THE FLEXIBLE AND AUTOMATABLE SYSTEM SOLUTION FOR BIOBANKING

Freezing * Storage * Automation * Transportation

ASKION C-line® System

CONTENT

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 I Vol. 173 No. 11). Biobanks provide basic data for the development of new cancer therapies and the research of biomarkers and they are a basic requirement for promising cell therapy, too. In addition to the growing number of stored samples their quality and logistical availability after decades of storage are also keys for the scientific and practical value of a biobank.

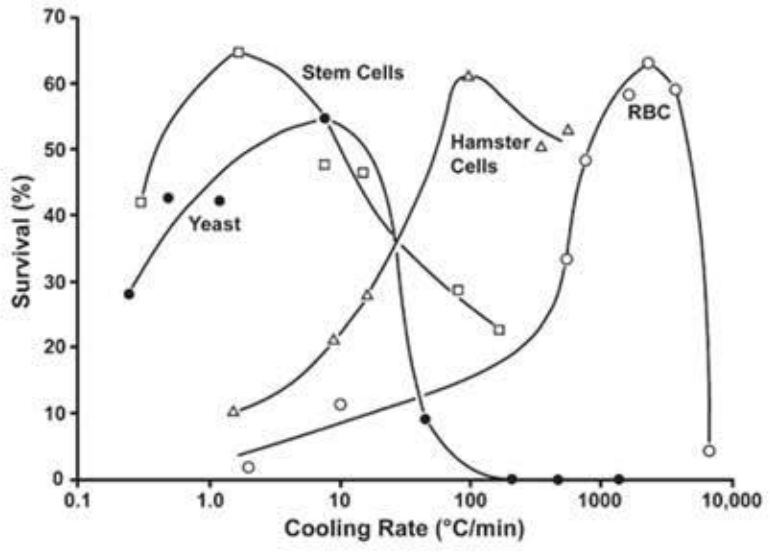
With the ASKION C-line® biobank product series ASKION provides a modular device concept that guarantees a maximum sample quality during freezing, storage as well as retrieval process and ensures a complete traceability of the sample history and their documentation.

Biobanks are a basic requirement for research and therapy.

With more than 70 installed systems since 2008 all over the world the ASKION C-line® system has proven itself. The conception of the ASKION C-line® system is based on the major steps of the whole biobanking process. These steps are described in the following:

FREEZING PROCESS

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 corresponding to the sample format/type (Mazur et al. 2008) that should be frozen and on the other hand to be able to control the freezing process according to the prescribed freezing curve by the sample temperature.



Depending on the sample material to be frozen different types of freezing arise in order to reach a maximum survival rate of the cells (Mazur et al. 2008)

SAMPLE HANDLING WITH UNINTERRUPTED COOLING CHAIN

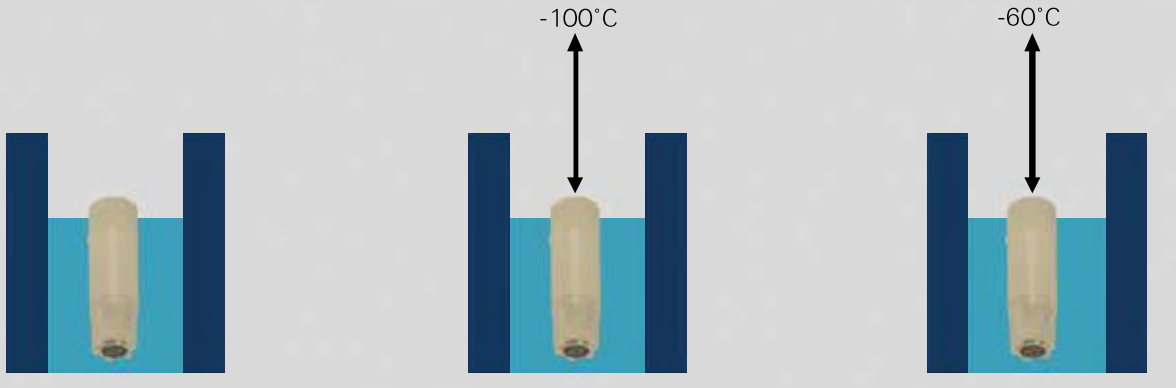
BEST HANDLING TEMPERATURE

After the samples had been frozen in the best possible way they 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 question now is which temperature is the best to handle frozen samples.

The best handling temperature for frozen samples is below -100°C.

Experiments had been used to determine a handling temperature of at least -100°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.

three aliquots of peripheral blood mononuclear cell (PBMC)



1. LN, constantly cooled
2. LN, sample handling -100°C
3. LN, sample handling -60°C

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

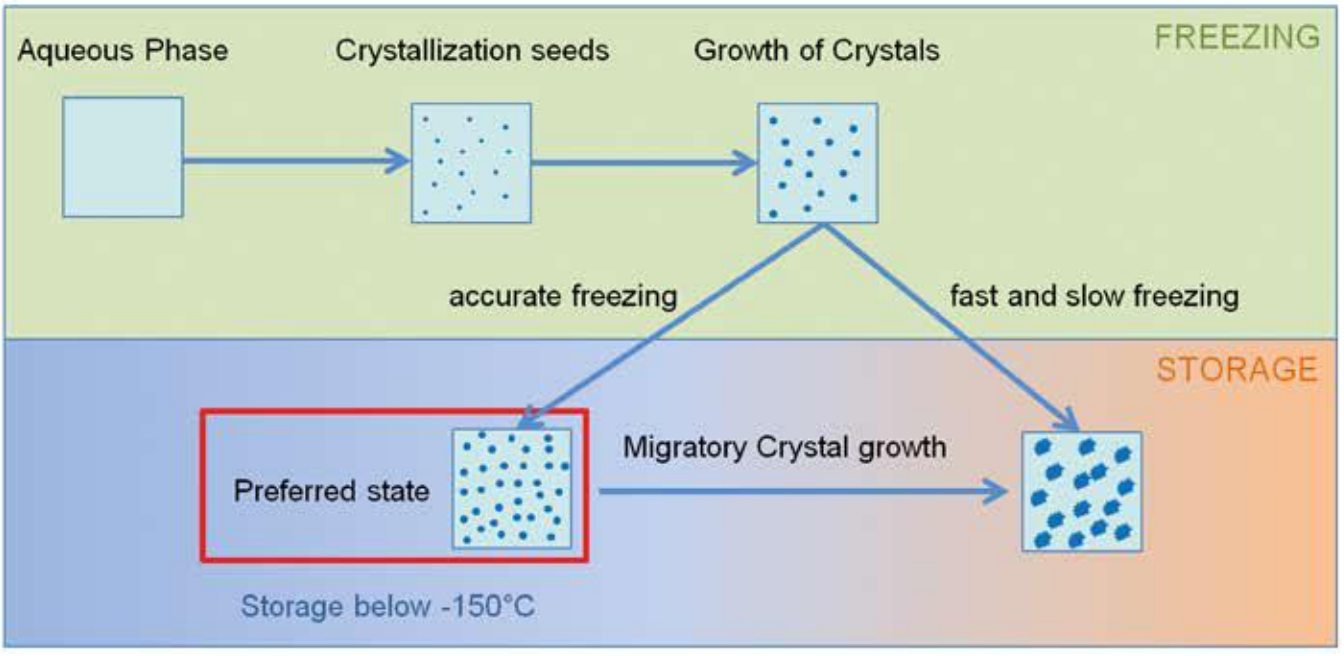
++++	++++	++
Best result	Similar results as constantly cooled samples (1)	Lower viability and t-cell response as constantly cooled samples (1)
→ high sample quality	→ high sample quality	→ lower sample quality

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

For preservation of sample quality, sample damaging processes, as migratory crystal growth, have to be avoided. During these processes smaller crystals of the freezing medium transform to bigger crystals and the surface energy will be reduced. These thermodynamically driven processes come to a standstill starting below -130°C. For this reason the sample storage should take place at temperatures below -150°C to ensure the remaining of the sample quality for the whole storage period. Another reason for the storage below -150°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.



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

Once the above stated steps (freezing, handling/transport, storage) have been performed and recorded as best as possible the sample quality can be analyzed using a simple overview or chart of the temperature profile of the sample after several years or even decades. For example it is possible to choose the best sample out of aliquots of an original sample for the final evaluation of a diagnostic assay.

i High quality samples must be stored as cold as possible, best below -150°C.

MODULARITY AND INDIVIDUALIZATION

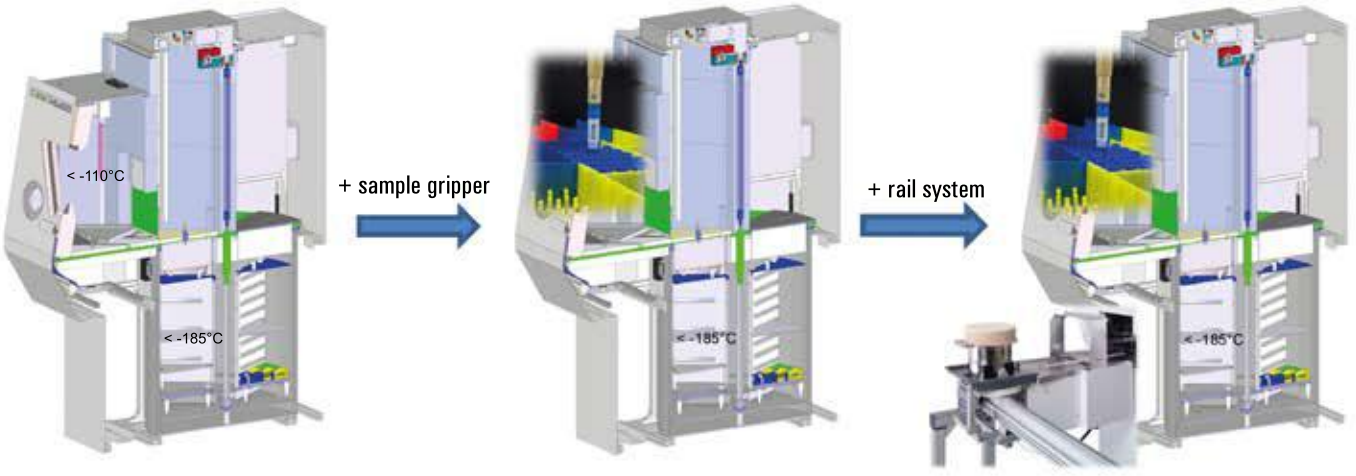
MAXIMUM FLEXIBILITY FOR THE OPERATION OF A BIOBANK

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

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

- **› ASKION C-line® hermetic storage**
- **› ASKION C-line® work bench**
- **› ASKION C-line® automation**
- **› ASKION C-line® control**

