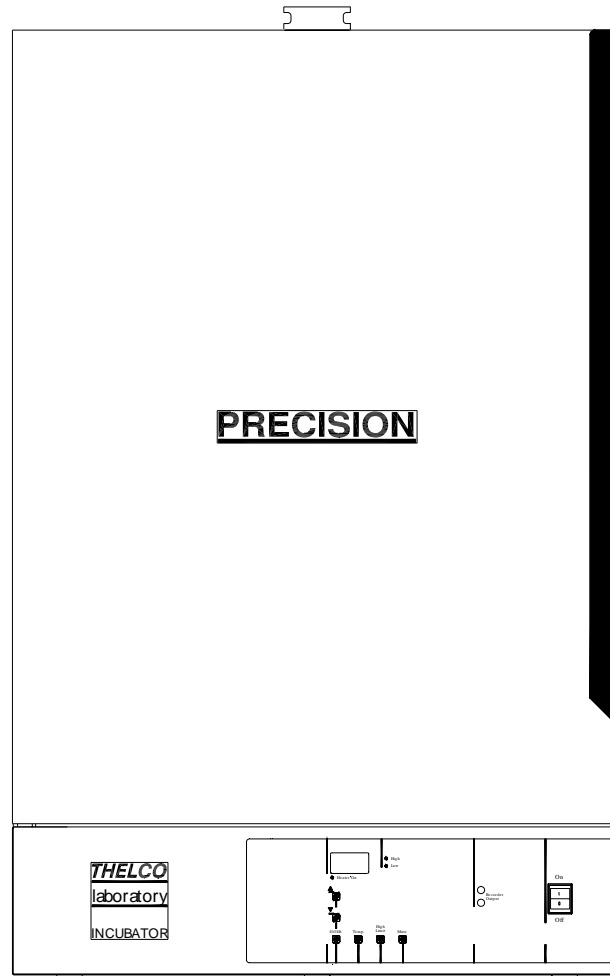


Installation/Service Manual

Thelco Incubator

**Models 2DG (3501), 3DG (3503), 5DG (3505),
6DG (3507), 3DM (3509), 5DM (3511), 6DM (3513)**



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NOTE:

THE UNITS DESCRIBED IN THIS MANUAL WERE DESIGNED SPECIFICALLY FOR THE EUROPEAN MARKET AND ARE SUPPLIED WITH A EUROPEAN STYLE POWER CORD. FOR DOMESTIC USE, A U.S. STYLE POWER CORD (P/N: 3176836) MUST BE ORDERED SEPERATELY.

NOTICE

THE MATERIAL IN THIS MANUAL IS FOR INFORMATION PURPOSES ONLY. THE CONTENTS AND THE PRODUCT IT DESCRIBES ARE SUBJECT TO CHANGE WITHOUT NOTICE. THERMO ELECTRON CORPORATION MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THIS MANUAL. IN NO EVENT SHALL THERMO BE LIABLE FOR ANY DAMAGES, DIRECT OR INCIDENTAL, ARISING OUT OF OR RELATED TO THE USE OF THIS MANUAL.

For repair information or replacement parts assistance from the manufacturer, call Customer Service using our toll free telephone number.

800-621-8820
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REVISION STATUS

INDEX	DATE	AMENDED PAGES	NOTES
A	9/99		Initial release for CE mark
B	OCT00	inside cover	Add power cord note
C	APR03	4	Update stability specs to match marketing literature
D	JUL05	51249001	new manual #, manufacture location
E	APR06	ECR 23443	Removed CE symbol and declaration

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1. INTRODUCTION

1.01 Your satisfaction and safety are important to Thermo and a complete understanding of this unit is necessary to attain these objectives.

1.02 As the ultimate user of this apparatus, you have the responsibility to understand the proper function and operational characteristics of your incubator. This instruction manual should be thoroughly read and all operators given adequate training before attempting to place this unit in service. Awareness of the stated cautions and warnings, and compliance with recommended operating parameters—together with maintenance requirements—are important for safe and satisfactory operation. The unit should be used for its intended application; alterations or modifications will VOID THE WARRANTY.

WARNING

AS A ROUTINE LABORATORY PRECAUTION, ALWAYS WEAR SAFETY GLASSES WHEN WORKING WITH THIS APPARATUS.

1.03 This product is not intended, nor can it be used, as a sterile or patient connected device. In addition, this apparatus is not designed for use in Class I, II or III locations as defined by the National Electrical Code.

CAUTION

WHEN UNPACKING THIS PRODUCT, USE A MECHANICAL LIFTING DEVICE OR ENOUGH PEOPLE TO EASILY LIFT THE UNIT AND PLACE IT IN ITS PROPER LOCATION.

THE BENCH TOP OR OTHER MOUNTING SURFACE, MUST BE RIGIDLY CONSTRUCTED AND CAPABLE OF COMFORTABLY SUPPORTING THE WEIGHT OF THE UNIT.

WARNING

THIS EQUIPMENT MUST NOT BE MOUNTED ON A FLAMMABLE SURFACE.

2. UNPACKING AND DAMAGE

2.01 Save all packing material if apparatus is received damaged. This merchandise was carefully packed and thoroughly inspected before leaving our factory.

2.02 Responsibility for safe delivery was assumed by the carrier upon acceptance of the shipment; therefore, claims for loss or damage sustained in transit must be made upon the carrier by the recipient as follows:

1. **Visible Loss or Damage:** Note any external evidence of loss or damage on the freight bill, or express receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusing to honor your damage claim. The form required to file such claim will be supplied by the carrier.
2. **Concealed Loss or Damage:** Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked and inspected. Should either occur, make a written request for inspection by carrier's agent within 15 days of the delivery date; then file a claim with the carrier since the damage is the carrier's responsibility.

