adjustable temperature down to  $-130^{\circ}\text{C}$
- Up to three independently working automatic freezers
- Free programmable freezing curves
- Supports all sample formats
- Optional reference sensor for sample temperature leaded freezing processes
- Configurable seeding, specifically initiated crystallization
- Two operator ports with heated gloves
- Ergonomic electrical height adjustment
- Integrated barcode scanners, optional ColdEye rack scanner
- Touchscreen user control
- Soft- and hardware supported monitoring system

## Specifications

Dimensions (width x depth x height)	186 x 97 x 203 cm (+/-15)
Electric height adjustment	30 cm range for individual ergonomic working height
Weight	300 kg (empty), 450 kg (fully loaded), moveable on wheels
Operator ports	two ports with heated gloves
Barcode scanner	1D and 2D integrated, ASKION ColdEye rack scanner optional
Freezers	3 lift freezers (WB230), 2 lift freezers (WB220)

## Temperatures

Temperature range working area	adjustable, down to $-130^{\circ}\text{C}$
Temperature range freezer area	$+20^{\circ}\text{C}$ down to $-160^{\circ}\text{C}$
Time to reach working temperature	max. 45 min to $-100^{\circ}\text{C}$ (depends on the LN2 supply pressure)
Temperature resolution	0.1 K
Cooling gradient freezer	0.1 – 50 K/min

## Control

Display	17" LCD-Touchscreen-PC
Connection to LIMS/HIS	available by ASKION C-line® control interface (CCI)

## Storage of samples

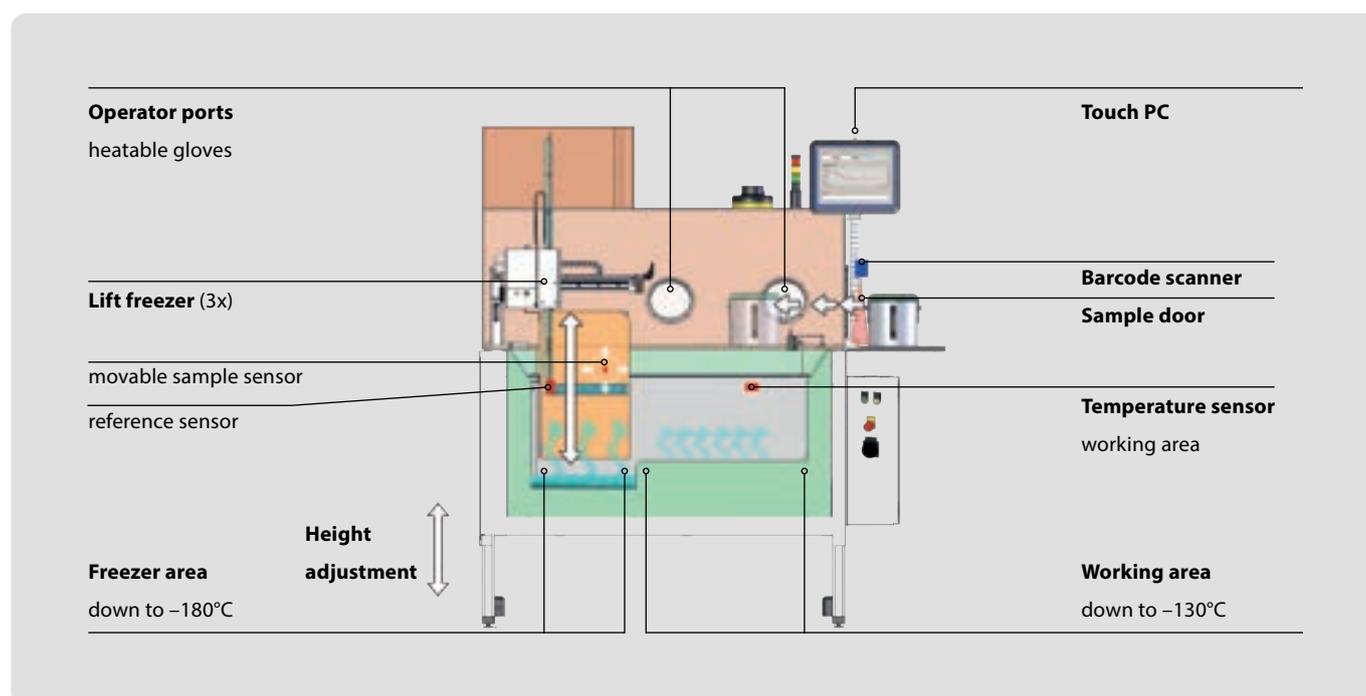
Monitoring	integrated temperature control system, external alarm interface
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## Electrical connections

