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Forma® Cryopreservation Equipment



Forma Scientific, Inc.

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CONTROLLED RATE FREEZING AND LN_2 STORAGE

For maintaining cell viability at ultra-low temperatures, Forma Scientific's Controlled Rate Freezing Systems and Liquid Nitrogen (LN_2) Storage Systems provide numerous configurations for continuous long-term storage. Cryopreservation has resulted in methods that permit low temperature maintenance of a diversity of cells. Maximum accuracy of cell freezing is assured with our microprocessor controlled rate freezing systems. Short- and long-term liquid nitrogen storage is available in the Forma® CryoPlus Series, Cryo Series, and CMR/CMC Series. The Forma CMD Series of dry shippers is available for transporting samples. All Forma storage systems use non-CFC liquid nitrogen as the single source for maintaining cryopreservation temperatures. Complete inventory control systems and accessories are available so you can design a system around your needs.

TABLE OF CONTENTS

PAGES

CONTROLLED RATE FREEZING SYSTEMS AND CHAMBERS 4-9

Sophisticated microprocessor technology and a liquid nitrogen cryogen provide easy controlled rate freezing. Forma Controlled Rate Freezing Systems and Freezing Chambers assist in providing maximum cell viability.

FREEZING CHAMBER ACCESSORIES 10-11

CRYOPLUS SERIES 12-13

The Forma CryoPlus Series features convenient storage and retrieval of valuable biological specimens. Front-mounted microprocessor control panel and liquid level control make programming and checking LN_2 levels quick and easy. Four units, including a 24.0" (61.0cm) diameter, are available with storage capacities of 6,318, 13,000, 24,000, and 38,500 vials (2.0ml) to maximize lab space use.

CRYO SERIES 14-15

The Forma Cryo Series provides high quality storage capabilities at a cost-effective price. These units provide a wide range of storage capacities while controlling your LN_2 costs. The front-mounted, liquid level control panel makes operating the unit and checking the alarm status convenient and easy.

INVENTORY CONTROL SYSTEMS FOR THE CRYOPLUS AND CRYO SERIES

Arrowhead, Square, and Vertical Racks 16

SUC-1 Rack for Cane Storage 17

Risers for Vapor Phase Storage 17

Blood Bag Canisters, Frames, Platform Dividers, and Risers 18

CMR/CMC SERIES PORTABLE LN_2 STORAGE CONTAINERS 20

The unique container design of the Forma CMR/CMC Series allows for long-term storage and easy retrieval of samples with minimal LN_2 usage. Units accept racks or canisters for storing up to 3,564 vials (2.0ml).

CMD SERIES DRY SHIPPERS 21

The Forma CMD Series includes cryopreservation dry shippers that range in shipping capacities from 10 to 996 vials (2.0ml) and can retain temperatures as low as -190C (-310F).

ACCESSORIES

General Accessories for the CryoPlus, Cryo, and CMD Series (e.g., gloves, vials, recorder, controls, etc.) .. 22-26

CMR/CMC Series Accessories 25

Lab Dewars 26

LN_2 Supply Tanks 26

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INDEFINITE STORAGE ... INFINITE POSSIBILITIES

Forma Scientific manufactures the most technologically advanced cryopreservation equipment available with our complete line of cryopreservation equipment.

Water is the major component of all living cells and must be present for chemical reactions to occur within a cell. During cryopreservation, the water changes to ice and cellular metabolism ceases. Dehydration also occurs, changing the concentration of salts and other metabolites and creating an osmotic imbalance that can be detrimental to cell recovery. However, these detrimental effects can be minimized by controlling the rate of cooling, using cryoprotective agents, and maintaining appropriate storage temperatures and rates of rewarming.

A cooling rate too high or too low can result in low cell recovery due to dehydration or ice crystal formation. Controlled rate freezing before long-term storage eliminates these variables to ensure maximum cell viability for a wide variety of cells. Programmed, uniform cooling rates are effective for a variety of freezing applications, some of which include:

Lymphocytes	**Tissue Banking**
Bone Marrow	**Tumor Cells**
Plant Cells	**Heart Valves**
Stem Cells	**Cord Blood**

The temperature at which frozen cells are stored affects their viability after recovery. The lower the temperature, the longer the viable storage period. At -196C (-320F), biologically relevant, thermally-driven chemical reactions are not known to occur. It is, therefore, believed that the majority of the population of stored cells will remain viable and unchanged for an indefinite period of time.(1)

Preservation of microorganisms, isolated tissue cells, small multi-cellular organisms, and even larger, more complex organisms can be achieved with controlled rate freezers and liquid nitrogen storage systems.

Choose Forma Scientific as your single source for controlled rate freezing systems and liquid nitrogen storage vessels for long-term storage.

Every effort has been made to provide the highest quality liquid nitrogen containers available. As an extra precaution, we recommend using external alarm systems to ensure maximum protection of your valuable specimens.



1. *Committee on Germ Plasm Resources, Division of Biological Sciences, Assembly of Life Sciences, National Research Council, 1978. Conservation of Germ Plasm Resources: An Imperative. 7:79-84.*

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FORMA 1050 (1051) COMPUTER INTERFACE FREEZING SYSTEM

We offer the Forma 1050 (1051) System for data base documentation of freezing protocols and graphs, as well as for sample information. This computer interface freezing system allows you to completely monitor and control all controlled rate freezing processes. The optional Forma 8028 (8029) Temperature Recorder (strip chart) is available for back-up documentation.



1050 (1051) System shown with the 8026 (8027) Freezing Chamber

COMPONENTS

- Pentium computer, mouse, and SVGA monitor
- Windows operating system
- Cryo-software, which operates in MS-DOS mode only
- RS-232 interface cable
- Dot matrix printer and stand
- 2.0ml sample thermocouple sensor
- Forma 8006 (8007) Controller and stand
- Six standard preset programs
- Choice of freezing chamber (choose from three sizes, see page 9)
- Stainless steel transfer hose and choice of one sample freezing rack or freezing press

FEATURES

- Monitor updates once per second, ensuring real time/real temperature accuracy. Data analysis updates once every 300 milliseconds.
- Zoom functions allow the graph to display temperature ranges of 1C to 20C (33.8F to 68F) and time ranges from five seconds to one hour for monitoring the controlled rate freeze.
- Graph comparison capability allows you to monitor protocol integrity.
- Program sequence is plotted on the screen so you can visually track performance.
- Storing graphs on computer diskettes eliminates storing chart paper.
- Program steps are printed on the graph for permanent reference and comparison to the protocol.
- Tracking and thermocouple (sample and/or chamber) errors are permanently logged to the program documentation.
- Forma 8006 (8007) Controller will operate independently of the computer interface.
- Program capability accepts 100 steps per program.
- Monitor continuously displays programmed, actual chamber, and sample temperatures.
- Manual override allows you to intervene and change the program while it is in progress.
- Wait For Temperature function equilibrates the chamber and sample temperature before automatically beginning the controlled rate freezing process.

FORMA 1060 (1061) COMPUTER INTERFACE FREEZING SYSTEM

The Forma 1060 (1061) System is the perfect solution if you want to use your own PC as an interface for controlled rate freezing. With the exception of the CPU, monitor, and printer, the standard components include all of the equipment necessary to monitor and control freezing processes as provided in the Forma 1050 (1051) System. The optional Forma 8028 (8029) Temperature Recorder (strip chart) is available also.

COMPUTER SYSTEM MINIMUM REQUIREMENTS

- IBM or compatible—386 minimum
- Monitor—Color VGA
- MS-DOS 6.0 operating system or higher
- Printer—IBM compatible dot matrix
- Mouse
- RS-232 interface
- RAM—1MB
- Hard Disk Space—1MB

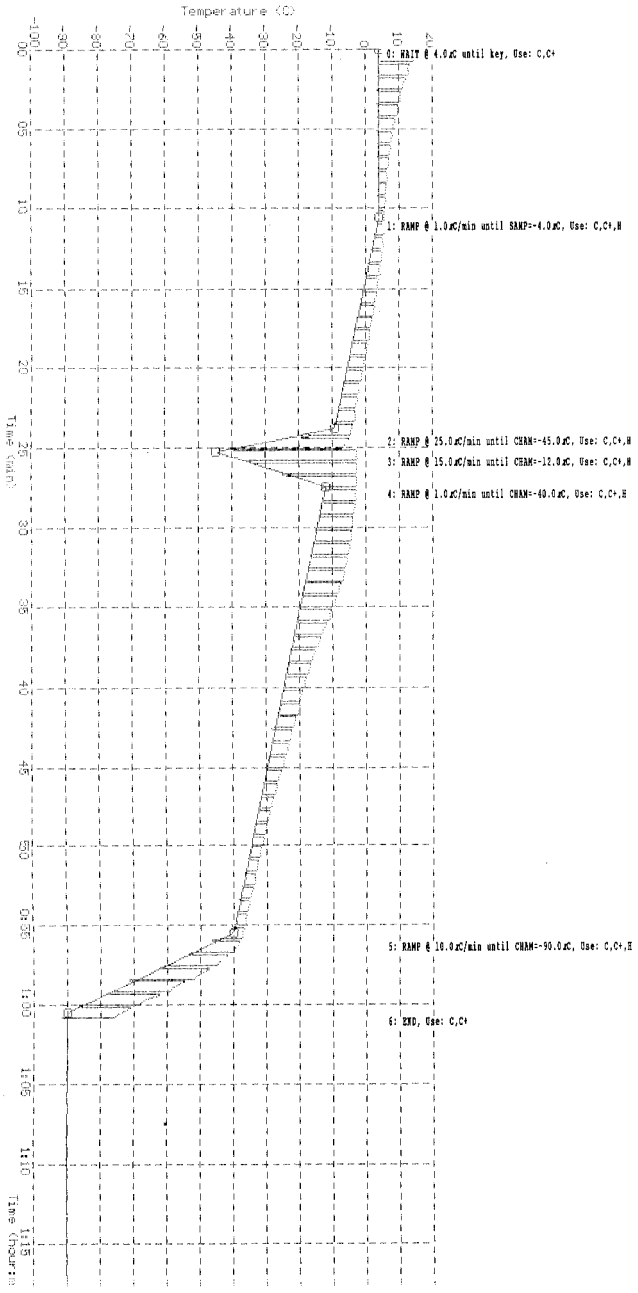
COMPONENTS

- Cryo-software (MS-DOS based) and RS-232 interface cable
- Forma 8006 (8007) Controller and stand
- Six standard preset programs
- Printer stand
- Choice of freezing chamber (choose from three sizes, see page 9)
- Stainless steel transfer hose and choice of one sample freezing rack or freezing press

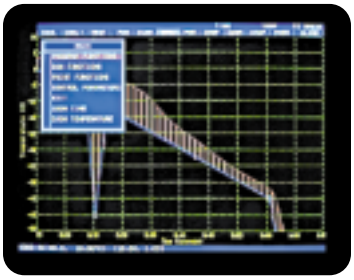
CRYOMED

DATE :
TIME : 0:23:50
PATIENT : Jeffery Ames I.D. 00009876
TYPE OF SAMPLE : Bone Marrow 65ML Bag
MEDIA :
CRYOPROTECTANT : DMSO
AMOUNT : 10%
NUMBER OF SAMPLES : 3
COMMENT:

Illustrated Graph is displayed in Temperature Increments of 10 degree and Time Intrevals of 5 minutes. Should a more detailed Graph be required see Zoom function available in Main Menu.