2.03 If you follow the above instructions carefully, we will guarantee our full support of your claim to be compensated for loss from concealed damage.

DO NOT—FOR ANY REASON—RETURN THIS UNIT WITHOUT FIRST OBTAINING AUTHORIZATION.

In any correspondence to Thermo, please supply the nameplate data, including catalog number and serial number.

3. GENERAL INFORMATION

3.01 This instruction manual encompasses the following models and their specific electrical characteristics.

3.02 Models 2DG, 3DG, 5DG, and 6DG employ gravity convection as a method of heat transfer. Gravity convection is defined as the natural tendency for heated air to rise due to its change in density.

Air is drawn into the chamber through openings in the bottom of the incubator then heated as it passes over the electric heating coils and up through the openings in the diffuser panel located on the bottom of the inner chamber.

3.03 A limited amount of the heated air is exhausted out of the chamber through the openings in the vent cap located on the top of the incubator and the remaining air recirculates within the chamber.

3.04 Gravity convection incubators are ideal where forced air circulation cannot be tolerated and for situations demanding gentle curing or long term sample storage under closely controlled conditions. Gravity convection incubators are ideal for heating fluid samples, tissues, and other cells.

3.05 Models 2DG, 3DG, 5DG, and 6DG use a microprocessor control with digital set point, digital display and digital safety thermostat.

3.06 Models 3DM, 5DM, and 6DM incubators use mechanical convection as a method of heat transfer. Mechanical convection can be defined as a positive and planned directional air flow or forced air circulation within the chamber. Air is drawn into the chamber through vent tubes located in the bottom of the incubator and is heated as it passes over the electric heating coils. The air is blown through the duct network and forced into the chamber through the side diffuser walls.

3.07 A limited amount of the heated air is exhausted out the top of the chamber through the vent shutter cap and the remaining air recirculates within the chamber.

3.08 Mechanical convection incubators provide the most efficient means of heat transfer as well as the most reproducible test conditions for repeat operations. Mechanical convection allows for rapid heat up time for high density loads, shortened recovery periods after door openings and improved uniformity for extremely heat sensitive materials.

3.09 Models 3DM, 5DM, and 6DM provide mechanical convection of heat controlled by a microprocessor with digital set point, digital display and digital safety thermostat.

Environmental Conditions-

This instrument is designed to operate safely under the following conditions:

- Indoor Use Only
- Temperature: 5° to 40° C
- Maximum Relative Humidity: 80% for temperatures to 22°C
- Maximum Altitude 2000 meters

Maximum performance is assured across the following temperature range:

- 15°C to 45°C

4. FEATURES

THELCO® HIGH PERFORMANCE INCUBATORS

STAINLESS STEEL CHAMBER
Corrosion/contamination resistant.
Easy to clean and maintain.

ADJUSTABLE EXHAUST PORT
Controls the amount of airflow from the chamber.

FORMED STEEL EXTERIOR WITH WHITE POWDER COATING

Durable, easy to clean, and maintains an attractive finish.

INTERIOR GLASS DOOR
Allows for sample viewing without disturbing chamber environment.

2" THICK INSULATION
Provides efficient heat retention and precise temperature uniformities.

REAR ACCESS PORT
Allows the running of power cords to auxiliary equipment within the chamber.

POLYURETHANE GASKETING Inner glass door seals tightly on gasketing to maintain temperature setpoint.

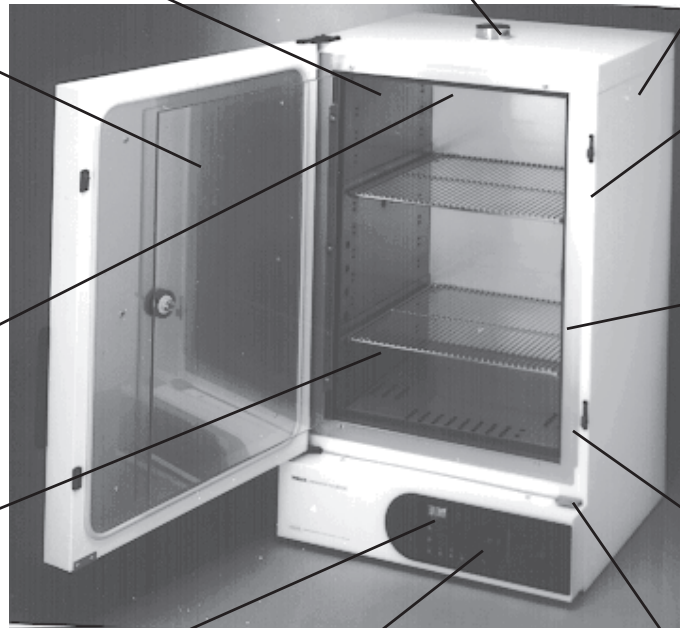
NON-TIP SHELVING
Each model comes standard with 2 shelves. Corrosion resistant nickel plated, easy to clean, and simplifies loading and unloading.

GRABBER DOOR LATCHES Provide a 4-point positive door seal.

DIGITAL DISPLAY LED
Displays temperature to 0.1°C. Microprocessor puts pushkey temperature setpoint selection at your fingertips.

RECORDER OUTPUT
Monitors temperature readings for data logging.

