

# HIGH PERFORMANCE CONTROLLED RATE FREEZE/THAW CHAMBER

## Model 4002

Designed for high volume, accelerated bulk freezing and/or thawing of product under controlled conditions.



Model 4002, shown, with a 20.4 cu.ft. interior chamber designed for bulk freezing and thawing with customer specified profile.

Temperature Range:  $-80^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$

Validatable.

Reduces product freezing and/or thaw time from days or weeks to hours.

### Applications:

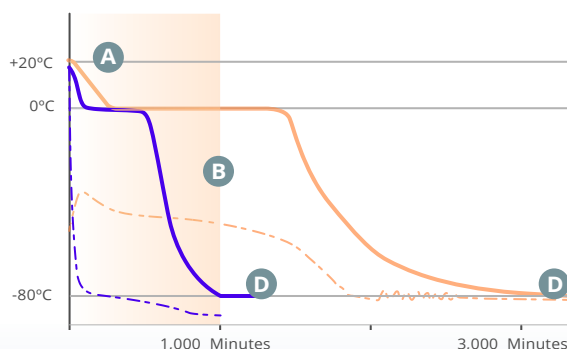
- High Throughput Freezing for Storage
- Control Rate Freeze/Thaw Capability for Single Use Systems
- Blast Freezing (Rapid Freeze)
- PCM Conditioning
- Thermal Shock Testing

The Farrar Scientific Controlled Rate Chamber permits fast, uniform bulk freezing and/or thawing of temperature sensitive products contained in a variety of containers such as single use system (SUS), polycarbonate/polypropylene vessels, and PCMs.

## General Performance

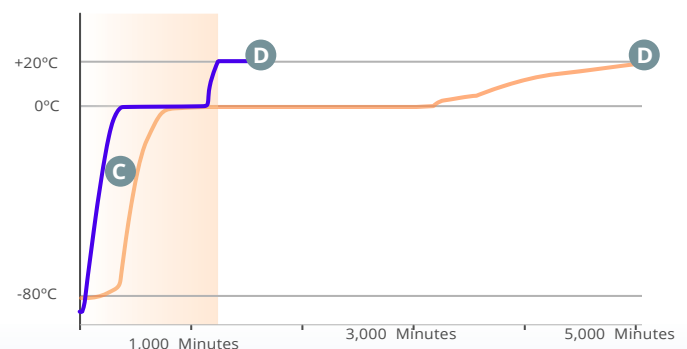
- Rapid bulk freezing and/or thawing in hours instead of days or weeks.
- Uniform, repeatable results improve quality control processes.
- Forced-air circulation provides quick pulldown from ambient to desired temperature throughout the fluid core.
- Eliminates uncertainty, provides temperature specific conditioning to satisfy thermal processing protocols.
- Deep temperature pulldown surpasses supercooling point of mixed solution fractions.
- User programmable profiles allow flexibility to meet unique product conditioning requirements.

Freeze Rate: Model 4002 vs Standard ULT Freezer, 50L Load

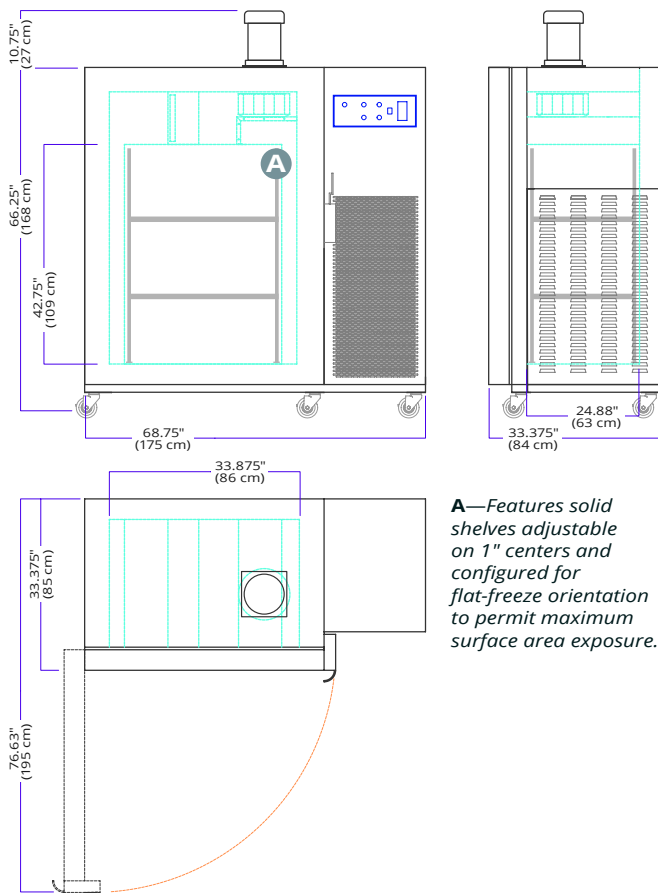


— Model 4002 product temp  
— Model 4002 air temp  
— Standard ULT product temp  
— Standard ULT air temp

Thaw Rate: Model 4002 Controlled Thaw vs Ambient Air (standard ULT Freezer has no thaw capability)



A Ambient, Start; product loaded into chamber  
Standard ULT freezer was pre-cooled to  $-80^{\circ}\text{C}$  | Model 4002 chamber was started from ambient  
B Controlled temperature pulldown  
C Controlled temperature ramp up  
D Product at storage/use temperature, nominal temps shown (user defined)



**A**—Features solid shelves adjustable on 1" centers and configured for flat-freeze orientation to permit maximum surface area exposure.

## Control System — Freeze/Thaw

- A programmable controller allows user defined temperature setpoint, pulldown, dwell, ramp and hold temperatures.
- The controller allows for the storage of three programmable profiles through the programming port.
- Probe port allows for external monitoring.
- Control panel lights indicate system status.

## Refrigeration and Airflow System

*Designed using the Farrar Scientific Energy Balance™ modeling protocol ensures:*

- High performance refrigeration system provides high BTU removal for rapid throughput with minimum power consumption.
- High differential pressure blower system provides one cabinet air exchange per second over the product load to maximize the rate of energy removal.

## Cabinet Design

- Powder-coated, heavy-gauge steel cabinet with foamed-in-place insulation.
- Outer door with positive door latch closes against multipoint gasket with door locking capability.
- Integrated evaporative condensate removal system, no facility drain required.

## MODEL 4002 SPECIFICATIONS

Temperature Range:	Programmable, +40°C to -80°C
Electrical:	208/230VAC, 3Ø, 60Hz, 26FLA, 40Amp breaker, NEMA 15-50R receptacle required
Chamber Volume:	20.4 cu.ft. (578 liters)
Shelves:	2 shelves, standard, adjustable on 1" centers; Additional shelving available
Cabinet Exterior:	68.75"W x 33.375"F-B x 77"H, including casters and motor (175 x 84 x 196 cm)
Casters and Leveling Feet:	4" Dia. casters; 4 swivel, 2 swivel/lock. 3 leveling feet
Door Swing Allowance:	48" (122 cm) arc
Cabinet Interior:	33.875"W x 24.88"F-B x 42.75"H (86 x 63 x 109 cm)
Net Weight (Empty):	995 lbs (451 kg)
Shipping Weight:	1454 lbs (660 kg)
CE Mark Models:	4005, 4006

## ADDITIONAL SERVICES

Validation
Temperature Mapping
Customer Specified Pre-Programming and Process Validation
Custom Material Handling Systems Available



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