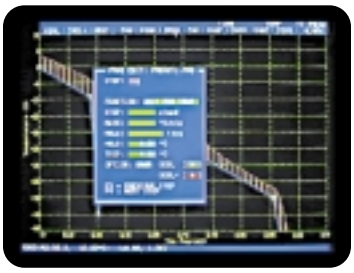


Typical freezing graph



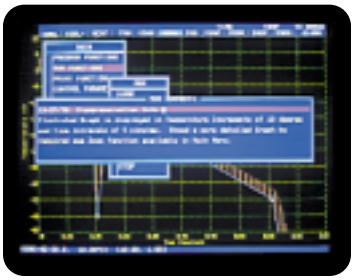
Main Menu

The Forma 1050 (1051) System boots up directly to the Cryo Freezing Program, followed by a **Main Menu**. This menu allows you to select various tasks, such as programming, retrieving a program from memory, activating a run, printing a previously run protocol, changing time/temperature settings, and setting error limits.



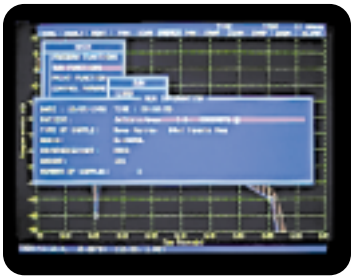
Program Screen

The **Program Screen** guides you through each step required to devise a new program or edit and update a previous program. Sample/chamber equalization temperature can be programmed, eliminating wasted time waiting for this occurrence before beginning the actual run. One hundred steps are available for each program.



Comment Section

The **Comment Section** is used to enter and save important information associated with each program and/or individual run. These comments provide a helpful specimen preservation history that can be stored and reviewed for future reference.



Run Information Screen

The **Run Information Screen** is used to log pertinent information associated with samples that are in the process of being frozen. This information remains with the specific saved run.

A **Help Screen**, which is available from each menu throughout the program, provides information about how to use the Cryo Freezing Program.

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FORMA 1010 (1011) CONTROLLED RATE FREEZING SYSTEM

The Forma 1010 (1011) Controlled Rate Freezing System offers microprocessor programming capabilities for user-defined protocols. Unsurpassed for user convenience, the microprocessor provides precise temperature control quickly and automatically.



1010 (1011) System shown with the 8024 (8025) Freezing Chamber and a rack

COMPONENTS

- Forma 8018 (8019) Programmable Controller with stand
- Forma 8028 (8029) Temperature Recorder (strip chart)
- Six standard preset programs
- Choice of freezing chamber (choose from three sizes, see page 9)
- Stainless steel transfer hose and choice of one sample freezing rack or freezing press
- 2.0ml sample thermocouple sensor

FORMA 8018 (8019) CONTROLLER FEATURES

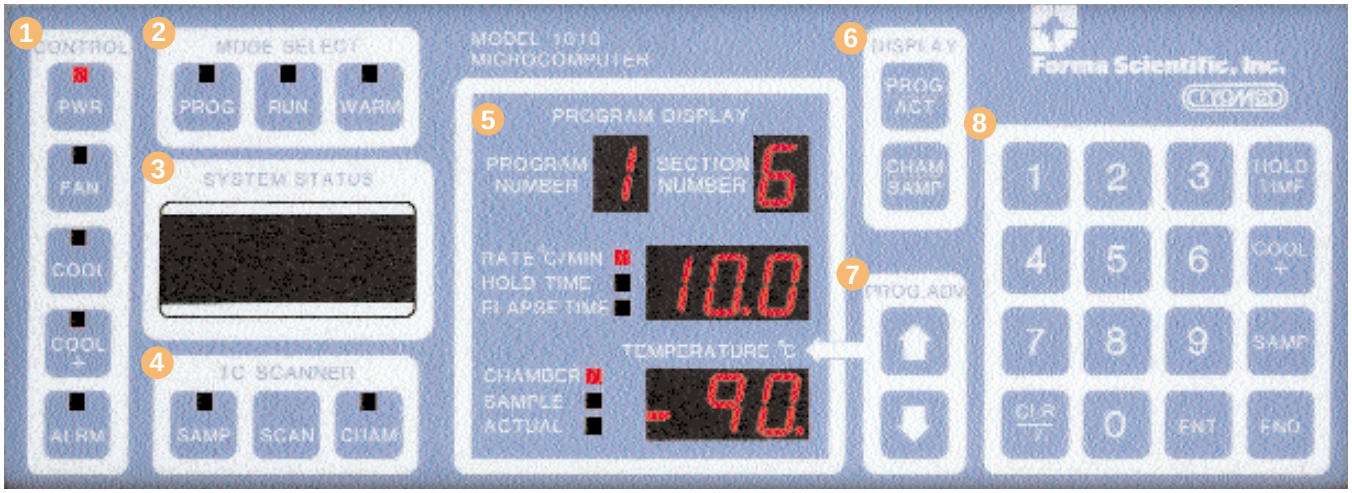
- Forma 8018 (8019) Programmable Controller combines microprocessor programming with push-button operation to quickly and easily meet your freezing needs between 50C and -180C (122F and -292F).
- Dual solenoid valve operation allows for precise temperature control and accelerated freezing.
- Programmable error limits with audible alarm protect against specimen damage resulting from program deviations. Alarm is tracked automatically, and a permanent record is documented on the temperature recorder.
- Freezing rates are programmable from 0.01C per minute to 99.9C per minute. Sample and chamber temperatures are clearly displayed as LED readouts on the control panel.
- Program holding times are from 1 second to 99.9 minutes.
- Manual override allows you to intervene and change the program while it is in progress.
- Convenience features include built-in self-diagnostics, a three digit access code for security, and compact design for limited laboratory space.
- RS-232 port permits computer interface or connection to our optional Thermal Data Printer.
- To compensate for latent release of heat, a chamber temperature drop may be activated by the actual sample temperature to reduce super cooling.

FORMA 8028 (8029) TEMPERATURE RECORDER FEATURES

- One roll of chart paper, one pen kit, and the cable are included.
- Single pen simultaneously charts the sample and chamber temperatures and permanently logs all tracking errors to a graph during freezing protocols.
- Incremental time is plotted at 2 minute intervals; temperature is plotted at 2C intervals. Paper advances at a rate of 0.5" (1.3cm) per minute.

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FORMA 8018 (8019) CONTROL PANEL LAYOUT



1. Touchpad keys control the fan, cooling mode, and alarm operation. Power key (PWR) indicates when power is on.
2. Mode Select keys are used to choose the four specific controller operating modes: program, run, warm, or idle. (Unit is in idle mode if no displays are illuminated.)
3. Six LED modules display the unit's system status during a program cycle.
4. Three keys control the thermocouple scanner operation for the sample only, chamber only, or sample and chamber alternately and relay temperature information to a temperature recorder.
5. Digital LED displays the selected program, section number, hold time, elapsed time, and setpoint temperatures.
6. Four indicators allow you to toggle between the programmed/actual chamber or the sample temperature display.
7. Up and down arrow keys allow you to advance or reverse through the programs to subsequent or previous sections.
8. Touchpad is used to select and enter numerical values and functions.

CONTROLLER AND RECORDER SPECIFICATIONS

MODEL	8018 (8019) CONTROLLER	8028 (8029) RECORDER
Temperature Range	50C to -180C (122F to -292F)	50C to -180C (122F to -292F)
Dimensions	14.0"W x 6.0"H* x 9.0"F-B (35.6cm x 15.2cm x 22.9cm)	15.0"W x 4.5"H x 12.8"F-B (38.1cm x 11.4cm x 32.5cm)
Electrical	95-125V, 50/60 Hz, 0.3 FLA (190-250V, 50/60 Hz, 0.3 FLA)	120V, 50/60 Hz, 0.5 FLA (230V, 50/60 Hz, 0.2 FLA)
Weight	20 lbs. (9.0 kg)	17.5 lbs. (7.9 kg)

Continuing research and improvements may result in specification changes at any time.
**Add 7.0" (17.8cm) to the height for the stand.*

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FORMA 700 (701) FREEZING SYSTEM

The Forma 700 (701) Controlled Rate Freezing System offers a pre-programmed protocol for 2.0ml vials with 7% to 12% cryoprotective agent. A second pre-programmed protocol for HLA trays is standard.



700 (701) Freezing System shown with the 8022 (8023) Freezing Chamber and a rack

COMPONENTS

- Forma 8016 (8017) Pre-Programmed Controller with stand
- Forma 8034 (8035) Temperature Recorder (strip chart)
- Choice of freezing chamber (choose from three sizes, see page 9)
- Stainless steel transfer hose and choice of one sample freezing rack or freezing press
- 2.0ml sample thermocouple sensor

FORMA 8016 (8017) PRE-PROGRAMMED CONTROLLER FEATURES

- Forma 8016 (8017) Pre-Programmed Controller is a compact, countertop, electronic device designed to regulate the cooling rate—1C per minute—of biological specimens in a freezing chamber.
- Two standard preset programs require minimum operator training and ensure maximum freezing accuracy and repeatability. (Customer-specified programs are available.)
- To compensate for latent release of heat, a chamber temperature drop may be activated by the actual sample temperature to reduce super cooling.
- LED readout and audible alarm are activated at the conclusion of the program, indicating the final chamber temperature of -90C (-130F) has been reached.

PRE-PROGRAMMED CONTROLLER FUNCTIONS

STEP	FUNCTION	TEMPERATURE
1.	Starting Temperature	4C (39.2F)
2.	Liquid Phase Freezing Rate	1C per minute
3.	Start Phase Change	-4C (24.8F) sample temperature
4.	Temperature Drop	To -45C (-49F)
5.	Solid Phase I Freezing Rate	1C per minute to -45C (-49F)
6.	Solid Phase II Freezing Rate	10C per minute
7.	End Freezing Setpoint	-90C (-130F)

When freezing HLA trays, Steps 3 and 4 are eliminated and the 1C per minute freezing rate is continuous from the Starting Temperature to the end of Solid Phase I.

FORMA 8034 (8035) TEMPERATURE RECORDER FEATURES

- One roll of chart paper, one pen kit, and the cable are included.
- Single pen simultaneously charts both sample and chamber temperature.
- Incremental time is plotted at 2 minute intervals; temperature is plotted at 2C intervals. Paper advances at a rate of 0.5" (1.3cm) per minute.

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CONTROLLER AND RECORDER SPECIFICATIONS

MODEL	8016 (8017) CONTROLLER	8034 (8035) RECORDER
Dimensions	8.0"W x 2.5"H* x 6.3"F-B (20.3cm x 6.4cm x 15.9cm)	15.0"W x 4.5"H x 12.8"F-B (38.1cm x 11.4cm x 32.5cm)
Electrical	95-125V, 50/60 Hz, 0.1 FLA (190-250V, 50/60 Hz, 0.1 FLA)	120V, 50/60 Hz, 0.5 FLA (230V, 50/60 Hz, 0.2 FLA)
Weight	3 lbs. (1.4 kg)	17.5 lbs. (7.9 kg)

Continuing research and improvements may result in specification changes at any time.
**Add 7.0" (17.8cm) to the height for the stand.*

FREEZING CHAMBERS FOR ALL FREEZING SYSTEMS



Models 8022 (8023), 8026 (8027), and 8024 (8025)

Forma Freezing Chambers can be used with all Forma Controlled Rate Freezing Systems. These Freezing Chambers are available in three standard sizes ranging from 0.1 cu. ft. to 1.3 cu. ft. (3.8 liters to 37.7 liters) to meet your freezing requirements. Choose from top or front loading units. We also offer a variety of chamber freezing racks for straws, 1.2/2.0ml cryo vials, 4.0/5.0ml cryo vials, canes, and blood and bone marrow bag presses.