STAINLESS STEEL DOOR GUIDE
Supports and aligns door for hands-off closure.



5. SPECIFICATIONS

THELCO® High-Performance Incubator Specifications

Model Number	2DG	3DG	5DG	6DG	3DM	5DM	6DM
Convection Technique	Gravity	Gravity	Gravity	Gravity	Mechanical	Mechanical	Mechanical
Chamber Volume	1.4 cu. ft., 40 liters	2.5 cu. ft., 71.5 liters	4.5 cu. ft., 129 liters	5.5 cu. ft., 157.5 liters	2.5 cu. ft., 71.5 liters	4.5 cu. ft., 129 liters	5.5 cu. ft., 157.7 liters
Temperature Control	Microprocessor	Microprocessor	Microprocessor	Microprocessor	Microprocessor	Microprocessor	Microprocessor
Temperature Display	3 Digit LED	3 Digit LED	3 Digit LED	3 Digit LED	3 Digit LED	3 Digit LED	3 Digit LED
Temperature Range Uniformity Stability Sensitivity	Amb. +5° to 70°C ±0.5°C ±0.1°C ±0.1°C	Amb. +5° to 70°C ±0.5°C ±0.3°C ±0.1°C	Amb. +5° to 70°C ±0.5°C ±0.3°C ±0.1°C	Amb. +5° to 70°C ±0.5°C ±0.3°C ±0.1°C	Amb. +5° to 70°C ±0.25°C ±0.2°C ±0.1°C	Amb. +5° to 70°C ±0.25°C ±0.2°C ±0.1°C	Amb. +5° to 70°C ±0.25°C ±0.2°C ±0.1°C
Dimensions (LxWxH): Chamber	14.0 x 12.5 x 13.75 in. 356 x 318 x 349 mm	15.5 x 18.5 x 15 in. 390 x 470 x 380 mm	15.5 x 18.5 x 27 in. 390 x 470 x 685 mm	15.5 x 18.5 x 33 in. 390 x 470 x 835 mm	15.5 x 18.5 x 15 in. 390 x 470 x 380 mm	15.5 x 18.5 x 27 in. 390 x 470 x 685 mm	15.5 x 18.5 x 33 in. 390 x 470 x 835 mm
Shelf (each)	13.5 x 12.5 in. 343 X 318 mm	15.5 x 18 in. 390 X 455 mm	15.5 x 18 in. 390 X 455 mm	15.5 x 18 in. 390 X 455 mm	15.5 x 18 in. 390 X 455 mm	15.5 x 18 in. 390 X 455 mm	15.5 x 18 in. 390 X 455 mm
*Exterior	19.5 x 18 x 28 in. 495 x 457 x 711 mm	21.5 x 24 x 28 in. 550 x 610 x 715 mm	21.5 x 24 x 40 in. 550 x 610 x 1020 mm	21.5 x 24 x 46 in. 550 x 610 x 1170 mm	21.5 x 24 x 28 in. 550 x 610 x 715 mm	21.5 x 24 x 40 in. 550 x 610 x 1020 mm	21.5 x 24 x 46 in. 550 x 610 x 1170 mm
Net Weight	80 lbs., 36 kg	105 lbs., 47 kg	135 lbs., 61.2 kg	150 lbs., 68 kg	115 lbs., 52.2 kg	145 lbs., 65.8 kg	160 lbs., 72.6 kg
**Shelves Supplied Maximum	2 6	2 6	2 12	2 15	2 6	2 12	2 15
***Electrical Data (all models 50/60 Hz) 230V	120 W, 0.5 A	125 W, 0.6 A	150 W, 0.7 A	175 W, 0.8 A	200 W, 0.9 A	225 W, 1.0 A	250 W, 1.1 A
Shipping Information Dimensions (LxWxH):	24 x 23 x 30 in. 609 X 584 X 762 mm	25 x 26 x 31.5 in. 635 X 660 X 800 mm	25 x 26 x 43.5 in. 635 x 660 x 1105 mm	25 x 26 x 49.5 in. 635 x 660 x 1260 mm	25 x 26 x 31.5 in. 635 x 660 x 800 mm	25 x 26 x 43.5 in. 635 x 660 x 1105 mm	25 x 26 x 49.5 in. 635 x 660 x 1260 mm
Weight	95 lbs., 43 kg	130 lbs., 59 kg	160 lbs., 72.5 kg	175 lbs., 79.4 kg	140 lbs., 63.5 kg	170 lbs., 77.1 kg	185 lbs., 83.9 kg
Volume	9.8 cu. ft. 0.28 cu. meter	11.7 cu. ft. 0.33 cu. meter	16.3 cu. ft. 0.47 cu. meter	18.5 cu. ft. 0.52 cu. meter	11.7 cu. ft. 0.33 cu. meter	16.3 cu. ft. 0.46 cu. meter	18.5 cu. ft. 0.25 cu. meter
Catalog Number 230V	3166753	3166755	3166757	3166759	3166761	3166763	3166765

* Includes vent cap and adjustable feet.

** Spacing between shelves is 1-7/8" (48 mm).

*** Equipped with standard line cord and plug.

6. INSTALLATION

WARNING

INSTALLATION SHOULD BE COMPLETED BY QUALIFIED INSTRUMENT PERSONNEL ONLY.

6.01 Location - The most uniform operating conditions will be obtained by placing the incubator in an area remote from drafts, ventilating outlets, radiators, and other rapidly changing ambient conditions. To assure proper ventilation allow a minimum of 3 inches of clearance between the rear, top and sides of the incubator and adjacent walls. If two or more incubators are to be placed side by side, then allow 6 inches between them. The four legs on the bottom of the incubator can be turned to raise or lower the corners of the incubator so that it sits level on the table.

