

Model 740 Series

Cryo Series

Liquid Nitrogen Storage System

Operating and Maintenance Manual 7000740 Rev. 9



Table 1. Models Covered by this Manual

Model	Voltage
740	120
741	230
742	120
743	230
744	120
745	230
746	120
747	230

MANUAL NO. 7000740

9	25127	12/17/08	Added detail to note in Specifications	ccs
8	24522/FR-1994	3/20/08	Updated electrical schematic to match AS400	ccs
--	--	4/16/07	Added hook-up/connection artwork to Section 1	ccs
7	23299	3/7/06	Added cautionary note about the use of Teflon tape on valves. Thread sealant is recommended (page 4-1).	ccs
--	--	6/30/05	Added accessory list	ccs
--	--	12/2/04	Clarified electrical specifications	ccs
6	--	10/29/04	Updated manual fill, LED information	ccs
5	22025/SI-9266	7/29/04	Added caution to sensor height adjustments	ccs
4	2043/FR-1620	6/17/02	Added lid strap info, Section 1.4	ccs
3	16746/SI-8022	10/16/00	Software change on cryo controller board FR740-05	aks
2	19496/FR-1440	9/7/00	Revise power cord attachment instructions	ccs
1	18966/FR-1362	3/8/00	Chg probe removal procedure	ccs
REV	ECR/ECN	DATE	DESCRIPTION	By



Important Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

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Note This equipment is Installation (Overvoltage) Category II, Pollution Degree 2. ▲

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Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.



Extreme temperature hazards, hot or cold. Use special handling equipment or wear special, protective clothing.



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Section 1 Quick Start-Up

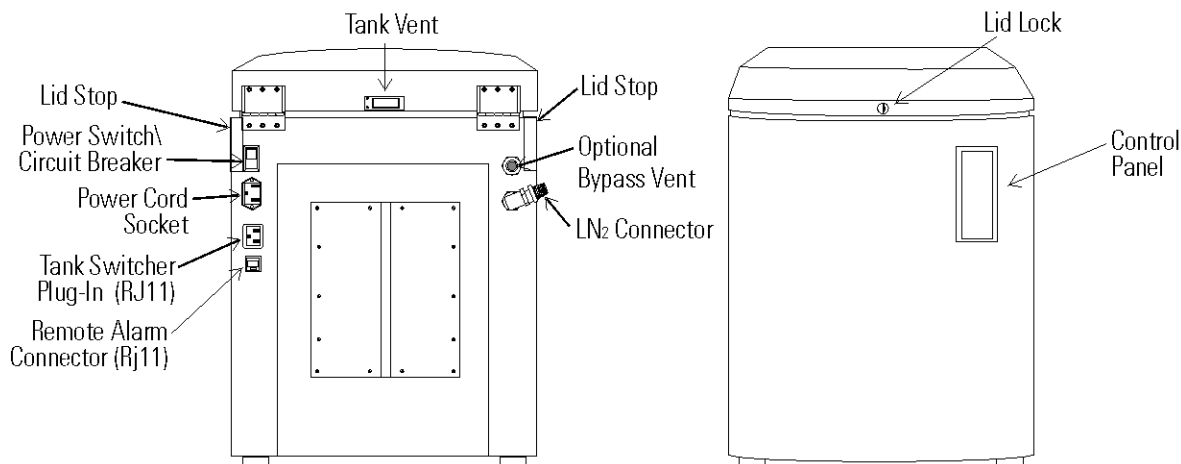


Figure 1-1. Unit Components

Locate the storage container in a well ventilated area of the laboratory, with adequate work space available for loading and unloading specimens. Allow for adequate lid opening clearance.

Note Rear stabilizer feet are included on Model 740/741. ▲

This unit is designed to operate in the following environmental conditions:

Temperature: 5°C (41°F) to 40°C (104°F)

Humidity: 80% at <31°C, decreasing linearly to 50% at 40°C.

Altitude: < 2,000 meters (6,650 feet)

Warning Whenever working with liquid nitrogen storage equipment in a closed environment, the use of personal O₂ detection devices is strongly recommended. Refer to "Handling Liquid Nitrogen" in the appendix of this manual. ▲

Connect LN₂ Transfer Hose

Liquid nitrogen is the only consumable material that is required for operation. Only tanks meeting the following specifications should be used with the unit's storage system:

Low Pressure Supply: 22 PSIG maximum

Liquid Outlet Fitting: .1/2", 45-degree flared tube

A four-foot Nitrogen transfer hose with swivel end and fittings is supplied with the unit.

Note A 6' long hose, with swivel, is supplied with Model 742/743, 744/745, 746/747. The use of a transfer hose longer than six feet will degrade system performance. Contact the Technical Services Department if an extended length transfer hose is required. ▲

The Cryo storage system requires a user-supplied, low pressure regulated (22 PSIG) liquid Nitrogen supply. Anything higher than 22 PSI will degrade performance of the Cryo storage container.

Connect the transfer hose between the low pressure, liquid outlet of the liquid Nitrogen supply tank (22 PSIG) and the input flare fitting connected to the solenoid valve at the back of the unit. Use an adjustable wrench to tighten the swivel nut on each hose end and a second wrench to steady the tank outlet.

After the transfer hose has been connected, open the supply tank valve and check the connections for leaks.

Attach Power Cord

1. Loosen screw located on the power cord retainer. Spread the power cord retainer.
2. Insert the power cord into the power outlet module. Tighten screw on the power cord retainer.
3. Position power cord/module assembly into outlet on unit. Secure with screws on module.

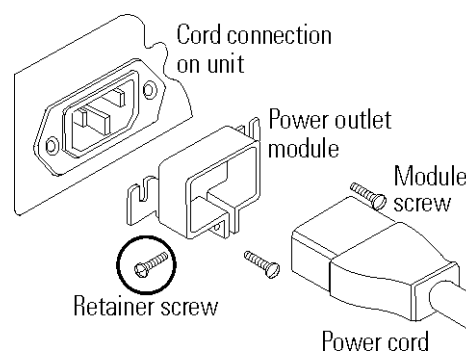
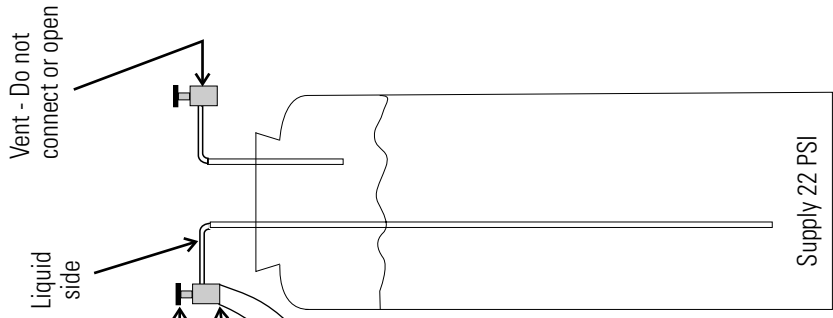


Figure 1-2. Power Cord Assembly



Open valve after both ends of the transfer hose are connected

No sealer

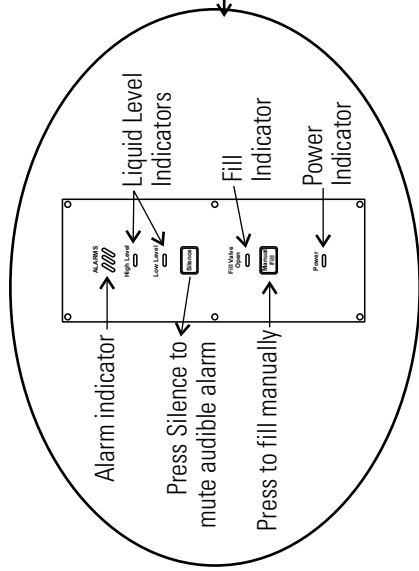
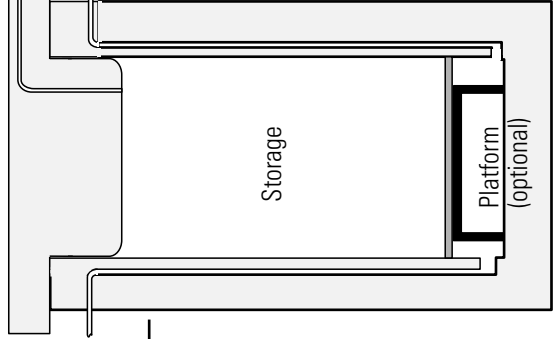
Vent - Do not block!

No more than 6 ft in distance

No sealer

High LN2 Level

Low LN2 Level



Control Panel

Connect Lid Strap

Included with each unit (Model 746/747) is a lid strap for user convenience.

1. Remove the protective white nylon screws from the areas indicated. Discard these screws.
2. Install the strap as shown below, using the screws included with the strap.

