



## **INSTRUCTION MANUAL**

### **SPX-70/150/250 BIOCOOL INCUBATORS**

**CONTHERM SCIENTIFIC LIMITED  
P O BOX 30-605 LOWER HUTT  
5040**

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## **WARRANTY STATEMENT**

\* \* \* \* \*

**CONTHERM Scientific Company will guarantee CONTHERM equipment for a period of twelve months from the date of installation against faulty workmanship and fabricated materials. This guarantee covers the replacement of component parts found to be defective and authorised labour charges during this period.**

**Should a malfunction occur or condition develop beyond reasonable acceptance the company will accept responsibility for returning the unit to its factory specification at no cost to the Purchaser providing that the operating instructions have been observed and the defect is due solely to faulty design, material and workmanship. That the defective part be returned, freight paid to the nearest sales service office. Units outside the warranty period will be accepted and repairs will be covered under an extension of the above for 90 days.**

**In remote installations where it is not possible for the company's or agents' engineers to attend, authority may be given to allow the Purchaser to arrange such service.**

**The Purchaser is required to remit the purchase price of the unit to the supplier within the terms of that supplier's condition of sale. CONTHERM Scientific Company will accept no liability or shall its agents for consequent damage of any kind due to a malfunction or component failure.**

\* \* \* \* \*



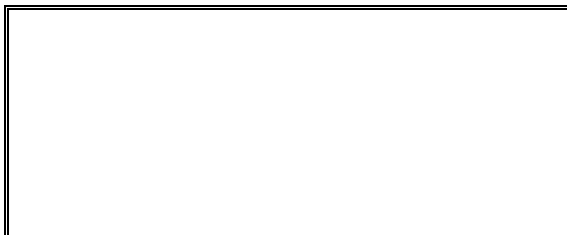
## ***STATEMENT of CONFORMITY***

This **Refrigerated Incubator** conforms to the following standards:

**EN 61326-1:2006**

**EN 61010-1:2010**

- **Electrical Safety:** CE Mark  
Council Directive 2006/95/EC on Low Voltage Directive
- **EMC:** CE Mark  
Council Directive 2004/108/EC on Electromagnetic Compatibility



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## **IMPORTANT**

All electrical servicing **must** be carried out by suitably qualified personnel only.

## SECTION 1 DEFINITION OF TERMS

For the purpose of our standard specifications the following definitions shall apply:

- a) **WORKING SPACE**  
That portion of the internal space which is above the lowest shelf and not less than 3cm from any wall (including roof).
- b) **CABINET TEMPERATURE**  
That temperature at the centre of the working space.
- c) **SPATIAL VARIATION**  
The difference between the midrange of all measured temperatures obtained at one site and that at another site for those sites which give the greatest difference.
- d) **TEMPORAL VARIATION**  
The maximum value of the temperature range obtained for the standard site with the greatest range throughout the test interval.
- e) **TEMPERATURE OVERSHOOT**  
Any excess of actual over desired cabinet temperature during a heating up period.
- f) **TEMPERATURE REPRODUCIBILITY**  
Temperature regained without alteration to controls.
- g) **TEST INTERVAL**  
Interval of time to which the steady state characteristics apply (Max 1 hour).

**NB:** All the above apply with an **empty** chamber.

## SECTION 2 INTRODUCTION AND SPECIFICATIONS

The CONTHERM SPX series BIO COOL range of cooled cabinets give a wide range of operating conditions consistent with high reliability and low cost.

All specifications are quoted for a cabinet temperature of 20°C with an ambient temperature of 20°C.

- **Construction** - High quality stainless steel interior, polystyrene insulation, with non-jar magnetic outer door catch and corrosive resistant epoxy powder coated exterior.
- **Safety** - Fitted with an independent user adjustable Hi-Limit completely separate from normal controls.
- **Convection** - All units come with mechanical convection fan systems.
- **Electrical** - All quoted at 20°C - SPX Micro-Controller with mechanical Convection.