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



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

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

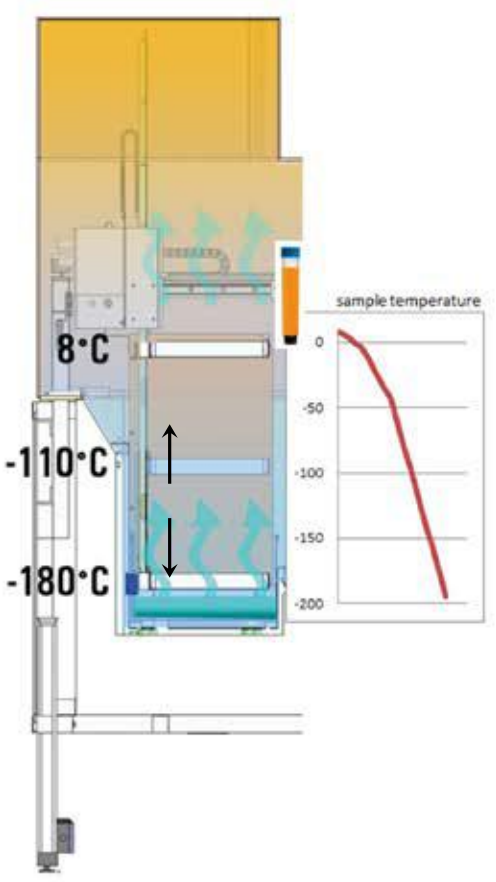
FREEZING PROCESSES

EXACT AND REPRODUCIBLE FREEZING ENABLES PRESICE CONTROL AND COMPARABILITY

The ASKION C-line® work bench allows freezing of different sample types and formats defined and reproducible by measuring the sample temperature with a reference sensor.

ASKION C-line® work bench

- Defined and reproducible freezing
- Sample format independent
- High accurate freezing by measuring sample temperature
- Automated parameter recording for each sample (documentation)
- Multiple freezing processes in parallel
- 1D/2D barcode scanner
- SBS rack scanning down to below -130°C



Exemplary freezing profile (right chart) of a sample inside the ASKION C-line® work bench

MAXIMUM SAMPLE QUALITY

UNINTERRUPTED COOLING CHAIN DURING SAMPLE TRANSPORTATION AND SAMPLE HANDLING

After the freezing process the samples can be taken to the storage system ASKION C-line® hermetic storage HS200 by keeping the cooling chain (below -100°C) using a special LN-cooled transport container. The HS200 storage system is available in different sizes and can be upgraded modularly and automated according to customer requirements (see section ASKION C-line® hermetic storage, page 11).

ASKION C-line® Transport container

EASIER ACCREDITATION

SECURED AND COMPLETE DOCUMENTATION

By simultaneously recording of all parameters and processes for every single sample the complete and precise documentation is guaranteed (further information in section ASKION C-line® control, page 22). 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 biobank system for maximum sample quality and safety, user-friendliness and documentation:

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

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

Next to the four 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, page 20) that enables the identification of frozen samples at temperatures of -130°C and below. All devices of the ASKION C-line® system correspond to internationally accepted standards. The individual components are available 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). You are also welcome to contact one of our worldwide partners.

CUSTOMIZATION OF THE BIOBANK

MODULARITY AND INDIVIDUALIZATION AT ANY POINT IN TIME

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 down to -185°C.

HS200 M/L

- Sample storage down to -185°C
- Sample handling below -130°C
- Cherry picking robot
- SBS Rack handling robot
- Fully automatable biobank (optional)
- 1D/2D barcode scanner
- SBS rack scanning below -130°C
- Uninterrupted cooling chain
- Capacity up to 800,000 vials per HS

ASKION C-line® hermetic storage HS200 M/L

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 an individual biobank that is customized to 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.

CUSTOMIZED STORAGE SOLUTION

MODULARITY AND INDIVIDUALIZATION AT ANY POINT IN TIME

ASKION C-line® hermetic storage HS200 S

HS200 S

- Sample storage down to -185°C
- Sample handling below -110°C
- Cherry picking robot (optional)
- Fully automatable biobank (optional)
- 1D/2D barcode scanner
- Uninterrupted cooling chain
- Up to 79,000 vials per HS

The HS200 consists of two main components, the nitrogen storage tank with storage racks for samples and the patented upper hermetic hood construction at which the sample handling during storage and retrieval takes place at cryogenic temperatures.

Inside the nitrogen tank the samples are stored at the nitrogen gas phase at temperatures down to -185°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.).

- Sample format independent
- Customized storage trays
- Optional high density trays with up to 25 % increased storage capacity
- Storage down to -185°C

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

AUTOMATION

INCREASED SAMPLE SAFETY AND THROUGHPUT

The upper hood construction enables to restore samples at temperatures down to below -130°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 below -130°C
- Automated recording of all parameters for each sample and system

Pick-and-Place robot with one single sample above a tray at cryogenic temperatures (left), gripper changing system of HS200 M/L (middle) and SBS rack gripper (right)

GMP COMPLIANT WORKING

AUTOMATED AND COMPLETE DOCUMENTATION FOR EACH SINGLE SAMPLE

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 (further information ASKION C-line® control, page 22).

SBS RACK GRIPPER AND SINGLE VIAL HANDLING ROBOT

INCREASED HANDLING SAFETY AND SAMPLE THROUGHPUT

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

- **Automated SBS rack and single tube handling**
- **Sample handling at environmental temperatures down to below -130°C**
- **Ergonomic and safe operation**

In many laboratories nitrogen storage systems that have to be operated manually 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, the C-line® components (ASKION C-line® hermetic storage, ASKION C-line® work bench) offer protection against 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 which can be combined optionally with a gripper changing system. These robots work in cryogenic environment at temperatures of at least below -100°C (see chapter ASKION C-line® hermetic storage, page 11).

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

Cherry Picking gripper with a single fixed sample

SBS rack gripper (bottom)

EASIER STORAGE AND RETRIEVAL PROCESSES

MODULAR CONNECTION IN BUILDING KIT PRINCIPLE

The ASKION C-line® automation provides optional connection to single C-line® components (ASKION C-line® hermetic storage, ASKION C-line® work bench) with an external automation. This external automation is based on a rail system on which a shuttle transports samples between the different modules.

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

A transfer station serves as handover stop for samples between the operator and the biobank. The transfer station simplifies the handling of sample storage and retrieval by providing the possibility to put down the samples at a handover stop and start the storage or retrieval process by pressing a single button.

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)

The ASKION C-line® automation provides a step by step automatization of a biobank starting with relatively small sample volumes. Already small budgets allow to start with an automated solution while guaranteeing high sample safety and quality at the same time. Further explanation on the topic sample data and storage management can be found at chapter ASKION C-line® control (page 22).

MAXIMUM SAMPLE FLEXIBILITY FOR BIOBANK OPERATION

MODULARITY AND INDIVIDUALIZATION

In addition to the high flexibility regarding storage capacity the ASKION C-line® system provides maximum flexibility with regard to storage of various sample formats. The suitable sample formats range from vials with different filling volumes (e. g. 0.2 ml to 8.0 ml) and dimensions (e. g. 6.0 ml tissue vials) to high-volume sample formats as blood bags up to formats like straws or tissue cassettes.

The ASKION C-line® cryo rack can be adapted to various 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)**

To meet the individual needs and requirements of the respective operator the relevant C-line® components can be adapted to the used sample format.

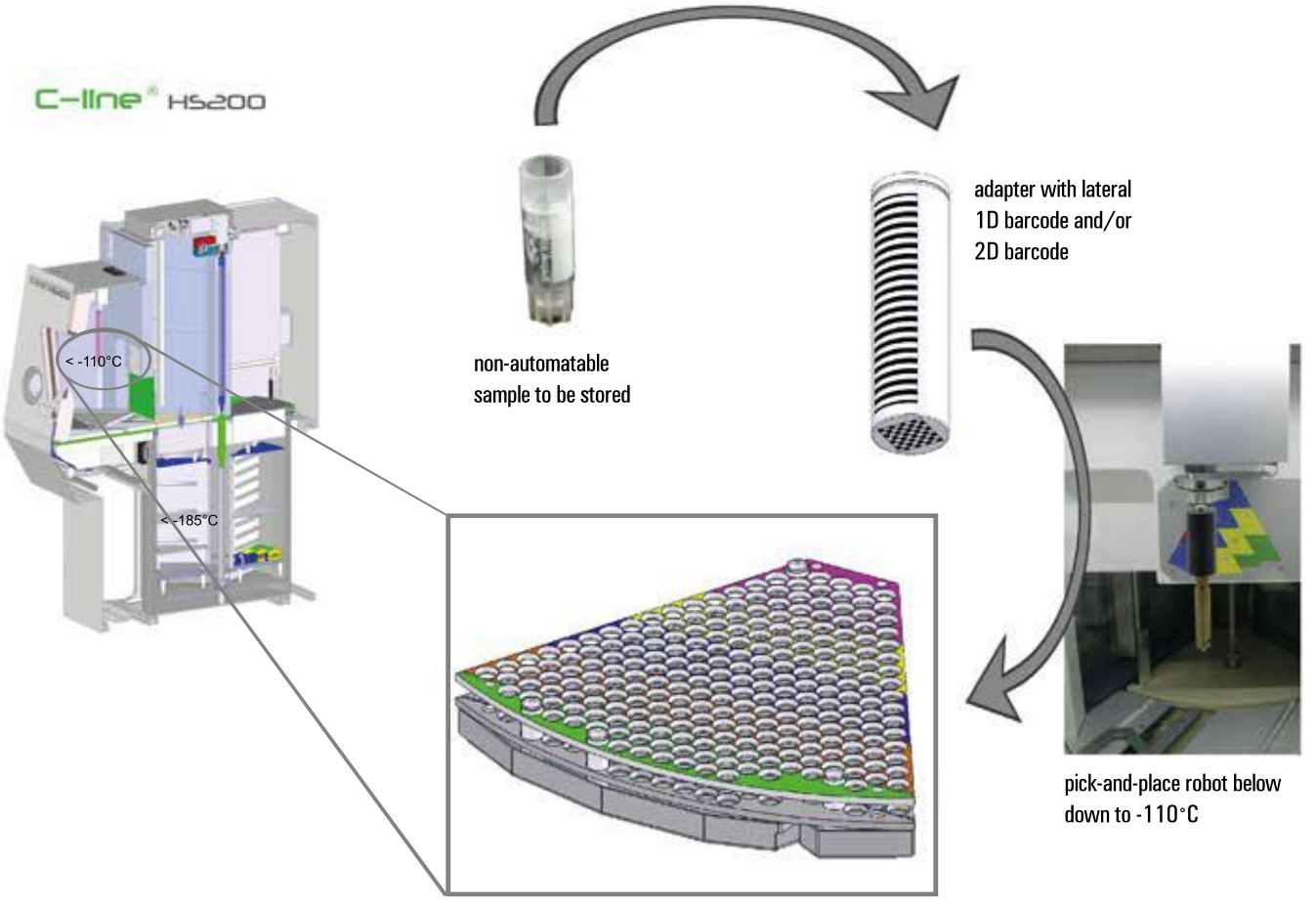
The modularity of the system allows the extension of the suitable sample formats.