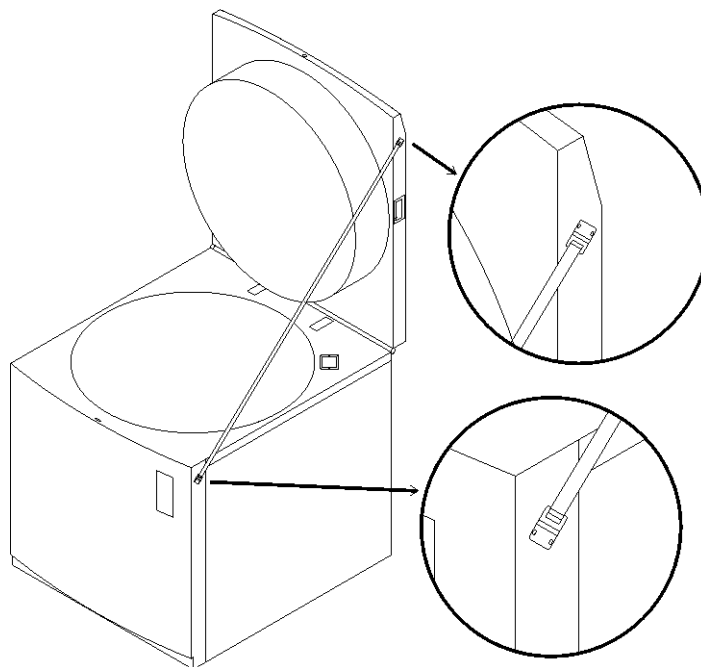


Figure 1-3. Lid Strap

Connect Electrical Supply

Warning Use only a grounded electrical receptacle. Failure to ground the unit can result in serious injury from electrical shock. ▲

With the power switch turned OFF, connect the unit to a grounded electrical outlet. See the tag on the back of the unit or the electrical schematics included in this manual for voltage and full load amps.

The power switch on the back of the unit is the **mains disconnect** and is also a reset-type circuit breaker. If an overload condition occurs, the built-in circuit breaker will trip and the power switch will turn off. Turning the power switch on resets the circuit breaker. If the circuit breaker trips again within a short time period, the unit should be checked by a qualified electrician.

Install Platform Riser

Depending on the inventory control system chosen, install the platform riser (if required) as shown in Figure 1-4.

Note In the liquid phase, the standard platform remains in the bottom of the tank. ▲

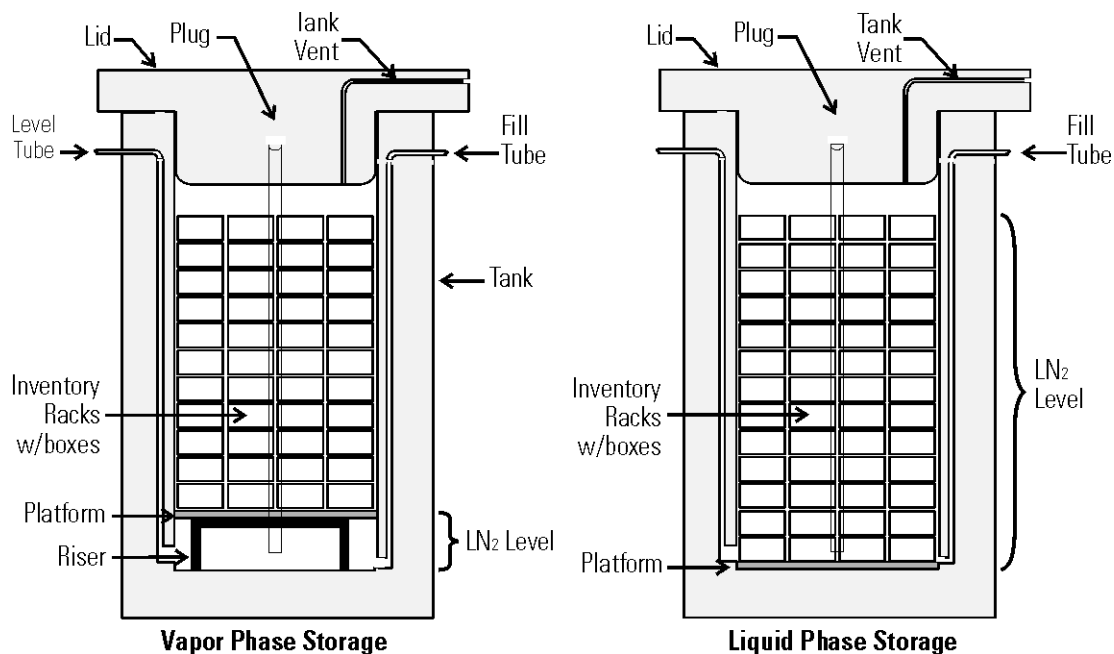


Figure 1-4. Phase Storage

Install Optional Temperature Sleeve

A Temperature Sleeve is optional on all Cryo units. The sleeve is designed to assist the temperature gradient within the unit so that in a normal vapor phase setting of 3-5 inches of liquid, the temperature under the lid will remain below -130°C .

When properly installed, the ends of the sleeve must be aligned with the temperature probe at the rear of the tank and the square holes in the bottom of the sleeve aligned with the fill and pressure ports.

It is imperative that the positioning of the sleeve not block either the fill or liquid level tube orifices located at the bottom rear of the tank. Should blockage occur, it will cause filling and liquid level indicator problems.

Fill Unit

Warning The lid must remain open throughout the initial filling of the storage container. ▲

When electric power and LN₂ have been connected, open the lid and turn on the power switch to begin filling the unit. Because the unit must go from ambient room temperature to -196°C, considerable boiling of the liquid nitrogen takes place, turning into super cooled nitrogen gas which flows over the side of the open chamber. As this occurs, some frost occurs around the top of the unit. This is normal during the initial fill with the lid open and disappears once the unit has stabilized.

The storage container fills until the liquid Nitrogen reaches the high level setpoint of five inches. During the initial fill, the low level alarm sounds after 10 minutes unless the low level setpoint is reached. Silence alarm and continue filling. The alarm clears when the low level is met. If low level setpoint is not reached in one hour, the low level shutdown alarm activates. See Section 2.

After the initial fill is complete, close the lid and allow the unit to stabilize for 8 to 10 hours or overnight before changing the high or low level setpoints or adding inventory.

Caution Some popping or cracking noises may be heard after the unit is initially filled, and the lid is opened and closed the first few times. This is normal and will quickly disappear. ▲

Remote Alarm Contacts

The liquid level controller has provision for a remote alarm system. A set of remote alarm connections (RJ-11 style connector) are located on the back of the cabinet (Figure 1-1). The remote alarm contacts are "dry" contacts requiring the remote alarm system to have its own power supply. The remote alarm contacts are activated immediately when AC power is lost, or when the unit goes into high level alarm. The contacts are activated after a thirty minute delay when the unit goes into low level alarm.

The contacts are marked COM = Common, N.O. = Normally Open, N.C. = Normally Closed

IMPORTANT USER INFORMATION
Caution! Stored product should be protected by an activated alarm system capable of initiating a timely response 24 hours/day. Alarms provide interconnect for centralized monitoring.

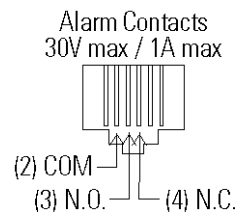


Figure 1-5. Contacts
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Tank Switcher Plug-In

The power outlet on the back of the cabinet provides line voltage to a tank switcher if such equipment is used. Refer to Figure 1-1.

Installation Validation

The following procedures tests key elements of the Cryo Freezer system and verify the unit installation. These tests can be performed at the operator's discretion. If any tests fail, contact the Service Department or your local sales representative.

Power Switch

Turn the unit on with the power switch located on the back of the unit. The Power LED indicator will light, as will the Fill, High and Low Alarm, if applicable. The power switch is the mains disconnect for the system.

LN₂ Supply

The source tank should indicate that it is full and the pressure to the Cryo unit regulated at 22 PSIG. Check all connections for leaks.

Remote Alarm Contacts

With the contacts wired to a remote alarm, turn the unit on, wait a few seconds, then turn the unit off. The remote alarm will activate immediately upon loss of AC power.

Manual Fill

The Manual Fill button is pressed and released to manually fill the tank to the high level set point. The Fill indicator lights when active. The unit can be filled past the high level set point by holding down the Manual Fill button.

Dip Level Test

Note Factory settings are High Level - 5 inches ($\pm 1/2''$), Low Level - 3 inches ($\pm 1/2''$). ▲

Press and release the Manual Fill button so the unit will fill to the high level set point and automatically shut off. Compare the High Liquid level with the actual liquid level by using the plastic ruler provided with unit.

Lower the ruler along the edge of the tank until it is at the bottom. (When taking subsequent measurements, lower the ruler at this same location.) When the LN₂ stops boiling, pull out the ruler. The actual liquid level will be approximately one inch lower than the frost line on the ruler.

Caution Some shrinkage of the ruler may occur depending on the level of liquid nitrogen in the tank. ▲

Installation Validation (continued)

Dip Level Test (continued)

Dip Tests should be made and the LN₂ level monitored about every seven to ten days. Many labs continuously monitor and keep permanent LN₂ consumption records.

Tank Switcher Outlet

Press Manual Fill while checking the tank switcher outlet with a volt meter. Line voltage will be present when the unit is filling.

Alarm and LED Validation (not required at installation)

To perform the following test, it is necessary to remove the temperature probes from the sensor tube. To adjust the probes, follow the procedures in Section 2 of this manual. An LN₂ sample in a small insulated cup, or the LN₂ supply already in the freezer can be used.