### PERFORMANCE:

- a) **Temperature:**
- |  |                 |
|--|-----------------|
| Nominal Range                                  | 0.0°C to 70°C   |
| (maximum of 50°C with refrigeration operating) |                 |
| Temporal Variation                             | ± 0.5°C         |
| Spatial Variation                              | ± 1.0°C         |
| Reproducibility                                | ±0.4°C          |
| Dial resolution                                | 0.1°C           |
| Operating Ambient                              | 10°C - 35°C     |
| Mains Voltage Range                            | 220-250 AC 50Hz |
- b) **Timer:**
- |                   |                    |
|-------------------|--------------------|
| Timing range      | 1 minute - 5 hours |
| Timing Resolution | 1 minute           |

**NB:** The Timer only starts counting down once the SET TEMPERATURE has been attained.

Automatic hot-gas defrost approximately every 12 hours – this may result in a small rise in temperature during the defrost period (about 4 minutes).

## SECTION 3 OPERATING INSTRUCTIONS

This appliance is NOT intended for use by young children or infirm persons without supervision.

To set up unit for operation after unpacking and checking for damage proceed as follows:

- 1) Fit shelf runners, then shelves.
- 2) Select a location handy to a 10amp electrical outlet.
- 3) Ensure a space of at least 150mm is allowed at the rear of the cabinet for air circulation.

**NB:** Ensure **ALL** of the cable ties (If fitted inside cabinet) are **REMOVED BEFORE** operating the incubator.

### OPERATING CONTROLLER:

- 1) Plug cabinet into 220-250V EARTHED Mains outlet.
- 2) Turn on main POWER switch – The green power indicator will come on and the LCD will illuminate all icons for about 3 seconds.
- 3) Press and HOLD the 'SET' button UNTIL the LCD shows '**SP**', the LCD should also show 'Temp Set' and display the CURRENT temperature SET POINT
- 4) Press either the 'UP' or 'DOWN' button to adjust the SET POINT to the desired temperature.
- 5) Now press the 'SET' button again to set the TIMER – the LCD should now display '**St**' and the words 'Time Set' with the CURRENT timer setting shown in the '**HR:MN**' format. – the 'HR' digit setting should be flashing.
- 6) If the TIMER is set to '**00:00**' – this means that the Incubator will run continuously without any time restriction. This is the NORMAL operating mode.

To SET the TIMER use the 'UP' & 'DOWN' buttons to change the setting (if desired) and then press the 'SET' button to move from the HOURS to the MINUTES side of the timer setting.

After setting the timer (by leaving it at '**00:00**' or by setting to the desired RUN time) – just press the 'SET' button to start incubator operation.

If the TIMER is set to a specific value e.g. '**01:00**' – this means that the incubator will run for 1 hour and then STOP. – When it stops the alarm will sound for 30 seconds. To repeat the timed session press & hold the '**DOWN/OPERATE**' button for 4 seconds.

- 7) The operating status will be shown on the LCD display – when operating the 'RUN' indicator will show a rotating arrow display. The LCD display will show the CURRENT TEMPERATURE (PV) and the SET TEMPERATURE (SV). Depending on the set values the HEAT' and COOL icons may come on.

If the TIMER has been set for a specified time, the CURRENT TEMPERATURE and the amount of time that has elapsed on the timer will be displayed.

Ensure the mechanical user HI-LIMIT (on the incubator RHS panel) is set correctly as described in the following section. The cabinet usually leaves the factory with the user HI-LIMIT set fully anticlockwise, if left in this position the HI-LIMIT will not allow the cabinet to heat and control correctly.

**NB:** Maximum current to be taken from incubator power outlet is **2A (450W)**



## **MECHANICAL HI-LIMIT MONITOR**

The mechanical hi-limit is provided as a secondary safety device to protect the cabinet from over temperature in the event of electronic controller failure.

### **To set the Mechanical Hi-Limit**

Turn the Hi-Limit control **FULLY CLOCKWISE**.

Allow the cabinet to stabilise at the required operating temperature (for at least 1 hour), then turn the Hi-Limit control anti-clockwise until the **MONITOR** neon comes on (or a slight 'click' is felt). Now turn the Hi-Limit control **SLOWLY CLOCKWISE** until the **MONITOR** neon goes off, then advance the Hi-limit clockwise 1-2 scale markings. This will set the Hi-Limit trip point about 3 - 4°C above the current cabinet temperature.

