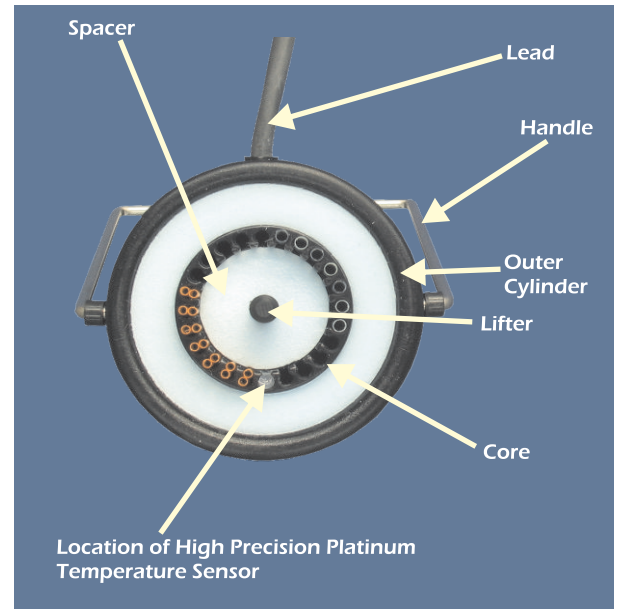


CRYOCHAMBERS Superior Technology

All FREEZE CONTROL® cryochambers have an outer cylinder, with a central core to hold the specimens. A control element and a built-in temperature sensor are located inside the cryochamber. The cryochamber has a handle, a lid, and a lead which connects to the temperature controller. All cryochambers (except the 60 ampoule) have a lifter and spacer.

FREEZE CONTROL® cryochambers are designed to provide uniform heat transfer from all specimens to liquid nitrogen. A high precision platinum temperature sensor permanently mounted in the core measures and continuously monitors the specimen temperature. The highly conductive material of the cryochamber ensures a very high degree of temperature uniformity of the specimens whether liquid nitrogen levels are high or low. The unique design of the cryochamber and the material used in its construction contribute to the efficient removal of latent heat from the specimens. The lifter and spacer supplied with a cryochamber are essential parts of the cryochamber operation. The lifter is an integral part of manual seeding. The spacer reduces condensation and convection within the core, and assists in maintaining specimen temperature uniformity.



Cryochamber sits directly inside the CryoBath

Cryochamber Technology

- The cylindrical design of the cryochamber ensures a very high degree of temperature uniformity for each specimen, and ensures efficient heat transfer from specimens.
- The strategic location in the core of the high precision platinum sensor ensures temperature stability and precise temperature control. Its fixed position contributes to sensor durability.
- Temperature is monitored continuously by the sensor, and is precisely maintained by servo-control technology.
- The highly conductive material used in the cryochamber ensures that the temperature between and along each straw is maintained with no more than $\pm 0.2^{\circ}\text{C}$ temperature variation.

CRYOCHAMBERS

For a range of Applications

A range of FREEZE CONTROL® Cryochambers are available. Each cryochamber is separate from, and plugs into, the temperature controller. Cryochambers, therefore, can be simply interchanged for freezing different specimens allowing the customer to select the option most appropriate to their needs.

Cryochambers are available in Standard or Fast versions. The STANDARD design is suitable for most slow cooling applications, whereas the FAST design is appropriate for applications where faster cooling rates are desired. The choice of different cooling rates at different stages of the cryopreservation program ensures that risk of cell damage is minimized. Cooling rates from 0.1°C/min to 16°C/min can be accommodated, depending on the particular cryochamber selected.

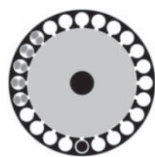
Maximum Cooling Rates (unloaded) are:

23-Slot Cryochamber

Standard (CC23S)

9°C/min at 20°C

6°C/min at -40°C



Fast (CC23F)

16°C/min at 20°C

10°C/min at -40°C

20-Slot Cryochamber

Standard (CC20S)

8°C/min at 20°C

5°C/min at -40°C



Fast (CC20F)

14°C/min at 20°C

9°C/min at -40°C

5-Slot Cryochamber

Standard (CC5S)

6°C/min at 20°C

4°C/min at -40°C



Fast (CC5F)

12°C/min at 20°C

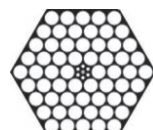
7°C/min at -40°C

60 Ampoule Cryochamber

Standard (CC60AS)

3°C/min at 20°C

2°C/min at -40°C



Fast (CC20AF)

5°C/min at 20°C

3°C/min at -40°C



Standard 60 Ampoule Fast 20-Slot Standard 23-Slot

FREEZE CONTROL® Cryochamber Facts

Applications:

- Designed for Freezing and Thawing a range of biological specimens.

Cooling Rates:

- A range of cooling rates are offered to accommodate a variety of specimen protocols.

Manual Seeding:

- Specimens are safely accessed by raising them with the lifter.
- Tight thermal coupling between specimens and core ensures latent heat is efficiently removed during manual seeding.

Location of Specimens:

- Specimens are frozen in straws or ampoules in the vertical position.