WARNING

FOR PERSONAL SAFETY, THIS APPARATUS MUST BE PROPERLY GROUNDED.

6.02 Electrical Connections

1. The power cord provided on this unit is equipped with a three-prong (grounding) plug, which mates with a standard three-prong grounding wall receptacle to minimize the possibility of electric shock hazard from this apparatus. The user should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly grounded.
2. Where a two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three-prong wall receptacle. Do not, under any circumstances, cut or remove the third (ground) prong from the power cord. Do not use a two-prong adapter plug.

6.03 Determine the total amount of current being used by other apparatus connected to the circuit that will be used for this apparatus. It is critical that the added current demand (see nameplate) of this and other equipment used on the same circuit does not exceed the rating of the fuse or circuit breaker.

CAUTION

- *BE SURE THAT THE POWER SUPPLY IS OF THE SAME VOLTAGE AS SPECIFIED ON THE NAMEPLATE.*
- *BE SURE THAT THE WALL RECEPTACLE IS READILY IDENTIFIABLE AND EASILY REACHED TO DISCONNECT THE UNIT FROM THE POWER SOURCE.*

7. EXPLANATION OF CONTROLS

7.01 On/Off Switch - The on/off switch controls the flow of all electric power to the incubator. The blower motor in the mechanically convected models will always be in operation with the power switch "ON".

7.02 Digital Display - The digital display shows actual temperature and set point temperatures in XX.X°C format. It also displays some helpful symbols during set-up.

7.03 Arrow Keys - The arrow keys will allow you to increment (∧) or decrement (∨) the displayed temperature or high limit values.

7.04 Temp Key - The Temp key will allow you to select a set point value for the desired operating temperature.

7.05 High Limit Key - The High Limit key will allow you to select a set point value for the desired high limit temperature. Setting the High Limit value also establishes a Low Limit value which is the same number of degrees below the operating temperature set point.

7.06 Enter Key - The Enter key will allow you to enter the value you have selected with the arrow keys when you are setting the operating or high limit temperatures.

7.07 Mute Key - The Mute key will silence the audible alarm for ten minutes if activated.

7.08 Heat On LED - The Heat On LED is illuminated when the heater is energized. While the incubator temperature is being controlled, the LED will blink regularly.

7.09 High LED - The High LED will illuminate if the incubator temperature exceeds the high limit temperature set point. The alarm buzzer will sound continuously until silenced by the Mute key.

7.10 Low LED - The Low LED will illuminate if the incubator temperature falls below the low limit temperature set point. To avoid nuisance alarms during routine door openings, an internal timer inhibits the alarm until the low temperature exists for ten minutes.

7.11 Recorder Output - A means of recording temperature is provided by the red and black binding post terminals on the control panel.

A suitable recorder would have a range of 0 to 1 volt DC. Zero volts represents 0°C and 1.000 volts represents 100°C.

The output is 10 millivolts per degree Celsius. 37.0°C would result in an output of 370 millivolts

8. OPERATION

WARNING

THIS EQUIPMENT HAS REACHABLE HOT SURFACES. THE OPERATOR SHOULD TAKE ANY PRECAUTION TO AVOID CONTACT WITH THESE PARTS.

8.01 Fully open the exhaust vent shutter cap on the top of the incubator and keep it open at all times. However, if running the incubator at the maximum rated temperature it may be necessary to turn the vent cap to a more closed position and bend one or more of the three vent cap tabs closed, in order to retain heat. Insert shelf supports into the holes punched in the side walls of the inner chamber. Insert the shelves into the shelf supports and try to keep an equal distance between shelves whenever

possible. Never cover the shelves with foil or reduce their open surface area by more than 75%, this will greatly reduce convection and hence uniformity and control will suffer.

8.02 Setup

1. Press the ON/OFF switch for power to the ON position.
2. Set desired operating temperature by depressing TEMP key once and use arrow keys to raise or lower to desired value. When desired value is displayed press the ENTER key.
3. Set desired high limit value by depressing HIGH LIMIT key and use arrow keys to raise or lower desired values. This value **MUST BE** at least 1° higher than the TEMP set point value previously set. If not, the display will blink "Hi" until an appropriate value is selected. When desired high temp limit value is shown in the SET POINT window, press the ENTER key.
4. If the actual temperature exceeds the entered high limit value, the HIGH LIMIT circuit will take over. The incubator will maintain control at the high limit temperature, and the alarm will sound. Depress the MUTE key to silence the alarm and check Maintenance and Servicing.

8.03 A glass thermometer (not provided) can be inserted through the hole in the vent shutter cap such that the three metal fingers punched in the cap converge toward the center of the cap and the glass ring on the thermometer rests on the top of the cap. The metal fingers may have to be bent slightly to grip the thermometer.

8.04 Loading

Although the gravity and mechanical convection incubators rely on different methods of air circulation, general loading procedures are applicable to both types and must be followed. It is important for uniformity and recovery that air circulation within the chamber is not restricted.

1. At least 1" (2.5 cm) should be left between objects placed on the shelves. Note: Within the mechanical convection cabinets objects should not be placed on the shelves in such a manner to block the movement of heated air into the chamber from the sidewall diffuser panels.
2. The bottom floor of the chamber must be kept free and clear of objects and never used as a shelf.
3. At no time should solid shelves be substituted for the shelves that are provided. Additional shelves and shelf supports are available from Precision.

