

PLANER

INTEGRA 750PLUS OPERATOR'S MANUAL

Original instructions

INTEGRA 750PLUS OPERATOR'S MANUAL

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Table of Contents

Chapter I An introduction to the Integra 750Plus	1
1 Symbols	2
Symbols used in this manual	2
Symbols used on the freezer	2
2 Safety precautions	2
First aid	3
Safety	3
EMC precautions	4
3 About this Manual	5
4 The Integra 750Plus components	6
The Integra 750Plus freezer	6
Liquid nitrogen delivery system	7
Personal Computer (PC)	9
Printer	9
Chapter II Installing the Integra 750Plus system	11
1 Preparation	12
2 Unpacking the equipment	12
3 Installing the freezer	13
4 Installing a Dura-Lo or Dura-TechCylinder	14
5 Installing a Planer Pump and Dewar	15
Attaching the delivery tube	15
Putting liquid nitrogen into the dewar	15
Fitting the pump	16
6 Freezer lifting instructions	16
Chapter III Operating the Integra 750Plus system	19
1 Maintaining a Planer dewar	20
Removing the pump	21
2 Freezing samples	21
The procedure to follow	22
Stopping a run	23
Shutting down the system	23
Power failures	23
Dealing with a system lockup	24
3 Alarms	24
4 Maintaining the equipment	24
Routine maintenance	25

Cleaning the Integra 750Plus freezer	26
Calibrating the system	27
Changing fuses	27
Disposal	27

Chapter IV Troubleshooting 29

1 Integra 750Plus freezer	30
2 LNP4 liquid nitrogen pump	31
3 Dewar	32

Chapter V Additional information 35

1 Integra 750Plus specifications	36
Integra 750Plus freezer	36
AUX connector	38
EU Declaration of Conformity	39
2 Spare parts	39
Ordering spares	39
Integra 750Plus fuses	39

**An introduction to the Integra
750Plus**

Chapter



1 An introduction to the Integra 750Plus

1.1 Symbols

1.1.1 Symbols used in this manual



Failure to follow these instructions could result in personal injury.



Failure to follow these instructions could result in damage to equipment or samples.



This indicates first-aid advice.

1.1.2 Symbols used on the freezer

	Warning: consult the manual and the accompanying documentation.	
	Mains supply ON	
	Mains supply OFF	
	Alternating current	
	RUN key	
	STOP key	
		
	COOL manual override	HEAT manual override
	Caution — hot surface	

1.2 Safety precautions

IT IS IMPORTANT TO READ THESE SAFETY INSTRUCTIONS PRIOR TO OPERATING ANY EQUIPMENT.

1.2.1 First aid



IF IN DOUBT, SEEK IMMEDIATE MEDICAL ATTENTION. If any quantity of liquid nitrogen comes into contact with the skin or eyes, immediately flood that area of the body with large quantities of unheated water, apply cold compresses and seek medical attention. If the skin is blistered or there is any possibility that eyes have been affected, the patient should be taken immediately to a doctor or hospital for treatment.

1.2.2 Safety



Failure to comply with these instructions could result in personal injury

- Operating the system in a manner not specified within this manual or under conditions outside of the specifications, see [Integra 750Plus specifications](#)^[36], may result in the protection offered by the equipment being impaired.
- Never leave a freezer unattended when running a program.
- Avoid nitrogen build up: anywhere liquid nitrogen is used must be well ventilated to reduce the risk of nitrogen build up. Small volumes of liquid nitrogen convert to very large volumes of gas. This can result in drowsiness, or in extreme cases, asphyxiation.
- When liquid nitrogen is used in confined spaces, oxygen-deficiency alarms must be installed. Guidance on ventilation requirements are given in BCGA Code of Practice CP30, The safe use of liquid nitrogen dewars up to 50 litres.
- When there is a risk of reduced or insufficient ventilation when a room is unoccupied, then alarms to indicate oxygen deficiency must be installed and positioned outside of the room so that operators are aware of the hazard before entering. The operational status of such an alarm should also be visible from outside the room.
- If liquid nitrogen is used in an area that requires forced ventilation, an alarm to indicate its failure should be fitted.
- When dispensing or potentially being exposed to liquid nitrogen, protect the face with a shield and wear gloves, boots and a protective apron. Prevent spillage into shoes and onto unprotected parts of the body.
- Handle vessels containing liquid nitrogen carefully. Liquid nitrogen boils at -196°C and both liquid and gas can cause rapid and severe frostbite. Delicate tissue, e.g. the eyes, can be damaged by an exposure to the cold gas, which may be too brief to affect the skin of the hands or face.
- Stand clear of boiling and splashing liquid nitrogen and its gas when filling a dewar at normal room temperature or when inserting objects (such as a pump) into the liquid.
- Use tongs or wear cryogloves when handling cold or hot objects. Cryogloves are available as an accessory from Planer. When running a program, the chamber and contents may get cold enough to cause frostbite or hot enough to cause burns.

- If a dewar with a pump is being used, it must be depressurised before the pump can be removed. This is achieved by opening the pressure-relief valve mounted on the side of the pump, which seals an orifice in the pressure system by toggle action. Avoid contact with cold nitrogen gas when depressurising the dewar.
- The dewars used with this equipment must never be used to store any liquid other than liquid nitrogen.
- Only use vessels designed for working with liquid nitrogen.
- Secure the liquid nitrogen container to prevent toppling.
- Ensure that the delivery pipe connections are secure and leak-free before supplying liquid nitrogen to the freezer.
- Liquid nitrogen pressure must not exceed 1.5 bar (22 psi).
- To maintain protection against electric shock, the mains lead must be properly fitted to a 3-way mains connector plugged into an earthed mains outlet.
- Because of the potentially wet laboratory environment, the operator should be provided with additional protection against electric shock by supplying mains power to the freezer through a residual current circuit breaker (RCCB) operating at a differential of 30 mA. Note that care must be taken to ensure that the freezer is not compromised by faulty equipment sharing the same supply and causing nuisance trips.
- The 9-way plug on the Controller is only for connecting to the RS232 serial port of a computer which complies with IEC950.
- The AUX socket on the Controller is to be used only for calibration by qualified service personnel. It must not be connected to any other equipment.
- The Sample PRT socket inside the chamber is only to be used with a Planer Sample PRT.
- When heating under manual control, check the chamber temperature at intervals of 30 seconds or less to avoid overheating.
- User servicing is limited to cleaning. All other servicing must only be undertaken by suitably qualified engineers.
- To avoid risk of fire, fuses must always be replaced with the same type and rating.
- The Kryo750Plus weighs approximately 40 kg and requires at least two people for safe handling.

