

# BioArchive System

BioArchive™ System (Fig 1) is a computer-controlled, liquid nitrogen cryopreservation and storage system that enables the freezing and management of up to 3623, 25-ml cord blood samples.

The BioArchive System offers:

- Precise, controlled-rate freezing and archiving of cord blood
- >94%\* post-thaw cell viability, when used in conjunction with the AXP AutoXpress™ Platform
- Robotic storage and retrieval which delivers precise sample handling, minimizes transient warming events (TWE), and reduces operator exposure to liquid nitrogen
- SMS (Sample Management System) software which provides barcode sample tracking, sample history, and inventory control
- Assistance with cGMP and cGTP compliance
- Built-in thermal tracking, data management features and safeguards

\* Data provided by The New York Blood Center.

## Precise and automated sample care

BioArchive integrates controlled-rate freezing, robotic storage, and retrieval into a single automated system. SMS data acquisition and tracking software assists with cGMP and cGTP compliance.

By integrating and automating functions, BioArchive ensures precise sample handling and reduces the risks for operator error and exposure to liquid nitrogen. Integration also helps maintain sample integrity since manual transfer from the CRF modules to storage in liquid nitrogen is eliminated, which reduces both the frequency and severity of TWE's. Standardized freezing bags allow repeatable freezing characteristics plus robotic storage and retrieval of samples. The BioArchive System has two integrated controlled-rate freezer (CRF) modules (Fig 3) for freezing and storing samples.



Fig 1. The BioArchive System.

## System components

### Liquid nitrogen dewar

The liquid nitrogen dewar (Fig 2) is a vacuum-insulated, stainless steel reservoir that holds 520 L liquid nitrogen. When filled, the storage dewar maintains all the samples at  $-196^{\circ}\text{C}$ . Storage racks in the dewar can house up to 3623, 25-ml samples in a concentric arrangement for access by the robotic arm and periscope assembly. The interior of the storage dewar is accessed through the two ports which are covered when not in use.

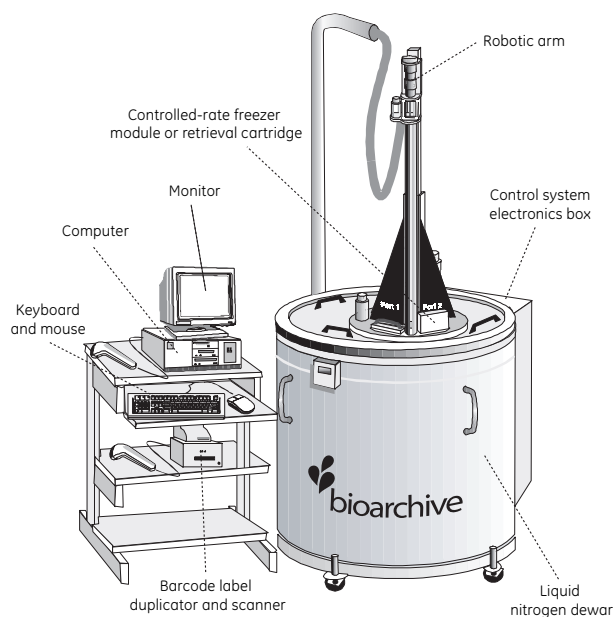


Fig 2. The BioArchive System components.

### Controlled-rate freezer

Two integrated CRF modules, which can be used simultaneously, are supplied with the BioArchive System. The CRF modules have hinged doors with sufficient insulation to prevent shock freezing. A fan mounted at the rear of the CRF doors determines the sample freezing rate by passing nitrogen vapor through the interior of the CRF freezing chamber (Fig 3). Sample freezing follows a predefined three-step profile to  $-50^{\circ}\text{C}$  (Fig 4), at which time the sample is transferred to an address within the liquid nitrogen. This process provides excellent post-thaw cell viability.