8.05 Safety

1. DO NOT place any explosive, combustible or flammable materials in this chamber.
2. DO NOT place sealed containers in the chamber. Sealed containers, filled with materials, do not provide room for expansion or evaporation and can develop dangerous vapor pressure as the temperature increases. Loosely covered containers do not present a hazard.
3. Avoid spillage of liquids or powders within the chamber. Clean all spills as soon as possible. Use caution if incubator is still hot.
4. DO NOT evaporate noxious or poisonous fumes.
5. These incubators are not intended for food service or the preparation of meals.
6. Caution, DO NOT store containers filled with acidic or caustic solutions within the chamber, as vapors from these materials will attack the chamber interior and electrical components, thus voiding the warranty.

8.06 Periodic Safety Check

Test the operation of the Hi-Limit thermostat, as described in section 8.02, every three months.

8.07 Cleaning

Stainless steel will resist corrosion; however, it is not impervious to it. Proper maintenance of the stainless steel bath chamber will help assure many years of service.

CAUTION

AVOID SPILLING HARSH CHEMICALS INSIDE THE CHAMBER, AS CORROSION OF THE STAINLESS STEEL MAY RESULT.

IMPORTANT

THE USER HAS THE RESPONSIBILITY FOR CARRYING OUT APPROPRIATE DECONTAMINATION IF HAZARDOUS MATERIAL IS SPILT ON OR INSIDE THE CHAMBER.

It should be cleaned regularly with mild soapy water and rinsed with distilled water. Should algae or other undesirable microorganisms form inside the chamber, add a little formaldehyde or quaternary ammonium germicide, available from Precision (P/N 51200912).

IMPORTANT

IF IT IS NECESSARY TO USE THE FOLLOWING CHEMICALS, LIMIT THE TIME TO A MAXIMUM OF FOUR HOURS. CLEAN SURFACES IMMEDIATELY AFTER USE.

-Aluminum Chloride	-Barium Chloride
-Bichloride of Mercury	-Calcium Chloride
-Carbolic Acid	-Chlorinated Lime
-Citric Acid (boiling)	-Dakin's Solution
-Ferrous Chloride	-Mercury Salts
-LysolMercuric Chloride	-Phenol
-Potassium Permanganate	-Stannous Chloride
-Potassium Thiocyanate	-Tartaric Acid
-Sodium Hypochlorite	

WARNING

EXPLOSION, IMPLOSION OR THE RELEASE OF TOXIC OR FLAMMABLE GASES ARISING FROM THE MATERIAL BEING HEATED IS THE SOLE RESPONSIBILITY OF THE USER.

CAUTION

DO NOT USE OTHER CLEANING OR DECONTAMINATION METHODS WITHOUT FIRST CONTACTING PRECISION TECHNICAL SERVICE .

NEVER USE THE FOLLOWING CHEMICALS:

*-Aqua Regia -Ferric Chloride
-Iodine -Sodium Azide
-Sulfuric Acid*

Removing Discoloration: Should the stainless steel ever become discolored by iron rust, use the following procedure to remove all traces of the rust and restore the stainless steel.

WARNING

OBSERVE THE FOLLOWING SAFETY PRECAUTIONS! USE HEAVY GLOVES OR OTHER ADEQUATE HAND PROTECTION. WEAR GOGGLES OR OTHER ADEQUATE EYE PROTECTION. ONLY WORK IN AREAS WITH ADEQUATE VENTILATION.

Prepare a solution of 20% nitric and 1.5% hydrochloric acid (if preferred, a 2% to 5% solution of warm oxalic acid may be used). Swab solution over surface, allowing it to remain until all rust is loosened. This will usually take 1 to 2 minutes.

As soon as rust is loosened, immediately flush with clean water until all acid is removed.

9. MAINTENANCE/SERVICE

9.01 Troubleshooting



WARNING

DANGEROUS VOLTAGES EXIST WITHIN THIS UNIT. SERVICE SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL. DISCONNECT THE UNIT FROM ITS ELECTRICAL SOURCE. REMOVE THE SHELVES AND THERMOMETER IF INSTALLED. DISCONNECTING ANY COMPONENT FROM THE CIRCUIT WITHOUT PRIOR REMOVAL OF THE POWER SOURCE MAY CAUSE DAMAGE TO OTHER CIRCUIT COMPONENTS.

9.02 Temperature Variance or Fluctuation

1. Make sure vent shutter cap is not closed. Open to the maximum position.
2. Test unit when empty; if results are satisfactory the chamber was improperly loaded. Redistribute the load.
3. Be sure to allow ample time for an empty chamber to stabilize at the desired temperature setting. It could take over three hours to equilibrate depending upon the difference between ambient and operating temperatures. The mass of the load can also affect stabilization time.
4. Make certain severe line voltage fluctuations are not occurring.
5. Make certain all wire connections are secure at their terminals.

9.03 Temperature calibration

A temperature offset may be required to match a stable incubator's actual temperature display to a calibrated thermometer. This is normal and can be adjusted as follows:

1. Allow the incubator to stabilize.
2. Press the TEMP key twice: the display will read "CAL".
3. Press the arrow keys to make the display agree with the calibrated thermometer reading.
4. Press ENTER. The display will agree with the thermometer. The incubator will heat or cool as required to the desired set point.

9.04 Heat Loss

1. No Heat - If the chamber does not heat, first check the line voltage, circuit breakers and/or fuses of the line circuit. Check if all electrical connections are secure.