Electrical connections	110/230 V, 50/60 Hz, 16 A
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## Coolant

Coolant	LIN, liquid nitrogen
Pressure LIN supply	1 – 1.5 bar
Environmental conditions	15 to $25^{\circ}\text{C}$ , 15 to 60 % humidity (non condensing)





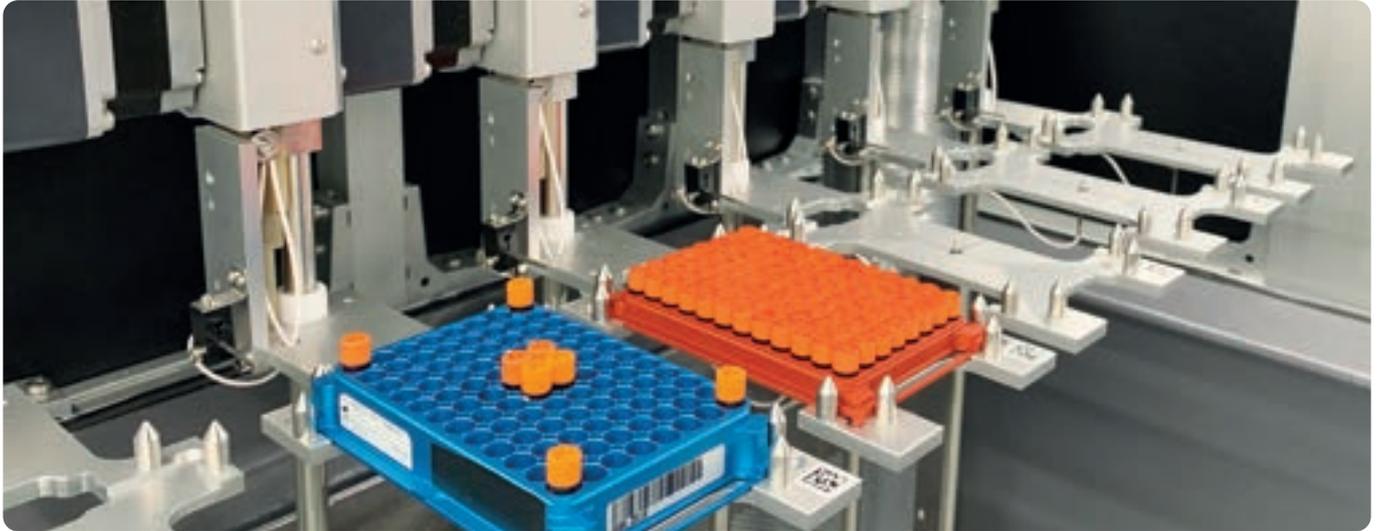
- 1 Large touch panel PC to control entire device
- 2 Manual I/O unit for warm sample
- 3 Up to 6 independent working freezers for control rate freezing
- 4 I/O unit for frozen samples (either for standalone device (shown) or for fully implemented)
- 5 Cryogenic working and parking area to handle frozen samples at  $-130^{\circ}\text{C}$  and below
- 6 Robotic system to handle single vials and SBS rack in warm and cold environment, combined with gripper changing module
- 7 Integrated camera for remote control

## ASKION C-line<sup>®</sup> aWB

Based on the ASKION C-line<sup>®</sup> work benches WB220/230, ASKION developed the new automated work bench aWB to meet the growing customers' requirements as automated sample handling, increased sample throughput as well as more precise monitoring and documentation.

The ASKION C-line<sup>®</sup> aWB provides all advantages of the well-established ASKION C-line<sup>®</sup> work bench family and comes with new features as for example automated SBS rack handling, single sample gripper, integrated rack scanners or the connection to the ASKION C-line<sup>®</sup> external automation (rail system).

- Automated SBS rack handling at down to  $-130^{\circ}\text{C}$
- Automated single sample handling at down to  $-130^{\circ}\text{C}$
- Fully automated freezing
- Multiple, independently performable freezing processes
- Uninterrupted cooling chain, monitored and automatically documented
- Integrated SBS rack scanners to identify samples in cryogenic environment down to  $-130^{\circ}\text{C}$
- Independent from sample format
- Interface to external devices, e. g. pipetting platforms
- Connection to ASKION C-line<sup>®</sup> external automation (rail system) for fully automated transport of frozen samples into the biobank possible
- Compatible to all ASKION C-line<sup>®</sup> components



control rate freezer with samples

### Specifications

Dimensions (width x depth x height)	291 x 115 x 245 cm (+/-15)
Weight	800 kg
Barcode scanner	two 2D ASKION ColdEye scanners integrated, SBS rack scan in cryogenic environment down to $-130^{\circ}\text{C}$
Freezers	6 lift freezers, fully automated, independently working from each other