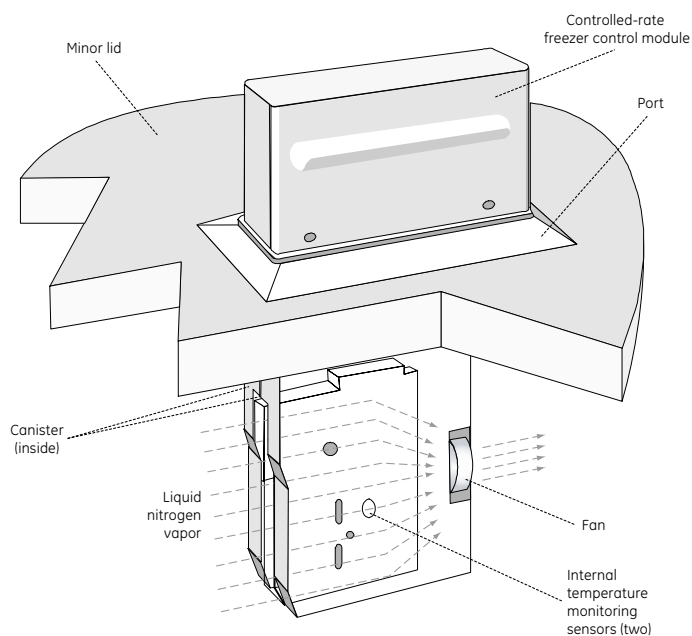
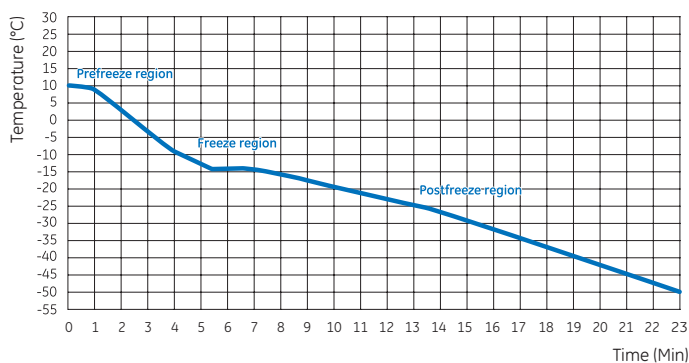


Fig 3. A CRF module in position for sample freezing.



#### Prefreeze region

In the prefreeze region the sample is above the freezing point of the cryoprotected sample solution (approximately  $-10^{\circ}\text{C}$ , depending upon the amount and type of cryoprotective material that is added to the sample).

#### Freeze region

In the freeze region the sample releases latent heat of fusion (freezing).

#### Postfreeze region

In the postfreeze region the temperature of the sample is below the freezing point.

Fig 4. Three-step sample freezing profile.

### Robotic arm

The robotic arm (Fig 2) is a system that confirms sample identity, then stores and retrieves the samples from specific storage addresses in the dewar. The robotic arm has a charge-coupled (CCD) barcode scanner mounted at the top of the periscope arm which is optically linked to the viewing glass at the bottom of the periscope arm. The barcode scanner reads the barcode label on the canister when the canister hook of the robotic arm engages a sample canister (Fig 5).

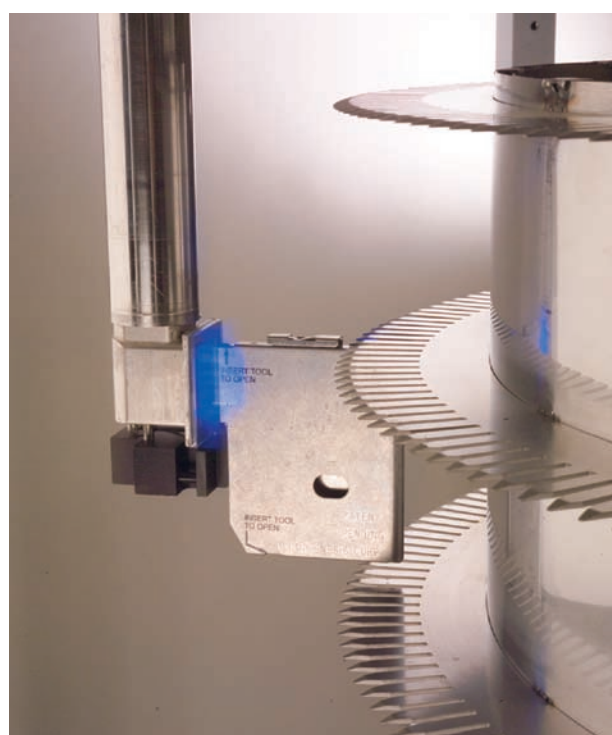


Fig 5. Removal of canister from CRF module.