FEATURES

- Each chamber is constructed of durable 304 stainless steel that provides a smooth interior and exterior surface.
- Silicone gasket surrounds the entire door opening to ensure proper sealing.
- Dual solenoid valve operation allows for precise temperature control and accelerated freezing.
- Heating element is incorporated into each chamber to balance controlled freezing and rewarming the chamber to ambient conditions.
- To maintain temperature stability, liquid nitrogen injection is distributed evenly into the chamber by an internal fan. For your safety, the fan and liquid nitrogen injection are disabled when the door/lid is opened. A protective screen covers the fan blades and all components are easily accessed.
- Chamber temperature is monitored by a permanently mounted Type T thermocouple. Sample temperature is monitored by a flexible Type T thermocouple.

SPECIFICATIONS

MODEL	8022 (8023)	8024 (8025)	8026 (8027)
External Dimensions	10.4"W x 16.0"H x 17.8"F-B (26.4cm x 40.6cm x 45.2cm)	19.8"W x 16.8"H x 17.0"F-B* (50.3cm x 42.6cm x 43.2cm)	24.3"W x 17.8"H x 20.8"F-B* (61.6cm x 45.1cm x 52.8cm)
Internal Dimensions	5.9"W x 11.7"H x 3.4"F-B (15.0cm x 29.7cm x 8.6cm)	9.3"W x 12.0"H x 9.9"F-B (23.6cm x 30.5cm x 25.1cm)	13.0"W x 13.0"H x 13.7"F-B (33.0cm x 33.0cm x 34.8cm)
Volume	0.1 cu. ft. (3.8 liters)	0.6 cu. ft. (18.0 liters)	1.3 cu. ft. (37.7 liters)
Electrical	95-125V, 50/60 Hz, 8.0 FLA (190-250V, 50/60 Hz, 4.0 FLA)	95-125V, 50/60 Hz, 9.5 FLA (190-250V, 50/60 Hz, 4.0 FLA)	95-125V, 50/60 Hz, 9.5 FLA (190-250V, 50/60 Hz, 4.0 FLA)
Utility Connections	1/2" 45 degree flare. 4.0 ft. (1.2m) flexible hose is supplied with Models 8022 (8023) and 8024 (8025). 6.0 ft. (1.8m) flexible hose is supplied with Model 8026 (8027).		
Weight	30 lbs. (13.0 kg)	51 lbs. (23.0 kg)	90 lbs. (41.0 kg)

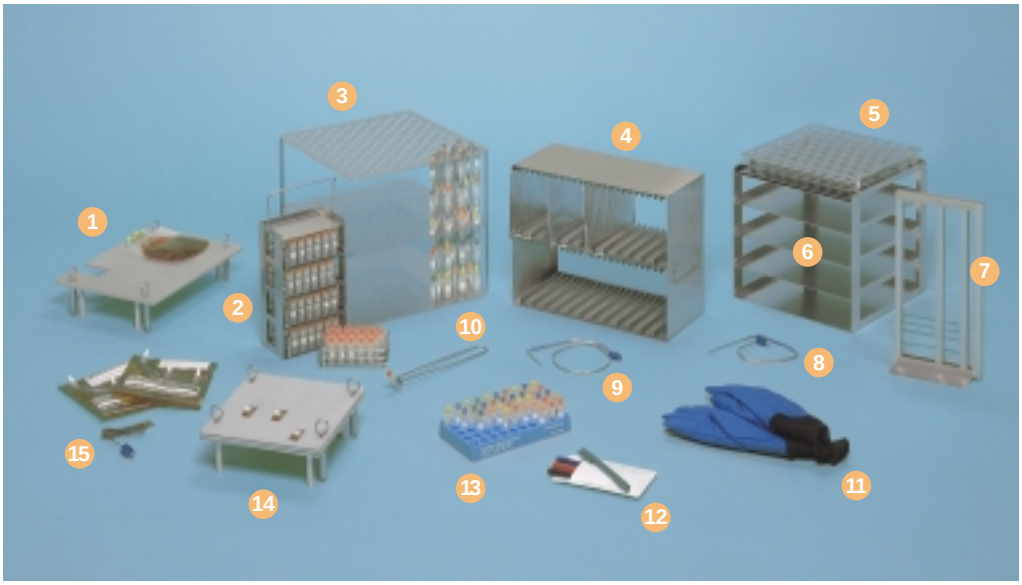
Continuing research and improvements may result in specification changes at any time.
**Dimension includes the handle.*

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ACCESSORIES FOR FREEZING CHAMBERS

Forma Scientific offers a full line of accessories to complement your cryopreservation equipment. This section describes the most common accessories used with Forma Controlled Rate Freezing Systems and Freezing Chambers. General accessories such as gloves, aprons, markers, and vials are included on pages 22 through 26.

QUICK REFERENCE ID CHART



Examples of freezing chamber racks, presses, and other available accessories

ITEM	NUMBER	DESCRIPTION
1	4000318	Nexell R4R9953 (Fenwal 4R5461) Double Bag Freezing Press
2	4000292	1.2/2.0ml Cryo Freezing Rack Holder with 5 Racks for Model 8022 (8023)
3	4000303	Cane Freezing Rack for Model 8026 (8027)
4	4000310	2 Level Skin Rack for Model 8026 (8027)
5	4000296	1.2/2.0ml Cryo Rack for Model 8024 (8025)
6	4000297	1.2/2.0ml Cryo Rack Holder for Model 8024 (8025)
7	4000294	0.25/0.5ml Straw Rack for Models 8022 (8023) and 8024 (8025)
8	4000386	4.0/5.0ml Cryo Tube Thermocouple Sensor for Models 8024 (8025) and 8026 (8027)
9	4000385	1.2/2.0ml Cryo Tube Thermocouple Sensor for Models 8024 (8025) and 8026 (8027)
10	4000388	Cryo Tongs
11	189575	Wrist-Length Gloves (size large)
12	4000221	Cryo Marker Pens, set of four pens (black, blue, green, and red)
13	4000226	Cryo Vial Filling Rack (holds 50)
14	4000316	Gambro DF-200 Bag Freezing Press
15	4000393	Thermocouple Sensor (ribbon type for bags)

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FREEZING CHAMBER RACKS AND PRESSES

NUMBER	DESCRIPTION	CAPACITY
	Chamber Racks for Model 8022 (8023)	
4000291	Cane Freezing Rack	24 canes, 5-6 ampules/cane
4000292	1.2/2.0ml Cryo Freezing Rack Holder w/5 Racks	5 racks, 24 ampules/rack
4000293	4.0/5.0ml Cryo Freezing Rack Holder	3 racks, 24 ampules/rack
4000294	0.25/0.5ml Straw Rack	1 rack/chamber, 40 straws/rack
	Chamber Racks for Model 8024 (8025)	
4000295	Cane Freezing Rack	72 canes, 5-6 ampules/cane
4000296	1.2/2.0ml Cryo Rack	72 ampules/rack
4000297	1.2/2.0 Cryo Rack Holder	Five 1.2/2.0ml Cryo Racks, 72 ampules/rack
4000298	4.0/5.0ml Cryo Rack	72 ampules/rack
4000299	4.0/5.0ml Cryo Rack Holder	Three 4.0/5.0ml Cryo Racks, 72 ampules/rack
4000294	0.25/0.5ml Straw Rack	2 racks/chamber, 40 straws/rack
4000301	2 Level Skin Rack	36 skin packets, 4.0" x 6.0" (10.2cm x 15.2cm)
4000302	2 Level Skin Rack	36 skin packets, 5.0" x 7.0" (12.7cm x 17.8cm)
4000340	10 Place Cord Blood Freezer Rack	1-2 racks/chamber, 10 canisters/rack
	Bag Freezing Presses for Model 8024 (8025)	
4000313	Delmed 2030-2	2 bags/press, 4 presses/chamber
4000314	Nexell R4R9953 (Fenwal 4R5461)	2 bags/press, 4 presses/chamber
4000315	Stericon RCM-91	2 bags/press, 4 presses/chamber
4000316	Gambro DF-200	2 bags/press, 4 presses/chamber
	Chamber Racks for Model 8026 (8027)	
4000303	Cane Freezing Rack	162 canes, 5-6 ampules/cane
4000304	1.2/2.0ml Cryo Rack	162 ampules/rack
4000305	1.2/2.0 Cryo Rack Holder	Five 1.2/2.0ml Cryo Racks, 162 ampules/rack
4000306	4.0/5.0ml Cryo Rack	162 ampules/rack
4000307	4.0/5.0ml Cryo Rack Holder	3 racks
4000294	0.25/0.5ml Straw Rack	3 racks/chamber, 40 straws/rack
4000310	2 Level Skin Rack	48 skin packets, 5.0" x 7.0" (12.7cm x 17.8cm)
4000311	3 Level Skin Rack	72 skin packets, 4.0" x 6.0" (10.2cm x 15.2cm)
4000312	1 Level Skin Rack	24 skin packets, 5.0" x 7.0" (12.7cm x 17.8cm)
4000340	10 Place Cord Blood Freezer Rack	1-2 racks/chamber
	Bag Freezing Presses for Model 8026 (8027)	
4000317	Delmed 2030-2	4 bags/press, 4 presses/chamber
4000314	Nexell R4R9953 (Fenwal 4R5461)	2 bags/press, 8 presses/chamber
4000318	Nexell (Fenwal 4R5461)	Double, 4 bags/press, 4 presses/chamber
4000555	Nexell R4R9955 (Fenwal 4R5462)	2 bags/press, 8 presses/chamber
4000320	Gambro DF-200	4 bags/press, 4 presses/chamber
4000321	Gambro DF-700	2 bags/press, 8 presses/chamber

SAMPLE THERMOCOUPLE SENSORS FOR FREEZING CHAMBERS

NUMBER	DESCRIPTION*	8022 (8023)	8024 (8025)	8026 (8027)
4000381	Thermocouple Sensor, 1.2/2.0ml Cryo Tube	•		
4000382	Thermocouple Sensor, 4.0/5.0ml Cryo Tube	•		
4000383	Thermocouple Sensor, 0.25/0.5ml Straw	•		
4000384	Thermocouple Sensor, 0.25/0.5ml Straw		•	•
4000385	Thermocouple Sensor, 1.2/2.0ml Cryo Tube		•	•
4000386	Thermocouple Sensor, 4.0/5.0ml Cryo Tube		•	•
4000393	Thermocouple Sensor, Ribbon Type for Bags		•	•

**All sensors are provided with a male plug.*

FORMA CRYOPLUS SERIES LIQUID NITROGEN STORAGE SYSTEMS

The Forma CryoPlus Series provides the perfect combination of liquid nitrogen storage reliability and microprocessor technology. Inventory systems of racks, canisters, and frames are available for optimum storage. Storage capacities of 6,318, 13,000, 24,000 and 38,500 vials (2.0ml) make the most of your valuable laboratory storage space. Custom inventory systems are available.



Models 7400 (7401), 7406 (7407), 7404 (7405), and 7402 (7403)

FEATURES

- CryoPlus liquid nitrogen storage tanks are double-walled and vacuum insulated with a stainless steel interior.
- Exterior cabinet is constructed of 18 gauge, cold-rolled steel with powder coated paint for durability and a high quality, uniform finish. Salt spray tests exceed 1,000 hours per ASTM Standard 117B-85.
- Top-mounted control panel allows easy access to the CryoPlus Microprocessor Controller for programming.
- Convenient, front-mounted key lock and rear-mounted, recessed power switch provide product security.
- Low profile of the tanks and the patented counterbalanced lid with 100% clearance allow easy access and sample retrieval. Exposure time and moisture migration are minimized; your valuable biological specimens are safeguarded.
- Lids incorporate foamed-in-place, high density polyurethane insulation with a dedicated vent (U.S. Patent 5,779,089). Two independent, flexible gaskets reduce moisture migration into the chamber.
- Standard temperature sleeve provides colder temperatures and more efficient vapor phase operation.
- Heavy-duty casters are standard.
- Optional Thermal Data Printer and optional Gas By-Pass Temperature Controller are available.
- Forma CryoPlus Series units are UL Listed, CSA Certified, and bear the CE Mark.