1.2.3 EMC precautions



The following precautions must be taken to ensure that the equipment is not damaged by electrostatic discharge (ESD), and that its immunity to radio frequency interference is not compromised.

- Ensure that the Controller is not running a program and that the mains power is disconnected before connecting or disconnecting any cable.
 - Fit the plastic covers and plugs provided to all unused connectors.
-

- Immediately before touching the sample PRT, touch an earthed part, such as the large metal surface at the rear or underside of the freezer.
- Do not touch any uncovered connectors with your hands or tools, even when the equipment is switched off.
- When connecting the system to a PC via the 9 way plug, always use a fully screened cable no longer than 2m.
- Take care to avoid placing freezers in environments influenced by sources of electromagnetic interference, such as cyclotrons, large transformers etc.

1.3 About this Manual

Welcome to Integra 750Plus, a system that provides precision cooling and heating of biological specimens.

This manual is aimed at Integra users; that is, people who are responsible for operating or installing the Integra system.

The manual consists of a number of chapters and appendices:

- The remainder of this chapter, Chapter 1, gives a description of each of the major components in the Integra system.
- [Chapter 2: Installing the Integra 750Plus System](#)^[12] is useful if you are installing Integra for the first time.
- [Chapter 3: Operating the Integra 750Plus System](#)^[20] describes how to operate the equipment.
- [Chapter 4: Troubleshooting](#)^[30] is useful if you experience difficulties with using or setting up the equipment. If you have a problem, you should always refer to this chapter before calling your supplier.
- [Chapter 5: Additional information](#)^[36]
 - [Integra 750Plus Specifications](#)^[36] gives a full list of the Integra specifications, including maximum temperature ranges, freezing rates, etc.
 - [Spare Parts](#)^[39] gives a listing of Integra 750Plus parts, together with part numbers. Refer to this section if you need to order new parts.

1.4 The Integra 750Plus components

The major components of the Integra 750Plus system are shown in the following diagram.

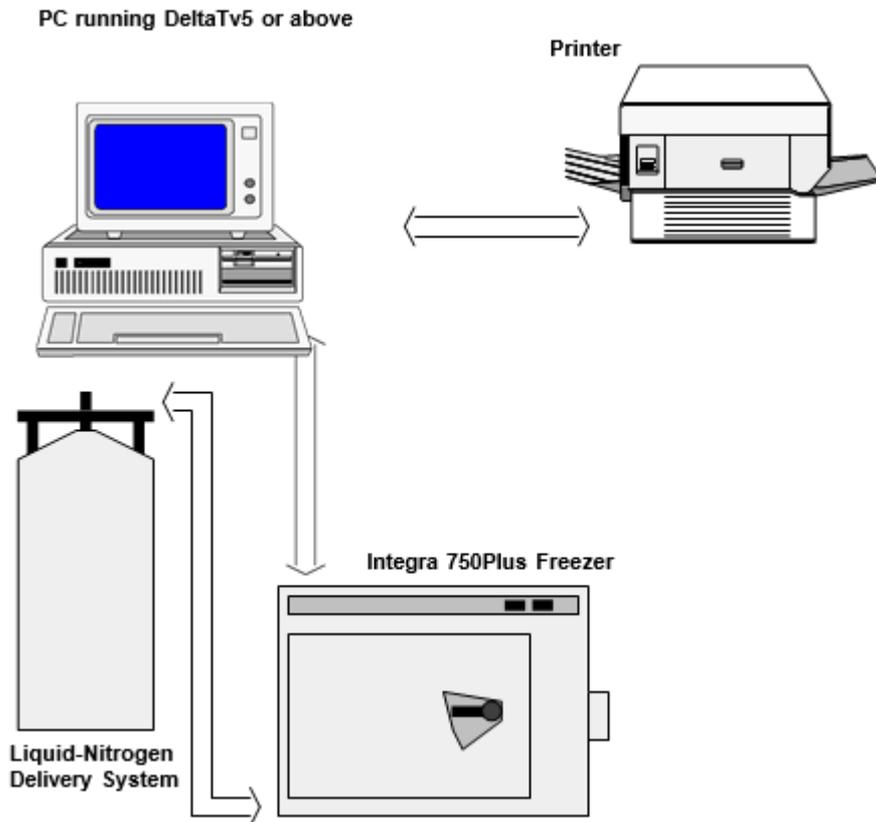


Figure 1.1 System components

1.4.1 The Integra 750Plus freezer

The Integra 750Plus freezer has many important design features:

Precision temperature control - Accurate linear cooling and heating is achieved by the controlled injection of atomised liquid nitrogen into the chamber and the pulsing of a heater. A fan and well-designed ducting ensure uniform circulation of nitrogen gas past the specimens and a uniform temperature throughout the freezing chamber.

Precision temperature monitoring - The chamber temperature is measured by a platinum resistance thermometer (PRT). Optionally, a second PRT can be used to record the temperature of the samples. Both of these temperatures can be plotted on a chart recorder and displayed as graphs within DeltaT.

Square freezing chamber - The large chamber makes the unit extremely versatile and able to use many different types of chamber furniture in different orientations.

Top-loading or front-loading chamber - The chamber can be configured by a service engineer to be accessible from either the top or front of the freezer. The front-loading configuration, coupled with the large chamber, facilitates the freezing of blood bags horizontally.

Stainless steel construction - The chamber and other parts are made from high-quality stainless steel for durability and cleanliness.

Easy-to-clean chamber - The chamber can be easily removed for cleaning, and the chamber temperature can be raised to +100 °C.

Heated seals - To prevent icing, heated seals are provided between the chamber door and body of the freezer.

Freezer furniture - A wide range of specimens can be frozen using a variety of freezer furniture, including ampoule baskets and racks for straws or blood bags. The freezer can hold up to four ampoule baskets, and each basket can hold up to 196 ampoules.

Internal programmable controller - The freezer's operation is controlled by an internal microprocessor-based controller. The controller stores the program that specifies start temperature, freezing rates, etc. in non-volatile memory. The program can be retained in memory for several years, even if the freezer's power is disconnected.