### Temperatures

Temperature range working area	adjustable, down to $-130^{\circ}\text{C}$
Temperature range freezer area	$+20^{\circ}\text{C}$ down to $-160^{\circ}\text{C}$
Time to reach working temperature	30 min to $-100^{\circ}\text{C}$ (depends on the LN2 supply pressure)
Temperature resolution	$0.1^{\circ}\text{C}$
Cooling gradient freezer	0.1 - 50 K/min

### Control

Display	17" LCD-Touchscreen-PC
Connection to LIMS/HIS	available by ASKION C-line® control interface (CCI)

### Storage of samples

Monitoring	integrated temperature control system, external alarm interface
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### Electrical connections

Electrical connections	110/230 V, 50/60 Hz, 16 A
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### Coolant

Coolant	LIN, liquid nitrogen
Pressure LIN supply	1 – 2 bar
Environmental conditions	15 to $25^{\circ}\text{C}$ , 15 to 60 % humidity (non condensing)

## ASKION C-line® ColdEye

ASKION C-line® ColdEye is the first and only available scanner for cryogenic temperatures worldwide.

The scanner works reliable at ambient temperatures of down to below  $-150^{\circ}\text{C}$ .

It allows to recognize the frozen samples in the SBS rack within less than five seconds.

The extremely cold temperatures allow the samples to be identified without any impairment due to warming or thawing.

ASKION C-line® ColdEye enables a safe handling of the samples in such a way as to meet the highest quality standards even after scanning.

ASKION Cline® ColdEye can completely be integrated into the ASKION C-line® work bench and it can be retrofitted at any time.

Besides this, a stand alone version is available, named ASKION C-line® ColdEye+.

This scanner operates independently from the ASKION C-line® work bench.

It is operational at temperatures between  $+25^{\circ}\text{C}$  down to  $-150^{\circ}\text{C}$ .



ColdEye+ half submerged in dry ice

- **Sample recognition within less than 5 seconds**
- **Simultaneous identification of several samples, scanning of SBS racks (96, 48, 24 format, etc.)**
- **Scanning of samples at ambient temperatures of down to below  $-150^{\circ}\text{C}$**
- **Independent from the sample format**
- **Completely compatible with the ASKION C-line® work bench**
- **Retrofittable within the ASKION C-line® work bench**
- **Available as standalone device (ASKION C-line® ColdEye+)**



ColdEye installed inside ASKION C-line® work bench to identify samples below –100°C

### Specifications

Reliable operation  
 Sample format  
 Barcode identification

Scanning time  
 File export  
 Cost efficiency

Power supply

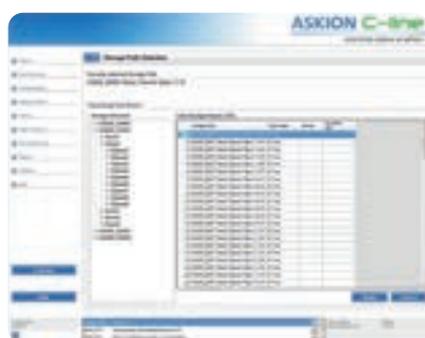
Scanning sensor  
 Connectivity  
 Portable device  
 Advantages

### ColdEye\*

between +25° C and –150° C  
 compatible with any SBS rack or box  
 any 2D bottom barcode (vials) and side  
 barcode (linear and 2D) at SBS rack or  
 box  
 approx. 3 seconds  
 csv/xml  
 integrated analysis tool to avoid  
 additional costs (no additional  
 software from ASKION is required)  
 integrated battery for operation  
 up to 5 h (at –150°C)\*  
 CMOS-Camera 5 Megapixel  
 WLAN | LAN | HDMI | USB  
 yes  
 scanning at cold/ambient temperatures  
 (e. g. –80/–140°C) enables best sample  
 quality due to reduced temperature  
 changes