SPECIFICATIONS

MODEL	CRYOPLUS 1/ 7400 (7401)		CRYOPLUS 2/ 7402 (7403)		CRYOPLUS 3/ 7404 (7405)		CROYPLUS 4/ 7406 (7407)	
LN_2 Capacity	90 liters		200 liters		340 liters		552 liters	
Static Evaporation Rate*	3 liters/day		5 liters/day		8 liters/day		10 liters/day	
Static Holding Time	30 days		40 days		42.5 days		55 days	
Exterior Dimensions	21.5"W x 41.0"H x 26.0"F-B (54.6cm x 104.1cm x 66.0cm)		28.5"W x 41.0"H x 34.0"F-B (72.4cm x 104.1cm x 86.4cm)		34.5"W x 41.0"H x 41.5"F-B (87.6cm x 104.1cm x 105.4cm)		43.5"W x 47.0"H x 50.0"F-B (110.5cm x 119.4cm x 127.0cm) 93.5" (237.5cm) total height with lid open	
Clearance Requirements	Add 5.0" (12.7cm) to F-B for utilities and lid opening.							
Usable Interior Space								
Height:	27.5" (69.9cm)		27.5" (69.9cm)		27.5" (69.9cm)		27.5" (69.9cm)	
Diameter:	16.0" (40.6cm)		24.0" (61.0cm)		31.0" (78.7cm)		39.5" (100.3cm)	
Maximum Capacity								
Rack No.:	4000044	4000012	4000006	4000012	4000006	4000012	4000006	4000012
Racks:	6 arrowhead	11 vertical	10 square	26 vertical	17 square	48 vertical	28 square	77 vertical
2.0ml Vials:	6,318	5,500	13,000	13,000	22,100	24,000	36,400	38,500
Electrical	**7400/7402/7404/7406:** 100-120V, 50/60 Hz, 0.8 FLA (Operating range 90-132V) **7401/7403/7405/7407:** 200-230V, 50/60 Hz, 0.5 FLA (Operating range 180-253V)							
Utility Connections	1/2" 45 degree flare, 4.0 ft. (1.2m) flexible hose is supplied with Model 7400 (7401). 6.0 ft. (1.8m) flexible hose is supplied with Models 7402 (7403), 7404 (7405), and 7406 (7407).							
Weight								
Empty:	194 lbs. (88.0 kg)		325 lbs. (147.4 kg)		416 lbs. (188.7 kg)		680 lbs. (308.4 kg)	
Full:	354 lbs. (160.6 kg)		680 lbs. (308.4 kg)		1,021 lbs. (463.1 kg)		1,620 lbs. (734.8 kg)	
Shipping:	260 lbs. (117.9 kg)		400 lbs. (181.4 kg)		540 lbs. (244.9 kg)		892 lbs. (404.6 kg)	

Continuing research and improvements may result in specification changes at any time.
**Rate is based on new container performance. Actual working performance may vary with individual applications. Excludes supply tank evaporation rate.*

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CryoPlus Microprocessor Liquid Level Control and Alarm System

The Forma CryoPlus Microprocessor Liquid Level Control and Alarm System provides precise and accurate control over all parameters without complicated programming. For your convenience, 16 preset audible and visual alarm combinations provide maximum product protection.

Features

- Microprocessor is easily programmed with convenient push-button touchpad. Control panel can be locked.
- Remote alarm contacts for all system functions permit connection to an in-house monitoring system or use of the optional Sensaphone® Telephone Dialing Systems.
- Non-volatile microprocessor memory stores operational functions and alarm sequences.
- Built-in self-diagnostics feature automatic and manual test functions.
- System is programmable and allows you to monitor liquid or vapor phase storage.
- RS-232 port permits computer interface or connection to an optional thermal data printer.
- Audible, visual, and remote alarms alert you of error limits and alarm conditions.
- Liquid level pressure orifice and fill port are located within the vacuum space for maximum use of the chamber.
- Digitally displayed under-the-lid temperature notifies you of high temperature conditions.



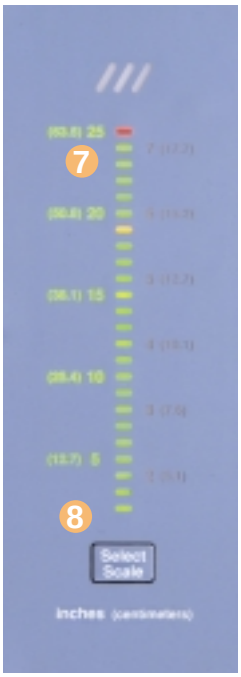
Microprocessor liquid level control and alarm system

1. Six LEDs reveal the system status and indicate visual warnings. Audible alarm exists for each of the following conditions:
   - ***Level Sensor*** indicates a level sensor malfunction.
   - ***Fill Valve*** indicates a fill solenoid valve malfunction.
   - ***LN_2 Source*** indicates an insufficient liquid nitrogen source.
   - ***By-Pass Sensor*** indicates a malfunction or disconnection of the by-pass sensor (with the Gas By-Pass option).
   - ***By-Pass Valve*** indicates a solenoid valve malfunction (with the Gas By-Pass option).
   - ***Open Valve*** indicates that the fill solenoid valve is stuck open.
2. Single backlit LED indicates that the solenoid valve is open and the container is filling.
3. Digital display indicates the actual temperature under the lid and the high temperature alarm setpoint.
4. Keypad incorporates eight functions for selecting or operating all control features.
5. Two-position switch allows access to all controller functions.
6. Continuous, red visual alarms alert you of any deviations in the program parameters, in addition to the actual alarm indication.
7. Twenty-four tri-color LED continuously displays the actual liquid nitrogen level and the high level/low level setpoints.

   Yellow is the remaining space above the high level flashing indicator. Flashing yellow upper section indicates the stop fill and high level alarm setpoint. Lower section indicates the start fill and low level alarm setpoint.

   Green indicates the actual liquid nitrogen level.

   Red would indicate liquid nitrogen high or low level alarm conditions.



LED bar graph

8. Select Scale button indicates whether the liquid phase scale of 2.0" to 25.0" (5.1cm to 63.5cm) or the vapor phase scale of 1.5" to 7.25" (3.8cm to 18.4cm) is in use.

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FORMA CRYO SERIES LIQUID NITROGEN STORAGE SYSTEMS

The Forma Cryo Series offers four sizes of storage tanks, including a unique 24.0" (61.0cm) diameter unit, to provide the proper size storage tank needed while minimizing your LN_2 storage costs. Inventory systems of racks, canisters, and frames are available for optimum storage.



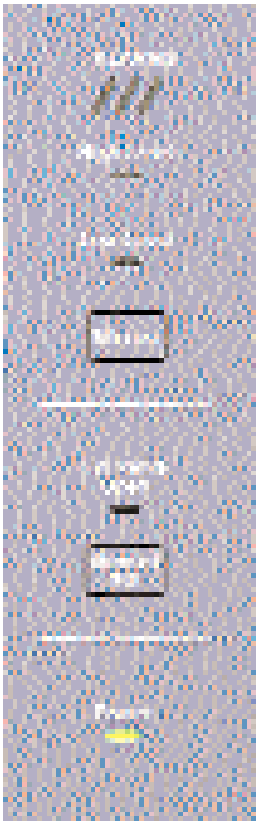
Models 740 (741), 746 (747), 744 (745), and 742 (743)

STORAGE SYSTEM FEATURES

- Cryo Series liquid nitrogen storage tanks are vacuum insulated with a stainless steel interior.
- Exterior cabinet is constructed of cold-rolled steel with powder coated paint for durability and a high quality finish. Salt spray tests exceed 1,000 hours per ASTM Standard 117B-85.
- For maximum product security, we provide a convenient, front-mounted key lock. Rear-mounted, recessed power switch protects against accidental power shut-off.
- Patented counterbalanced lid on all models provides easy entry into the storage area for retrieval of samples, minimizing exposure time and safeguarding valuable biological specimens.
- All lids incorporate foamed-in-place, high density polyurethane insulation with a dedicated vent (U.S. Patent 5,779,089). Two independent, flexible gaskets reduce the migration of moisture into the chamber and minimize icing.
- Wide variety of inventory control systems are available in capacities of 6,318, 13,000, 24,000, and 38,500 vials (2.0ml). Custom systems are available upon request.
- Heavy-duty casters are standard.
- Optional Gas By-Pass Temperature Controller is available.
- All Forma Cryo Series Liquid Nitrogen Storage Systems are UL Listed, CSA Certified, and bear the CE Mark.

CONTROL FEATURES

- Front-mounted Cryo Series control panel with audible and visual alarms allows you to easily check unit performance.
- Cryo Series allows the choice of either a manual fill or a built-in automatic liquid level control system to the following factory preset levels:
  - Low: 3.0" (7.6cm)
  - High: 5.0" (12.7cm)
- Access plate at the top of the unit makes it easy to adjust the liquid level sensor.
- Alarm contacts for remote monitoring of storage tank conditions or for use of the optional Sensaphone Telephone Dialing Systems are standard.
- Optional, factory installed gas by-pass of warm nitrogen vapor provides economical LN_2 transfer.
- Liquid level control sensor and fill ports are located within the vacuum space to provide maximum storage and sensor protection.



Control panel

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SPECIFICATIONS

MODEL	CRYO 100/ 740 (741)		CRYO 200/ 742 (743)		CRYO 300/ 744 (745)		CRYO 400/ 746 (747)	
LN_2 Capacity	90 liters		200 liters		340 liters		552 liters	
Static Evaporation Rate*	3 liters/day		5 liters/day		8 liters/day		10 liters/day	
Static Holding Time	30 days		40 days		42.5 days		55 days	
Exterior Dimensions	21.5"W x 41.0"H x 26.0"F-B (54.6cm x 104.1cm x 66.0cm)		28.5"W x 41.0"H x 34.0"F-B (72.4cm x 104.1cm x 86.4cm)		34.5"W x 41.0"H x 41.5"F-B (87.6cm x 104.1cm x 105.4cm)		43.5"W x 47.0"H x 50.0"F-B (110.5cm x 119.4cm x 127.0cm) 93.5" (237.5cm) total height with lid open	
Clearance Requirements	Add 5.0" (12.7cm) to F-B for utilities and lid opening.							
Usable Interior Space **Height:** **Diameter:**	27.5" (69.9cm) 16.0" (40.6cm)		27.5" (69.9cm) 24.0" (61.0cm)		27.5" (69.9cm) 31.0" (78.7cm)		27.5" (69.9cm) 39.5" (100.3cm)	
Maximum Capacity **Rack No.:** **Racks:** **2.0ml Vials:**	4000044 6 arrowhead 6,318	4000012 11 vertical 5,500	4000006 10 square 13,000	4000012 26 vertical 13,000	4000006 17 square 22,100	4000012 48 vertical 24,000	4000006 28 square 36,400	4000012 77 vertical 38,500
Electrical	**740/742/744/746:** 100-120V, 50/60 Hz, 0.8 FLA (Operating range 90-132V) **741/743/745/747:** 200-230V, 50/60 Hz, 0.5 FLA (Operating range 180-253V)							
Utility Connections	1/2" 45 degree flare, 4.0 ft. (1.2m) flexible hose is supplied with Model 740 (741). 6.0 ft. (1.8m) flexible hose is supplied with Models 742 (743), 744 (745), and 746 (747).							
Weight **Empty:** **Full:** **Shipping:**	194 lbs. (88.0 kg) 354 lbs. (160.6 kg) 260 lbs. (117.9 kg)		325 lbs. (147.4 kg) 680 lbs. (308.4 kg) 400 lbs. (181.4 kg)		416 lbs. (188.7 kg) 1,021 lbs. (463.1 kg) 540 lbs. (244.9 kg)		680 lbs. (308.4 kg) 1,620 lbs. (734.8 kg) 892 lbs. (404.6 kg)	

Continuing research and improvements may result in specification changes at any time.
**Rate is based on new container performance. Actual working performance may vary with individual applications. Excludes supply tank evaporation rate.*

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FORMA CRYOPLUS AND CRYO SERIES INVENTORY CONTROL SYSTEMS: RACKS AND RISERS

Our complete line of inventory control systems is designed to help organize your biological specimens. Inventory systems are available in either vapor or liquid phase capacities for 2.0ml, 4.0ml, or 5.0ml samples. Vertical racks, which allow you to work conveniently in the vapor or liquid phase, are available in 4 or 5 box configurations, each with 100-cell dividers. All Forma racks are shipped complete with boxes, dividers, and locking rods. Risers are available for vapor phase storage.