INTEGRATION OF EXISTING BIOBANKS

AUTOMATION OF EXISTING AND NON-STANDARD SAMPLES

When building up a new biobank already stored samples have to be transferred to the new storage system. Often 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® adapter. According to the stored sample format the ASKION C-line® 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® system safely at any time.

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



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

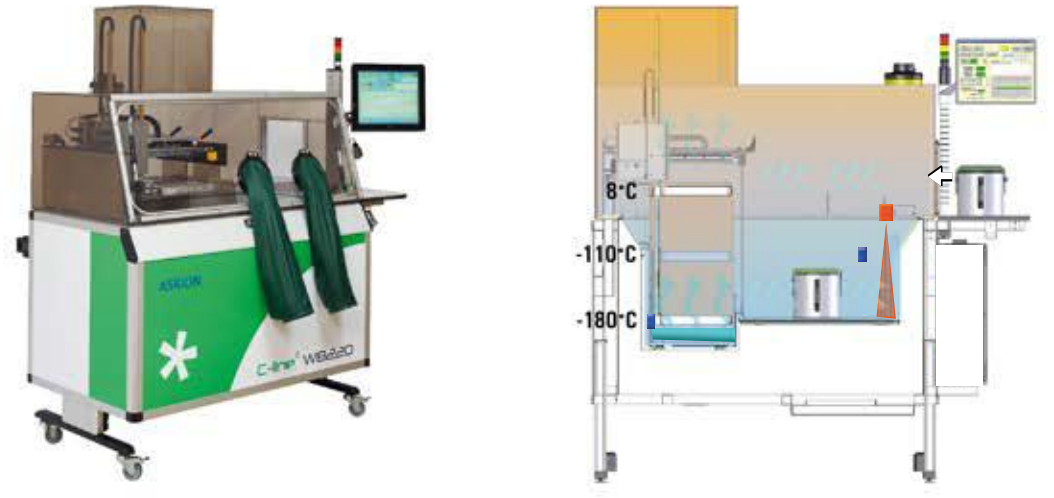
MAXIMUM SAMPLE QUALITY

CRYOGENIC WORKING AREA

The ASKION C-line® work bench combines cryogenic, ice- and contamination-free working area for sample handling as well as freezing unit for controlled freezing of biomaterial. The device is portable and operates with liquid nitrogen. The cryogenic working area is cooled by selective evaporation of liquid nitrogen. With the interaction of 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) a 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 down to below -130°C (e. g. resorting, identifying and scanning).

- Defined and reproducible freezing
- Individual freezing curves programmable
- Measurement of sample temperature
- Cryogenic working area (-130°C)
- Scanning below -130°C and fully automatable (optional)

The prevention of heat input into the frozen samples is essential to preserve the sample quality. As studies have shown, samples should be stored in the gas phase of liquid nitrogen and should be handled and transported at temperatures of at least -100°C and below to prevent damages to the sample quality (Germann et al. 2013).



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

EXACT AND REPRODUCIBLE FREEZING

PRECISE CONTROL AND COMPARABILITY OF DIFFERENT FREEZING PROCESSES

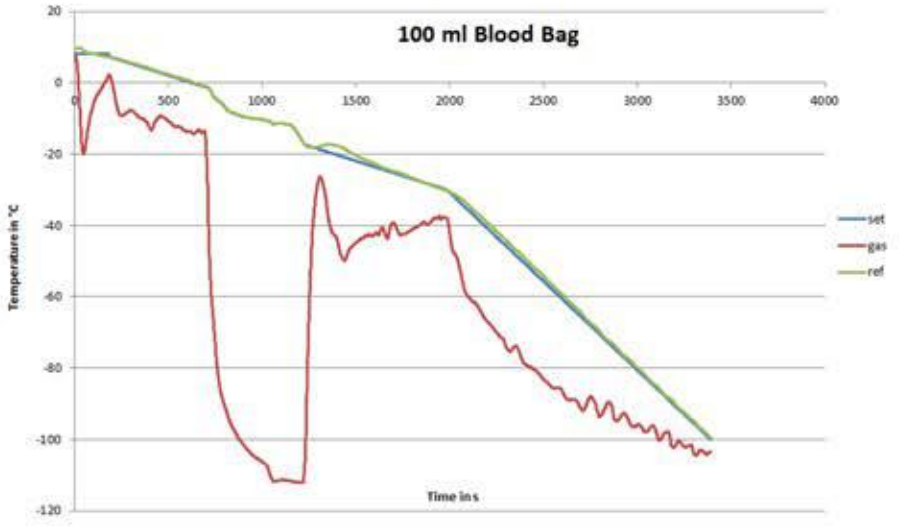
The ASKION C-line® work bench is equipped optionally with two or three controlled rate freezers.

- **Maximum conformity between programmed and real freezing curve**
- **Selective nucleation**
- **Avoidance of latent heat and undercooling during freezing process**
- **Parallel independent freezing processes possible**

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 of every sample will be recorded and saved.

Furthermore, the ASKION C-line® work bench enables the controlled triggering of the crystallization ("seeding") to avoid a undercooling of the samples. At the same time the reference sensor guarantees the controlled crystallization by targeted compensation of escaping crystallization heat.



Exemplary freezing curve of a blood bag using the ASKION C-line® work bench. Described are sample temperature (green), prescribed freezing curve (blue) and ambient temperature of the freezing basket (red). The regulation of the freezing process according to sample temperature results in an almost perfect compliance of the temperature course of the sample compared to the prescribed freezing curve.

SCANNING IN CRYOGENIC ENVIRONMENT

IDENTIFICATION OF FROZEN SAMPLES IN SBS RACKS WITHOUT INFLUENCING SAMPLE QUALITY

ASKION C-line® ColdEye is the first cryogenic 2D barcode scanner worldwide. This scanner was especially developed for environmental temperatures below -100°C and is compatible with the ASKION C-line® work bench. The scanner allows the parallel identification of samples in SBS rack format within a few seconds and so the scanning of single samples can be omitted.

Due to the low temperatures of below -130°C frozen samples can be identified safely as a warming of the samples will be avoided. Additionally the handling of samples in SBS rack format inside the ASKION C-line® work bench prevents icing or hoarfrost whereby the sample barcodes remain readable at any time.

- Identification of samples in SBS rack format at environmental temperatures below -130°C
- Identification of e. g. 96 samples within less than 5 seconds
- Compatible to ASKION C-line® work bench
- Retrofittable
- Sample format independent

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

ASKION C-line® ColdEye shown as autonomous device (left) and installed inside the ASKION C-line® work bench (right)

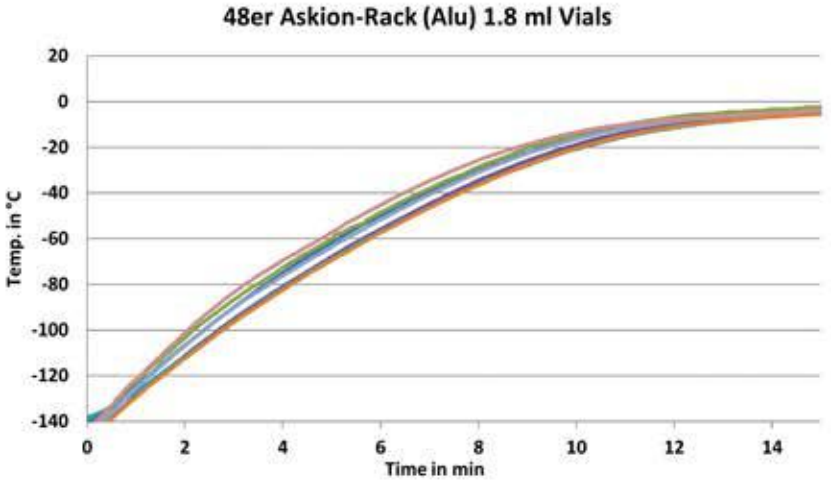
TD100

CONTAMINATION-FREE THAWING

The ASKION C-line® TD100 completes the family of devices for cryogenic storage by allowing a reproducible thawing of different sample formats after retrieval from the storage system. The unit produces a weak heated air stream and supplies this over the frozen sample material. The samples may remain in the used sample holder, e. g. in a SBS rack. The use of a water bath is no longer necessary, thus contamination of the samples as well as damage to the sample identification is prevented. The most homogenous thawing curves can be achieved using the especially to C-line® adapted and for freezing and thawing optimized ASKION C-line® aluminum SBS racks. If samples in these racks are immediately taken off the device just before complete liquefaction, the rack shows a temperature barely above the freezing point and keeps the samples long enough in a chilled state to further process them with minimal toxic effects due to CPA usage.