### ColdEye

between +25° C and –150° C  
 compatible with any SBS rack or box  
 any 2D bottom barcode (vials) and side  
 barcode (linear and 2D) at SBS rack or  
 box  
 approx. 3 seconds  
 csv/xml  
 integrated analysis tool to avoid  
 additional costs (no additional  
 software from ASKION is required)  
 24 V DC/0.6 A  
 CMOS-Camera 5 Megapixel  
 WLAN | LAN | HDMI | USB  
 no  
 scanning at cold/ambient temperatures  
 (e. g. –80/–140°C) enables best sample  
 quality due to reduced temperature  
 changes



data station with barcode scanner

## ASKION C-line® control 2.0

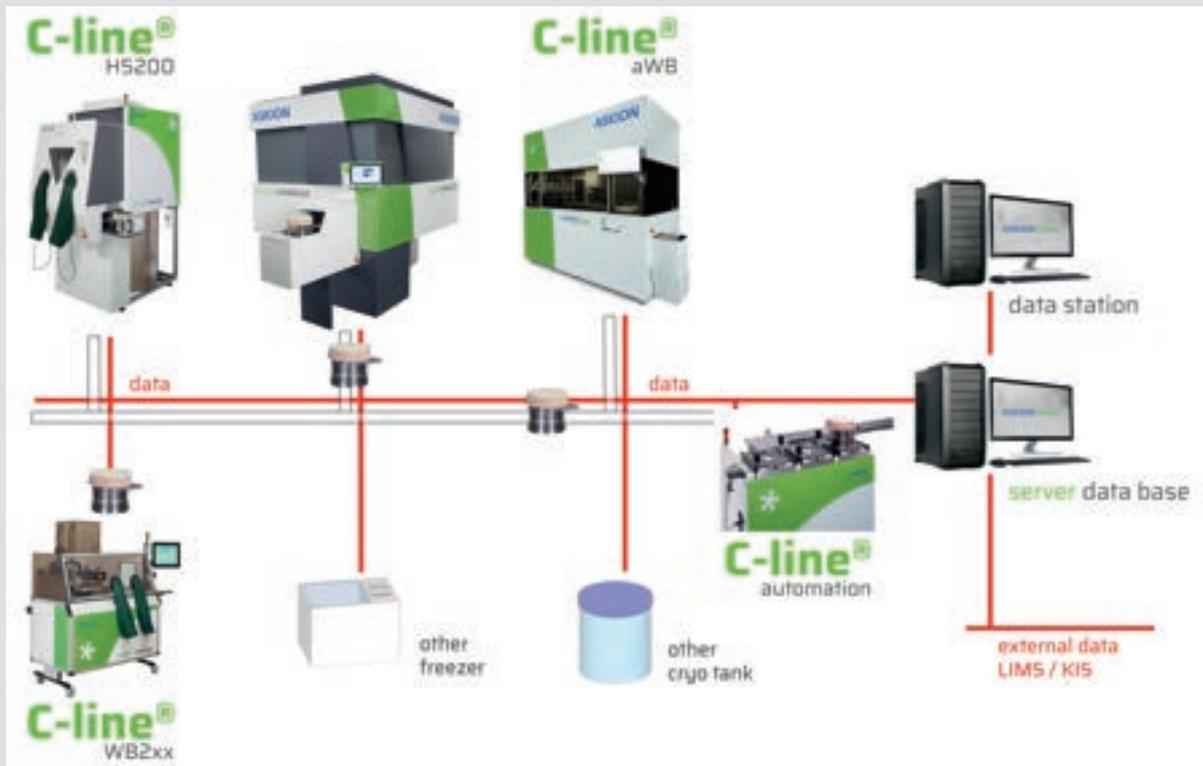
ASKION C-line® control 2.0 is the brain and communication interface of your biobank. It enables a complete tracing of all sample and system data.

The biodatabase can be fully integrated into existing laboratory or hospital information systems.

ASKION Cline® control 2.0 already provides the option to upgrade your biobank to a fully automated solution.

ASKION C-line® control server for storing all system data of the biobank. ASKION C-line® control data station as input and communication interface for the server.

- Tracking of the history of every single sample inside the biobank
- Multiple interfaces to input stations, your PC or the LIMS/HIS
- Generating of individual reports
- Integrated backup system
- Easy customer-specific adjustment by the end user
- Easy order creation for freezing, storage and retrieval of single samples or batches
- Data base to store data (sample ID and storage location) and additional data (freezing)
- Curve, all activities in the storage system marked with date, time, temperature and use



C-line® control work flow

### System requirements

- Processor
- Memory
- HDD
- Operating system
- Virtualization system
- Network
- Monitor
- Input device
- Optional

### Server

- 2.3 GHz or higher
- 8 GB RAM or higher
- 500 GB, recommended: 1 TB or higher
- Windows Server 2016, recommended: Windows Server 2019
- VMWare Workstation version 10 x or higher (Windows/Linux)
- 100/1000 Mbit/s
- at least 1280 x 1024 pixel
- mouse and keyboard
- 17" LCD-Touchscreen-PC

### System requirements

- Processor
- Memory
- HDD
- Operating system
- Network
- Monitor
- Input device
- Optional

### Data Station

- 1.6 GHz or higher
- 8 GB RAM or higher
- 100 GB, recommended: 500 GB or higher
- Windows 10
- 100/1000 Mbit/s
- at least 1280 x 1024 pixel
- mouse and keyboard
- backup system

## ASKION C-line® TD defroster

The ASKION C-line® TD defroster completes the family of devices for cryogenic storage. It allows the reusability of frozen SBS racks in a short time.