Warning Protective gloves, eye wear, and apron should be worn when performing this test. ▲

Alarm and LED Test

1. Referring to Figure 1-6, remove the access panel and remove clamp.
2. Pull the probe sets toward the top of the tube until resistance is felt.
3. Power up the unit with the sensors out of the LN₂. The solenoid valve LED will light.

Caution When the probes are near the top of the sensor tube and resistance is felt, it may be necessary to wait a few minutes to allow the probes to warm up before removing them completely. ▲

4. The Low Level alarm LED and the audible alarm activate in about 10 minutes. The remote alarm contacts activate in about 30 minutes.

Note If the low level probe is not submerged in LN₂ within approximately one hour, the low level shutdown alarm activates. See Section 2. ▲

5. To shut off the audible alarm, press the Silence button.
6. Submerge the Low Level Sensor into the LN₂. The Low Level alarm LED will go out.
7. Press the Manual Fill button. The solenoid LED lights. When the unit is full, release the button, the fill stops, and the LED goes out.

Alarm and LED Test (continued)

9. Submerge the High Level sensor into the LN₂, keeping the Low Level sensor submerged. The solenoid LED will go out.
10. The High Level alarm LED, remote alarm contacts, and audible alarm will activate in about 2 minutes.
11. Replace the probes and adjust if necessary. Refer to the instructions in Section 2 of this manual.

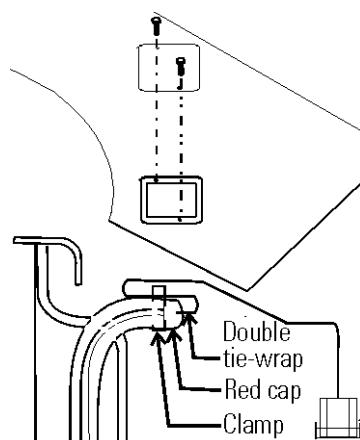


Figure 1-6. Alarms and LED Test

Section 2 Operation

The liquid level controller installed on the Cryo Series controls the liquid nitrogen level between the low and high level sensors. When the liquid level drops below the low level sensor, the solenoid opens and the refilling process starts. The refilling continues until the high level sensor is reached, or the solenoid switch is turned off.

If the controller detects an alarm condition, an audible alarm sounds and the corresponding High or Low Level alarm indicator on the controller panel lights.

The audible alarm may be disabled by pressing the Silence button. However, the warning light and Alarm indicators remain lit and audible alarm sounds every 30 minutes until the alarm condition is corrected.

Note Low level shut down and open level probe alarms can not be silenced. After the alarm condition is corrected, the power switch must be turned off, then on to clear the alarm.

When Manual Fill button is pressed, the solenoid opens and unit begins to fill. The Fill indicator lights.

Power indicator lights when power is applied to the unit and the switch is turned on.

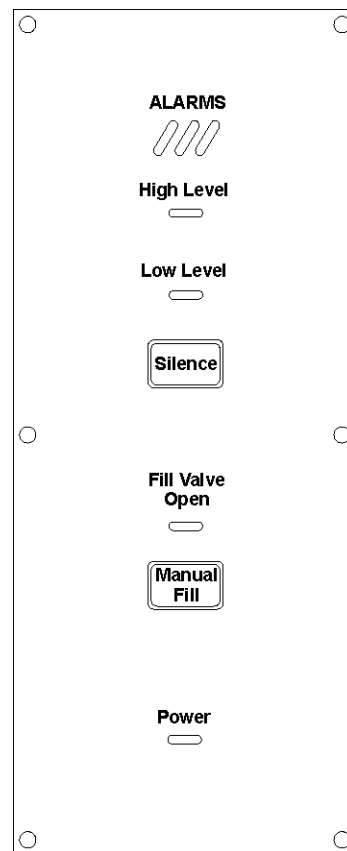


Figure 2-1. Control Panel

Liquid Level Controller

The Cryo Series liquid level controller is a three sensor liquid level controller, with high and low level alarm capabilities. The liquid nitrogen is controlled between the low level sensor, and the high level sensor.

When liquid nitrogen drops below the low level sensor, the solenoid valve will be activated, and liquid nitrogen will enter the tank and fill to the high level sensor. If the low level sensor is not immersed in liquid nitrogen within ten minutes, the low alarm system will be activated. The low alarm LED will illuminate, as will the Alarm indicators and an audible alarm will sound. The Silence key pad will silence the alarm, but the LED and Alarm indicators will remain on and audible alarm will sound every 30 minutes for as long as the alarm condition exists.

If the low level sensor is not immersed in liquid nitrogen within one hour, the unit will go into low level shut down alarm. When in this alarm state, the following occurs: high level LED (off), audible alarm (cycle on and off), all valves close and remote alarm contacts activate. To clear this alarm (after the alarm condition is corrected), the unit power switch must be turned off, then on.

The high level alarm signals an overflow condition, and is activated when liquid nitrogen touches the high level alarm sensor and remains there for at least two minutes. The Silence key pad will silence the audible alarm, but the High LED and Alarm indicators will remain on and audible alarm will sound about every 30 minutes for as long as the alarm condition exists.

Both alarm systems activate relay contacts that can be interfaced with most remote alarm systems.

The Cryo Series liquid level controller continuously monitors the integrity of the three liquid level sensors and associated wiring harness. If any one of the sensors or the wiring harness should fail (open circuit), the unit will go into open sensor alarm. When in this alarm, the following will happen: alarms LED (cycle on and off), high and low level LEDs (off), all valves will close and remote alarm contacts will activate. To clear this alarm (after the alarm condition is corrected), the unit power switch must be turned off, and back on.

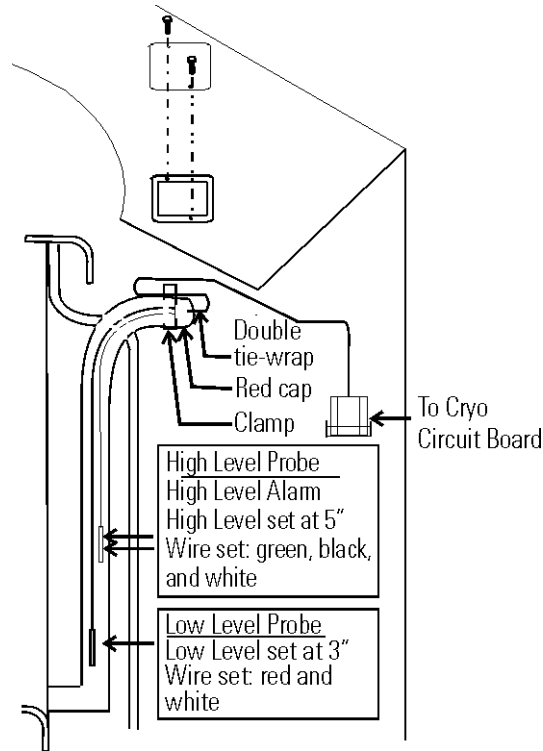


Figure 2-2. Sensor Adjustment

High and Low Level Sensors Adjustments

Factory default sensor settings are:

3-inch ($\pm 1/2$ ") - Low Level (start fill)

5-inch ($\pm 1/2$ ") - High Level (stop fill)

High Alarm set point is always 1 inch above the High Level setpoint

The following procedures are used to change the high and low level sensor settings. Refer to illustration above.

1. Open the lid and remove the access panel cover on the right rear of the cabinet.
2. Slide clamp off of the sensor wires.
3. The double tie-wrap on the sensor wires are the 3-inch low level and the 5-inch high level settings.

Caution Allow probe to warm up for 30 minutes before removing from tube. Pulling probe completely out of the tube when cold could damage probe. ▲

Sensor Adjustment (continued)

4. Using the tie-wrap as a reference, pull the probes to the new level.

Caution If blue or black heat shrink tubing becomes visible when pulling up wires, maximum height adjustment has been reached. Adjustments above this tubing may cause LN₂ overflow. ▲

5. Route the sensor wires back over the red cap and reinstall the clamp.

Note On **Vapor Phase** settings, the high and low levels should be at least 2 inches apart. On **Liquid Phase** settings, the high and low level settings should be at least 5 inches apart. ▲

Gas Bypass Control System

The factory installed option Gas Bypass Control System (P/N 195021, 120VAC or P/N 195023, 230VAC) consists of a thermocouple sensor located in the fill line, the fill solenoid, and the vent valve. Refer to Figure 4-1.

The Gas By-pass System works with the sensor to cause the warm nitrogen gas to automatically bypass the storage tank and be vented to the atmosphere (during the fill cycle).

At the start of the fill cycle, the sensor detects warmer nitrogen vapor in the fill line coming from LN₂ supply source. The sensor causes the fill solenoid to temporarily close, which causes the warm gas to bypass the fill system and be vented to the atmosphere through the vent valve. This prevents warm gas from entering the tank.

When the sensor detects colder liquid nitrogen in fill line, fill solenoid opens, permitting LN₂ to flow into storage tank.

If cold liquid nitrogen is not detected in one hour, the unit goes into Bypass Shutdown alarm. In this alarm state, the following occurs:

- alarms LED lights
- low level and high level LED flash
- audible alarm will cycle on and off
- all valves will close
- remote alarm contacts will activate.

To clear this alarm (after the alarm condition is corrected), the unit power switch must be turned off, then turned on.

Power Switch and Power Indicator

The Power switch (mains disconnect) is located at right rear of the storage system cabinet. When power is applied to the controller, the red LED indicator lights.