CHOOSING THE APPROPRIATE RACK

1. Point to the row that contains the **Storage Unit** you are going to use (e.g., CryoPlus 3/Model 7404).
2. Move your finger across the column(s) to the appropriate **Rack Style** (e.g., Square).
3. Note the quantity of racks required for maximum capacity (e.g., System = 17 racks).
4. Point to the desired **Vial Size** (e.g., 4.0ml).
5. Move your finger immediately to the left for **Vapor Phase Storage** or to the right for **Liquid Phase Storage**.
6. Note the rack description (e.g., 7-3-C/100).
7. Move your finger down the column to the **Description and Part Number** that correlates to the rack.
8. Note the selected rack part number for order placement (e.g., If I'm using 4.0ml vials in the Model 7404 using vapor phase storage, I need 17 racks (No. 4000003) for maximum capacity).

STYLE	ARROWHEAD			SQUARE			VERTICAL	
	System = 6 Racks			System = 4 Racks			System = 11 Racks	
CryoPlus 1/	Vapor		Liquid	Vapor		Liquid	Vapor	Liquid
7400 (7401)	10-2-C/81	2.0ml	13-2-C/81	11-2-C/100	2.0ml	13-2-C/100	4-2-C/100	5-2-C/100
Cryo 100/740 (741)	7-3-C/81	4.0ml	8-3-C/81	7-3-C/100	4.0ml	8-3-C/100		
16.0" (40.6cm) Dia.	6-3.75-C/81	5.0ml	7-3.75-C81	6-3.75-C/100	5.0ml	7-3.75-C/100		
				System = 10 Racks			System = 26 Racks	
CryoPlus 2/				Vapor		Liquid	Vapor	Liquid
7402 (7403)				11-2-C/100	2.0ml	13-2-C/100	4-2-C/100	5-2-C/100
Cryo 200/742 (743)				7-3-C/100	4.0ml	8-3-C/100		
24.0" (61.0cm) Dia.				6-3.75-C/100	5.0ml	7-3.75-C/100		
				System = 17 Racks			System = 48 Racks	
CryoPlus 3/				Vapor		Liquid	Vapor	Liquid
7404 (7405)				11-2-C/100	2.0ml	13-2-C/100	4-2-C/100	5-2-C/100
Cryo 300/744 (745)				7-3-C/100	4.0ml	8-3-C/100		
31.0" (78.7cm) Dia.				6-3.75-C/100	5.0ml	7-3.75-C/100		
				System = 31 Racks			System = 77 Racks	
CryoPlus 4/				Vapor		Liquid	Vapor	Liquid
7406 (7407)				11-2-C/100	2.0ml	13-2-C/100	4-2-C/100	5-2-C/100
Cryo 400/746 (747)				7-3-C/100	4.0ml	8-3-C/100		
39.5" (100.3cm) Dia.				6-3.75-C/100	5.0ml	7-3.75-C/100		
Description and Part Number	5-3.75-C/81	5.0ml	4000092	6-3.75-C/100	5.0ml	4000005	4-2-C/100	4000011
	6-3-C/81	4.0ml	4000095	7-3-C/100	4.0ml	4000003	5-2-C/100	4000012
	6-3.75-C/81	5.0ml	4000097	7-3.75-C/100	5.0ml	4000010		
	7-3-C/81	4.0ml	4000100	8-3-C/100	4.0ml	4000008		
	7-3.75-C/81	5.0ml	4000043	11-2-C/100	2.0ml	4000001		
	8-3-C/81	4.0ml	4000104	12-2-C/100	2.0ml	4000042		
	9-2-C/81	2.0ml	4000106	13-2-C/100	2.0ml	4000006		
	10-2-C/81	2.0ml	4000108					
	11-2-C/81	2.0ml	4000110					
	12-2-C/81	2.0ml	4000112					
	13-2-C/81	2.0ml	4000044					

KEY TO DESCRIPTION:

5-3.75-C/81

number of boxes per rack — box height (inches) — box material*/number of cells per divider

Example would read: 5 boxes per rack—3.75" high—cardboard/81-cell divider

**All boxes listed are cardboard (C). Polycarbonate boxes and stainless steel boxes are available. Stainless steel boxes do not include lids. Contact Forma Scientific, your local sales representative, or your international distributor for details.*

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RACK WITH CANISTERS FOR CANE STORAGE

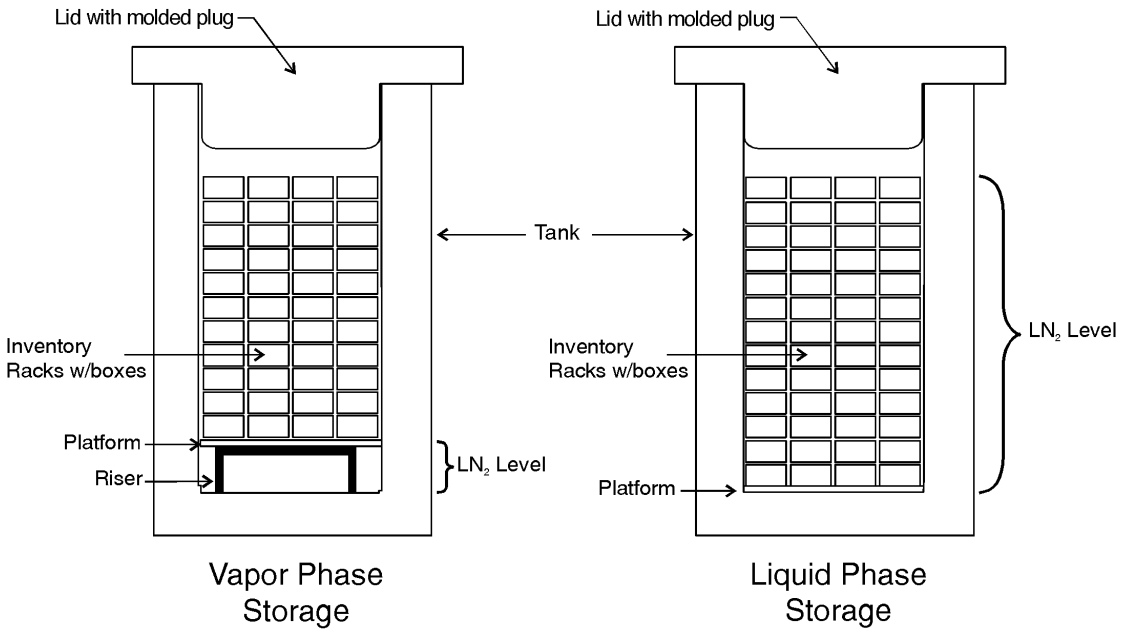
The SUC-1 Square Rack includes eight SUC-1 canisters. The rack is used to hold canes in liquid or vapor phase storage. Each cane can hold 10 straws or 6 vials (2.0ml). See items #11 and #12 on page 22 for a picture of the rack and a canister.

MODEL	CRYOPLUS 1/7400 (7401) CRYO 100/740 (741)	CRYOPLUS 2/7402 (7403) CRYO 200/742 (743)	CRYOPLUS 3/7404 (7405) CRYO 300/744 (745)	CROYPLUS 4/7406 (7407) CRYO 400/746 (747)
Tank Diameter	16.0" (40.6cm)	24.0" (61.0cm)	31.0" (78.7cm)	39.5" (100.3cm)
Capacity				
SUC-1 Rack No.:	4000379	4000379	4000379	4000379
Racks:	4	10	17	31
Canister Capacity	8 canisters/rack (included)			
Canes/Canister:	16 canes with sleeves/canister or 25 canes without sleeves/canister			

CHOOSING THE APPROPRIATE RISER FOR VAPOR PHASE STORAGE RACKS

FOR THIS MODEL...	AND THIS RACK...	CHOOSE RISER...	RISER HEIGHT
CryoPlus 1/7400 (7401) or Cryo 100/740 (741) 16.0" (40.6cm) Diameter	4000011, 4000108, or 4000109	4000056	4.0" (10.2cm)
CryoPlus 2/7402 (7403) or Cryo 200/742 (743) 24.0" (61.0cm) Diameter	4000001 or 4000002	4000060	3.5" (8.9cm)
	4000003, 4000004, or 4000011	4000061	5.0" (12.7cm)
CryoPlus 3/7404 (7405) or Cryo 300/744 (745) 31.0" (78.7) Diameter	4000005	4000062	4.0" (10.2cm)
	4000001 or 4000002	4000063	3.5" (8.9cm)
	4000003, 4000004, or 4000011	4000064	5.0" (12.7cm)
Cryoplus 4/7406 (7407) or Cryo 400/746 (747) 39.5" (100.3cm) Diameter	4000005	4000065	4.0" (10.2cm)
	4000001, 4000002, or 4000011	4000066	3.5" (8.9cm)
	4000003, 4000004, or 4000011	4000067	5.0" (12.7cm)

COMPARISON OF VAPOR PHASE AND LIQUID PHASE STORAGE



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FORMA CRYOPLUS AND CRYO SERIES INVENTORY CONTROL SYSTEMS: CANISTERS/FRAMES

Choose from our many standard size canister/frame inventory systems when storing blood, blood components, or bone marrow. These inventory systems are designed to maximize capacity and protect your samples' integrity. Durable stainless steel frames, coupled with lightweight aluminum canisters, protect your samples throughout the inventory retrieval processes associated with cryopreservation storage.

CHOOSING THE APPROPRIATE CANISTER/FRAME

1. Point to the row that contains the **Storage Unit** that you are going to use (e.g., CryoPlus 3/Model 7404).
2. Move your finger across the column(s) to the **Bag Type** you are using (e.g., Gambro DF-200).
3. Note the quantity of **Canisters** and **Frames** required for maximum capacity.
4. Move your finger down the column to the **Description and Part Number** information, and note the part number(s) that correlates to the frame, dividers, canisters, etc. that can be used with the tank size.