You can load a new program by using the DeltaT software on a PC.

Stand-alone operation - The freezer can store a program from a PC and can run that program independently of the PC.

Cool/heat switches - Push-button switches on the rear panel allow manual control of the cooling and heating functions.

Safety features - The lid activates an interlock switch to switch off the heater, fan and liquid-nitrogen solenoid valve when it is opened. Safety from overheating due to sensor failure is provided by a thermal cutout. A relief valve set to 50psi (3.4bar) is fitted on the input side of the solenoid valve.

1.4.2 Liquid nitrogen delivery system

It is normal to use a 22psi Dura-Lo or Dura-Tech cylinder to provide the supply of liquid nitrogen to the freezer. The cylinder is filled by the supplier and, being self-pressurising, does not require a pump to deliver the liquid nitrogen to the freezer.

Alternatively, a Planer plc 5psi dewar and pump can be used. The dewar contains the store of liquid nitrogen, and the pump is inserted into the neck of the dewar. The pump operates by energising a heater element immersed in the liquid nitrogen; this produces gaseous nitrogen, which pressurises the dewar and forces liquid nitrogen along a delivery tube to the freezer. The dewar needs to be filled manually.

It is preferable to use a 22psi cylinder rather than a 5 psi dewar, since it is physically larger and therefore requires less-frequent filling. In addition, using a 5 psi dewar, the full specified performance of the system may not be achieved and the rate of cooling during a seeding pulse is reduced.

The principal components of the dewar and pump are shown in the following diagram.

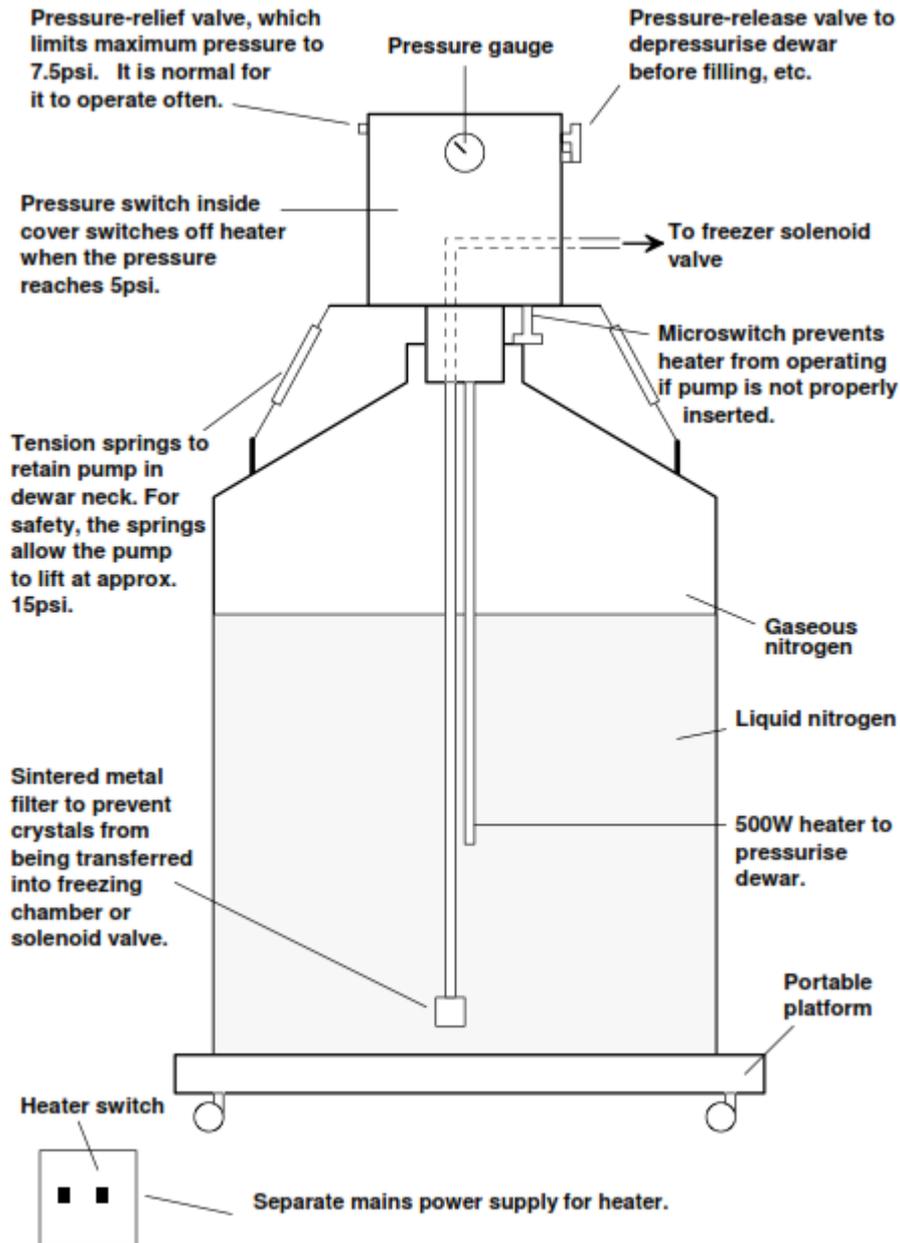


Figure 1.2 Dewar and pump

Although it is normal to use a Dura-Lo/Dura-Tech cylinder or Planer dewar, any liquid-nitrogen supply that has a source pressure between 5 and 22psi may be connected directly to the freezer.



Planer freezers must not be used with supply pressures in excess of 22psi.

1.4.3 Personal Computer (PC)

The optional DeltaT software on a PC enables you to create and store programs. You can run one of these programs from the PC and view the recorded chamber and sample temperatures graphically. All results from the run are stored on the PC for traceability purposes.

Any program you run from the PC can be stored in the freezer's memory (overwriting any previously stored program) if the *Make Permanent* option is selected.. This enables you to rerun the program directly from the freezer, without having the PC connected.

1.4.4 Printer

If you are using a PC, it is strongly recommended that you connect a printer. You can use the printer for tasks such as printing programs and graphs.

Installing the Integra 750Plus system

Chapter



2 Installing the Integra 750Plus system

This chapter describes how to unpack and install the Integra 750Plus system.