Solenoid Switch and Indicator

The Cryo controller automatically controls the liquid nitrogen level between the low and high level sensors. Liquid nitrogen enters the storage tank through a remotely-operated, normally closed, electric solenoid valve. The solenoid valve is mounted inside of cabinet with access panel provided.

Manual Fill button activates the solenoid valve when the liquid level is greater than one inch below the high level sensor and will fill until the high level sensor is submerged in liquid nitrogen. If a higher level is desired, the Manual Fill button must be held down until that level is reached.

The yellow LED solenoid indicator lights whenever the fill solenoid valve activates.

Section 3 Maintenance

Solenoid valve maintenance information follows.

Operation

Normally closed: Valve is closed when solenoid is de-energized, valve is open when solenoid is energized.

Positioning/Mounting

The valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted upright, to reduce the possibility of foreign matter accumulating in the core tube area.

Maintenance

Warning Turn OFF electrical power supply and de-pressurize valve before making repairs. It is not necessary to remove valve from pipe line for repairs. ▲

Cleaning

A periodic cleaning of all solenoid valves(s) is desirable. The time between cleanings will vary, depending upon media and service conditions. Generally, if the voltage to the coil is correct, sluggish valve operation, excessive noise, or leakage will indicate that cleaning is required.

Valve Disassembly And Reassembly

De-pressurize valve and turn OFF electrical power supply. Proceed in the following manner:

1. Remove retaining clip and slip entire solenoid enclosure off solenoid base sub-assembly.

Caution Retaining clip springs upward when disengaged. ▲

2. Unscrew solenoid base sub-assembly and remove body gasket, core assembly with rider ring and core spring attached.
3. Clean and reassemble in reverse order of disassembly, paying careful attention to exploded view provided for identification and placement of parts.

After maintenance, operate the valve a few times to ensure proper opening and closing.

Caution This procedure must be performed by a qualified service technician. ▲

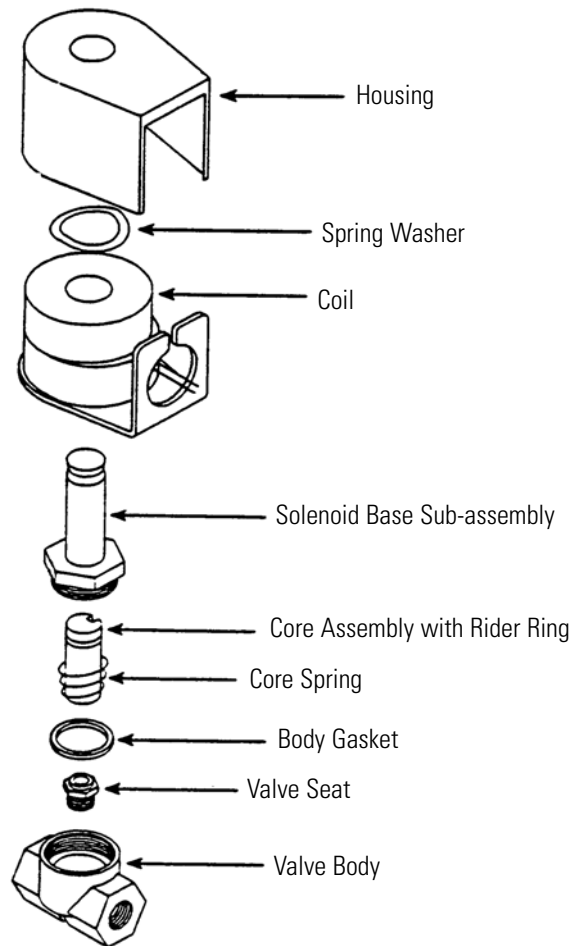


Figure 4-1. Exploded View of Valve

General Cleaning

Protective clothing and gloves should be worn whenever cleaning the inside of this unit. Follow established laboratory procedures. Allow the interior of the unit to warm to ambient and use an appropriate germicide.

Freezing chamber

The interior of the CryoPlus unit is made of high quality stainless steel and should not be cleaned with any cleanser containing chlorine.

Exterior Cabinet

Wash the outside of the cabinet with a mild detergent.

Defrosting the Storage Tank

When defrosting the storage tank, remove the LN₂ from the tank and remove the product. Allow the tank to warm at room temperature.

Caution Do not attempt to speed LN₂ evaporation, or frost removal, by applying direct heat. Avoid using a heater or blowing compressed air into storage tank. ▲

Section 4 Troubleshooting



Caution Servicing of the unit must be performed by qualified service personnel only. ▲

Figure 4-1. Alarms

Alarm Description	Probable Cause	Remedy
Excessive LN ₂ use.	Frequent cycling of level control causes excessive LN ₂ loss.	Verify that the liquid nitrogen container meets static evaporation rate. Verify that a minimum of two inches is maintained between the high and low level sensors.
Solenoid valve stuck	Foreign matter in the valve seat.	Check the liquid level control panel: solenoid valve LED is off, solenoid is open and liquid nitrogen is flowing. Turn liquid nitrogen off at the supply source. Thaw transfer hose and solenoid valve. Remove coil from solenoid valve and open valve to expose seat. Inspect seat for foreign matter. Clean seat and re-assemble valve. Note Use thread sealant, not teflon tape. Tape could get inside the valve. in the open position. ▲
Controller calling for LN ₂ (solenoid LED on)	Supply tank empty or shut-off valve closed.	Replace supply tank. Open shut-off valve.
Liquid not being delivered to tank.	Defective solenoid valve. LN ₂ pressure too low (below 10 psi).	Repair or replace solenoid valve.
Controller continually overfills, solenoid LED is on.	Defective cryo control board. Defective liquid level probe assembly.	Replace cryo control board. Replace liquid level probe assembly
Low level shut down alarm. (audible alarm, alarms LED, and Low Level LED flash).	Insufficient supply of LN ₂ (below 10 psi). Malfunction of low level sensor. Defective fill solenoid valve.	Replace supply tank or open shut-off valve. Replace liquid level probe assembly. Repair or replace fill solenoid valve.
Bypass shutdown alarm (audible alarm, alarms LED, low level LED & high level LED flash).	Insufficient supply of LN ₂ (below 10 psi). Malfunction of bypass sensor. Defective bypass solenoid valve.	Replace supply tank or open shut-off valve. Replace bypass sensor. Repair or replace bypass solenoid valve.
Open sensor alarm (audible alarm and alarms LED flash, low and high level LEDs are off).	Defective sensor or sensor wiring harness.	Repair or replace cryo liquid level probe assembly

Mechanical Block Diagram

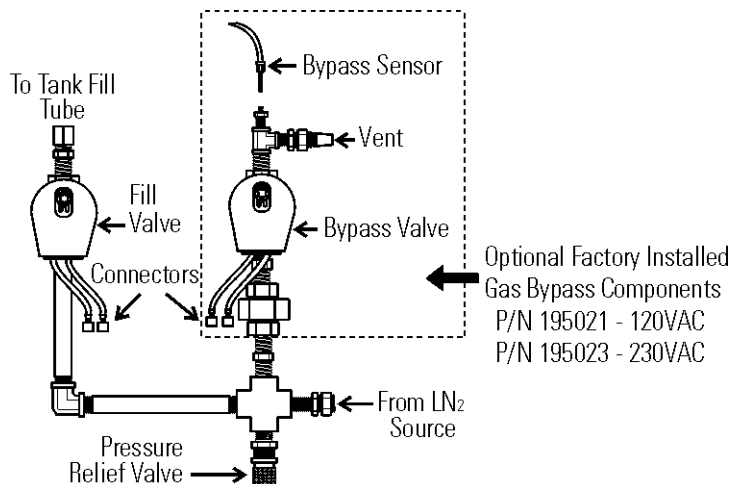


Figure 4-1. Cryo System Mechanical Block Diagram

Manual Liquid Level Check (Dip Stick)

It is a good practice to routinely determine how much liquid nitrogen is in the tank, and to keep a record of these values. It is possible to estimate the number of liters remaining in the tank, by taking a depth measurement (in inches).

The procedure for estimating the amount of liquid in the tank is as follows:

1. With the tank filled and stable, lower the ruler along the edge of the tank until it is at the bottom. (Take subsequent measurements lowering the ruler at this same location.) When the LN₂ stops boiling, pull out the ruler. The actual liquid level will be approximately one inch lower than the frost line on the ruler.

Caution Some shrinkage of the ruler may occur depending on the level of liquid nitrogen in the tank. ▲

Control Board Fuses

Two 63mA Slo-Blow fuses (P/N 230162) are located on the Cryo control circuit board which protects power transformer T1. Refer to Figure 4-2.