STYLE	NEXELL R4R9951 (FENWAL 4R9951) 50ML BAG		NEXELL R4R9953 (FENWAL 4R5461) 250ML BAG		NEXELL R4R9955 (FENWAL 4R5462) 500ML BAG		GAMBRO DF-200 200ML BAG		GAMBRO DF-700 700ML BAG	
	Canisters*	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**
CryoPlus 1/7400 (7401) Cryo 100/740 (741) 16.0" (40.6cm) Dia.	204	34-6 place	112	28-4 place	88	22-4 place	76	19-4 place	40	10-4 place
	Canisters*	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**
CryoPlus 2/7402 (7403) Cryo 200/742 (743) 24.0" (61.0cm) Dia.	540	90-6 place	256	64-4 place	200	50-4 place	160	40-4 place	104	26-4 place
	Canisters*	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**
CryoPlus 3/7404 (7405) Cryo 300/744 (745) 31.0"(78.7cm) Dia.	924	154-6 place	448	112-4 place	328	82-4 place	272	68-4 place	176	44-4 place
	Canisters*	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**	**Canisters**	**Frames**
CryoPlus 4/7406 (7407) Cryo 400/746 (747) 39.5" (100.3cm) Dia.	1,536	256-6 place	696	174-4 place	608	152-4 place	464	116-4 place	N/A	N/A
Description and Part Number (OAH = Overall Height)	**Swing Arm Canister Frames** 4000610 7 Place, OAH 27.4"** 4000670 6 Place, OAH 23.5"*** 4000660 **Platform Dividers** Tank - 16.0" 4000616 Tank - 24.0" 4000624 Tank - 31.0" 4000631 Tank - 39.5" 4000639 **4.0" (10.2cm) Risers** Tank - 16.0" 4000056 Tank - 24.0" 4000062 Tank - 31.0" 4000065 Tank - 39.5" 4000068		**Slide Canister** 4000335 **Frame OAH 22.9"** 4000371 **Platform Dividers** Tank - 24.0" 4000075 Tank - 31.0" 4000050 Tank - 39.5" 4000053		**Slide Canister** 4000336 **Frame OAH 23.1"** 4000372 **Platform Dividers** Tank - 24.0" 4000076 Tank - 31.0" 4000051 Tank - 39.5" 4000054		**Slide Canister** 4000332 **Swing Arm Canister** 4000356 **Frame OAH 26.1"** 4000368 **Platform Dividers** Tank - 24.0" 4000078 Tank - 31.0" 4000047 Tank - 39.5" 4000052		**Slide Canister** 4000333 **Swing Arm Canister** 4000357 **Frame OAH 23.0"** 4000369 **Platform Dividers** Tank - 24.0" 4000079 Tank - 31.0" 4000048	

**Number of canisters is based on a frame with a 4.0" (10.2cm) riser.*
***For use with the liquid phase. A riser is not required.*
****For use with the vapor phase. 4.0" (10.2cm) risers are available.*

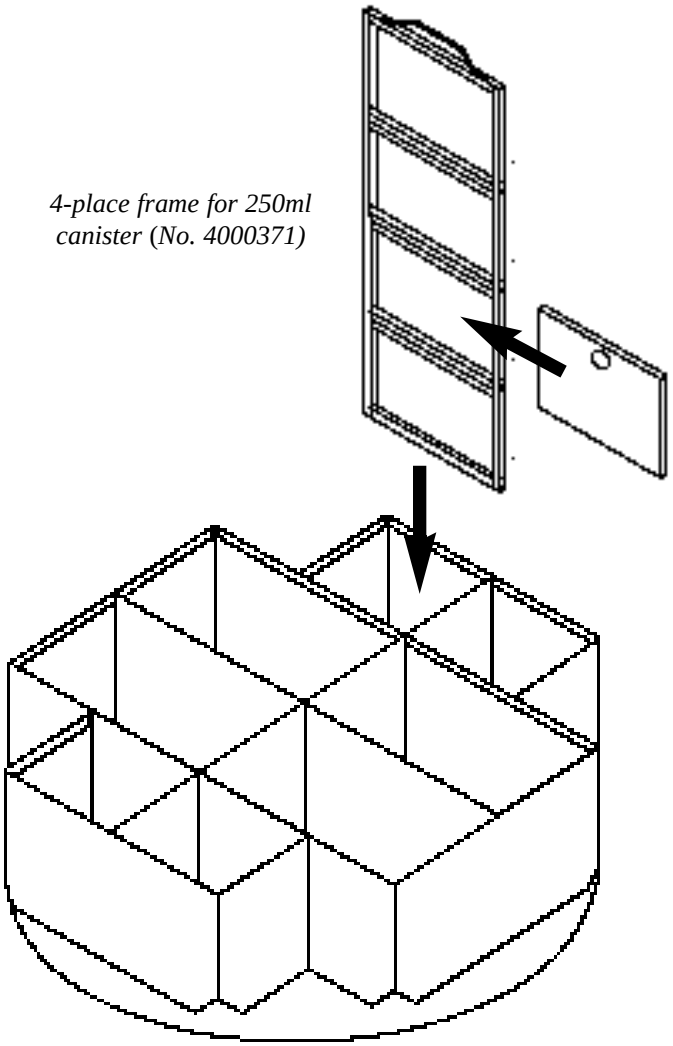
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CANISTER DIMENSIONS

BAG STYLE	NUMBER	DIMENSIONS
NEXELL		
R4R9951 (Fenwal 4R9951)	4000610	3.7"H x 6.3"W x 0.5"F-B (9.4cm x 16.0cm x 1.3cm)
R4R9953 (Fenwal 4R5461)	4000335	5.5"H x 7.6"W x 0.4"F-B (14.0cm x 19.3cm x 1.0cm)
R4R9955 (Fenwal 4R5462)	4000336	5.6"H x 9.8"W x 0.4"F-B (14.2cm x 24.9cm x 1.0cm)
GAMBRO		
DF-200	4000332 or 4000356	6.4"H x 7.8"W x 0.8"F-B (16.3cm x 19.1cm x 2.0cm)
DF-700	4000333 or 4000357	6.5"H x 12.1"W x 0.8"F-B (16.5cm x 30.7cm x 2.0cm)

SYSTEM LAYOUT EXAMPLE

4-place frame for 250ml canister (No. 4000371)



Canister for Nexell R4R9953 bag (No. 4000335)

Platform divider for frames (No. 4000371) and 250ml canister (No. 4000335)

IQ/OQ PROTOCOLS

NUMBER	DESCRIPTION
6007400	Installation and Operational Qualifications (IQ/OQ) Protocol for the CryoPlus Series
6000740	Same as 6007400 but for the Cryo Series

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FORMA CMR/CMC SERIES PORTABLE LN_2 STORAGE CONTAINERS

The Forma CMR/CMC Series provides a unique container design that achieves long-term storage and provides easy sample retrieval. Maximum storage capacity combined with minimum LN_2 consumption makes the CMR/CMC Series the most cost-effective units available. Racks and canisters are included.



Models 8038, 8036, 8037, 8030, 8033, and 8031 shown with optional canisters, rack, and universal roller bases

FEATURES

- Storage containers are constructed of durable, lightweight aluminum with vacuum insulation.
- Optional universal roller base is available for easy mobility.
- Multiple-sized containers are available to provide rack or canister storage from 180 to 3,564 vials (2.0ml).
- Color-coded/numbered inventory racking systems that reduce the risk of misplacing specimens are available.
- Lockable lid and optional low-level alarm enhance specimen security.

SPECIFICATIONS

MODEL	CMR		CMC			
	8030	8031	8036	8037	8038	8033
LN_2 Capacity	110.0 liters	110.0 liters	20.5 liters	33.4 liters	47.4 liters	79.0 liters
Static Evaporation Rate*	0.7 liter/day	0.4 liter/day	0.1 liter/day	0.1 liter/day	0.4 liter/day	0.4 liter/day
Static Holding Time	169 days	275 days	186 days	303 days	121 days	197 days
Dimensions						
Diameter:	22.0" (55.9cm)	22.0" (55.9cm)	14.5" (36.8cm)	18.2" (46.2cm)	20.0" (50.8cm)	22.0" (55.9cm)
Height:	37.1" (94.2cm)	37.1" (94.2cm)	25.7" (65.3cm)	25.9" (65.8cm)	26.5" (67.3cm)	29.5" (74.9cm)
Neck Diameter:	8.5" (21.6cm)	6.0" (15.2cm)	2.0" (5.1cm)	2.0" (5.1cm)	5.0" (12.7cm)	6.0" (15.2cm)
Racks						
Number of Racks:	4	8	N/A	N/A	N/A	N/A
Dimensions:	5.5" x 5.5" (14.0cm x 14.0cm)	3.3" x 5.0" (8.4cm x 12.7cm)	N/A	N/A	N/A	N/A
Canisters						
Number:	N/A	N/A	6	6	6	8
Diameter:	N/A	N/A	1.5" (3.8cm)	1.5" (3.8cm)	4.0" (10.2cm)	4.8" (12.2cm)
Capacity**						
2.0ml:	3,564	2,808	180	180	1,512***	2,880
4.0ml:	2,376	1,872	90	90	756	1,440
5.0ml:	1,980	1,560	60	60	504	960
Straws (10/Cane)	N/A	N/A	540	540	4,500	5,000
Weight						
Empty:	60 lbs. (27.2 kg)	60 lbs. (27.2 kg)	26 lbs. (11.8 kg)	34 lbs. (15.4 kg)	36 lbs. (16.3 kg)	52 lbs. (23.6 kg)
Full:	255 lbs. (115.8 kg)	255 lbs. (115.8 kg)	63 lbs. (28.2 kg)	94 lbs. (42.7 kg)	120 lbs. (54.5 kg)	192 lbs. (87.2 kg)
Shipping:	130 lbs. (59.0 kg)	114 lbs. (51.7 kg)	28 lbs. (12.7 kg)	38 lbs. (17.2 kg)	46 lbs. (20.9 kg)	95 lbs. (43.1 kg)

Continuing research and improvements may result in specification changes at any time.
**Static evaporation rates are based on new container performance. Actual working performance may vary with individual applications.*
***Vial capacity is based on 6 vials (2.0ml)/cane.*
****Optional square rack kit (No. 195749) for Model 8038 holds 750 vials (2.0ml).*

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FORMA CMD SERIES DRY SHIPPERS

Forma Scientific offers three sizes of cryopreservation dry shippers. These Forma CMD Series containers can retain temperatures as low as -190C (-310F) and range in shipping capacities from 10 to 996 vials (2.0ml).

Models 8039 and 8040 provide easy transfer of small quantities of 2.0ml vials. Canisters are included for Models 8039 and 8040. Model 8032, which includes a cardboard shipping container, provides a convenient method for transporting bone marrow, heart valves, and oversized samples.



Models 8032, 8040, and 8039

FEATURES

- Dry shippers are constructed of a lightweight aluminum shell and are vacuum insulated.
- Interior is lined with an absorbent material that allows the samples to be transported in a dry vapor condition, eliminating the risk of LN_2 spillage.
- All models provide long holding times for reliable, worldwide shipping convenience.
- Lockable lid provides product security.
- Easy-to-grasp handle provides a comfortable grip.
- Optional universal roller base provides easy mobility.
- Optional hard shell shipping containers are available (No. 189795 for Models 8039 and 8040 and No. 195460 for Model 8032). A replacement cardboard shipping container for Model 8032 is available also (No. 4000073).