**WARNING:** To prevent **FIRE** or **SHOCK** hazard, **DO NOT** expose this product to rain or any type of moisture.

## **FOR YOUR SAFETY**

To ensure safe operation the three-pin plug supplied must be inserted **ONLY** into a standard three-pin power outlet that is effectively earthed through the normal building wiring.

Extension cords are **NOT** recommended.

The fact that the equipment operates satisfactorily does **NOT** imply that the power outlet is earthed and that the installation is completely safe. For your safety, if in any doubt about the effective earthing of the power outlet, consult a qualified electrician.

## **PERIODIC ELECTRICAL SAFETY CHECKS**

This appliance should be regularly tested (at intervals not exceeding 12 months) according to the procedures prescribed in **AS/NZS 3760**. The basic safety checks and tests on electrical appliances required by **AS/NZS 3760** are:

- a) A visual check to ensure that there is no mechanical damage, that controls etc. are in good working order and that no parts are missing.
- b) An earth continuity test.
- c) An insulation resistance test.

## **ALARMS**

All alarms are indicated by a number and accompanied by an audible alarm.  
To **CANCEL** any Alarm PRESS any button

<b>ALARM</b>	<b>MEANING</b>
--------------	----------------

' □ □ □ □ '	Temperature sensor problem or Controller problem.
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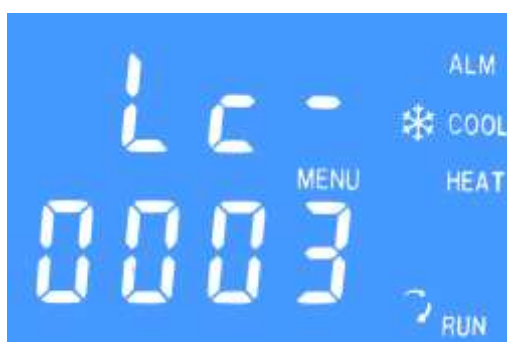
## CALIBRATION

Calibration should be carried out at 20.0°C or at the temperature of interest, with the thermometer in the centre of the working chamber with the chamber empty.

**NB:** A BIOCOOL incubator will typically cool to a temperature of 0°C in a room ambient of +20°C or lower. The calibration temperature must be within the achievable operating range of the BIOCOOL incubator.

- 1) Place the Calibration Thermometer probe in the workspace centre, close the door and set the controller for 20.0°C or the temperature of interest, allow at least 1 hour to stabilise.
- 2) Read the temperature on the Calibration Thermometer.
- 3) To calibrate the cabinet -  
Press and HOLD the **'SET'** button for about 4 seconds until the LCD shows **'Lc-'** and the word **'menu'**

Use the **'UP'** button to adjust the value to **'0003'** as in the LCD screen picture below and then press the **'SET'** button.



This will enter the controller programming mode.

Continue to press the **'SET'** button to step through the sequence of **P--**, **AL-**, **cF-** until **Pb-** is reached

The **'Pb-'** adjustment value adjusts the current temperature reading up or down by an **OFFSET** value.

- 4) Allow to stabilise again - the temperature should now be correct. If NOT repeat the procedure.

**NB:** The calibration can only be performed within limits, if the calibration cannot be achieved the **SPAN** may require adjustment using the **'Py-'** parameter setting, this is usually set in the factory to a value of about **'0270'**. If the **SPAN** requires adjustment use the **'Pb-'** adjustment to calibrate the cabinet at a temperature of **0.0°C** and the **'Py-'** adjustment to calibrate at a temperature of **+40°C**. If calibration still cannot be achieved a further fault may exist.

## VERIFYING CABINET PERFORMANCE

There are two basic tests that may be carried out to verify cabinet performance.

**NB:** These tests **MUST** be carried out with the cabinet **EMPTY** and at the specified ambient of +20°C.

### **TEMPORAL PERFORMANCE:**

The cabinet should be set to operate at the Contherm specified calibration conditions.

Temporal performance is tested by placing a suitable (calibrated) test probe in the centre of the workspace and recording the readings for up to 1 hour **AFTER** the cabinet has **FULLY STABILISED**.