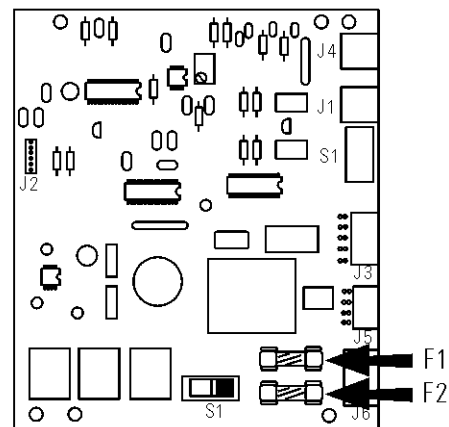


Figure 4-2. Fuse Locations

Section 5 Specifications

Series	740-741	742-743	744-745	746-747
LN ₂ capacity (liters)	90	200	340	552
Static evaporation rate (liters/day)*	3	5	8	10
Static Holding Time (days)	30	40	42.5	55
Exterior Height	41.0" (104.1 cm)	41.0" (104.1 cm)	41.0" (104.1 cm)	47.0" (119.4 cm)***
Exterior W x D	21.5"W x 26.0" F-B** (54.6 cm x 66.0 cm)	28.5"W x 34.0" F-B** (72.4 cm x 86.4 cm)	34.5"W x 41.5" F-B** (87.6 cm x 105.4 cm)	43.5"W x 50.0" F-B** (110.5 cm x 127.0 cm)
Usable Interior Height	27.5" (69.9 cm)	27.5" (69.9 cm)	27.5" (69.9 cm)	27.5" (69.9 cm)
Usable Interior Diameter	16.0" (40.6 cm)	24.0" (61.0 cm)	31.0" (78.7 cm)	39.5" (100.3 cm)
Electrical	100 - 120 VAC, 1 PH, 50/60 Hz, 0.8 FLA (Operating Range 90-132V) 200 - 230 VAC, 1 PH, 50/60 Hz, 0.5 FLA (Operating Range 180-253V)			
Utility Connections	1/2" 45° Flare 4-foot hose	1/2" 45° Flare 6-foot hose	1/2" 45° Flare 6-foot hose	1/2" 45° Flare 6-foot hose
Weight Empty	194.0 lbs. (88.0 kg)	325.0 lbs. (147.4 kg)	416.0 lbs. (188.7 kg)	680.0 lbs. (308.4 kg)
Weight Full	354.0 lbs.(160.6 kg)	680.0 lbs. (308.4 kg)	1021.0 lbs.(463.1 kg)	1620.0 lbs. (734.8 kg)
Shipping Weight	260.0 lbs. (117.9 kg)	400.0 lbs. (181.4 kg)	540.0 lbs. (244.9 kg)	892.0 lbs. (404.6 kg)
No. of Racks				
Standard	6	10	17	28
Maximum	6	28	50	31
Capacity 2.0 ml vials				
Standard****	6,318	13,000	22,100	36,400
Maximum	6,318	14,000*****	25,000*****	40,300

Continuing research and improvements may result in specification changes at any time.

* Static evaporation rates are based on new container performance, no product load, styrofoam plug/lid, and no lid openings. Actual working performance may vary with individual applications, ambient conditions, and/or scale accuracy; excludes supply tank evaporation.

** Add 5.0" (12.7 cm) for utilities and lid opening

*** 93.5" (237.5 cm) total unit height of CryoPlus 4 with lid open

**** Rack = 13-2C/100

***** Use rack #4000112

Section 6 Parts List

Stock No.	Description	MODELS			
		740/741	742/743	744/745	746/747
103067	Tank trim gasket	5-foot	7-foot	8.5-foot	11-foot
107406	Lid seal gasket	5-foot	7-foot	8.5-foot	11-foot
120054	Dual wheel caster	4	4	4	
120059	7406/7407 caster				4
122010	Lid tumbler lock	1	1	1	1
129047	Lid pneumatic spring	1			
129048	Lid pneumatic spring		2		
129046	Lid pneumatic spring			2	3
190551	Cryo control board	1	1	1	1
195006	Ribbon cable - control board to display	1	1	1	1
195011	Cryo main wiring harness	1	1	1	1
195009	Cryo liquid level probe	1	1	1	1
195024	120V valve assy. 740,742, 744, 746	1	1	1	1
195025	220V valve assy. 741,743, 745, 747	1	1	1	1
251004	Pressure relief valve 1/4" MPT	1	1	1	1
990027	Magnetic lid gasket	1			
990028	Magnetic lid gasket		1		
990029	Magnetic lid gasket			1	
990031	Magnetic lid gasket				1
180143	LN2 dip measuring ruler	1	1	1	1
4000400	4 foot transfer hose	1			
4000401	6 foot transfer hose		1	1	1
195884	Lid closing strap	1	1	1	1

Accessory List

Part No.	Description
195021	Bypass Assembly Kit 120V FI
195063	Internal Temperature Sleeve
195700	Bypass Assembly Kit 120V QI
201175	Recorder Kit 115V FI
201229	Recorder Kit QI
4000001	Inventory Rack 11-2-CW
4000005	Inventory Rack 6-3.75-CW
4000006	Inventory Rack 13-2-CW
4000008	Inventory Rack 8-3-CW
4000010	Inventory Rack 7-3.75-CW
4000011	Vertical Inventory Rack 4-2-CW
4000012	Vertical Inventory Rack 5-2-CW
4000042	Inventory Rack 12-2-CW
4000043	Jumbo Inventory Rack 7-3.75-C
4000044	Jumbo Inventory Rack 13-2-C
4000056	Platform Riser 4x16/CMS (not used on Model 747)
4000057	Platform Riser 7x16 F/CMS (not used on Model 747)
4000097	Jumbo Inventory Rack 6-3.75-C (Model 740 only)
4000100	Jumbo Inventory Rack 7-3-C (Model 740 only)
4000103	Jumbo Inventory Rack Kit 8-2-SS
4000104	Jumbo Inventory Rack 8-3-C (Model 740 only)
4000108	Jumbo Inventory Rack 10-2-C (Model 740 only)
4000144	Inventory Control Rack 13-2-C
4000324	Delmed 2030-2 Slide Canister
4000332	Gambro DF-200 Slide Canister
4000333	Gambro DF-700 Slide Canister
4000335	Fenwal 4R5461 Slide Canister
4000336	Fenwal 4R5462 Slide Canister
4000348	Delmed 2030-2 Swing Arm Canister
4000356	Gambro Df-200 Swing Arm Canister (not used on Model 743)
4000357	Gambro Df-700 Swing Arm Canister (not used on Model 743)
4000364	Delmed 2030/-50 Canister Frame (not used on Model 743)
4000368	Gambro DF-200 4-Place Frame (not used on Model 743)
4000369	Gambro DF-700 4-Place Frame (not used on Model 743)
4000371	Frame For Fenwal 4R5461 (not used on Model 743)
4000372	Fenwal 4-PL 4R5462 Frame (not used on Model 743)
4000616	Fenwal 4R9951 Platform Dividers
6000740	Installation/Operation Qualification
107406	Tank Plug Foam Gasket
990027	Lid Gasket

* FI = Factory Install

QI = Qualified Personnel Install

Exceptions

Part No.	Description
Model 741	
195023	Bypass Assembly Kit 230V FI
195701	Bypass Assembly Kit 230V QI
201280	Recorder Kit 220V FI
Model 742	
195064	Int. Temperature Sleeve
4000003	Inventory Rack 7-3-CW
4000004	Inventory Rack 7-3-SS
4000060	Platform Riser 3-1/2"x20"
4000061	Platform Riser 5"x20"
4000062	Platform Riser 4"x20"
4000075	Fenwal 4R5461 Platform Divided
4000076	Fenwal 4R5462 Platform Divided
4000078	Gambro DF200 Platform Divided
4000079	Gambro DF700 Platform Divided
4000080	Delmed 2030-2 Platform Divided
4000624	Fenwal 4R9951 Platform Divided
Model 743	
195023	Bypass Assembly Kit 230V FI
195064	Internal Temperature Sleeve
195701	Bypass Assembly Kit 230V QI
201280	Recorder Kit 220V FI
4000003	Inventory Rack 7-3-CW
4000004	Inventory Rack 7-3-SS
4000060	Platform Riser 3-1/2"x20"
4000061	Platform Riser 5"x20"
4000062	Platform Riser 4"x20"
4000075	Fenwal 4R5461 Platform Divided
4000076	Fenwal 4R5462 Platform Divided
4000078	Gambro DF200 Platform Divided
4000079	Gambro DF700 Platform Divided
4000080	Delmed 2030-2 Platform Divided
Model 744	
195065	Int. Temperature Sleeve
4000003	Inventory Rack 7-3-CW
4000004	Inventory Rack 7-3-SS
4000045	Delmed BP4/4BP Platform Dividers
4000047	Gambro DF-200 Platform Dividers
4000048	Gambro DF-700 Platform Dividers
4000050	Fenwal 4R5461 Platform Dividers
4000051	Fenwal 4R5462 Platform Divided
4000063	Platform Riser 3-1/2x31
4000064	Platform Riser 5x31
4000065	Platform Riser 4x31
4000631	Fenwal 4R9951 Platform Dividers

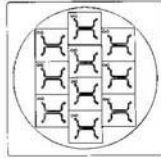
Exceptions (continued)