If the door is configured for top opening, do not open it if you have turned the freezer so that the door is to the side. The door has a powerful spring attached that allows it to be opened easily when opened from the top, but when opened from the side, will cause it to open VERY quickly and with a significant amount of force. Refer to [Freezer lifting instructions](#)^[16] for further warnings

2.1 Preparation

The surface (e.g. a bench) on which the freezer is to be placed needs to be sturdy and able to carry the weight of the freezer easily.

It is important to ensure that there is adequate airflow around the Integra for cooling purposes. The underside of the freezer must be kept clear to ensure adequate airflow to and from the motor and there must also be a gap of at least 40mm between the Integra and any wall or other piece of equipment.

If you are using a bench, consider its location. If you are using a top-loading freezer, it is important to pull the bench away from the wall, so that the freezer's rear panel can overhang the bench to make it easier to replace fuses and access controls, etc.

If using a front-loading freezer, make sure that there will be sufficient room behind it for you to access the rear panel.

Power sockets are required for the freezer, pump (if using a Planer dewar and pump), chart recorder and PC (if using DeltaT). Ensure that sufficient power sockets are nearby.

2.2 Unpacking the equipment

The Integra is packed standing on its rubber feet in a cardboard tray, with its door uppermost. A rectangular foam ring locates and protects the lower edges of the Integra fibreglass casing, and the sides are protected by a cardboard sleeve. Foam strips protect the upper corners of the Integra. Ground clearance is provided by two wooden battens, which enable a small fork-lift truck to be used to transport the Integra, whilst in its packing, to its intended place of use.

If the Integra is configured for front-loading it will be fitted with a metal foot labelled to show that the system must not be operated in a top-loading position.

To remove the freezer from its packaging

1. Cut and remove the binding tape, then lift off the cardboard lid and remove the foam corner protectors from the Integra casing. Lift the cardboard sleeve up and away from the Integra.
 2. Grasp the handle inset in the door of the Integra and turn it counter-clockwise until the catch disengages. Lift the handle to open the door. This will require about 5kg of force if the Integra is configured for use in the front-opening mode.
-

3. Continue to lift the door until it is just beyond the vertical position, where it will remain. Do not force or slam the door back on its hinge or allow the door to fall back to the closed position, as personal injury or damage may occur.
4. Do not try to turn the door handle. An interlock in the door catch mechanism prevents the handle from being returned to the closed position while the door is open.
5. From inside the Integra chamber, remove the following items:
 - a. Operator's Manual
 - b. Liquid-nitrogen delivery hose
 - c. Mains supply cable Serial control cable Sample PRT
 - d. Exhaust-duct adapter
 - e. Inner chamber release key
 - f. Spare-fuse pack
 - g. Spare sealing-washer pack
6. Close the door and latch it by turning the handle clockwise.
7. Two persons, one at each end, are required to lift and position the Integra safely. Slide the hands between the fibreglass casing and the lower protective foam to get a grip on the base of the Integra, then lift it onto the bench or other place of use, making sure that the door is facing upwards (even for front-loading freezers). **The door handle must not be used to lift the Integra.**
8. Regardless of the intended operating configuration (front-loading or top-loading), it should now be rotated to place its door to the front. This is to allow access to the service panels for purpose of connecting electrical and liquid-nitrogen supplies. If the Integra is configured for top-loading operation, a soft pad should first be placed on the bench to prevent damage to the fibreglass casing.

Two persons, one at each end, are required to rotate the Integra safely. Grip a rear foot and a top front corner of the Integra, then carefully lift and rotate the Integra so that its door faces to the front of the bench. Place the rear edge of the freezer down first, so that the hands at the front can be slid upwards to prevent them from being trapped. **Do not open the door of a top-loading freezer.**

2.3 Installing the freezer



Remember: if the freezer has been configured for top loading, do not open its door until the freezer is in the correct orientation.

If you wish to have the freezer modified for top or front loading, call the Service Engineer. Do not attempt this operation yourself.

Connect the freezer

1. Check that the mains voltage rating shown on the back panel of the freezer correct for local voltage value (115 or 230). If not correct, contact your supplier and do not continue to install the freezer.
2. Wrap the threads of the delivery tube (the tube that supplies liquid nitrogen to the freezer) with PTFE sealing tape, then connect the tube to the 'T' connector on the back of the freezer. Tighten the nut using a spanner. If required, the delivery tube can enter the 'T' connector from the opposite direction; simply move the copper pipe attached to the pressure-relief valve to the opposite side of the 'T' connector (ensuring that the copper sealing washer is undamaged and in place) and tighten securely.
3. Connect the mains lead to the rear panel of the freezer, but DO NOT connect it to the mains wall socket.
4. If the rear panel will become difficult to access in the freezer's final position, make sure that the power switch on the rear panel is on (i.e. press '1'). Otherwise, switch off the freezer, i.e. press '0'.
5. If appropriate, connect the serial cable (9F-9F one-to-one connections) between the Serial Port on the rear panel to the PC's serial port, using a 9M-25w adaptor if necessary. Retain the ESD cover for future use if the cable is subsequently removed.

Rotate a top-loading freezer

7. If the freezer has been configured for top loading, it now needs to be lifted and rotated into its correct orientation. Refer to [Lifting Instructions](#) ¹⁶ at the end of this chapter.

Fit the sample PRT and exhaust elbow

8. Open the freezer's door and plug the sample PRT into the socket (hole) in the top (front loading) or back (top loading) of the chamber.
9. Fit the plastic exhaust elbow adapter to the exhaust port on the right-hand side of the freezer. Direct the exhaust gas to the rear of the freezer or connect the adapter to your own exhaust ducting.

2.4 Installing a Dura-Lo or Dura-Tech Cylinder

Use the following procedure if your system uses a Dura-Lo or Dura-Tech cylinder.

To install a Dura-Lo or Dura-Tech cylinder

1. Connect the delivery tube to the liquid-nitrogen tap by using an appropriate adapter, and tighten securely, observing the manufacturer's instructions.
 2. Wear gloves and goggles, then open the liquid-nitrogen tap slowly whilst checking for leaks. Rectify as necessary.
-

2.5 Installing a Planer Pump and Dewar

Use the following procedures if your system uses a low-pressure Planer pump and dewar. If required, refer to [Figure 1.2](#)^[7].