The cabinet has fully stabilised when the average temperature is no longer increasing or decreasing over time.

The result should be within the quoted specification.

This result is a function of the cabinet control system, sensor and airflow.

### **SPATIAL PERFORMANCE:**

The cabinet should be set to operate at the Contherm specified calibration conditions.

Check Spatial Variation @ 20°C

*(Refer manual for specification, 8 points as per diagram)*

[6R]	[4C]	[3R]	TOP
[8C]	[1C]	[ ]	CEN
[2F]	[7C]	[6F]	BOT

*(Where F=Front, C=Center, R=rear)*

Spatial performance is tested by placing suitable (calibrated) test probes (usually thermocouples) in the eight specified positions and recording the readings for up to 1 hour **AFTER** the cabinet has **FULLY STABILISED**.

The cabinet has fully stabilised when the average temperature is no longer increasing or decreasing over time.

The sensors must be no closer than 30mm to any wall or roof and must be above the lowest shelf position by at least 30mm.

The result should be within the quoted specification.

This result is a function of the cabinet design and air distribution.

The spatial test must be performed with all doors, vents etc **CLOSED** and the measuring sensors must be very closely matched at the specified temperature.



## SPX CONTROLLER INTERNAL PARAMETERS

PARAMETER	FUNCTION	FACTORY SETTING
Lc-	Lc=3 allows these parameters to be changed	
P--	Proportional Band (Larger value will reduce overshoot)	<b>015.0</b> (2.0 ~ 25.0)
AL-	Over Temperature alarm limits	<b>003.0</b> (0.0 ~ 20.0)
CR-	Compressor operate Delay This prevents the refrigeration compressor from immediately starting & stopping (Seconds)	<b>0180</b> (0 ~ 10min)
Pb-	Calibration ZERO offset Used to calibrate the cabinet at temperature	<b>-03.5</b> (-9.9 ~ +9.9)
Py-	Temperature SCALE setting Ensure the calibration is linear	<b>0270</b> (-999 ~ +999)

## SECTION 4 THEORY OF OPERATION

This CONTHERM General Purpose Cooled Incubator uses a microprocessor electronic PID controller with a 100 $\Omega$  Resistance RTD probe as the temperature sensing element. The LCD display gives a direct readout of SET POINT and Cabinet temperature in degrees centigrade.

The air inside the incubator is circulated by a small stirring MOTOR which draws air in at the top of the chamber and discharges it down over the heating element and then through a finned refrigeration evaporator into the cabinet near the bottom of the chamber.

The sheathed HEATING ELEMENT is located adjacent to the air rotor such that the discharged air passes over the active portion of the element.

Setting and Calibration of the chamber temperature is performed via the adjustment buttons and is stored in non volatile memory.

An internal glass door allows the contents to be viewed without disturbing the internal temperature.

BIOCOOL units provide cooling via a conventional refrigeration system with automatic 'hot-gas' defrost

## SECTION 5 TROUBLESHOOTING AND MAINTENANCE

### MAINTENANCE

The painted mild steel exterior is resistant to corrosion and spillage's and should be wiped with a damp cloth occasionally to maintain its appearance.

The fan motor bearings do not require lubrication under normal conditions.

The stainless steel interior and shelves should be kept clean with a damp cloth. Take care that the temperature probe is not damaged during cleaning of the interior base.

Any spillage or breakage within the cabinet should be cleaned up immediately with the cabinet switched off and unplugged at the mains.

### ROUTINE MAINTENANCE

Suggested to be checked Annually:

- Check glass door gasket for damage (cuts and splits), replace if necessary.
- Check glass door seals correctly onto gasket.
- Wipe out floor of cabinet to remove any water stains.
- Check controller overlay for damage, replace if necessary.
- Check basic cabinet control functions and that user hi-limit control is set appropriately.

### ELECTRICAL SAFETY

This appliance should be tested for insulation and earthing continuity at regular intervals according to **AS/NZS 3760**.

The basic safety checks and tests on electrical appliances required by **AS/NZS 3760** are:

1. A visual check to ensure that there is no mechanical damage to the supply cord, that controls etc. are in good working order and that no parts are missing.
2. An earth continuity test.
3. An insulation resistance test.