SPECIFICATIONS

MODEL	8039	8040	8032
LN_2 Capacity	1.6 liters	4.3 liters	10.0 liters
Static Holding Time*	13 days	14 days	14 days
Static Evaporation Rate*	0.1 liter/day	0.1 liter/day	0.7 liter/day
Dimensions			
Diameter:	7.3" (18.5cm)	8.7" (22.1cm)	15.0" (38.1cm)
Height:	13.5" (34.3cm)	19.4" (49.3cm)	23.0" (58.4cm)
Neck Diameter:	1.4" (3.6cm)	2.0" (5.1cm)	8.5" (21.6cm)
Canisters			
Number:	1	1	0
Diameter:	1.2" (3.1cm)	1.8" (4.6cm)	N/A**
Capacity			
2.0ml:	9	48	966
4.0ml:	6	24	483
5.0ml:	3	16	322
Straws (10/Cane)	15***	120	1,610
Weight			
Empty:	6 lbs. (2.7 kg)	13 lbs. (5.9 kg)	30 lbs. (13.6 kg)
Full:	8.8 lbs. (4.0 kg)	20.6 lbs. (9.4 kg)	47 lbs. (21.3 kg)
Shipping:	9 lbs. (4.1 kg)	14 lbs. (6.4 kg)	41 lbs. (18.6 kg)

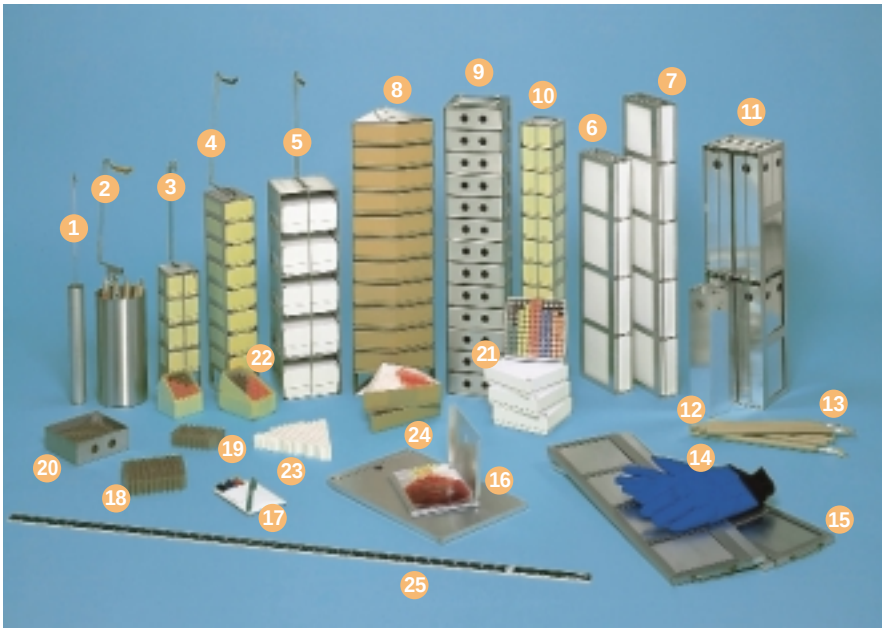
Continuing research and improvements may result in specification changes at any time.
**Static holding time and evaporation rates are based on new container performance. Actual working performance may vary with individual applications.*
***Interior measures 8.5" diameter x 11.0" height (21.6cm x 27.9cm) storage capacity. Shipments of bone marrow, heart valves, or other large samples require specific package size to determine the Model 8032 capacity.*
****Five straws/cane*

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GENERAL ACCESSORIES

We provide an array of accessories designed for your Forma cryopreservation equipment. This section describes accessories commonly used with the Forma CMR/CMC Series and CMD Series as well as general accessories, such as waterproof gloves and aprons; cryogenic canes, tubes, and vials; level and temperature controls; Forma Lab Dewars; and LN_2 supply tanks. Contact your local sales representative, international distributor, or the home office for details about our complete line of accessories.

QUICK REFERENCE ID CHART



Examples of various general accessories

ITEM	NUMBER	DESCRIPTION
1	189746	Canister included with Models 8036 and 8037, 1.5" (3.8cm) diameter
2	4000562	Canister included with Model 8033, 5.0" (12.7cm) diameter
3	195555	Square Inventory Rack for Model 8038 (optional)
4	4000561	2.0ml Vial Rack for Model 8031
5	4000556	5.0ml Vial Rack for Model 8030
6	4000011	Vertical Rack (four box vapor phase rack)
7	4000012	Vertical Rack (five box liquid phase rack)
8	4000112	Jumbo Arrowhead Rack
9	4000007	Square Rack with Stainless Steel Boxes
10	4000260	Square Mini Vertical Rack
11	4000379	SUC-1 Square Rack (includes eight SUC-1 canisters)
12	4000176	SUC-1 Canister (holds 16 canes with sleeves or 25 canes without sleeves, 10 straws/cane)
13	4000218	Cryo Sleeve with optional cane (No. 4000217)
14	189574	Wrist-Length Cryo Gloves (size medium)
15	4000371	Nexell R4R9953 (Fenwal 4R5461) 4 Place Frames with four optional Nexell sliding canisters (No. 4000335)
16	4000335	Nexell R4R9953 (Fenwal 4R5461) Sliding Canister and Delmed 8000/9000 Swing Arm Canister (No. 4000354)
17	4000221	Cryo Marker Pens (set of four)
18	4000013	100-Cell Divider
19	4000174	40-Cell Divider
20	4000238	2.0" (5.1cm) Square Stainless Steel Box with optional 100-cell divider (No. 4000013)
21	4000014	2.0" (5.1cm) Square White Box with Hole and 100-Cell Divider
22	4000189	2.0" (5.1cm) Rectangular Cardboard Box with 40-Cell Divider
23	4000181	81-Cell Jumbo Arrowhead Divider
24	4000193	2.0" (5.1cm) Jumbo Arrowhead Cardboard Box with optional 81-cell divider (No. 4000181)
25	180143	LN_2 Measuring Stick

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CRYO GLOVES AND APRONS



Cryo apron and gloves

WRIST LENGTH CRYO GLOVES, 12.0" (30.5cm)

189573 Small
189574 Medium
189575 Large

MID-ARM CRYO GLOVES, 14.0" to 15.0" (35.6cm to 38.1cm)

189440 Small
189441 Small, waterproof
189561 Medium
189442 Medium, waterproof
189562 Large
189443 Large, waterproof
189563 Extra-Large
189444 Extra-Large, waterproof

ELBOW LENGTH CRYO GLOVES, 18.0" to 20.0" (45.7cm to 50.8cm)

189564 Medium
189445 Medium, waterproof
189565 Large
189446 Large, waterproof
189566 Extra-Large
189447 Extra-Large, waterproof

SHOULDER LENGTH CRYO GLOVES, 28.0" (71.1cm)

189567 Medium
189448 Medium, waterproof
189568 Large
189449 Large, waterproof
189569 Extra-Large
189450 Extra-Large, waterproof

WATERPROOF CRYO APRONS

189451 Small, 36.0"W (91.4cm)
189452 Medium, 42.0"W (106.7cm)
189453 Large, 48.0"W (121.9cm)

SENSAPHONE® DIALING SYSTEMS AND ALARM CABLE

400047 4 channel Sensaphone Telephone Dialing System for the CryoPlus and Cryo Series continuously dials up to four different pre-programmed numbers in sequence until one user is reached

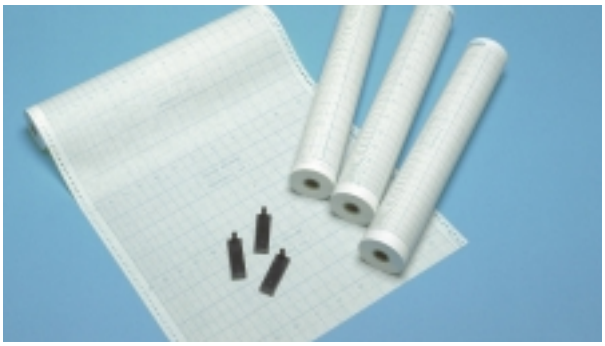
400134 Same as 400047 but with 8 channels

400142 RJ-11 Remote Alarm Cable Kit for the CryoPlus and Cryo Series is used to connect remote alarm contacts of equipment, such as a Forma Sensaphone Telephone Dialing System

RECORDER KIT

201175 Recorder Kit for the CryoPlus and Cryo Series, includes 6.0", 7 day temperature recorder, pen, and chart drive (specify top, left side, or right side mount)

RECORDER ACCESSORIES



Recorder paper and pens

4000394 Chart Paper for Model 8028 (8029) and 8034 (8035) Recorder (four rolls/package)

4000395 Pen Kit for Model 8028 (8029) and 8034 (8035) Recorder (five pens/kit)

4000396 Chart Paper for Model 500 Bausch & Lomb Recorder (four rolls/package)

4000397 Pen Kit for Model 500 Bausch & Lomb Recorder (four pens/kit)

THERMAL DATA PRINTER AND PAPER

This printer for the CryoPlus Series produces a hard copy record of operational functions and alarm sequences logged to document system performance (i.e., temperature, time, date, liquid level, and the number of lid openings/lid closings). A total of 16 alarms can be tracked and documented.

4000565 Printer, complete with cable assembly and RS-232 connector kit, 120V, 60 Hz

4000665 Same as No. 4000565 but with a 220V, 50 Hz AC adapter

4000566 Thermal Printer Paper, 5 rolls/package



Optional thermal data printer

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CRYO TUBE COLOR CODING

4000230 White, one case of 500
4000231 Red, one case of 500
4000232 Yellow, one case of 500
4000233 Green, one case of 500
4000234 Blue, one case of 500
4000235 Orange, one case of 500
4000236 Tan, one case of 500
4000237 Violet, one case of 500
4000389 Rainbow (assortment of all colors above), one case of 400

CANES

4000211 1.2ml – 6 Ampule
4000214 5.0ml – 2 Ampule
4000216 Aluminum Cane for 9.2ml and 10.0ml Goblets
4000217 Aluminum Cane for storage of all 12.5mm diameter Cryo tubes

CRYO SLEEVE

4000218 Cryo Sleeve, 0.6" (1.5cm) interior diameter, 10.8" (27.4cm) long, case of 100 each

CRYO MARKERS

4000221 Cryo Marker Pens, set of four fine tip pens (black, blue, green, and red) with fast drying, non-smearing, permanent ink; recommended for all Cryogenic vials at -200C (-328F)
4000222 Black Cryo Marker Pens, set of 12
4000223 Blue Cryo Marker Pens, set of 12
4000224 Green Cryo Marker Pens, set of 12
4000225 Red Cryo Marker Pens, set of 12

FILLING RACK

4000226 Cryo Vial Filling Rack, holds 50 Cryogenic vials

HEAT GUN

4000219 Heat Gun for Cryo Flex Tubing, 120V, 2.2 FLA

MISCELLANEOUS

4000176 SUC-1 Aluminum Cane Canister, 2.5" x 2.5" x 11.1" (6.4cm x 6.4cm x 28.2cm), 16 holes/canister
4000388 Cryo Tongs



Cryo vial filling rack, aluminum canes with sleeves, markers, vials, and color cap codes

CRYOGENIC VIALS*

NUMBER	SIZE	DESCRIPTION	CASE QUANTITY
4000197	1.2ml	Self-standing, conical interior bottom, silicone washer	2,000
4000198	1.2ml	Self-standing, conical interior bottom, silicone washer	500
4000199	2.0ml	Self-standing, round interior bottom, silicone washer	1,800
4000200	2.0ml	Self-standing, round interior bottom, silicone washer	450
4000201	2.0ml	Round bottom, silicone washer	2,000
4000202	2.0ml	Round bottom, silicone washer	500
4000203	2.0ml	Self-standing, external threads	1,800
4000204	2.0ml	Self-standing, external threads	450
4000205	4.0ml	Round bottom, silicone washer	1,600
4000206	4.0ml	Round bottom, silicone washer	400
4000207	5.0ml	Round bottom, silicone washer	1,200
4000208	5.0ml	Round bottom, silicone washer	300