› **Reproducible warming and thawing of samples**

› **Independent of sample format**



Thawing curves of a 10 % aqueous DMSO solution measured at different sites inside the SBS rack

Furthermore, the device can be used to warm up and dry C-line® inserts (sample format holder), which have been used to freeze or store/retrieve samples in a short period of time. So the samples are available for other freezing or storage processes without losing time. An input of humidity into the storage system HS200 caused by condensation or icing is prevented.

CENTRAL ADMINISTRATION UNIT

MANAGEMENT AND CONTROL OF YOUR BIOBANK

ASKION C-line® control is the central administration unit of the biobank. It consists of two elements: C-line® control server and 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 centrally all processes and data, including regular backups and is the communication interface to all C-line® devices. The C-line® control server establishes also the data exchange to already available LIMS systems and enables the data exchange and control of the biobank by external software products.

Simplified retrieval of samples on the basis of documentation of the complete life cycle of a sample

- Sample data mangement
- Connectable to external program (e. g. LIMS/HIS)
- With one software control of different biobanks possible
- Customized software adaption
- Access control

The data management of every single sample is made by ASKION C-line® control. This means that among other things for every sample inside the C-line® system all parameters are recorded for the complete life cycle. These data can be called up for every sample at any time and therefore allow maximum control. Also sample data with additional and individual data fields can be added (e. g. age, gender, disease, etc.) to simplify the later search for the required samples.

OPEN INTERFACE

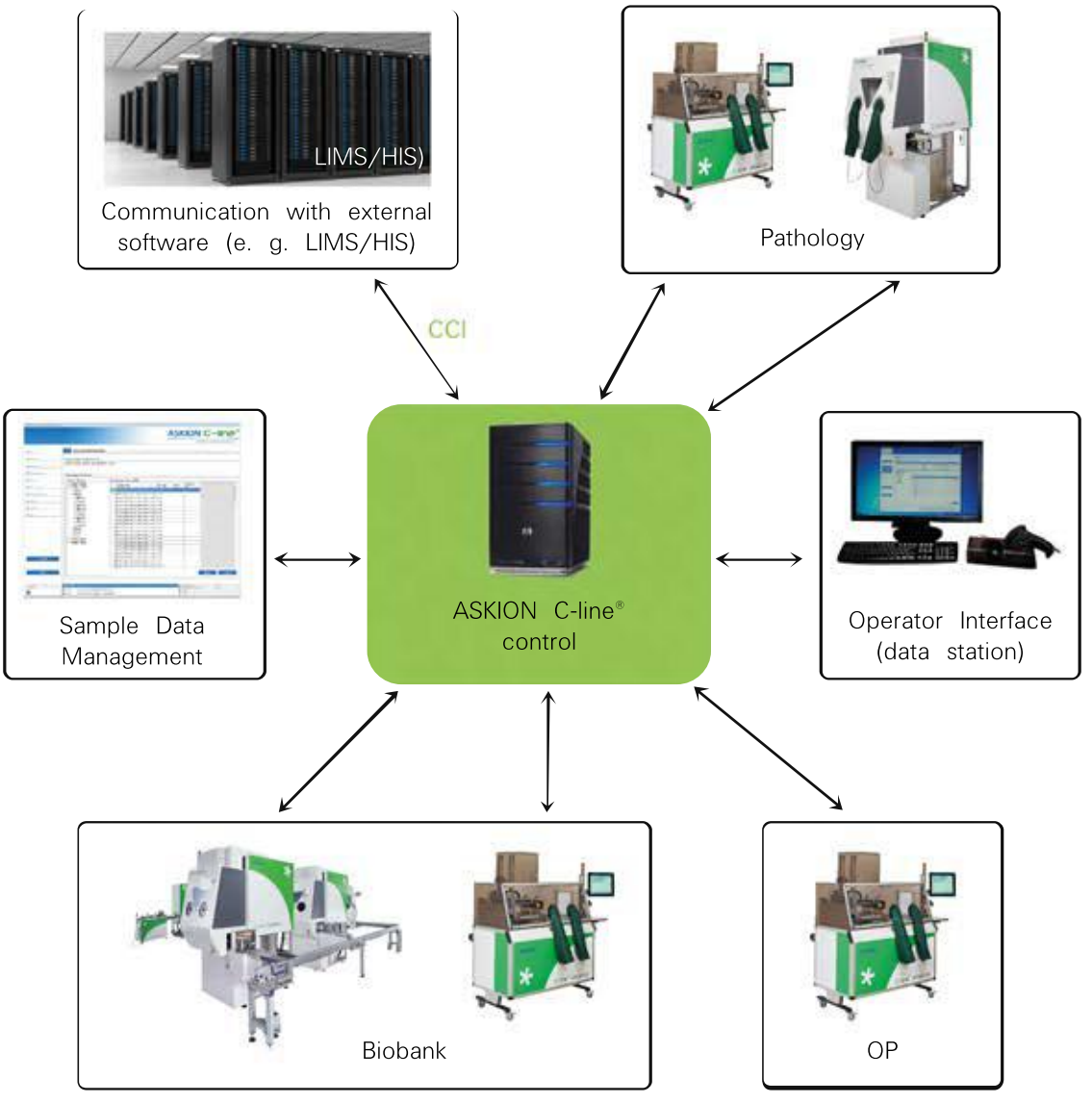
EASY INTEGRATION TO EXISTING INFRASTRUCTURES

In the event that an appropriate data management (LIMS/HIS) does already exist, ASKION C-line® control is able to communicate by the open interface CCI (C-line® Control Interface) with this system. The CCI is not limited to the communication with LIMS/HIS and can generally 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

CUSTOMIZABLE TO YOUR NEEDS

By software adaptions 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 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 system. 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.

✱ Notes

TECHNICAL DATA/ SHORT DESCRIPTION

ASKION C-line®
System

hermetic storage

HS200 S

ASKION C-line®
hermetic storage

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

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

Building on this technology, the next generation of the storage system HS200 offers a significantly better handling and a higher degree of automation. These improvements are already implemented in the basic device (semi-automated operation). All configurations, from a single system up to a fully automated biobank, can be realized due to the step-by-step expansion/upgrade of the HS200, in connection with the automation.

The freely configurable storage racks are available for a storage that is independently of sample formats, e. g. for straws, vials, blood bags, etc.The sample management system ASKION C-line® control gives you access to all relevant sample storage data at any time. It is the brain and communicator of your biobank.

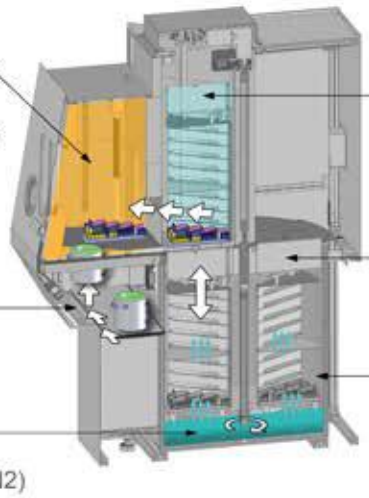
SEMI- OR FULLY AUTOMATED, INDEPENDENT OF SAMPLE FORMATS

Performance

- All sample formats are accepted, e. g. straws, vials, blood bags, etc.
- Access Tower with cryogenic working area of below -110°C in the gas phase of LN2
- Two operator ports with individually heatable gloves
- Sample storage in the gas phase of LN2
- Input/Output unit for transport containers
- Uninterrupted cooling chain
- No intake of moisture into the cryogenic working area, the HS200 remains ice-free
- Integrated barcode scanner
- Modularly upgradable with internal and external automation
- The storage and retrieval processes are controlled by the sample management system
- Controlled environmental conditions ensure low temperature differences
- Available as medical device according to medical device directive 93/42/EEC

TECHNICAL DATA

HS200 S



-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

Dimensions (width x depth x height)	125 x 180 x 245 cm
Weight	840 kg (fully loaded)
Operator port	closed and monitored operator ports, gloves (heatable)
Input/Output unit	motorized
Barcode scanner	one- or two-dimensional, lateral or bottom barcode, permanently installed
Racks	six racks (customizable), different types depending on the formats of the samples, motorized lift system with automatic rack positioning
Temperatures	
T-range working area	adjustable from -80°C down to -110°C
Time to reach T-working area	15 min (at -100°C working area)
Control	5.7'' LCD Terminal
Connection to LIMS/HIS	interface by C-line® control (C-line® control interface CCI) for communication/implementation with other programmes available
Storage of samples	in the gas phase of LN2 down to -185°C
Static nitrogen evaporation rate	8 kg/24 h (resting consumption without components)
Effective LN resting consumption	18 kg/24 h (depending on the usage rate of the device and environmental conditions)
Dwell time	48 - 72 h (until achieving a temperature of -130°C, depending on the filling level)
Monitoring	integrated, automatic filling level controller; cryo tank monitoring system with alarm function; connections for external alarm system
Electrical connection	max. power consumption 700 W (110/230 V, 10 A, 50/60 Hz)
	standby ‹ 1.5 kWh/24 h
Coolant	liquid nitrogen
Pressure liquid nitrogen supply	1.4 bar
Positive operating pressure	0 bar
Climate conditions for use	+15 to +25°C; 15 to 60 %

hermetic storage

HS200 M

HS200 L

ASKION C-line®

hermetic storage M and L

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

C-line®

HS200 M/HS200 L

During the operation of a Biobank the amount of stored samples increases continuously. As a result, the capacity requirements of automated storage systems increase in the course of time. In order to fulfill these requirements, ASKION has extended it's product familiy ASKION C-line® by two additional storage modules.