2. Improper Door Closure - Inspect door latches which are spring loaded to see if they pull the door in tightly against the body of the incubator. If the "finger" of the latch (in the door) has been sprung into the body of the latch, use a pen or similar object to pop it back out. Check the incubator cabinet to see that it is level. Use a spirit level and turn the 4 adjustable feet on the bottom of the incubator to make it level.
3. Inspect door gasket to make certain it fits firmly against cabinet at all points. Replace gasket if torn or damaged.

9.05 Heater Resistance Check

WARNING

DISCONNECT INCUBATOR FROM ITS POWER SOURCE BEFORE PROCEEDING.

Refer to the appropriate wiring diagram at the end of the manual and locate the electrical leads for the heater. Use the values in the Heater Cold Resistance Table (see page 17) to find the appropriate value. Disconnect at least one heater lead from the terminal strip before taking the reading with your ohm meter. Again, it is imperative that the unit be completely disconnected from its electrical power source before any readings are taken.

If the heater is open (infinite resistance) it should be replaced. If the heater reads less than five ohms it is shorted and should be replaced. Check the resistance between each lead of the heater and a bare metal point on the incubator chassis. If there is less than infinite resistance (a million ohms or greater) between the heater and chassis, the heater is shorted to the ground and should be replaced. Also, inspect all wires leading to the heater for signs of shorting or electrical contact to chassis of incubator.

10. PARTS REPLACEMENT

10.01 Heater Replacement

1. Disconnect power.
2. Open door as wide as possible.
3. Remove two screws from stainless steel flange just above control panel.
4. Chamber floor is now free. Pull forward and lift out.
5. Disconnect heater mounting screws.
6. Lift heater slightly. Label wires.
7. Disconnect heater leads. **CAUTION: Make sure wires remain visible and do not fall beneath base plate.**
8. Replace heater reversing these steps.

10.02 Heater Wire Replacement

1. Disconnect power.
2. Open door as wide as possible.
3. Open control panel by removing two top screws. Set panel down, exposing controls.
4. Unplug the heater connection (see p. 15) located on the board.
5. Remove 2 screws from the stainless steel flange just above the control panel.
6. The chamber floor is now free. Pull forward and lift out.
7. Disconnect heater leads.
8. Remove heater leads and connector from the opening in the control panel.
9. Replace heater leads by reversing these steps.

10.03 RTD Sensor Replacement

1. Disconnect power.
2. Remove back panel screws. Do not remove access port screws. Insulation is now exposed, use gloves.
3. Pull RTD Sensor straight out.
4. Open control panel by removing two top screws.
5. Disconnect RTD Sensor plug from printed circuit board.
6. Remove RTD Sensor assembly.
7. Replace RTD Sensor by reversing these steps.
8. **Caution: Route RTD Sensor plug through opening on rear frame when making connection to printed circuit board.**
9.
 - a. Redress insulation before installing back panel.
 - b. Line up access port.
 - c. Slip upper panel under cabinet.
 - d. Secure panel.

10.04 Motor Replacement (mechanical models only)

1. Disconnect power.
2. Open doors as wide as possible.
3. Remove two screws from stainless steel flange just above control panel. Remove flange.
4. Chamber floor is now free. Pull forward and lift out.
5. Disconnect heater mounting screws.
6. Lift heater slightly. Label wires.
7. Disconnect heater leads. **Caution: Make sure wires remain visible and do not fall beneath base plate.**
8. Detach blower wheel from motor shaft.
9. Open control panel by removing two top screws.
10. Disconnect motor terminals. Label leads.
11. Remove motor (mounted to motor bracket) from underside of incubator. Turn incubator on its side to facilitate this removal.
12. Replace motor. Reassemble incubator by reversing these steps.

10.05 Printed Circuit Board Replacement

1. Disconnect Power.
2. Open outer door as wide as possible.
3. Open control panel by removing two top screws. Set panel down, exposing controls.
4. Unplug the electrical connections from circuit board in question (four connections on larger, one on smaller).
5. Remove nuts securing board to control panel.
6. Replace printed circuit board by reversing these steps.

10.06 Outer Door Gasket Replacement

1. Disconnect power.
2. Open outer door and loosen panel screws. Do not remove.
3. Remove used gasket. Note orientation of gasket.
4. Replace new gasket into groove maintaining orientation. Begin insertion at door bottom center, always pressing toward the starting direction. This will minimize gasket stretching.
5. Retighten panel screws.

10.07 Door Latch Grabber

For replacement of door latch grabber (on body of incubator) follow instructions which came with the replacement door latch kit.