Note If you use a different make of dewar, it may be necessary to fit an adapter ring to its neck to actuate the microswitch. The lengths of the heater, feed tube and springs may also need to be changed. If in doubt, consult your supplier.

2.5.1 Attaching the delivery tube

To attach the delivery tube:

1. Check that the freezer has its liquid-nitrogen delivery pipe securely fitted.
2. Support the pump carefully to avoid damage to the heating element near the end of its inlet tube.
3. Fit the adaptor to the free end of the freezer's liquid-nitrogen delivery pipe and connect it to the Planer pump, making sure that the fibre sealing washer is undamaged and correctly positioned. Tighten the gland nut securely.

2.5.2 Putting liquid nitrogen into the dewar

To add the liquid nitrogen

1. Wear protective goggles, boots, gloves and an apron.
2. With the dewar on its platform, fully insert the tube from the storage container into the dewar in order to reduce the risk of splashing.
3. Add the liquid nitrogen slowly to occupy between 50% and 85% of the total capacity of the dewar. **AVOID THE COLD GAS THAT ISSUES FROM THE DEWAR.** Do not overfill the dewar (above 85% of its capacity), otherwise spillage may occur when the pump is inserted and there may be insufficient gas space to pressurise the dewar. No material other than liquid nitrogen should be put into the dewar.

The use of a graduated dipstick is recommended to check the level of liquid nitrogen.

2.5.3 Fitting the pump



NEVER insert the pump into a dewar that contains liquid nitrogen, unless the delivery tube is attached to the pump and freezer and the red pressure-release valve on the pump is open.

1. Wear protective goggles, boots, gloves and an apron.
2. Ensure that the pump is disconnected from the mains wall socket.
3. Open the red pressure-release valve on the pump.
4. Slowly insert the pump into the neck of the dewar, being careful to avoid the liquid nitrogen splashing. It is normal for nitrogen gas to issue from the pressure-release valve immediately.

If the pump is inserted too rapidly, the liquid nitrogen may bubble violently and may spurt from the neck of the dewar. If this happens, withdraw the pump far enough to stop the bubbling, then reinsert it more slowly.
5. While seating the pump, align it so that when fully inserted, it will be possible to clip its springs onto the handles of the dewar.
6. Check that the microswitch plunger projecting from the underside of the pump contacts the dewar neck or the collar fitted to it, and seat the rubber bung firmly and evenly in the dewar.
7. Pressing firmly on the top of the pump to hold it level, clip all the springs onto the dewar handles, alternating between handles to keep the side loading to a minimum.
8. Close the pressure-release valve.
9. If you are installing the integra system for the first time, connect the pump to the power supply unit (PSU) under the platform.
10. Connect the PSU to a suitable mains wall socket using an appropriate cable. The PSU end of the cable requires an IEC socket. The mains plug or socket must be fitted with a fuse rated at 5A.
11. Press the switch on the PSU and the adjacent lamp will switch on. After about 5 minutes, the pressure-gauge reading will rise to 5psi and the lamp will switch off to indicate that the PSU has switched off. Normally, the dewar will remain pressurised until nearly empty.
12. Check for liquid and gas leaks, and rectify as necessary.
13. Position the dewar so that delivery pipe to the freezer runs as straight as possible with no major high or low spots.

2.6 Freezer lifting instructions



Failure to follow these instructions could result in personal injury.

-
1. The freezer weighs approximately 40Kg. Lift using two people; one at either end. If the freezer has a delivery tube or cables already attached, use a third person to ensure that they do not become trapped, etc.
 2. If the door is configured for top opening, do not open it if you have turned the freezer so that the door is to the front. The door has a powerful spring attached that allows it to be opened easily when opened from the top, but when opened from the front, will cause it to open VERY quickly and with a significant amount of force.
 3. If the door is configured for front opening, it is not spring- assisted and if you have turned the freezer so that the door is to the top, it will appear very heavy. Take care not to release the open door as it may cause injury or damage to the freezer as it falls to the closed position.
 4. Do not attempt to lift the freezer by using the door handle or exhaust port.
-

To rotate a top-loading freezer so that the door is at the front

1. Place protective material on the bench where the front panel will be resting.
2. Each person should have one hand underneath the freezer at the rear, near the foot, and the other hand on the front panel at the front of the freezer.
3. Lift and rotate the unit so that the door is to the front.
4. Place the rear edge of the freezer down first, so that the hands under the front panel can be slid upwards to prevent them from being trapped.

To rotate a top-loading freezer so that the door is at the top

1. Each person must place the palm of one hand on the side of the freezer, at the top-back corner, with the fingers wrapping round under the upper foot on the back of the freezer. The other hand should be on the front panel on the bottom of the freezer at the front.
2. Tip the freezer back to slide each person's hand under the front panel.
3. Lift and rotate the unit so that the door is to the top, then put down, ensuring that no hands are trapped.

To lift a top-loading freezer

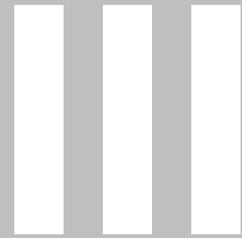
1. Each person should have both hands under the freezer.
2. Lift.

To lift a front-loading freezer

1. Each person must place the palm of one hand on the side of the freezer, at the top-back corner, with the fingers wrapping round under the upper foot on the back of the freezer. The other hand should be on the dark grey foot rail on the bottom of the freezer at the front.
 2. Tip the freezer back to slide each person's hand under the foot rail.
 3. Lift.
 4. Place the rear edge of the freezer down first, so that the hands under the foot rail can be slid upwards to prevent them from being trapped.
-

Operating the Integra 750Plus system

Chapter



3 Operating the Integra 750Plus system

This chapter describes how to operate and maintain the equipment on a day-to-day basis.

3.1 Maintaining a Planer dewar

Before you start a freezing program, you must ensure that there is sufficient liquid nitrogen to complete the program. If the pump heater is not immersed in liquid nitrogen and is operated for more than a few seconds, damage will occur to the thermoplastic filter assembly and the heater element may burn out.

This section gives instructions on how to remove the pump. To recharge the dewar with liquid nitrogen and refit the pump, refer to [Putting Liquid Nitrogen into the Dewar](#)^[15] and [Fitting the Pump](#)^[16] in Chapter 2. If you are using an alternative liquid-nitrogen source, fill, use and maintain it in accordance with the supplier's instructions.