Based on the established ASKION C-line® heremtic storage HS200 S the newly developed ASKION C-line® hermetic storage HS200 M and HS200 L were introduced into the market in 2017. The HS200 M and L have a cherry picking robot to handle single samples, just as the HS200 S. Additionally, the HS200 M and L are equipped with an automated gripper changing system and a newly introduced SBS rack gripper. This combination provides a maximum of flexibility to the storage system. By the simultaneous reduction of the sample handling temperature to below -130°C the impairment of the sample quality during storage process is minimized.

Performance

- All sample formats are accepted, e. g. straws, vials, blood bags, etc.
- Access Tower with cryogenic working area of below -130°C in the gas phase of LN2
- Cherry picking and SBS rack handling robot
- Sample storage down to -185°C in the gas phase of LN2
- Input/Output unit for transport containers
- Uninterrupted cooling chain (below -100°C)
- No intake of moisture into the cryogenic working area, the HS200 remains ice-free
- Integrated barcode scanner
- Modularly upgradeable with external automation
- Storage and retrieval processes controlled by sample management system
- Controlled environmental conditions ensure low temperature differences
- Available as medical device according to medical device directive 93/42/EEC

TECHNICAL DATA

HS200 M

HS200 L

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

	HS200 M	HS200 L
Dimensions (width x depth x height)	300 x 250 x 270 cm	450 x 350 x 320 cm
Weight	3,300 kg (fully loaded)	8,000 kg (fully loaded)
Operator port	only for service and average	only for service and average
Input/Output unit	automated connecting station (fully automated)	automated connecting station (fully automated)
Barcode scanner	rack scanner (ColdEye) and linear scanner for TRG	rack scanner (ColdEye) and linear scanner for TRG
Racks	16 racks (customizable), different types depending on the formats of the samples, motorized lift system with automatic rack positioning	33 racks (customizable), different types depending on the formats of the samples, motorized lift system with automatic rack positioning
Temperatures		
T-range working area	adjustable from -80°C down to -130°C	adjustable from -80°C down to -130°C
Time to reach T-working area	15 min (at -100°C working area)	20 min (at -100°C working area)
Control	5.7" LCD Terminal	5.7" LCD Terminal
Connection to LIMS/HIS	communication/implementation to external programs (e. g. LIMS/HIS)	communication/implementation to external programs (e. g. LIMS/HIS)
Storage of samples	in the gas phase of LN2 down to -185°C	in the gas phase of LN2 down to -185°C
Nitrogen evaporation rate	48 kg/24 h (depends on usage rate and environmental conditions)	96 kg/24 h (depends on usage rate and environmental conditions)
Dwell time	up to 120 h (until achieving a temperature of -130°C, depending on the filling level)	up to 120 h (until achieving a temperature of -130°C, depending on the filling level)
Monitoring	integrated, automatic filling level controller; cryo tank monitoring system with alarm function; connections for external alarm system	integrated, automatic filling level controller; cryo tank monitoring system with alarm function; connections for external alarm system
Electrical connection	max. power consumption 700 W (110/230 V, 10 A, 50/60 Hz) standby ‹ 1.5 kWh/24 h	max. power consumption 700 W (110/230 V, 10 A, 50/60 Hz) standby ‹ 1.5 kWh/24 h
Coolant	liquid nitrogen	liquid nitrogen
Pressure liquid nitrogen supply	› 1.5 bar	› 1.5 bar
Positive operating pressure	0 bar	0 bar
Climate conditions for use	+15 to +25°C; 15 to 60 %	+15 to +25°C; 15 to 60 %

hermetic storage

HS200

cryo rack

A FEATURE OF THE
ASKION C-LINE® SYSTEM

ASKION C-line®
cryo rack

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

STORAGE RACK
WITH CUSTOMIZED
CONFIGURATION

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

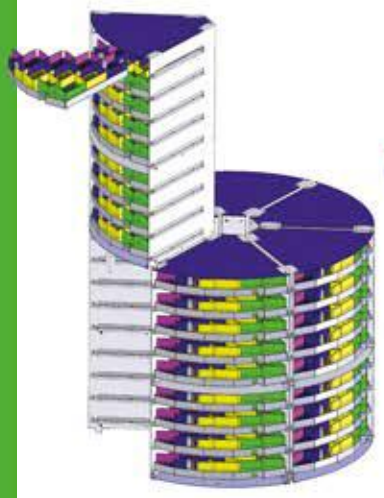
Performance

- 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
- Available as medical device according to medical device directive 93/42/EEC

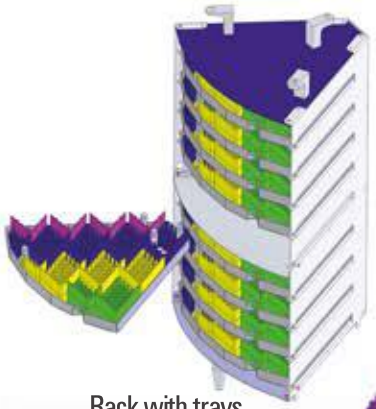
TECHNICAL DATA

HS200

cryo rack



Rotary plate with 6 racks

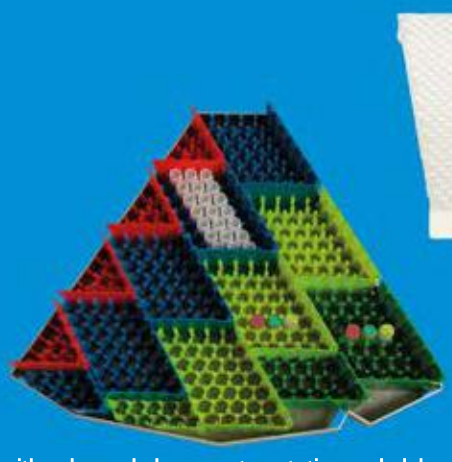


Rack with trays

Tray to store

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

	HS200 S	HS200 M	HS200 L
Capacity per HS200*			
Vial ø 9 mm/0.30 ml	78,500	273,900	784,600
Vial ø 9 mm/0.50 ml	52,300	136,900	376,600
Vial ø 9 mm/0.70 ml	62,800	182,600	502,100
Vial ø 9 mm/1.00 ml	47,100	137,000	376,600
Vial ø 13 mm/1.80 ml	21,100	64,500	177,400
Goblets á 15 Straws 0.25 ml	56,600	199,400	685,600
Goblets á 12 Straws 0.50 ml	68,000	159,600	548,500
Goblets á 10 Straws 0.50 ml	85,000	133,000	457,100
Blood bags 100 ml	360	upon request	upon request
Blood bags 25 ml	780	upon request	upon request
Tissue vial ø 17 mm/3.00 ml	15,600	53,200	146,300
Embedding cassettes (42 x 29 x 12)	7,300	upon request	upon request



Level with color-coded compartmentation and alphanumeric coordinate system e. g. yellow3, B3 or green2, D4

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

HS200 S
internal automation

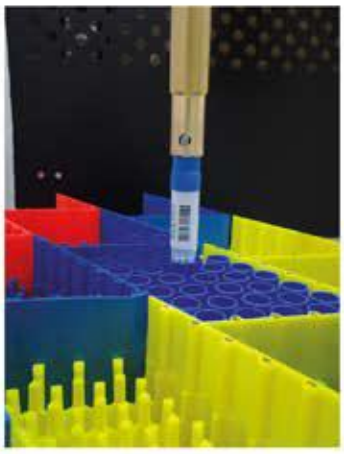
ASKION C-line®
internal automation

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

INTERNAL AUTOMATION

The recent generation of the storage system HS200 allows, due to the upgradeable internal automation, the fully automated sample storage and sample retrieval at temperatures down to below -110°C. This function is fullfilled by a pick-and-place-gripping-roboter. Furthermore, the racks in a storage system may be configured according to the used sample format, e. g. for straws, vials and blood cassettes. As before, the storage in the gas phase of nitrogen guarantees a maximum sample quality.

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



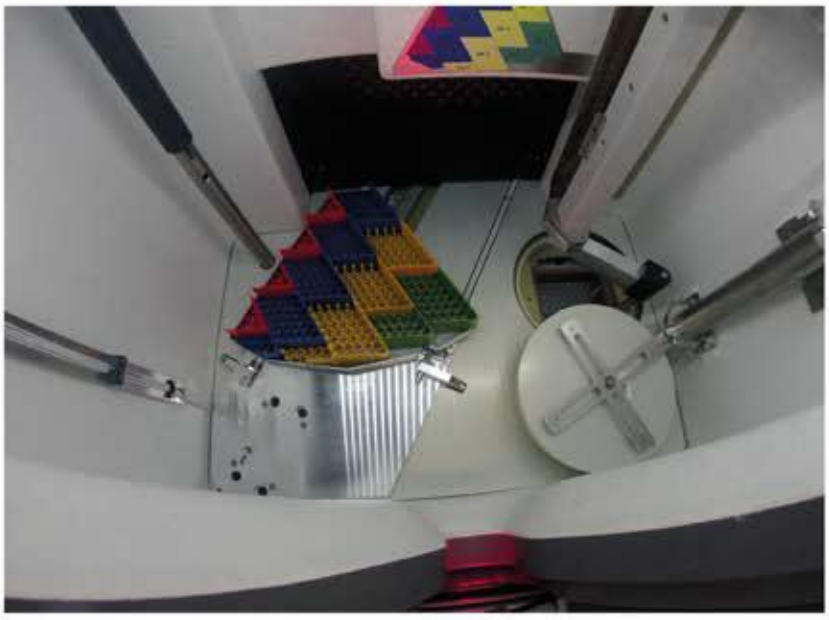
FULLY AUTOMATED INDEPENDET OF SAMPLE FORMATS

Performance

- Fully automated sample storage and retrieval
- Storage down to -185°C in the gas phase of LN2
- All sample formats are accepted, e. g. straws, vials, etc.
- Access Tower with cryogenic working area of down to below -110°C in the gas phase of LN2
- Uninterrupted cooling chain
- Input/Output unit for transport containers
- Low temperature differences during the sample storage and retrieval
- No intake of moisture into the cryogenic working area, i. e. handling and storage are ice-free
- The storage and retrieval processes are controlled by ASKION C-line® control
- Stationary barcode scanner
- Available as medical device according to medical device directive 93/42/EEC

TECHNICAL DATA

internal automation HS200 S



-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

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)
Barcode scanner	one- or two-dimensional, lateral or bottom barcode, permanently installed
Temperatures inside HS200	
Working area	adjustable from -80°C down to -110°C
Time to reach T-working area	15 min (at -100°C working area)
Storage of the samples	in the gas phase of LN2 at temperatures down to -185°C
Control	automatically by ASKION C-line® control, manually by 5.7'' LCD Terminal of the HS
Safety	sample sensor; in the event of damages manual access by using heatable gloves; closed, monitored operator ports; inspection window
Electrical connection	by hermetic storage, max. power consumption 1 000 W (110/230 V, 10 A, 50/60 Hz)
Coolant	liquid nitrogen
Positive operating pressure	0 bar
Climate conditions for use	+15 to +25°C; 15 to 60 %

ASKION C-line®
external automation

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

ASKION C-line® automation - the flexible, fully automated biobank solution for storage temperatures down to -185°C.