## Retrieval cartridge

The retrieval cartridge (Fig 6) is used for retrieving frozen samples. The retrieval cartridge is similar to the CRF except that the two doors and the fan are not present. In their place is a frame to hold a foam canister sleeve. The canister sleeve insulates the sample from warming when it is removed from storage in the BioArchive.



Fig 6. Retrieval cartridge with sample canister in canister sleeve.

## Workstation

The BioArchive workstation includes a computer, monitor, barcode scanner, printer and label duplicator. The SMS software allows users with administrative privileges to create, alter and save freezing profiles. The barcode scanner is used to enter the sample ID during sample storage and retrieval. The label duplicator prints barcode labels with the same number as the sample for labeling the freezing bag and storage canister.

## Sample management and system control

### Sample management system

The SMS software tracks samples by barcode identification and collects sample history information, including the serial number of the CRF used, sample temperature during freezing, the number of TWE's, and user access ID. Information is stored in a fully searchable database. Reports for sample history, inventory, QC, and freeze graphs can be generated.

## Liquid nitrogen control system

The liquid nitrogen control system continuously monitors and detects when the liquid nitrogen level is above or below preset levels.

## Microprocessor control system

The microprocessor controls the motion of the robotic arm and the opening and closing of the CRF doors. The control system also systematically assigns the specific addresses at which each canister containing a sample is to be stored, and it maintains the location of each specific sample in the database.

After the freezing is completed, the sample ID, time and date the sample was frozen, and temperature vs. time data that are obtained during freezing of the sample are stored in the database. BioArchive includes an uninterruptible power supply (UPS) that allows completion of sample placement or retrieval in the event of a power failure.

## Technical specifications

Storage capacity	Up to 3623 units (25 ml/unit)
Storage temperature	-196°C
Liquid nitrogen capacity	520 L
Liquid nitrogen consumption	approx. 25 L/day (amount will vary depending on usage)
Power requirements	220–240 VAC, 50/60 Hz
Line voltage variation	+ 10%, - 15%
Power consumption	10 A (maximum)
Monitor power consumption	1.5 A (maximum)
Weight	545 kg (empty), 1590 kg (full)
Dimensions (W × H × D)	130 × 269 × 152 cm

## Ambient operating environment

Relative humidity	60% maximum
Temperature	15°C to 27°C

## Ordering information

Description	Code No.
BioArchive Cryopreservation System, 200-240 VAC*	8-4000-1

\* All BioArchive Cryopreservation Systems include BioArchive dewar, computer with SMS software, printer, computer stand, two CRF's, retrieval cartridge, barcode-label duplicator and labels, printer, barcode scanner, UPS, and magnetic retrieval device.

## Accessories

Description	Quantity	Code No.
Fill/Sael Jig	1	TG7-63-051
Controlled Rate Freezer Module (spare)	1	TG7-65-009
Manual Retrieval Device	1	TG7-80-001
Advanced Overwrap Sealing System, 110 VAC	1	TG8-6200-0
AV-1 Auto Expressor	1	TG8-4100-0
Sebra Sealer, Moddifie	1	TG8-6100-0
Barcode Label Set	1000	TG6-01-036
Canister Sleeves	100	TG6-16-202
Overwrap Bags	100	TG7-01-150
Needle Positioning Jig	1	TG6-57-018
Needle Positioning Jig	1	TG6-57-018
BioArchive System Installation	1	5090-001BA
1 Year Service Agreement	1	5090-001BASA1
3 Year Service Agreement	1	5090-001BSA3

## Related Products

Description	Quantity	Code No.
AXP Startup Kit*	1	28-4044-63

\* The AXP Startup Kit includes; AXP device and weight compensation cap, device stand, docking station-main, XpresTRAK™ software, weight kit, counterweight, operator manual, and barcode scanner.



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