If necessary, refer to [Figure 1.2](#)^[7].



Failure to follow these instructions could result in personal injury.

3.1.1 Removing the pump

To remove the pump

1. Wear protective goggles, gloves, boots and an apron.
2. Disconnect the pump power supply from the mains wall socket.
3. Release the pressure in the dewar by opening the red pressure-release valve.
4. Wait until zero pressure is shown on the gauge and the flow of gas has ceased. This ensures that the dewar is depressurised at the correct rate to prevent violent boiling of the liquid nitrogen, which can be a severe safety hazard. **AVOID CONTACT WITH THE COLD GAS STREAM.**
5. Disconnect the pump from the power supply below the platform.
6. Press firmly on the upper surface of the pump, then remove the spring clips from the handles on the dewar. To prevent jamming, remove only one spring at a time from each side.
7. Lift the pump carefully, but firmly, out of the neck of the dewar using a slight twisting and rocking action. **DO NOT TOUCH ANY COLD PARTS.**
8. Place the pump in a safe position on its side or suspended vertically (as in the dewar). **NEVER** store the pump upside down.
9. Remove frost by using a hot-air gun. Do not overheat, otherwise nylon parts may melt.
10. When the pump has attained ambient temperature, dry any condensation with absorbent tissue. If the pump is not dry when you put it back into the dewar (see [Chapter 2: Installing the Integra 750Plus System](#)^[12]), the filter may become blocked with frozen water.
11. If the dewar is to be left for longer than a few minutes, fit a bung to stop water from condensing inside the dewar.

3.2 Freezing samples



Never leave the freezer unattended while running a program.



Note If you are not using DeltaT, the freezer will need to have been pre-programmed with the required freezing program before use. If in doubt, consult your supplier.

3.2.1 The procedure to follow

Start the run

1. Switch on the freezer.
2. If you are using a Dura-Tech or Dura-Lo cylinder, make sure that the liquid-nitrogen supply tap is open.
3. If you are using a newly-filled Planer dewar and pump, switch on the pump power supply, then wait for the orange light to switch off; this indicates that the correct pressure has been attained. If the time to pressurise exceeds five minutes, check that there are no gas leaks and that the dewar is not overfilled or empty.
4. If the dewar has not been recently filled, test its weight to judge whether it contains sufficient liquid nitrogen for the intended freezing run. If it does not, fully depressurise it and add more liquid nitrogen (refer to Maintaining a Planer Dewar in this chapter).
5. If you are using DeltaT, run the program. Otherwise, press the RUN button on the front panel of the freezer. In both cases the light near the RUN button should go on.
6. Wait for the light to flash and for the bleeper to sound (long flashes, short beeps). This indicates that the program's start temperature has been reached.

Load the samples

7. Load the samples into the chamber. (It is normal to load the samples at this point, rather than before the freezer has been switched on.)
8. Attach the sample PRT to the required location.
9. Shut the freezer's door.
10. Wait for five minutes to allow the chamber to stabilise at the start temperature.

Start the freezing process

11. Press the RUN button on the front panel of the freezer to start the freezing process. The bleeping should stop and the light should remain on to indicate that the program is running.

Remove the samples

12. The end of the program is signalled by long beeps and short light flashes. Press the STOP button on the front panel. The bleeping should stop and the light should go out.
 13. Remove the samples and close the freezer's door. **WEAR PROTECTIVE CLOTHING, INCLUDING BOOTS AND AN APRON, AS WELL AS GLOVES AND GOGGLES.**
-

Warm the chamber for the next run

14. To warm up the chamber, press the RUN button. This causes the chamber to heat up to the start temperature of the previous program. The light should remain on.
15. When the light flashes and the bleeper sounds, load the new samples, as described above.

Switch off the freezer

16. Switch off the freezer.
17. If a dewar is being used, switch off the pump at the wall.

3.2.2 Stopping a run

At any time, you can stop a run prematurely by pressing the STOP button on the front panel of the freezer.

If you subsequently press RUN, the chamber will heat or cool, as necessary, to reach the start temperature of the program again. The light flashes and the beeping sounds when the freezer is at the start temperature. Pressing STOP again at this point, will terminate the program with the chamber left at the normal start temperature.

3.2.3 Shutting down the system

It is important to ensure that a program is not running, by pressing STOP if necessary, before switching off the Integra. This avoids unnecessary discharging of the backup battery; see Power Failures below.

If you have finished using the system for a short period of time, simply remove all specimens from the chamber and switch off the freezer and pump when the chamber has reached the start temperature.

However, if the equipment is to remain unused for longer than a working day, also turn off the liquid-nitrogen tap, or in the case of a Planer dewar, depressurise the dewar by opening the red pressure-release valve.

3.2.4 Power failures

An integral backup battery allows the program to continue to run for 1 minute following a loss of mains power, although the solenoid valve and heaters do not operate. If mains power is restored within this period, the system regains control of the chamber temperature. If the power is not restored, the program terminates.

3.2.5 Dealing with a system lockup

Although the Integra freezer has been rigorously designed and tested to provide utmost reliability, it is recognised that a fault could cause a run to stop prematurely.

To deal with a system lockup

1. The first task is to protect the samples if at all possible. If you can hear the solenoid valve operating normally, LEAVE THE MACHINE RUNNING; it is virtually certain that the program will be completed correctly.
2. If the solenoid valve has stopped for more than five minutes, estimate the temperature of the samples by:
 - Estimating the amount of time that the program has been running for.
 - Reading the temperature off from the DeltaT window.
 - Pulling off the exhaust fitting and inserting a thermometer (suitable for use to -200°C) into one of the exhaust holes.
3. If the samples are above their freezing point, open the door and allow the samples to warm up.
4. If the samples are below their freezing point, use the COOL override button on the rear panel of the freezer to go to the final temperature.
5. Following a system lockup, you need to reset the freezer's controller. The reset button is operated by inserting the tip of a ball-point pen or similar tool through the hole in the rear panel, located between the manual over-ride button and the AUX socket. Alternatively, switch off and on again. If the freezer needs to be lifted and/or rotated to gain access, refer to the Lifting Instructions in [Chapter 2: Installing the Integra 750Plus System](#)¹⁶.
6. Operate the freezer through a couple of trial runs to ensure that there is no permanent fault.