The ASKION automation solution connects the fully automated ASKION storage systems HS200 to a flexible and gradually expandable biobank solution which is adaptable to your requirements regarding capacity and spatial conditions. A rail system connects the single storage stations and therefore allows the positioning of the HS200 in several rooms and across several floors.

CONNECTING STATION

The loading or retrieval of the samples in LN2 cooled transport containers is done at the ASKION C-line® transfer station. This transfer portal is connected to the individual storage systems HS200 by the rail system and the respective ASKION C-line® connecting station.

TRANSFER STATION

Performance

- Fully automated transport of samples
- Expandable by modules
- LN2 cooled transport containers/optionally with temperature monitoring
- Uninterrupted cooling chain during transport
- Transport batches are configurable with ASKION C-line® control
- Rail system adaptable to the specific spatial conditions
- Monitoring function with visual and acoustical alarm

TECHNICAL DATA

external automation

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

Transfer station	optional with three or six handover stations (ports) for transport containers
Dimensions (width x depth x height)	three handover stations 100 x 80 x 130 cm
	six handover stations 200 x 80 x 130 cm
Weight	approx. 150 kg, or approx. 180 kg
Rail system	monorail system with ride-on shuttle
Configuration	flexible routing to connect spatially distributed hermetic storages with the transfer station
Route length	no restrictions
Rail height	approx. 80 cm above the floor
Basis transport time	for shuttle with transport container
Speed	0.4 m/s
Docking/undocking	to the transfer station 28 s, to the hermetic storage 25 s
Connecting station	automated Input/Output unit including transfer of the transport containers by the rail system
Dimensions	approx. 35 x 150 x 60 cm
System complete	
Electrical connection	100/230 V, 10 A, 50/60 Hz
Electrical consumption	60 W/24 h in standby mode, ~ 1.5 kWh/24 h
Monitoring	visual and acoustical alarm

sample formats

ASKION C-line®
hermetic storage

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

C-line® HS200

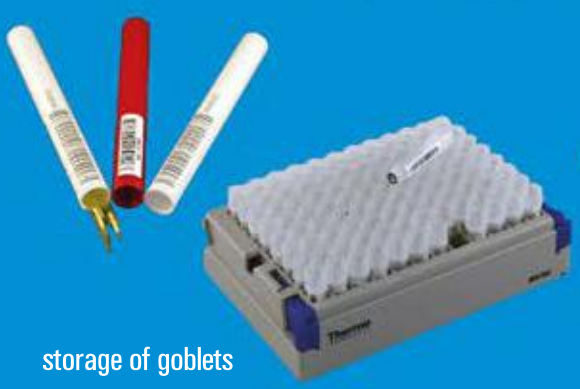
Storage of tissue

tissue cassettes,
vials for tissue storage

Storage of large volume samples

blood/cryo bags inside cassettes

Storage of fluids (e. g. bodily fluids)



storage of goblets
with straws

vials in various formats from different
providers

sample formats

ASKION C-line®
hermetic storage

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

The ASKION C-line® hermetic storage (HS) allows a high quality storage of samples. At this process the samples are stored in the gas phase of nitrogen at temperatures down to -185°C and handled at temperatures of at least -100°C.

It is possible to store different sample formats inside the HS. These samples range from straws (e. g. 100 µl) in goblets to vials (e. g. 0.2 - 8.0 ml) and tissue cassettes up to large volume sample formats like cryo/blood bags in cassettes (up to 150 ml). Thereby, the storage of the samples inside the HS is independently of the manufacturer of the used storage containers. However, there can occur differences within the storage capacities depending on manufacturer specific dimensions (see also technical data cryo rack).

Besides a standardized sample format it is possible to store different sample types within one device (mixed operation). Moreover, it is possible to adapt the system to new sample formats at any time.

For a large number of sample formats (e. g. 2 ml vials from Greiner Bio-One) exists also an upgradable internal automation (pick-and-place-roboter). This makes an increase of sample safety/quality possible and enables a gentle use of existing resources.

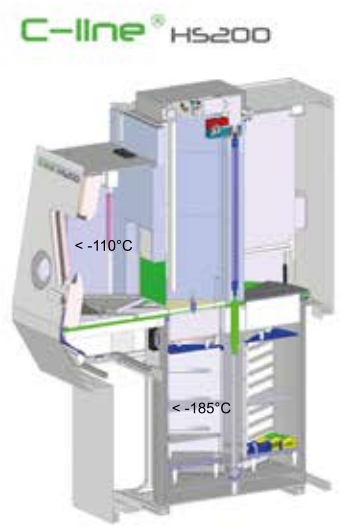
The ASKION C-line® hermetic storage represents a optimum and customer specific solution for all high quality sample storages.

usage of blood bags

ASKION C-line®
hermetic storage

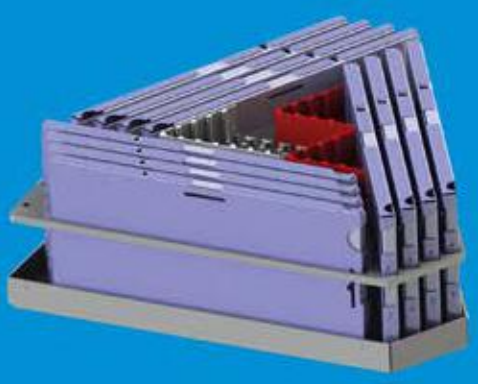
ASKION C-line®
work bench

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1



TEMPERATURE DISTRIBUTION INSIDE THE HS200

The ASKION C-line® work bench is a cryogenic working area (‹-130°C) that can be equipped with up to three independently working freezers.



Tray design for the storage of blood cassettes including reference samples inside the ASKION C-line® hermetic storage

usage of blood bags

ASKION C-line® system

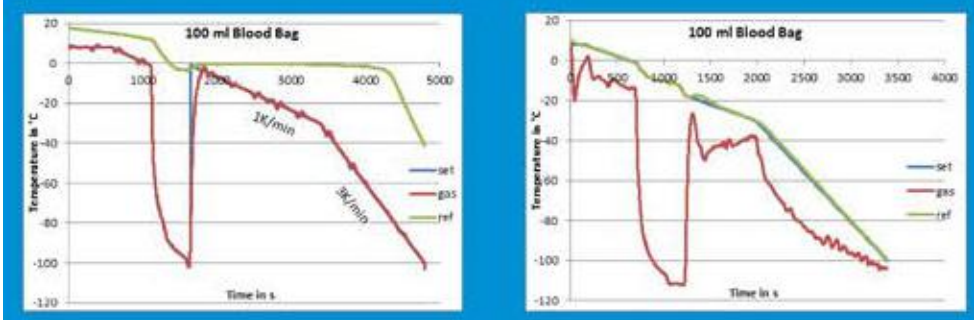
-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

BLOOD/CRYO BAGS
IN CASSETTES

Blood bags represent the bigger sample volumes (usually 50 - 100 ml) of the laboratory diagnostics/routine. Because of their size they are a particular challenge with regard to correct handling during the controlled freezing and storage. For obtaining the maximum sample quality it is vital to perform an exactly defined, reproducible freezing process (see below).

By measuring the sample temperature it is possible to freeze samples defined and controlled with the ASKION C-line® work bench (WB). Afterwards, the cryogenic working area allows the temporary storage and repackaging of the samples without detrimental freeze and thaw cycles.

After the successful freezing of the blood cassettes, the frozen samples can be moved inside a suitable transport container, thus without interrupting the cooling chain (T‹-100°C), into an liquid nitrogen storage (hermetic storage) .



The temperature profile of a blood bag (ref) for a freezing process (set), regulated by the ambient temperature (“uncontrolled“ freezing, left (gas)) in comparison to the measurement of the sample temperature (defined freezing, right (ref))

adapter

FOR AUTOMATED STORAGE OF FORMERLY NON-AUTOMATABLE SAMPLES

ASKION C-line® hermetic storage

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

ASKION C-LINE®
HERMETIC STORAGE

The ASKION C-line® hermetic storage (HS) allows a high-quality storage of samples. In this process the samples are stored in the gas phase of liquid nitrogen at temperatures down to -185°C and they are handled at temperatures below -110°C.

For several, especially older sample formats, the automated storage and retrieval might not be possible. Reasons for that are the sample design (no cavity of the lid) and/or deformations or other modifications (e. g. laterally protruding labels).

Minimum quantities of different sample formats can also cause, that no economically reasonable storage structure can be found, e. g. when taking over older samples into a fully automated biobank. Due to these different sample formats it is also possible, that no common gripper design covers all sample formats for the internal automation.

Against this background, the ASKION C-line® adapter provide the opportunity to store formerly not automatable samples fully automated. Additionally, the storage management of samples is simplified and you receive a complete documentation of temperature, movement/accesses, etc. for every individual sample.