Part No.	Description
Model 745	
195023	Bypass Assembly Kit 230V FI
195065	Internal Temperature Sleeve
195701	Bypass Assembly Kit 230V QI
201280	Recorder Kit 220V FI
4000003	Inventory Rack 7-3-CW
4000004	Inventory Rack 7-3-SS
4000045	Delmed BP4/4BP Platform Dividers
4000047	Gambro DF-200 Platform Dividers
4000048	Gambro DF-700 Platform Dividers
4000050	Fenwal 4R5461 Platform Dividers
4000051	Fenwal 4R5462 Platform Divided
4000063	Platform Riser 3-1/2x31
4000064	Platform Riser 5x31
4000065	Platform Riser 4x31
4000631	Fenwal 4R9951 Platform Dividers
Model 746	
195066	Internal Temperature Sleeve
4000052	Gambro 200 Platform Dividers
4000053	Fenwal 4R5461 Platform Dividers
4000054	Fenwal 4R5462 Platform Dividers
4000639	Fenwal 4R9951 Platform Dividers
Model 747	
195023	Bypass Assembly Kit 230V FI
195066	Internal Temperature Sleeve
195701	Bypass Assembly Kit 230V QI
201280	Recorder Kit 220V FI
4000007	Inventory Rack 13-2-SS
4000009	Inventory Rack 8-3-SS
4000052	Gambro 200 Platform Dividers
4000053	Fenwal 4R5461 Platform Dividers
4000054	Fenwal 4R5462 Platform Dividers
4000639	Fenwal 4R9951 Platform Divider

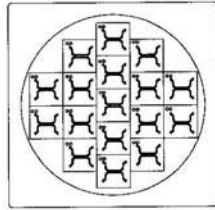
**Standard Inventory
Arrowhead, Square**



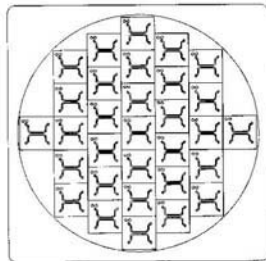
Cryo Plus 1 - Model 7400/7401
Cryo 100 - Model 740/741



Cryo Plus 2 - Model 7402/7403
Cryo 200 - Model 742/743

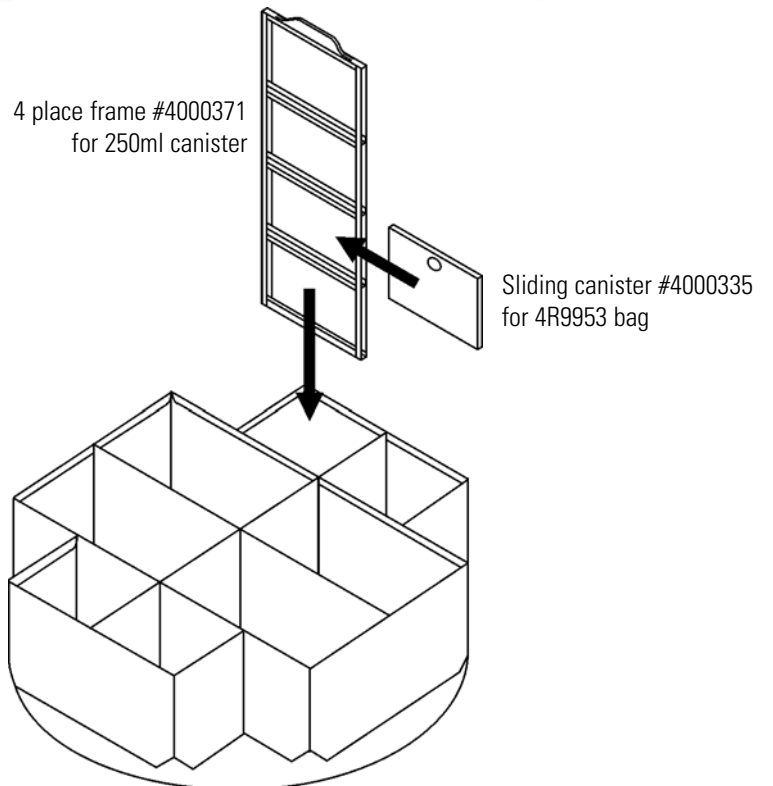
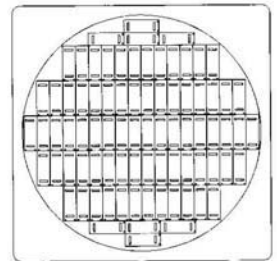
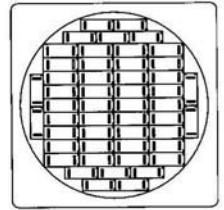
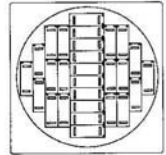
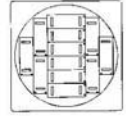