3.3 Alarms

If a fault condition is detected, the freezer will generate an alarm. The alarm is indicated by a continuous tone from the internal buzzer. An alarm is generated under the following fault conditions:

- The current temperature deviates from the expected freezing profile by more than 10 °C. In this case, the light near the RUN button will remain illuminated indicating that the run is still in progress.
- The chamber temperature probe is faulty. In this case the freezing profile will also be terminated and the light near the RUN button will switch off indicating that the run has terminated.

3.4 Maintaining the equipment

3.4.1 Routine maintenance



- Before cleaning:
 - Switch off the equipment.
 - Disconnect the mains supply at the wall socket.
 - Turn off any connected liquid nitrogen cylinders.
 - Open the red pressure relief valve on the pump. Wait until the pressure on the gauge has fallen to zero and the flow of gas has stopped.



- Ensure that the equipment has been cleaned as necessary to ensure that it is safe to handle and service and is free from any biohazard or toxic materials.

Periodically:

- [Clean the equipment](#) ^[26].
- Check all nitrogen fittings.
- Check all mains cables and interconnecting cables.



- The equipment is classified as Class I equipment and must be earthed for safe operation.
- Repetition of potentially damaging high-voltage flash tests should be avoided.
- To ensure adequate earth bonding, the equipment and mains cables must be regularly checked by suitably trained personnel using a Portable Appliance Tester or similar equipment.
- The earth continuity of the mains installation must be regularly inspected by the person responsible for the safety of the installation.

3.4.2 Cleaning the Integra 750Plus freezer

1. Clean surface dirt with a cloth containing water and detergent.
2. Then clean all surfaces with 70% IPA (alcohol).
3. Finally clean the surfaces again with a cloth containing water.

Do not use an abrasive cleaner, and do not flood areas.

Do not forget to clean the door seals.

The Integra has a removable chamber, which can be cleaned easily:

To remove the chamber

1. Disconnect the freezer from its mains wall socket.
2. If using a Dura-Tech or Dura-Lo cylinder, turn off the liquid-nitrogen tap. Otherwise, if using a Planer dewar, depressurise the dewar.
3. Open the door and pull the sample PRT out of its socket.
4. Insert the special tool provided into the slot in the right-hand side of the chamber, then turn it clockwise by 90° to hook the catch. Pull the tool towards the centre of the chamber to release the catch.
5. Remove the chamber. Note that it is quite heavy.
6. Clean the chamber and inside of the freezer as required, conforming to the local health and safety regulations. If the freezer is heavily contaminated, call a Service Engineer.



Note The equipment may have been used to process hazardous materials. The Service Engineer will require a person of suitable authority to complete and sign a Safety Declaration form before any work can be carried out.

To insert the chamber

1. Slide the chamber into place, making sure that the hole for the sample PRT is in the correct orientation.
 2. The catch relocks automatically.
 3. If required, use a program to raise the chamber temperature to 100°C in accordance with laboratory procedures. Do not touch hot metal parts inside the freezer!
-

3.4.3 Calibrating the system

The system is supplied factory calibrated.



Note Calibration must only be undertaken by suitably trained personnel.

The system should be calibrated at least annually by your service provider to maintain accuracy.

3.4.4 Changing fuses

There are four fuses located on the rear panel of the freezer:

- | | |
|----|---|
| F1 | Mains Line fuse. |
| F2 | Mains Neutral fuse. |
| F3 | Electronics, solenoid valve and motor fuse. |
| F4 | Door-seal and bearing heater fuse. |

One other fuse is located inside the freezer (refer to Service Engineer).

Refer to [Spare Parts](#)^[39] for details of fuse ratings, etc.

If the freezer needs to be lifted and/or rotated to gain access, refer to the Lifting Instructions in [Chapter 2: Installing the Integra 750Plus System](#)^[12].

3.4.5 Disposal



- Do not dispose of with general waste.
- Ensure that the system has been cleaned as necessary to ensure that it is safe to handle and service, and is free from any biohazard or toxic materials.

Troubleshooting

Chapter IV

4 Troubleshooting

4.1 Integra 750Plus freezer

Fan not running, RUN lamp fails to light when RUN pressed

- Faulty mains supply.

Remedy: check that the supply cable is properly connected and that the external fuse (if any) is intact. Also check the wall socket.

- F1, F2 or F3 on rear panel blown.

Remedy: check/replace as required with similarly-rated fuses.

- Main switch faulty.

Remedy: refer to Service Engineer.

- Internal transformer faulty.

Remedy: refer to Service Engineer.

Fan not running, RUN lamp lights when RUN pressed

- Door not fully locked.

Remedy: Operate door handle to unlock and re-lock door.

- Solid state relay on CPU board faulty.

Remedy: refer to Service Engineer.

- Fan motor faulty.

Remedy: refer to Service Engineer

- If motor running - fan drive belt faulty.

Remedy: refer to Service Engineer.

- If motor running - fan bearing frozen.

Remedy: thaw fan bearing and clear away condensation to prevent a repetition.

Fan running, RUN lamp fails to light when RUN pressed

- Control board latched up.

Remedy: press reset button or switch off then on.

- Blown DC input or fuse on pcb in electrics tray.

Remedy: refer to Service Engineer.

Fan running, RUN lamp on. No automatic cooling/heating

- If manual cooling or heating OK, then incorrect program loaded, or controller latched up.
-

Remedy: press reset button and/or run correct program from DeltaT.

- If no manual cooling or heating - door interlock not operated.

Remedy: close door and turn handle fully clockwise.

- If no manual cooling or heating - faulty door interlock switch.

Remedy: refer to Service Engineer.

No manual cooling after pressing STOP (RUN lamp off), but solenoid valve clicks.

- No liquid-nitrogen supply due to low level, low pressure, supply valve off or blocked or leaking delivery hose.

Remedy:

1. Check LN2 container contents and pressure, then add more liquid nitrogen or repressurise as necessary.
2. Check supply valve is turned on.
3. Check supply hose for leaks or blockages and replace or rectify as necessary.

4.2 LNP4 liquid nitrogen pump

Pump will not pressurise and lamp on pump PSU switch does not light.

- Pump power supply not plugged in.