Performances

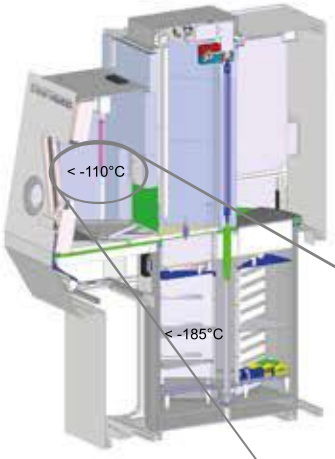
- Applicable for a variety of sample formats, e. g. for 2 ml vials
- Enables a reliable long-term storage of e. g. labelled samples
- Available with lateral and/or lower barcode (1D/2D)

ASKION C-line®

hermetic storage

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

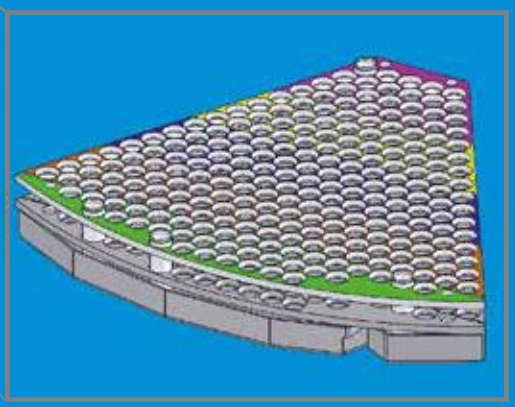
C-line® HS200



transfer of the sample

non-automatable
sample to be stored

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



Fully automated storage of samples inside the adapter
using the internal automation (pick-and-place-robot)

work bench

WB200

WB220

WB230

MODULES OF THE ASKION C-LINE® SYSTEM

ASKION C-line®
work bench

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

WORK BENCH WITH CRYOGENIC WORKING AREA AND LIFT FREEZER

The work bench consists of a cryogenic working area, that may be equipped with additionally two (WB220) or three (WB230) freezers. The work bench WB220/230 is used for defined freezing of biological material such as stem cells, blood components, tissue, semen, occytes, samples for DNA/RNA analysis, etc. The compliance of an uninterrupted cooling chain of the samples is monitored and recorded during this process.

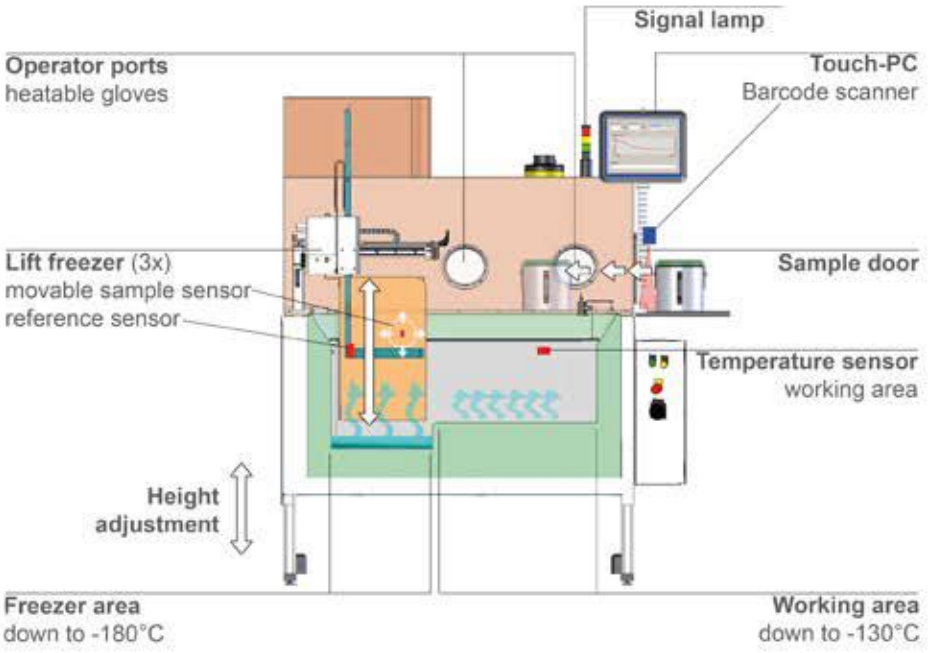
The integrated freezer unit, containing of up to three independently operating freezers, allows reproducible freezing processes. The freezing process can be done on the basis of freely programmable freezing curves. It is possible to start the individual freezers at any time without having to wait for the end of the process of the neighboring freezer. A barcode supported sample management system for sample tracking is available for the user. The work bench can be delivered also without freezer but with a big, cryogenic working area (WB200).

Performance

- Cryogenic working area with adjustable temperature down to -130°C
- Up to three independently operating freezers
- Freely programmable freezing curves
- Independent of sample formats
- Optional measurement of sample temperature using a corresponding sensor
- Configurable seeding, specific crystallization initiation
- Electrically height adjustable
- Integrated barcode scanner
- Uninterrupted cooling chain
- Control by touch screen
- Soft- and hardware supported monitoring system
- Available as medical device according to medical device directive 93/42/EEC

TECHNICAL DATA

WB200
WB220
WB230



-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

Dimensions	186 x 97 x 203 cm (± 15 cm) (width x depth x height)
Electric height adjustment	30 cm adjustment range for individual, ergonomic working height
Weight	300 kg (empty), 450 kg (fully loaded)
Operator port	two ports, closure by gloves (heating optional)
Barcode scanner	optional, one- or two-dimensional, lateral and bottom barcode, permanently installed
Number of freezers	3 lift freezers (WB230), 2 lift freezers (WB220), working independently
Temperatures	
T-range working area	adjustable +20°C down to -130°C
T-range freezer area	+20°C down to -180°C
Time to reach T-working area	max. 45 min (at -100°C working area)
T-display resolution	0.01°C
Cooling rate freezer	0.01 - 50 K/min
Freezing rate samples	depending on the sample volume, sample format and sample material
Control	17'' LCD Touchscreen-PC, mounted on an mobile support arm
Connection to LIMS/HIS	interface by C-line® control (C-line® control interface CCI) for communication/implementation with other programmes available
Monitoring	integrated temperature control device, temperature sensors, connections for an external alarm system
Electrical connection	max. power consumption 1 000 W (230 V, 10 A, 50 Hz)
Coolant	liquid nitrogen
Pressure liquid nitrogen supply	1.4 bar
Positive operating pressure	0 bar
Climate conditions for use	+15 to +25°C; 15 to 60 %

automated work bench AWB

MODULE OF THE ASKION C-LINE® SYSTEM

ASKION C-line®
automated work bench

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

The ASKION C-line® work bench consists of a cryogenic working area in which frozen samples can be handled at down to -130°C while keeping the uninterrupted cooling chain. The work bench can be equipped optionally with freezing units for defined and reproducible freezing of different sample formats. Based on this original work bench ASKION has developed the ASKION C-line® automated work bench AWB to meet the growing requirements of the customers with regard to increasing sample throughput, 24/7 working and even more precise documentation.

The ASKION C-line® automated work bench AWB keeps all advantages of the known and well established ASKION C-line® work bench WB220/WB230. Furthermore, it will be equipped with new features as for example SBS rack gripper, single sample gripper or the connection to the ASKION C-line® external automation (rail system).

Performance

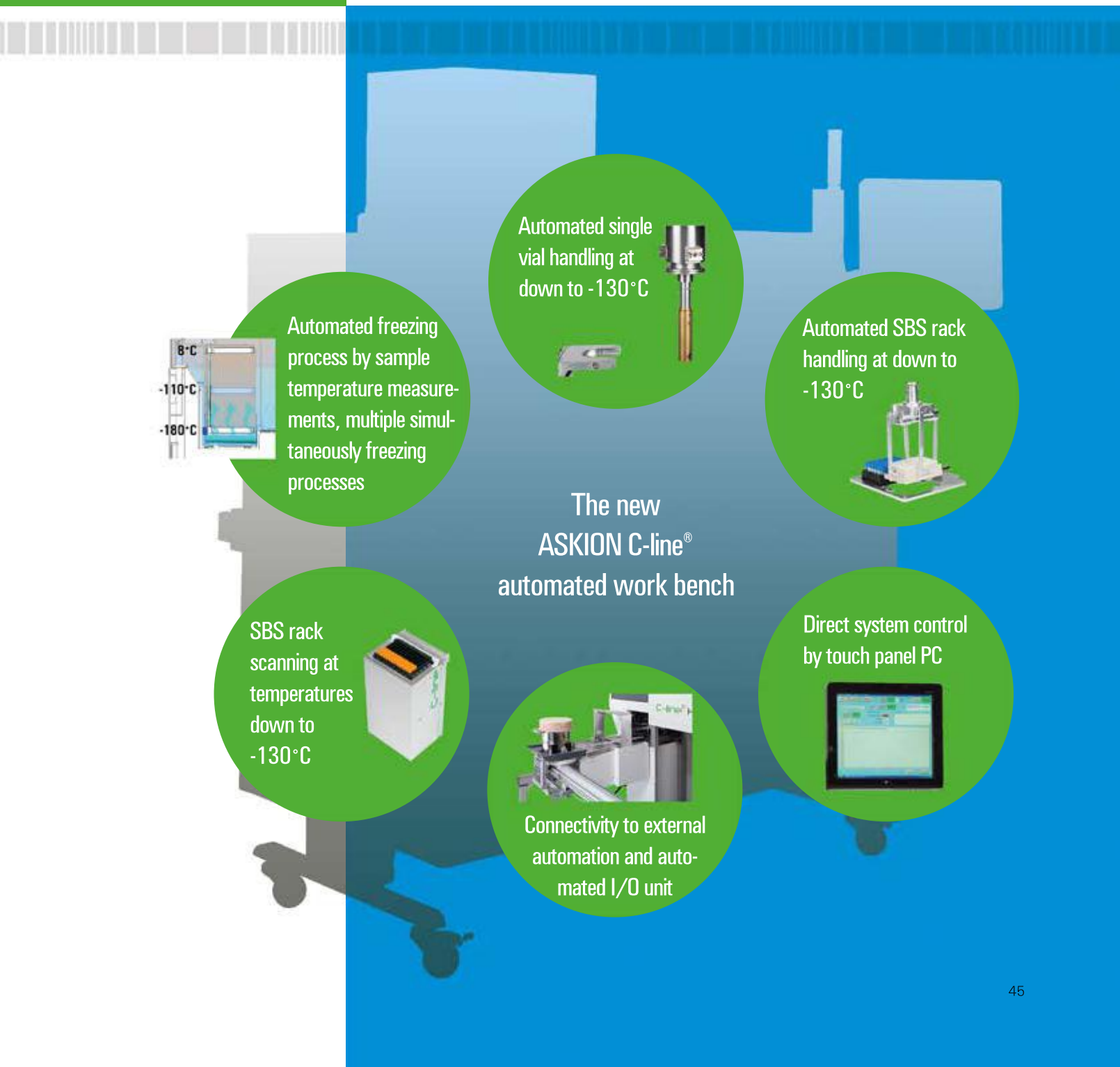
- Automated SBS rack handling at down to -130°C
- Automated single sample handling at down to -130°C
- Fully automated freezing
- Multiple, independently of each other but simultaneously performable freezing processes
- Keeping an uninterrupted cooling chain at down to -130°C following the freezing process
- Integrated cryogenic SBS rack scanner to identify frozen samples in SBS rack format at down to -130°C
- Sample format independent
- Interface for sample collection for the connection to e. g. pipetting platforms
- Connection to the ASKION C-line® external automation (rail system) for fully automated transport of frozen samples into the biobank
- Compatible to all ASKION C-line® components