In order to provide evidence of compliance, a label (signed and dated by the person testing the equipment) may be placed on the tested appliance.



## **TROUBLESHOOTING:**

- A) **CABINET COMPLETELY DEAD. NO POWER SWITCH NEON :**  
- NO POWER TO CABINET, CHECK CABINET APPLIANCE INLET FUSE (8amp) WALL SOCKET AND WALL SOCKET FUSES
- B) **TEMPERATURE DISPLAYS' '□□□□ 'CHECK TEMPERATURE SENSOR or CONTROLLER HAS FAILED.**
- C) **LARGE TEMPERATURE VARIATION IN CABINET, CONTROLLER 'HEAT' LCD ICON PULSING :**  
- INTERNAL REAR FAN NOT GOING (CHECK FOR AIR MOVEMENT INSIDE CABINET)  
- CABINET OVERLOADED WITH SAMPLES, REMOVE SOME SAMPLES TO ALLOW BETTER AIR FLOW.  
- LOOK FOR HI-LIMIT MONITOR NEON COMING ON, INDICATES MECHANICAL HI-LIMIT SET TOO LOW
- D) **INSUFFICIENT COOLING :**  
- PERFORMANCE IS DEPENDANT ON THE AMBIENT TEMPERATURE, TYPICAL PERFORMANCE IS 0°C in a +20°C AMBIENT.

## REMOVAL AND REPLACEMENT OF SPX CONTROLLER PCB

The following should only be carried out by suitably qualified electrical personnel.

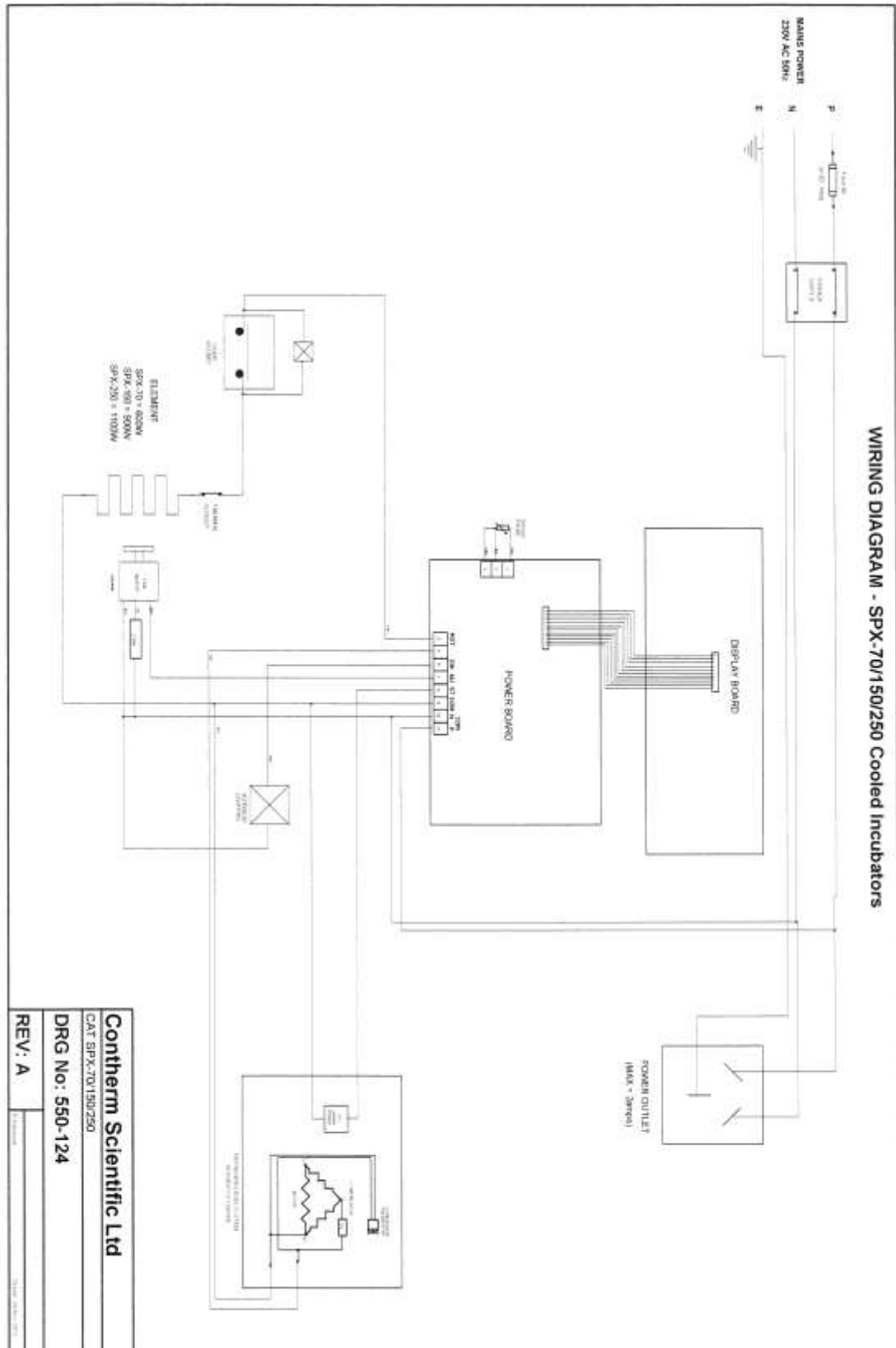
**NB: ENSURE** that power cord has been **REMOVED** from the wall socket **BEFORE** attempting to remove the PCB.