Remedy: plug into mains wall socket.

- Pump not plugged into power supply.

Remedy: plug pump into power supply.

- Neck ring fitted incorrectly and failing to operate microswitch.

Remedy: check/refit.

- Neck microswitch is faulty.

Remedy: refer to Service Engineer.

- Switch is faulty.

Remedy: refer to Service Engineer.

- Heater element open circuit.

Remedy: refer to Service Engineer.

- Internal pressure switch is faulty.

Remedy: refer to Service Engineer.

Pump will not pressurise, but lamp on pump PSU switch lights.

- Toggle valve open.
Remedy: close valve.
- Heater fault.
Remedy: refer to Service Engineer.
- Transformer fault.
Remedy: refer to Service Engineer.
- Relay fault.
Remedy: refer to Service Engineer.

4.3 Dewar

Dewar loses pressure

- Dewar overfilled
Remedy: depressurise, check there is sufficient space at the top of the dewar, then repressurise as described in [Chapter 2](#)¹².
- Pump is not fitted correctly to the dewar.
Remedy: check that the rubber bung is firmly and squarely inserted into the neck of the dewar. Remove after releasing pressure in the dewar and thawing the bung with a hair drier. Dry the bung and replace. Take care not to overheat any plastic parts.
- Major leak in hose.
Remedy: release pressure to zero, then check/replace.
- Split, cracked or damaged bung.
Remedy: release pressure to zero, then check/replace.
- Broken or weakened holding springs.
Remedy: release pressure to zero, then check/replace.
- Freezer solenoid faulty.
Remedy: release pressure to zero, then refer to Service Engineer.

No liquid-nitrogen flow

- Filter blocked by ice.
Remedy: open the release valve, let the pressure return to zero, then remove the pump and dry the filter with a hair drier until all traces of moisture and ice have gone. Allow to cool and replace. Take care not to overheat any plastic parts.
-

Additional information

Chapter

V

5 Additional information

5.1 Integra 750Plus specifications

5.1.1 Integra 750Plus freezer

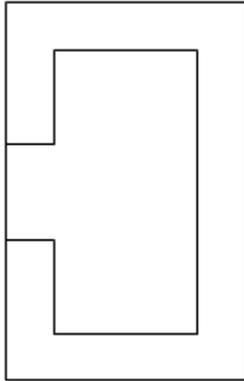


Note These specifications are subject to change without notice.

Dimensions	Front loading		Top loading	
	External	Internal	External	Internal
Height	55 cm	26 cm	48 cm	25 cm
Width	79 cm	46,5 cm	79 cm	46,5 cm
Depth	48 cm	25 cm	55 cm	26 cm
Weight	45kg (shipping weight including packaging) approx.			
Capacity	960 2ml ampoules			
	1216 0.5 cc straws (horizontal or vertical)			
	1216 0.25 cc straws (horizontal or vertical)			
	22 blood bags.			
Temperature range	+100.0°C to -160°C			
Maximum profile length	9 hours			
Cooling medium	liquid nitrogen 22 ± 2 psi			
Heater	1000 W			
Sensors	Control and sample: 4-wire Platinum resistance thermometer. Sensors are linearised in software to international standards that utilise a 4096-point lookup table based on BS1904:1984 Table 1. Calibration facility provided.			
Accuracy	±0.5 °C at a hold at 0 °C (dynamic accuracy depends on actual program, e.g. rate of change of temperature).			
Heating rates	0.01 °C/min to 10 °C/min.			
Cooling rates	-0.01 °C/min to -10°C/min.			

Operating positions	Vertical or horizontal
Thermal cutout	120 °C cutout
Power	115 VAC 50/60Hz 1200VA (max.) (470VA freezing only, with seal and bearing heaters operating). 230 VAC 50Hz 1200VA (max.) (470VA freezing only, with seal and bearing heaters operating). The freezer may be damaged by voltage surges in excess of 10% above nominal. Installation category (over-voltage category) II mains supply as defined in IEC 60364-4-443
Standards	Designed to comply with BS EN 61010 and BS EN61326
Pollution degree	Pollution degree 2 (BS EN 61010-1)
Altitude	Up to 2000 m
Storage temperature	-10 °C to +70 °C.
Storage humidity	Up to 95% noncondensing
Operating temperature	5 °C to +40 °C.
Operating humidity	Less than 90%
Vibration	Designed to survive normal shipment when packed in the Planer supplied container. Not designed to endure significant vibration when being operated.
Sound pressure level	< 70 dB(A)

5.1.2 AUX connector



Screen - GND

- 1 NC
 - 2 0V (GND)
 - 3 0V (GND)
 - 4 NC
 - 5 NC
 - 6 Calibration switch
 - 7 NC
 - 8 NC
-

5.1.3 EU Declaration of Conformity

The EU Directives covered by this declaration

2004/108/EC EMC Directive
2006/42/EC Machinery Directive

The products covered by this declaration

Equipment name:

Integra 750Plus

Model numbers:

GDKRYO750Plus-x-xxx

The basis on which conformity is being declared

The products identified above comply with the essential requirements of the above EU Directives by application of the following standards:

BS EN61326-1:2013

BS EN61010-1:2010

ATTENTION

The attention of the specifier, purchaser, installer or user is drawn to special measures and limitations of use which must be observed when the product is taken into service in order to maintain compliance with the above directives. Details of these measures, if any, are given in the instructions supplied with the products.

5.2 Spare parts

5.2.1 Ordering spares

When ordering spares, always quote the model number, the serial number, the part number and the part description. Always use qualified parts from Planer plc, except where parts are clearly marked with the original manufacturer's description and are identical to the original.

5.2.2 Integra 750Plus fuses

For 230V AC operation

Part number	Description	Ident.
FL 010498	F 5A L 20x5mm, glass, 250 V	F1, F2
FL 011977	F 1A L 20x5mm, glass, 250 V	F3
FL 010496	F 2A L 20x5mm, glass, 250 V	F4

For 115V AC operation

Part number	Description	Ident.
FL 013299	T 10A H 20x5mm, ceramic, 250 V	F1, F2
FL 011819	T 2A H 20x5mm, ceramic, 250 V	F3
FL 010498	F 5A L 20x5mm, glass, 250 V	F4

MA008797 Issue 12

INTEGRA 750PLUS OPERATOR'S MANUAL

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