TECHNICAL DATA

automated work bench AWB

ASKION C-line®
automated work bench

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1



ColdEye

SCANNING SAMPLES
AT TEMPERATURES
BELOW -100°C

ASKION C-line® ColdEye

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

ASKION C-LINE® COLDEYE

The ASKION C-line® ColdEye is the first commercially available and reliable operating scanner at cryogenic temperatures for SBS racks. Using this scanner, it is possible to scan samples while keeping the uninterrupted cooling chain.

Due to the cryogenic ambient temperatures of -130°C and colder, the warming up of samples, up to temperatures at which processes occur that damage the sample quality (e. g. migratory crystal growth), can be avoided. ColdEye is especially designed for the usage in the ASKION C-line® work bench and can be inserted into all existing work benches.

Consequently, using the ASKION C-line® ColdEye makes it possible to scan frozen samples safely within the ASKION C-line® work bench and to keep the uninterrupted cooling chain at the same time.

Performances

- Reliable operation at ambient temperatures below -130°C
- Scanning of frozen samples without interrupting the cooling chain
- Shorter scanning times
- Detection of samples in SBS racks from ASKION and external providers
- Detection of various 2D barcodes
- Fully compatible with the ASKION C-line® work bench

ColdEye

ASKION C-line®

ColdEye

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

Sample format	compatible with SBS rack with a maximum of 96 tubes ASKION insert for SBS-Racks
Scanning time (image capture and decoding)	approx. 3 seconds
File export	File format .csv/.txt/.xml
Operating system	Windows 7 (32-/64-bit)
Dimensions (approx.)	160 mm x 130 mm x 270 mm (W x D x H, without fastening hooks)
Ambient temperature at scanning plane	down to below -150°C
Supported1D barcodes	Interleaved 2/5, Industrial 2/5, Code 39, Code 39 Extended, Codabar, Code 11, Code 128, Code 128 Extended, EAN/UCC 128, UPC-E, UPC-A, EAN-8, EAN-13, Code 93, Code 93 Extended, DataBar Omnidirectional (RSS-14), DataBar Truncated (RSS-14 Truncated), DataBar Limited (RSS Limited), DataBar Stacked, DataBar Expanded, DataBar Expanded Stacked
Supported 2D barcodes	PDF417 (Micro, Compact), QRCode (Micro), DataMatrix, AztecCode
Scanning sensor	CMOS-Kamera 5 Megapixel
Communication interface	1 x USB 2.0
Power supply	24 V DC/0,6 A (via ASKION C-line® work bench or external power supply unit)

defroster TD100

ASKION C-line® TD100

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

ASKION C-LINE® TD100

The ASKION C-line® TD100 defroster completes the family of devices for cryogenic storage. It allows a reproducible thawing of different sample formats after retrieval from the storage system.

The TD100 produces a light, heated air stream and spreads this over the frozen sample material. The samples may remain in the used sample holder, e. g. an SBS-rack. The use of a water bath is no longer necessary, thus contamination of the samples as well as damage to the samples identification will be prevented.

The most homogenous thawing curves can be achieved using the especially to the C-line® system adapted and for freezing and thawing optimized ASKION aluminium SBS-racks. If samples in these racks are taken out of the device immediately after complete liquefaction, the racks show a temperature barely above the freezing point and keep the samples long enough in a chilled state to process them further with minimal toxic effects due to CPA usage.

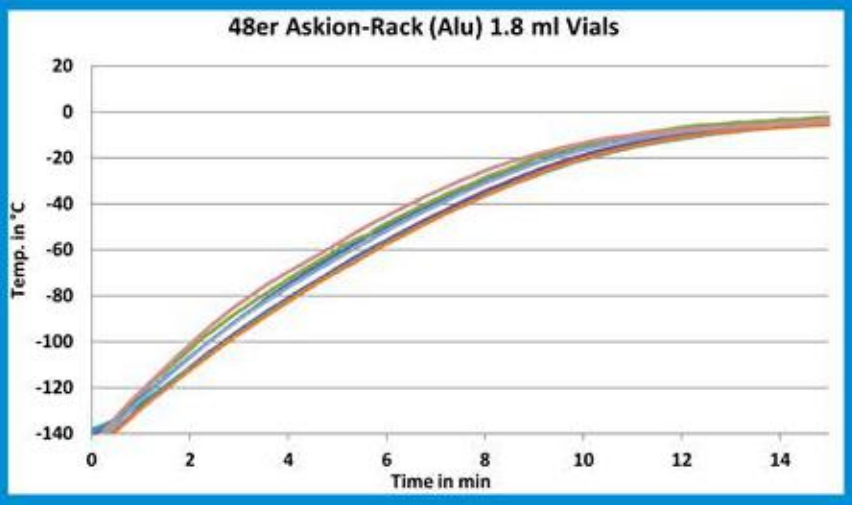


Figure: Thawing curves of a 10 % aqueous DMSO solution measured at different sites within the SBS rack

TECHNICAL DATA

defroster TD100

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

The ASKION C-line® TD100 defroster can be used to warm up and dry C-line® inserts, that have been used to freeze, store or retrieve samples, in a short period of time. So the 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.

Dimensions (width x depth x length)	190 x 230 x 330 mm
Weight	6 kg
Electrical connection	230 V/5 A
Max. power	1,150 W
Climate conditions for use	0°C ... + 40°C 15 % ... 70 % relative humidity
Thawing time/empty rack	approx. 5 min

control 2.0

ASKION C-line® control

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

DATA STATION WITH BARCODE SCANNER

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 bio-database can be integrated fully into extisting laboratory or hospital information systems. ASKION C-line® control 2.0 already provides the option to upgrade your biobank to a fully automated solution.

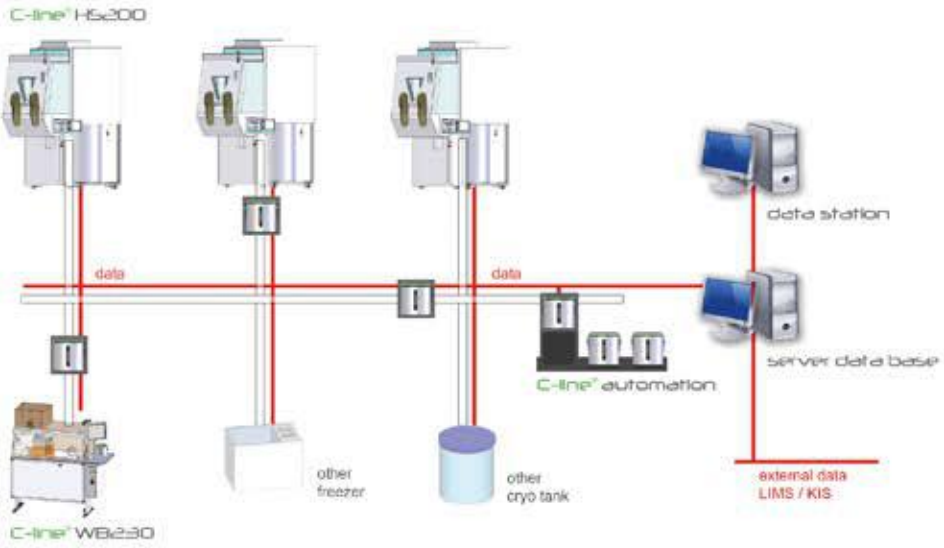
ASKION C-line® control server for storing all system data of the biobank
ASKION C-line® control data station as input and communication interface for the server

Performance

- 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-specifical adjustment by the end user
- Easy order creation for freezing, storage and retrieval of single samples or batches
- Data base for store data (sample ID and storage location) and additional data (freezing curve, all activities in the storage system marked with date, time, temperature and user)

SYSTEM REQUIREMENTS

control 2.0



C-line® control work flow

-100°C -110°C -120°C -130°C -140°C -150°C -160°C -1

System requirements	server
Processor	1.6 GHz (x64 processor)
	recommended: 2.3 GHz (x64 processor) or higher
Memory	4 GB RAM, recommended: 8 GB RAM or higher
Fixed-disc storage	500 GB, recommended: 1 TB or higher
Operating system	Windows Server 2008 R2
	recommended: Windows Server 2012 R2
Virtualization system	VMWare Workstation from version 10x (Windows/Linux)
Network card	100/1000 MBit/s
Monitor	monitor with at least 1280 x 1024 pixel resolution
Input device	mouse and keyboard
Optional	backup system

System requirements	data station
Processor	1.0 GHz (x86 or x64 processor)
	recommended: 1.6 GHz (x86 or x64 processor) or higher
Memory	1 GB RAM, recommended: 2 GB RAM
Fixed-disc storage	100 GB, recommended: 500 GB or higher
Operating system	Windows 7
Network card	100/1000 MBit/s
Monitor	monitor with at least 1280 x 1024 pixel resolution
Input device	mouse and keyboard
Optional	barcode scanner, printer

✱ Notes

✱ Notes

✱ Notes

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