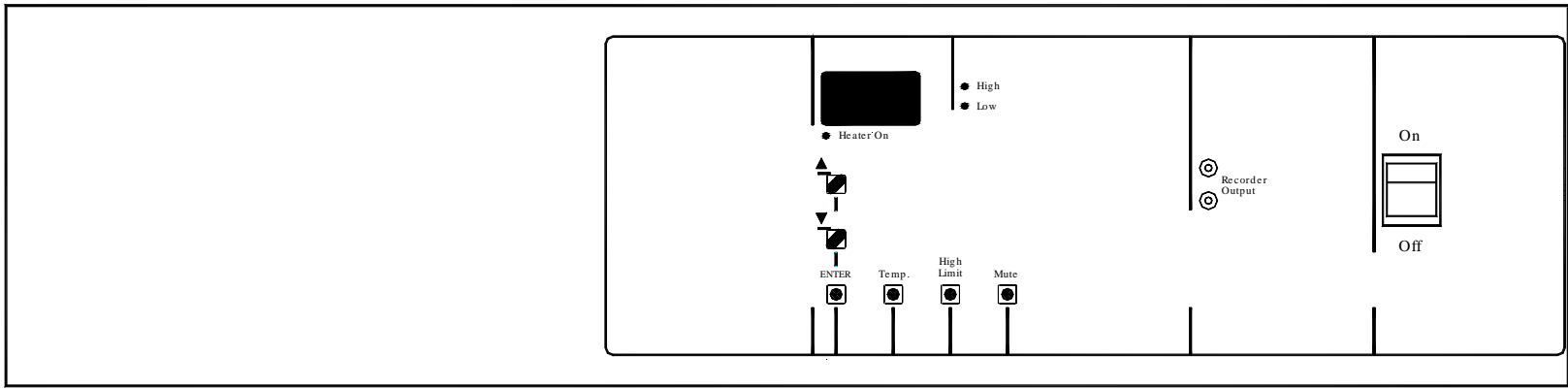
10.08 Replacement of Door Latches (also see kit instructions)

1. Disconnect power.
2. Open door as wide as possible.
3. Remove door panel. Insulation is now exposed. Use gloves when in contact with insulation.
4. Remove insulation or move away from area of latches.
5. Remove nuts securing latch assemblies to door frame.
6. Set new latch into latch holder. Reinsert into door frame. Line up holder openings to frame studs.
7. Secure latch holder assemblies with nuts removed.
8. Redress insulation carefully and secure door panel.