Cryo Plus 3 - Model 7404/7405
Cryo 300 - Model 744/745



Cryo Plus 4 - Model 7406/7407
Cryo 400 - Model 746/747

Vertical Inventory



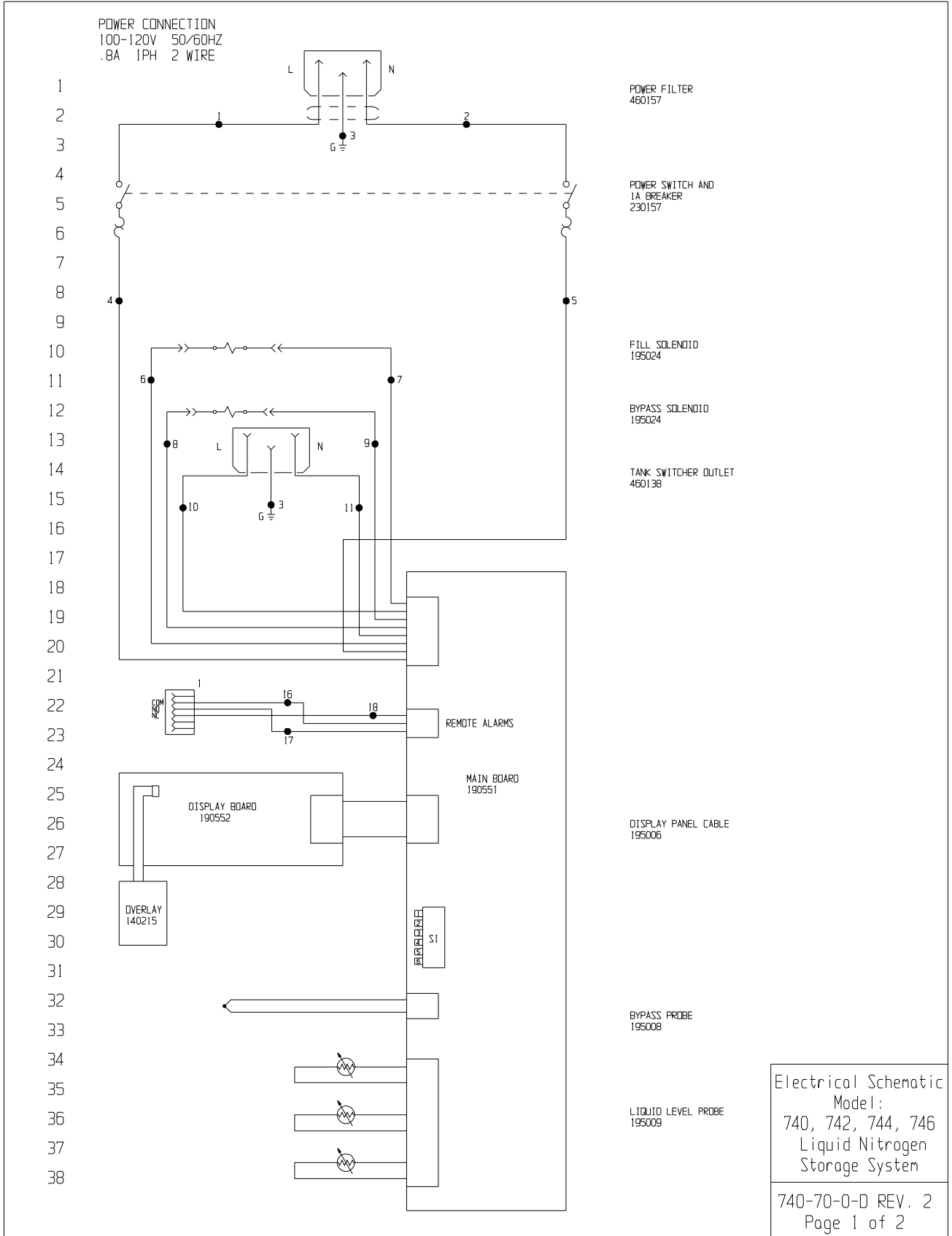
Section 6
Parts List

Table 1. Inventory Control - Rack Systems

Model #	Arrowhead			Square			Vertical			
	Vapor		Liquid	Vapor		Liquid	Vapor		Liquid	
CryoPlus 1	10-2-C/81	2ml	13-2-C/81	2ml	11-2-C/100	2ml	13-2-C/100	2ml	CV-4-2-C/100	CV-5-2-C/100
Cryo 100	7-3-C/81	4ml	8-3-C/81	4ml	7-3-C/100	4ml	8-3-C/100	4ml		
16" Dia.	6-3.75-C/81	5ml	7-3.75-C/81	5ml	6-3.75-C/100	5ml	7-3.75-C/100	5ml		
	System = 6 Racks			System = 4 Racks			System = 12 Racks			
CryoPlus 2					11-2-C/100	2ml	13-2-C/100	2ml	CV-4-2-C/100	CV-5-2-C/100
Cryo 200					7-3-C/100	4ml	8-3-C/100	4ml		
24" Dia.					6-3.75-C/100	5ml	7-3.75-C/100	5ml		
					System = 10 Racks			System = 28 Racks		
CryoPlus 3					11-2-C/100	2ml	13-2-C/100	2ml	CV-4-2-C/100	CV-5-2-C/100
Cryo 300					7-3-C/100	4ml	8-3-C/100	4ml		
31" Dia.					6-3.75-C/100	5ml	7-3.75-C/100	5ml		
					System = 17 Racks			System = 50 Racks		
CryoPlus 4					11-2-C/100	2ml	13-2-C/100	2ml	CV-4-2-C/100	CV-5-2-C/100
Cryo 400					7-3-C/100	4ml	8-3-C/100	4ml		
39.5" Dia.					6-3.75-C/100	5ml	7-3.75-C/100	5ml		
					System = 31 Racks			System = 82 Racks		
Description	5-3.75-C/81	5ml	4000092		6-3.75-C/100	5ml	4000005		CV-4-2-C/100	4000011
& Part No.	6-3-C/81	4ml	4000095		7-3-C/100	4ml	4000003		CV-5-2-C/100	4000012
	6-3.75-C/81	5ml	4000097		7-3.75-C/100	5ml	4000010			
	7-3-C/81	4ml	4000100		8-3-C/100	4ml	4000008			
	7-3.75-C/81	5ml	4000043		11-2-C/100	2ml	4000001			
	8-3-C/81	4ml	4000104		12-2-C/100	2ml	4000042			
	9-2-C/81	2ml	4000106		13-2-C/100	2ml	4000006			
	10-2-C/81	2ml	4000108							
	11-2-C/81	2ml	4000110							
	12-2-C/81	2ml	4000112							

Table 2. Inventory Control Canisters/Frames

	Fenwal 4R5461/4R9953		Fenwal 4R5462/4R9955		Gambro DF-200		Gambro DF-700		Delmed 2030-2	
	Canisters	Frames	Canisters	Frames	Canisters	Frames	Canisters	Frames	Canisters	Frames
CryoPlus 1										
Cryo 100										
16" Dia.	124	31-4 place	88	22-4 place	76	19-4 place	48	12-4 place	66	22-3 place
CryoPlus 2										
Cryo 200										
24" Dia.	272	68-4 place	192	48-4 place	184	46-4 place	112	28-4 place	168	56-3 place
CryoPlus 3										
Cryo 300										
31" Dia.	448	112-4 place	352	88-4 place	256	64-4 place	168	42-4 place	270	90-3 place
CryoPlus 4										
Cryo 400										
39.5" Dia.	792	198-4 place	624	156-4 place	432	108-4 place	312	78-4 place	564	188-3 place
Description	Slide Canister	4000335	Slide Canister	4000336	Slide Canister	4000332	Slide Canister	4000333	Slide Canister	4000324
& Part No.					Swing	4000356	Swing	4000357	Swing	4000348
	Frame OAH 22.9" Platform Dividers	4000371	Frame OAH 23.1" Platform Dividers	4000372	Frame OAH 26.1" Platform Dividers	4000368	Frame OAH 23" Platform Dividers	4000369	Frame Platform Dividers	4000364
	Tank - 24"	4000075	Tank - 24"	4000076	Tank - 24"	4000078	Tank - 24"	4000079	Tank - 24"	4000080
	Tank - 31"	4000050	Tank - 31"	4000051	Tank - 31"	4000047	Tank - 31"	4000048	Tank - 31"	4000045
	Tank - 39.5"	4000053	Tank - 39.5"	4000054	Tank - 39.5"	4000052				



Section 7
Electrical Schematics

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S1 SETTINGS

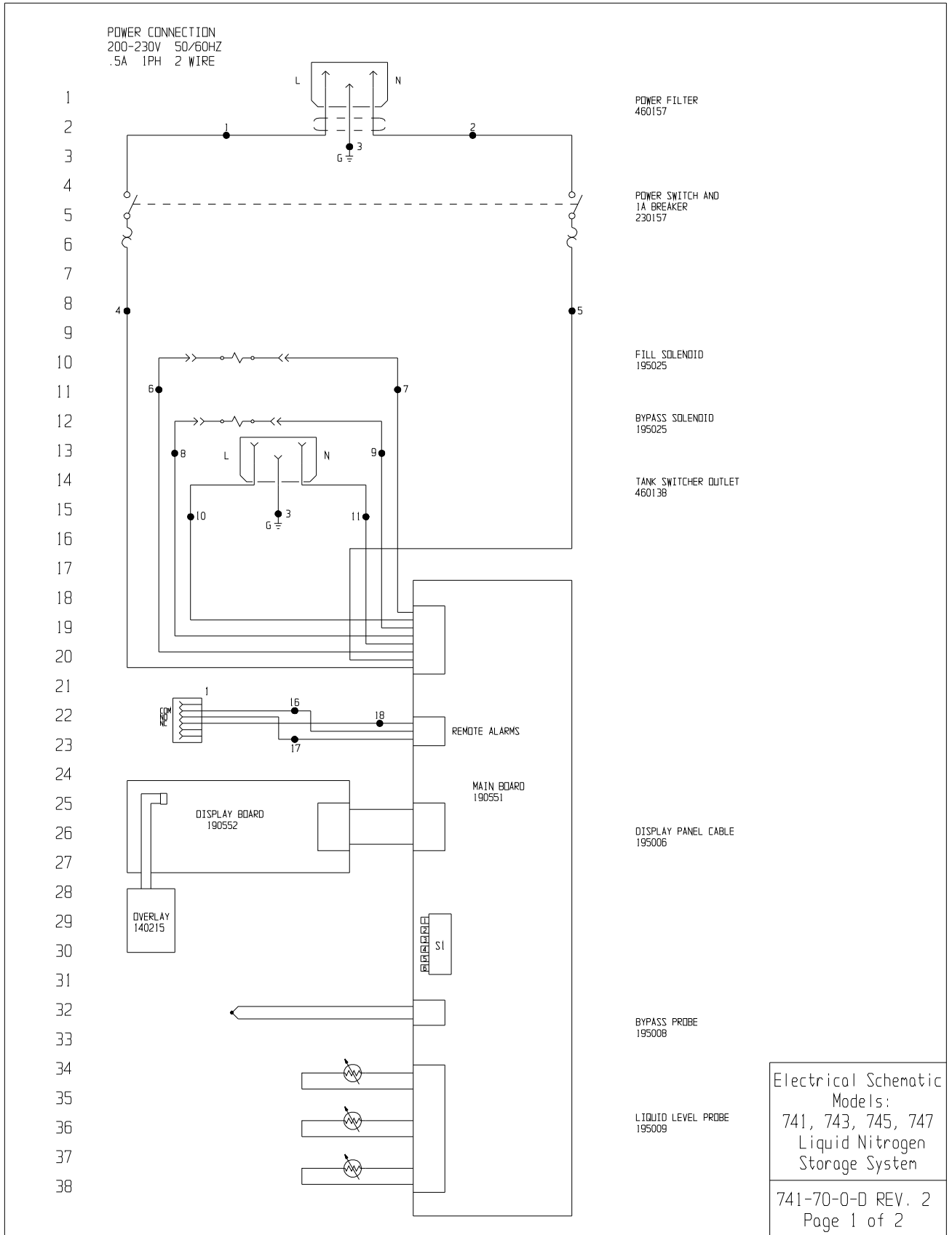
WITHOUT BYPASS:	1 UP	WITH BYPASS:	1 UP
	2 UP		2 UP
	3 UP		3 UP
	4 DN		4 DN
	5 DN		5 DN
	6 DN		6 UP

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89
90

WIRE REFERENCE CHART

WIRE #	GAUGE	COLOR
1	18	BRN
2	18	BLU
3	18	GRN/YEL
4	18	BLK
5	18	WHT
6	22/3	BLK
7	22/3	WHT
8	22/3	BLK
9	22/3	RED
10	18	BLK
11	18	WHT
12		
13		
14		
15		
16	24/3	BLK
17	24/3	RED
18	24/3	WHT

NOTES:		CUSTOMER APPROVAL/REFERENCE								Electrical Schematic Model: 740, 742, 744, 746 Liquid Nitrogen Storage System	
<input checked="" type="checkbox"/> Denotes Terminal Strip Connection	Ports List Reference Number	APPROVED BY									
Last Relay Number	<input type="checkbox"/> Assembly	APPROVING FIRM									
18 Last Terminal Number	<input type="checkbox"/> Panel	DATE OF APPROVAL	2	FR-1093	02-20-97	MAB/PDK	CCS				CORRECT WIRE COLORS
Last Wire Number	<input type="checkbox"/> Refrigeration	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM FORMA SCIENTIFIC									
	<input type="checkbox"/> Wiring	REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION			
		DATE	10-26-95	DNW	AT	CAD	AT	APPD	WCW	SCALE	NONE
		CUSTOMER									
		JOB TITLE	CRYO (740,742,744,746)								
		DWG TITLE	ELECTRICAL SCHEMATIC								
		LOCATION	JOB NUMBER	DRAWING NUMBER							
		FREEZERS		740-70-0-D							
										740-70-0-D REV. 2 Page 2 of 2	



Section 7
Electrical Schematics

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S1 SETTINGS

WITHOUT BYPASS:	1 UP	WITH BYPASS:	1 UP
	2 UP		2 UP
	3 UP		3 UP
	4 DN		4 DN
	5 DN		5 DN
	6 DN		6 UP

77
78
79
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81
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85
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87
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89
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WIRE REFERENCE CHART