**Each vial is constructed of sterile polypropylene with a white marking area and includes a screw cap.*

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CMR/CMC SERIES ACCESSORIES

LOW LEVEL ALARMS

4000574 Low Level Alarm with Sensor for Model 8033, 115V, factory installed

4000575 Low Level Alarm with Sensor for Models 8030 and 8031, 115V, factory installed

4000576 Same as No. 4000574 but 230V

4000577 Same as No. 4000575 but 230V

8130 Low Level Alarm with Sensor for any standard-sized LN_2 container

UNIVERSAL ROLLER BASE

195230 Universal Roller Base, fits 14.5" to 22.0" (36.8cm to 55.9cm) diameter tanks, 325 lbs. (147.4 kg) capacity, adds 3.6" (9.1cm) to the total height

MISCELLANEOUS

195555 Square Inventory Rack for Model 8038, 5 position/25 cell

195749 Inventory Rack Kit for Model 8038, consists of six No. 195555 racks in place of standard canisters (No. 189749)

LN_2 TRANSFER HOSES

4000400 4.0 ft. (1.2m) Flexible Metal Hose, 1/2", 45 Degree Flare, swivel ends

4000401 6.0 ft. (1.8m) Flexible Metal Hose, 1/2", 45 Degree Flare, swivel ends

PHASE SEPARATOR

4000571 1.3" (3.3cm) diameter x 3.0" (7.6cm) long x 1/4" FPT



Level controls, solenoid valves, low level alarm, T-valve assembly, and transfer hose with phase separator

CONTROLS*

LOW LEVEL ALARM

8130 Low Level Alarm with Sensor for any standard-sized LN_2 container

TEMPERATURE CONTROLLERS

8135 Temperature Controller, range -200C to 50C (-328F to 122F), requires valve No. 4000286

8136 Keep Cold Temperature Controller for Vacuum Insulated Pipelines, 120V, requires valve No. 4000287

TANK SWITCHERS

8182 Tank Switcher Control and Sensor, No. 4000272 and No. 4000273 are recommended when ordering Model 8182

4000272 Solenoid Valve Assembly for Model 8182, includes 100 psi valves, relief valves, one-way check valve, and TC fitting

4000273 Wall Mount Bracket for Model 8182 and No. 4000272

4000274 Floor Stand for Model 8182 and No. 4000272, 5.0 ft. (1.5m) high, includes No. 4000273 wall mount bracket

8185 Interface Box for Model 8182 when monitoring three level controls

SENSORS AND PROBES

4000277 Single Element Sensor with 5.0 ft. (1.5m) lead for Model 8130

4000280 Sensors with Two Dual Elements, 5.0 ft. (1.5m) lead

4000282 Sensor Probe, Thermocouple Type T, 0.1" diameter x 14.0" (0.3cm x 35.6cm) long probe, 5.0 ft. (1.5m) lead, and TC plug for Model 8136

4000283 Sensor Probe, Thermocouple Type T, 0.1" diameter x 6.0" (0.3cm x 15.2cm) long probe, 5.0 ft. (1.5m) lead, and TC plug for Model 8135

SOLENOID VALVES AND VALVE ASSEMBLIES

4000285 Solenoid Valve, 1/4" NPT, 7/32" orifice, 100 psi

4000287 Two No. 4000285 Solenoid Valves with candy cane relief valve and compression fitting, for use with Model 8136 Keep Cold Temperature Controller

4000290 T-Valve Assembly with manual valve and T fitting, used to connect two transfer hoses to a supply tank

GAS BY-PASS TEMPERATURE CONTROLLER

195021 Gas By-Pass Temperature Controller for the CryoPlus and Cryo Series, diverts warm nitrogen to the atmosphere until the control probe reaches the set temperature, 120V, factory installed

195023 Same as No. 195021 but 230V

**115V options. Contact us for 230V options.*

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Lab Dewars with optional cryo gloves, LN_2 withdrawal device, and universal roller base

LAB DEWARS

8122 5 liter aluminum liquid nitrogen container
8123 10 liter aluminum liquid nitrogen container
8124 20 liter aluminum liquid nitrogen container
8125 30 liter aluminum liquid nitrogen container

SPECIFICATIONS

MODEL	8122	8123	8124	8125
LN_2 Capacity (liters)	5.0	10.0	21.0	32.0
Static Evaporation Rate (liters/day)	0.15	0.18	0.18	0.25
Neck Opening (in/mm)	2.2/56	2.2/56	2.0/5.01	2.5/64.0
Overall Height (in/mm)	18.2/462	21.5/546	24.7/627	24.1/11
Outside Diameter (in/mm)	8.8/222	10.3/260	14.5/368	17/432

LN_2 WITHDRAWAL DEVICES*

4000071 LN_2 Transfer Unit for Model 8124, supplied with 2.0" (5.1cm) stopper and 19.0" (48.3cm) stainless steel draw tube
4000072 LN_2 Transfer Unit for Model 8125, supplied with 2.5" (6.4cm) stopper and 20.5" (52.1cm) stainless steel draw tube

LN_2 SUPPLY TANKS**

8126 35 Liter Pressurized Stainless Steel Liquid Nitrogen Supply Tank, 28.5" height x 16.0" diameter (72.4cm x 40.6cm)
8127 50 Liter Pressurized Stainless Steel Liquid Nitrogen Supply Tank, 35.5" height x 16.0" diameter (90.2cm x 40.6cm)
8120 180 Liter Low Pressure Stainless Steel Liquid Nitrogen Supply Tank, 63.5" height x 20.0" diameter (161.3cm x 50.8cm), 210 lbs. (95.3 kg) empty
8121 230 Liter Low Pressure Stainless Steel Liquid Nitrogen Supply Tank with caster base and fold-down handle, 54.8" x 26.0" (139.2cm x 66.0cm), 290 lbs. (131.5 kg), dimensions are 27.0"W x 28.0"F-B (68.6cm x 71.1cm) at the caster base
4000173 Liquid Nitrogen Cylinder Hand Truck with pneumatic wheels for use with Model 8120
4000175 Liquid Nitrogen Cylinder Roller Base for use with Model 8120, base dimensions are 22.0"W x 3.5"H x 30.0"F-B (55.9cm x 8.9cm x 76.2cm)



Model 8121 LN_2 Supply Tank with standard cart and Model 8120

FREEZERWORKS 5

Freezerworks 5 is a cryogenic, refrigerator, and freezer sample inventory tool used to track product types, quantities, and locations. This powerful Windows®, Macintosh®, and NT® based system includes functions such as transaction entry, user-defined fields, reporting, sample movement tracking, search options, and an audit trail.



Freezerworks Bar Code Package

195625 Freezerworks 5 Software CD
195626 Eltron 2740 Printer
195627 Symbol 4004 Hand Held Gun
195628 Labels (1ml wraparound roll of 650)
195629 Freezerworks 5 Bar Code Package, includes software CD, printer, hand held gun, and labels

**Used only with fixed handle units (Models 8124 and 8125).*
***All LN_2 supply tanks are rated at 22 psi. Supply tank will evaporate 2% of its volume/day.*

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WORLD LEADER IN QUALITY AND SAFETY

For your personal safety and product protection, Forma Scientific's cryopreservation products are manufactured to conform with Forma's Continuous Improvement guidelines. Our commitment to you is reinforced by our adherence to known quality standards.

UL LISTING, CSA CERTIFICATION, AND THE CE MARK

UL Listing (Standard UL 3101), CSA Certification (Standard C22.2 No. 1010.1), and the CE Mark (EN 61010/IEC 1010) attest to the electrical and mechanical safety of the Forma CryoPlus and Cryo Series. Unit construction and electrical characteristics comply with Underwriters Laboratories, CSA International, and International Electrotechnical Commission requirements. The CryoPlus and Cryo Series units undergo stringent testing before they carry the UL, CSA, and CE markings. Application of the CE Mark also means that the equipment has been tested for compliance with international requirements related to emission of, and susceptibility to, RF energy and electrostatic discharge. Copies of UL, CSA, and CE documentation are available for compliance verification.

ISO 9001: A COMMITMENT TO EXCELLENCE

As an innovative, global leader, Forma Scientific continues the pursuit of excellence by maintaining ISO 9001-1994 registration. This advanced quality system reinforces our commitment to provide the highest quality products available. The ISO 9000 series is a set of international requirements for establishing and maintaining quality management systems. It is based on the widely recognized quality assurance standards of the British Standards Institute (BSi). Continued compliance is assured by ongoing internal audits and periodic audits by the assessing agency. We are proud to be ISO 9001 registered. Of the three ISO 9000 Standards, ISO 9001 is the most comprehensive and the most difficult to obtain.

WARRANTY PROTECTION

All Forma Controlled Rate Freezing Systems and LN_2 Storage Systems feature a one year parts and labor warranty. Liquid nitrogen storage containers include a two year warranty on vacuum integrity.

DIRECT SERVICE SYSTEM: UNMATCHED SERVICE FOUR WAYS

- To save you both time and expense, our toll-free Technical Service Department (1-888-213-1790) provides access to qualified telephone technicians who can help you troubleshoot and make minor adjustments to your Forma equipment. In an ongoing effort to better serve you, our Technical Service Department and our Sales Support Department (1-800-848-3080) are available from 8:00 a.m. to 7:00 p.m. (EST).

- For added coverage, we offer an Extended Warranty to repair or replace component parts proven to be defective once the original warranty period has ended. For additional convenience, we also provide Preventive Maintenance Agreements. Contact our Technical Service Department for details.

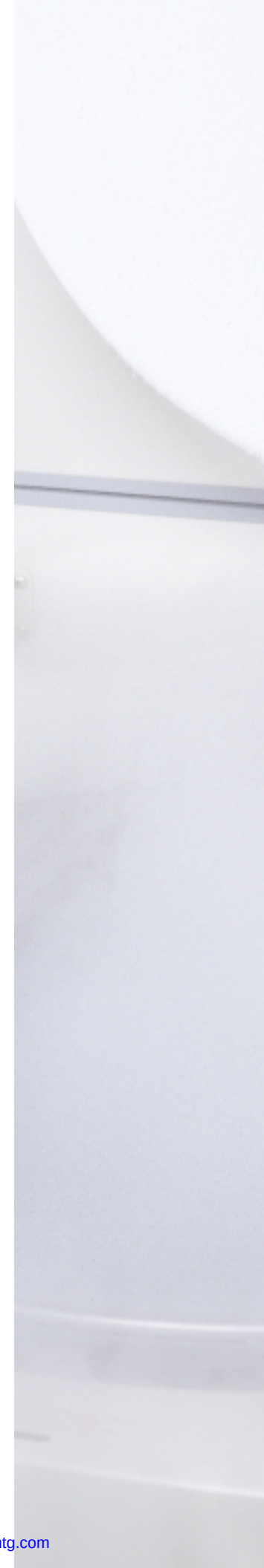
- A staff of direct factory-trained service technicians is maintained in major metropolitan areas of the United States. In all other areas, service needs are provided by factory-trained service organizations.

- Outside the U.S., service and warranty work are available through our distributors who are authorized to work on Forma products. Contact your local distributor for details.

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Forma offers the following products:

- Cell Culture Incubators
- In Vitro Fertilization (IVF) Incubators
- Environmental Chambers
- Ultra-Low Temperature Freezers
- Laminar Airflow Equipment
- Biological Safety Cabinets
- Cryopreservation Equipment
- Blood Bank Equipment
- Monitor/Alarm System
- Orbital Shakers
- Programmable Centrifuges
- Lab Washers and Dryer
- Lab Refrigerators
- Lab Freezers
- Chromatography Refrigerators
- Custom-Designed Equipment



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