- a) Remove PC Board.  
List FULLY all fault details, carefully pack, return to Agent for repair. ALWAYS supply contact details and FULL physical return address.  
The refitting of the controller should be done in the reverse order as above, taking care when reconnecting the sensor etc that they are connected to the correct socket holes.
  
- b) Carry out Insulation (use 500V insulation tester) and earth continuity check BEFORE applying power to cabinet. (As per **AS/NZS 3760** – In-service safety inspection and testing of electrical equipment).  
The basic safety checks and tests on electrical appliances required by **AS/NZS 3760** are:
  1. A visual check to ensure that there is no mechanical damage to the supply cord, that controls etc. are in good working order and that no parts are missing.
  2. An earth continuity test.
  3. An insulation resistance test.

In order to provide evidence of compliance, a label (signed and dated by the person testing the equipment) may be placed on the tested appliance.

**N.B:** Check for loose wires that may have been missed, particularly the earth wires.

**ELECTRICAL GP LAYOUT SPX-70/150/250 550-124**



## REFRIGERATION SYSTEM

This system is fitted with a conventional refrigeration system with automatic hot-gas defrost. The defrost occurs at intervals of 12 hours and the internal circulating fan is stopped during the defrost to minimize changes in cabinet temperature.

A built-in time delay (factory set 3 minutes) prevents the refrigeration compressor from starting/re-starting after turning on/off.

The refrigeration compressor is turned OFF during the heating up period and then on if required at the desired set point.

To prolong the life of the compressor avoid selecting a low temperature (which will turn the refrigeration system on) until the cabinet temperature is below +45°C.

The system is charged with R134a refrigerant.

The amount of charge is as follows:

SPX-70.....	70g
SPX-150.....	170g
SPX-250.....	200g

### **Refrigeration Maintenance**

If the unit is going to be stored for some period after the refrigeration has been used for some length, a drying out period is necessary to remove moisture from the element well. This could be done by setting a temperature of approximately 35°C and have the unit operating with the door slightly ajar to allow for the drying out of the moisture in the interior.

Once the unit is suitably dried it can be closed up and stored without further problems.

The Refrigeration System is designed to maintain the internal Cabinet Temperature of 0°C - 45°C with ambients of 20°C.

Please ensure that the refrigeration condenser (located behind the bottom front grille) is checked/cleaned every 3 months to ensure it is kept free of dust build-up. Remove the grille by removing the two self-tapping screws on each side.