WIRE #	GAUGE	COLOR
1	18	BRN
2	18	BLU
3	18	GRN/YEL
4	18	BLK
5	18	WHT
6	22/3	BLK
7	22/3	WHT
8	22/3	BLK
9	22/3	RED
10	18	BLK
11	18	WHT
12		
13		
14		
15		
16	24/3	BLK
17	24/3	RED
18	24/3	WHT

NOTES: <input checked="" type="checkbox"/> Denotes Terminal Strip Connection <input type="checkbox"/> Parts List Reference Number <input type="checkbox"/> Last Relay Number <input type="checkbox"/> Last Terminal Number <input type="checkbox"/> Last Wire Number <input type="checkbox"/> Assembly <input type="checkbox"/> Panel <input type="checkbox"/> Refrigeration <input type="checkbox"/> Wiring	CUSTOMER APPROVAL/REFERENCE APPROVED BY _____ APPROVING FIRM _____ DATE OF APPROVAL _____	2 FR-1994 03-17-08 CCS KDG CCS 1 FR-1010 08-21-96 WCM RGM WCM 0 N/A 10-26-95 AT AT WCM	CORRECT WIRE COLORS 7 & 9, ADD 750 REVISED SOLENOID NO. RELEASED FOR PRODUCTION	Electrical Schematic Models: 741, 743, 745, 747 Liquid Nitrogen Storage System
	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM THERMO FISHER SCIENTIFIC	REV ECR NO. DATE BY CAD APPD DESCRIPTION OF REVISION DATE 10-26-95 DWN AT CAD AT APPD WCM SCALE NONE CUSTOMER JOB TITLE CRYO (741, 743, 745, 747 & 750) DWG TITLE ELECTRICAL SCHEMATIC LOCATION JOB NUMBER DRAWING NUMBER FREEZERS 741-70-0-D	741-70-0-D REV. 2 Page 2 of 2	

THERMO FISHER SCIENTIFIC STANDARD PRODUCT WARRANTY (LN₂ Vacuum)

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows for shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the first year warranty period.

During the first year, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor included. *LN₂ Vacuum Integrity is covered for two years.* Installation and calibration are not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters and gaskets are excluded from this warranty.

Replacement or repair of components parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any components or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.
Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-800-438-4851 (USA and Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service and special application. Outside the USA, contact your local distributor for warranty information.



Rev. 4 4/09

THERMO FISHER SCIENTIFIC INTERNATIONAL DEALER WARRANTY

The Warranty Period starts two months from the date your equipment is shipped from our facility. This allows for shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the first year warranty period. Dealers who stock our equipment are allowed an additional six months for delivery and installation, provided the warranty card is completed and returned to the Technical Services Department.

During the first year, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor excluded. Installation and calibration are not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters, reagents, tubing, and gaskets are excluded from this warranty.

Replacement or repair of components parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any components or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

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Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

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Rev. 4 2/09

Handling Liquid Nitrogen

Warning Contact of liquid nitrogen or cold gas with the skin or eyes may cause serious freezing (frostbite) injury. ▲

Handle liquid nitrogen carefully.

The extremely low temperature can freeze human flesh very rapidly. When spilled on a surface the liquid tends to cover it completely and intimately, cooling a large area. The gas issuing from the liquid is also extremely cold. Delicate tissue, such as that of the eyes, can be damaged by an exposure to the cold gas which would be too brief to affect the skin of the hands or face.

Never allow any unprotected part of your body to touch objects cooled by liquid nitrogen.

Such objects may stick fast to the skin and tear the flesh when you attempt to free yourself. Use tongs to withdraw objects immersed in the liquid, and handle the object carefully.

Wear protective clothing.

Protect your eyes with a face shield or safety goggles (safety glasses without side shields do not give adequate protection). Always wear gloves when handling anything that is, or may have been, in immediate contact with liquid nitrogen. Insulated gloves are recommended, but heavy leather gloves may also be used. The gloves should fit loosely, so that they can be thrown off quickly if liquid should splash into them. When handling liquid in open containers, it is advisable to wear high-top shoes. Trousers (which should be cuffless if possible) should be worn outside the shoes.

Introduction

The safe handling and use of liquid nitrogen in cryogenic refrigerators and dewar flasks is largely a matter of knowing the potential hazards and using common-sense procedures based on that knowledge. There are two important properties of liquid nitrogen that present potential hazards:

1. It is extremely cold. At atmospheric pressure, liquid nitrogen boils at -320° F (-196° C).
2. Very small amounts of liquid vaporize into large amounts of gas. One liter of liquid nitrogen becomes 24.6 cu. ft. (0.7 m³) of gas.

Introduction (continued)

The safety precautions in this appendix must be followed to avoid potential injury or damage which could result from these two characteristics. Do not attempt to handle liquid nitrogen until you read and fully understand the potential hazards, their consequences, and the related safety precautions. Keep this information handy for ready reference and review.

Note Because argon is an inert gas whose physical properties are very similar to those of nitrogen, precautions and safe practices for the handling and use of liquid argon are the same as those for liquid nitrogen. ▲

Use only containers designed for low temperature liquids.

Cryogenic containers are specifically designed and made of materials that can withstand the rapid changes and extreme temperature differences encountered in working with liquid nitrogen. Even these special containers should be filled SLOWLY to minimize the internal stresses that occur when any material is cooled. Excessive internal stresses can damage the container.

Warning Do not cover or plug the entrance opening of any liquid nitrogen refrigerator or dewar. Do not use any stopper or other device that would interfere with venting of gas. ▲

These cryogenic liquid containers are generally designed to operate with little or no internal pressure. Inadequate venting can result in excessive gas pressure which could damage or burst the container. Use only the loose-fitting necktube core supplied or one of the approved accessories for closing the necktube. Check the unit periodically to be sure that venting is not restricted by accumulated ice or frost.

Use proper transfer equipment.

Use a phase separator or special filling funnel to prevent splashing and spilling when transferring liquid nitrogen into or from a dewar or refrigerator. The top of the funnel should be partly covered to reduce splashing. Use only small, easily-handled dewars for pouring liquid. For the larger, heavier containers, use a cryogenic liquid withdrawal device to transfer liquid from one container to another. Be sure to follow instructions supplied with the withdrawal device. When liquid cylinders or other large storage containers are used for filling, follow the instructions supplied with those units and their accessories.

Do not overfill containers.

Filling above the bottom of the necktube (or specified maximum level) can result in overflow and spillage of liquid when the necktube core or cover is placed in the opening.

Never use hollow rods or tubes as dipsticks.

When a warm tube is inserted into liquid nitrogen, liquid will spout from the top of the tube due to gasification and rapid expansion of liquid inside the tube.



Warning Nitrogen gas can cause suffocation without warning! ▲

Store and use liquid nitrogen only in a well-ventilated place.

As the liquid evaporates, the resulting gas tends to displace the normal air from the area. In closed areas, excessive amounts of nitrogen gas reduce the concentration of oxygen and can result in asphyxiation. Because nitrogen gas is colorless, odorless and tasteless, it cannot be detected by the human senses and will be breathed as if it were air. Breathing an atmosphere that contains less than 18% oxygen can cause dizziness and quickly result in unconsciousness and death.

Note The cloudy vapor that appears when liquid nitrogen is exposed to the air is condensed moisture; not the gas itself. The issuing gas is invisible. ▲

Never dispose of liquid nitrogen in confined areas or places where others may enter.

Disposal of liquid nitrogen should be done outdoors in a safe place. Pour the liquid slowly on gravel or bare earth where it can evaporate without causing damage. Do not pour the liquid on pavement.

First Aid

If a person seems to become dizzy or loses consciousness while working with liquid nitrogen, move to a well-ventilated area immediately. If breathing has stopped, apply artificial respiration. If breathing is difficult, give oxygen. Call a physician. Keep warm and at rest.

If exposed to liquid or cold gas, restore tissue to normal body temperature (98.6° F) as rapidly as possible, followed by protection of the injured tissue from further damage and infection.

Remove or loosen clothing that may constrict blood circulation to the frozen area. Call a physician. Rapid warming of the affected part is best achieved by using water at 108° F. Under no circumstance should the water be over 112° F, nor should the frozen part be rubbed either before or after rewarming. The patient should neither smoke nor drink alcohol.

Declaration of Conformity

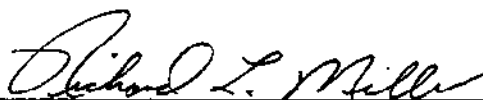
Manufacturer's Name: Thermo Electron Corp.
Manufacturer's Address: 401 Millcreek Road
Marietta, Ohio 45750
U.S.A.
Product Description: Liquid Nitrogen Freezing/Storage Systems
Product Designations: 740, 741, 742, 743, 744, 745, 746 & 747
Year of Initial Marking (CE): 1996
Affected Units: Release Level 2
(Release Level [REL#] shown on Serial Tag)

This product conforms to the following European Union Directive(s):

EMC: 89/336/EEC
LVD: 73/23/EEC

This product conforms to the following Harmonized, International and National Standards:

EMC:	LVD:
EN 61326-1:1997	EN 61010-1:1993
EN 50081-1:92	Amendments 1 and 2
EN 50082-1:97	CSA C22.2 No. 1010.1
	UL 61010A-1



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13 January 2004

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