Wet SBS racks or inserts must not be used for storage, because the samples would freeze on and get stuck inside the SBS rack, so the automation can not grip and store them.

The TD100 produces a light, heated air stream to warm up and dry SBS racks or C-line inserts, which have been used to freeze, store or retrieve samples.

So the racks or inserts are available for other freezing processes or storage operations without a loss of time.

An introduction of humidity into the storage system HS200 due to condensation or icing will be prevented.

The thawing of frozen samples is not the intended use of the TD100.



### Specifications

Dimensions (width x depth x height)	19 x 23 x 33 cm
Weight	6 kg
Thawing and dry time	approx. 5 min

### Electrical connections

Electrical connections	230 V/5 A
Max. power	1150 W

### Environmental Conditions

Environmental conditions	0°C – 40°C, 15 to 60 % humidity (none condensing)
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## ASKION C-line<sup>®</sup> LN flow control

The ASKION C-line<sup>®</sup> LN flow control is an external and retrofittable liquid nitrogen safety valve.

By its powerful and independent motor powered valve system it allows a secured and controlled liquid nitrogen supply.

As LN flow control can be connected to a liquid nitrogen level sensors potential floods or flooding risk can be detected and avoided due to automated valve closing.

When all parameters getting back to a normal range, LN flow control will automatically open the valve to ensure a liquid nitrogen supply.

LN flow control can be installed at most liquid nitrogen driven devices.

### Specifications

Dimensions (width x depth x height)	34 x 24 x 74 cm
Weight	18 kg

### Electrical connections

Electrical connections	230 V/5 A
Max. power	50 W

### Environmental conditions

Environmental conditions	-20°C to +40°C, 15 to 60 % humidity (none condensing)
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## ASKION C-line® aluminum SBS Racks

ASKION C-line® aluminum SBS Racks are helpful accessories which are custom-made. They are mostly used for control rate freezing procedures.

Herein they ensure a maximum homogeneity within one freezing batch, due to best conductive.

A special coated surface ensures long term usage for cold and warm temperatures.

Combined with best bionic design the weight of these aluminum SBS Rack can be reduced as much as possible without affecting their stability.

- Ensure best homogeneity within one freezing batch
- Available with 1D and 2D rack barcode
- Available for various sample formats
- Bionic design to ensure best stability and lowest weight
- Compatible with existing robotics (e. g. pipetting platforms)
- Compatible with ASKION C-line® work bench and automated work bench
- Special coated surface to ensure long term usage
- Individual colors available



## ASKION C-line® transfer tool

ASKION C-line® transfer tool is the fastest and easiest way to transfer samples between different SBS racks.

Nondependent if only a few or all samples at one SBS rack shall be transferred, this can be handled by the transfer tool.

Moreover, this transfer tools can be adapted to operator requirements.

This includes modifications with regard to sample formats and user applications (light or dark color).



- Available for various sample formats
- Individual colors available
- Compatible with ASKION C-line® work bench and automated work bench
- Simple handling
- Fast sample transfer between SBS racks

# ADAPTER



## ASKION C-line® adapter

ASKION C-line® adapter are the most efficient and easiest way to transfer legacy sample into a fully automated biobank/ biorepository.

If legacy have to be transferred to a new automated biobank/biorepository, operator face with two major challenges.

First, how to trace most of the hand written and non-coded vials? Second, how to automate these vials? Both questions can be answered by using the ASKION C-line® adapter.

These adapters are custom made to ensure traceability, by adding at least a bottom code to the vial and to ensure automated sample handling.

Depending on which legacy sample shall be transferred different adapters are available, ranging from "simple" bottom barcode up to full sleeves with new cap design and barcode.



- Enable to transfer legacy sample into an automated biobank/biorepository
- Available for various sample formats
- Adapter will add a code to previous non-coded vials to ensure traceability
- Simple handling
- Compatible with ASKION C-line® work bench, automated work bench and hermetic storage





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