## SECTION 6 PARTS LISTS AND SPARES

Shelves	??????
Shelf Support Brackets (MUST be in pairs) (State Model when ordering)	??????
Hinges:Glass Door	??????
Fan Motor	??????
Elements	SPX70                      500W
	SPX150                     800W
	SPX250                    1200W
Temperature Sensor: 100Ω RTD	??????
Hi-Limit Thermostat: Incubator	GP1021
Mains POWER Switch (Illuminated – Swann 52)	??????
Control Knob	GP1324
Monitor Neon	GP1073





**PACKING INSTRUCTIONS**

Installation Quality Check List (IQ)  
(Leave with Cabinet)

**CONTHERM CAT.No**  
(BIOCOOL Incubator)

App No:

Date: ...../...../.....

**Accessories Supplied**

**Qty**

**(IQ)Checked**

Operating Manual	[ ]	[ ]
Shelf Ladders (pairs)	[ ]	[ ]
Shelves	[ ]	[ ]
IEC Mains Lead	[ ]	[ ]
Other.....	[ ]	[ ]

Cabinet Undamaged when Packed [ ]      When Received [ ]  
*(No dents, scratches or obvious damage)*

Certificate of Conformance Completed [ ]      [ ]  
*(Factory test sheet attached)*

Ensure cabinet has been fully tested and approved for packing . [ ]      [ ]

Ensure data plates are fitted. [ ]      [ ]

Interior and exterior clean. [ ]      [ ]

Cabinet Installed as per installation Instructions: [ ]  
*(See SECTION 3 of the operating manual)*

Installation Verification (IQ) Satisfactory: [Y][N]

PACKED BY .....

(IQ)CHECKED BY .....

Date: ...../...../.....

Date: ...../...../.....



**OPERATION VERIFICATION INSTRUCTIONS**

**Operational Quality Check List (OQ)**

(Leave with Cabinet)

**CONTHERM CAT.No**  
(BIOCOOL Incubator)

**App No:**

**Date:** ...../...../.....

**Operation .....**

**(OQChecked)**

**Comments**

LCD Display working [ ]

*(Manual SECTION 3 – during powerup)*

Able to adjust SET POINTS [ ]

*(Manual SECTION 3 – set for 20.0°C)*

Temperature stable @ 20°C [ ]

*(Allow cabinet to stabilise at temperature for 1 hour)*

Check HI-LIMIT Control [ ]

*(Manual SECTION 3 – turn anticlockwise when stabilised)*

Calibrate at temperature at 20°C [ ]

*(Manual SECTION 3 – Calibration @ 20°C or temperature of interest)*

Operational Performance (OQ) Satisfactory: [Y][N]

(OQ)CHECKED BY .....

Date: ...../...../.....





**PERFORMANCE VERIFICATION INSTRUCTIONS**

Performance Quality Check List (PQ)

(Leave with Cabinet)

**CONTHERM CAT.No**  
(BIOCOOL Incubator)

**App No:**

**Date:** ...../...../.....

**Operation .....**

**(PQChecked)**

**Comments**

Check Temporal Variation @ 20°C [    ]

*(Refer manual for specification, cabinet empty, center only, see verifying cabinet performance in the manual)*

Performance Verification (PQ) Satisfactory: [Y][N]

(PQ)CHECKED BY .....

Date: ...../...../.....

**CONTHERM SCIENTIFIC**  
CUSTOMER INSTALLATION REPORT

Please fill in and return to:

**CONTHERM SCIENTIFIC LIMITED**  
**DEVELOPMENT SECTION**  
**P.O. BOX 30605**  
**LOWER HUTT**  
**NEW ZEALAND**

1) Did your cabinet arrive in good condition? **YES / NO**

2) Any difficulties experienced in setting up? **YES / NO**

Comments:

3) Is this your first CONTHERM purchase? **YES / NO**

4) Any previous problems of a specific nature  
with CONTHERM products? **YES / NO**

Comments:

5) Any suggestions for improvements or special  
features you would like to see -

Comments:

6) **Cabinet Details**      **Catalogue No:**    **CAT**      **SPX 70/150/250**

**Appliance No:** .....

**Date Installed:** .....

**Company:** .....

.....

.....

**COUNTRY:** .....

**Contact Name:** .....

**PHONE:** ..... **Email:** .....