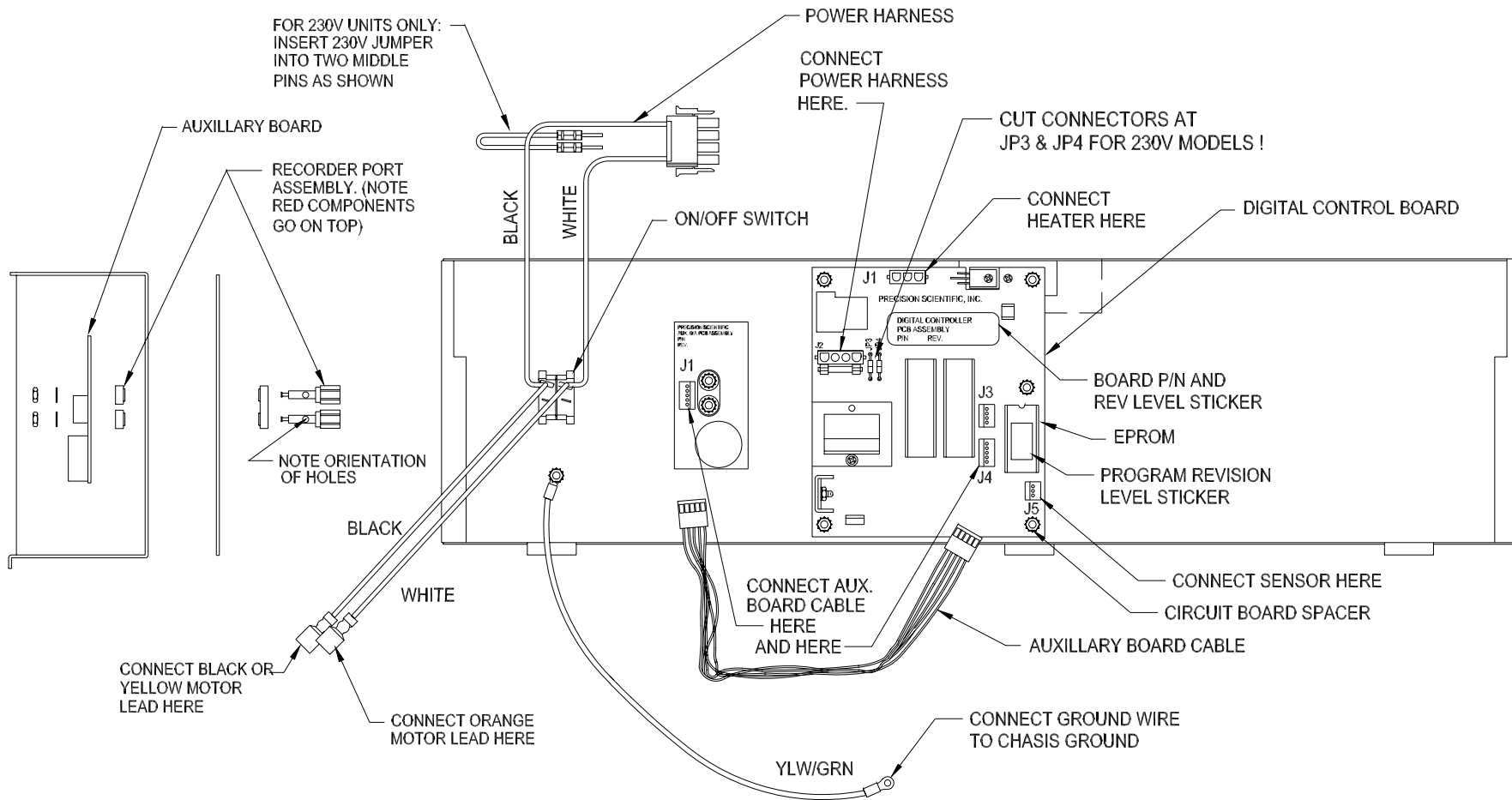
11. REPLACEMENT PARTS LIST/ACCESSORIES

REPLACEMENT PARTS LIST - THELCO INCUBATORS				
	MODEL 2DG	MODEL 3DG 3DM	MODEL 5DG 5DM	MODEL 6DG 6DM
GLASS DOOR ASSEMBLY	3162657	3166992	3162655	3162656
HEATER	See Page 17			
PACKAGING KIT	3164602	3167019	3164530	3164531
OUTER DOOR GASKET KIT	3167249			
"GASKET, 3/8" x 1/2"	3175096			
LATCH REPAIR KIT	3167037			
OUTER DOOR ASSEMBLY	3166923	3167074	3164810	3164812
LEVELING FOOT KIT	3167186			
GLASS DOOR LATCH KIT	3166996			
ON/OFF SWITCH	3175318			
LINE CORD ASSEMBLY, 230V	3179481	3179482		
VENT SHUTTER CAP	3177386			
RTD SENSOR ASSEMBLY	3176738			
DIGITAL CONTROL BOARD	3176802			
AUXILLIARY BOARD	3176803			
AUXILLIARY BOARD CABLE	3176758			
POWER HARNESS	3177630			
MOTOR ASSEMBLY, 230V	3167015			
CATCH KIT, INNER	3167187			
WHEEL BLOWER, MECHANICAL MODELS	N/A	3175897		
BOTTOM PLATE, MECHANICAL MODELS	N/A	3162397		
BOTTOM PLATE, GRAVITY MODELS	N/A	3162404		
MAINS FUSE	3172461			
PCB FUSE	317592			

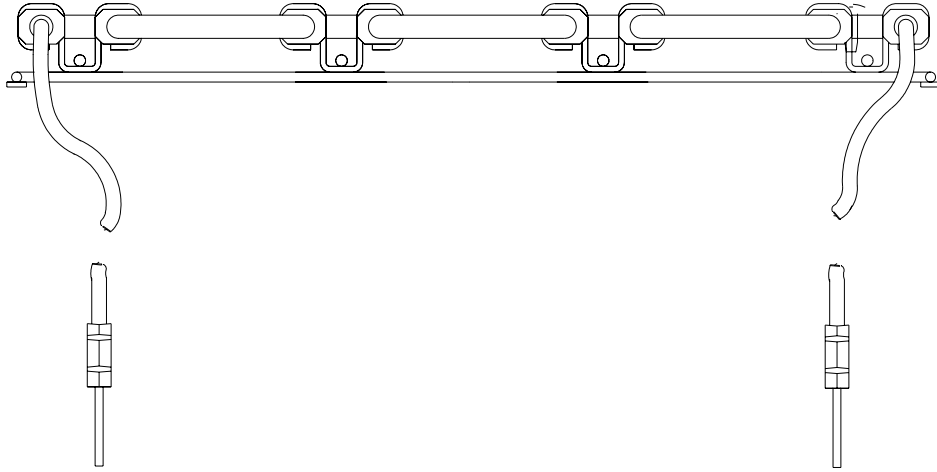
ACCESSORIES - THELCO INCUBATORS		
	3, 5, 6 DG/DM	2 DG
SHELF KIT	3166214	3166212
THERMOMETER, 0-100°C	3173710	
ACCESS PORT STOPPER KIT	3167215	
RS232 KIT	3166245	



DIGITAL CONTROL PANEL
LAYOUT

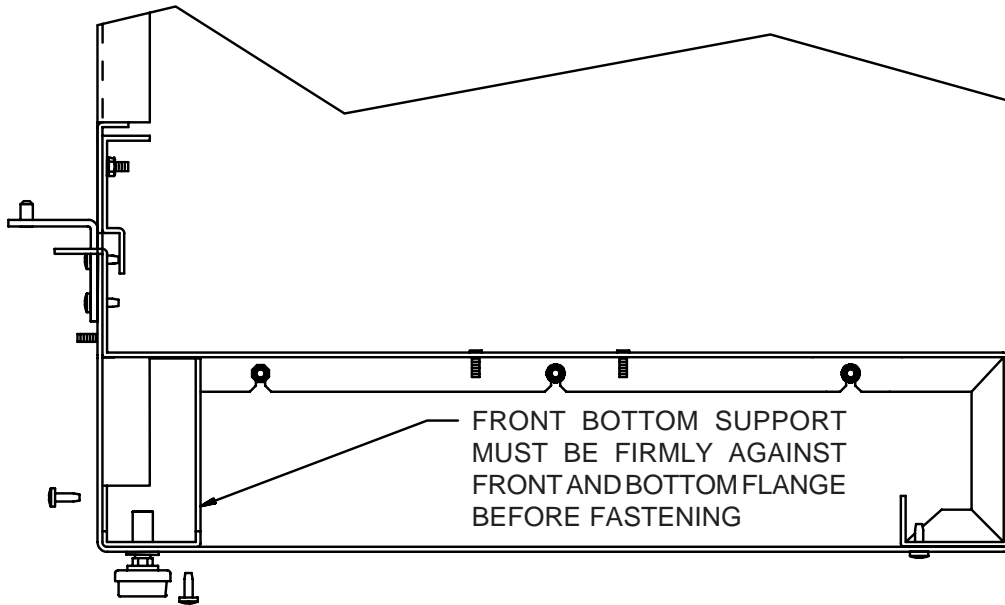
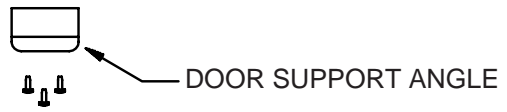
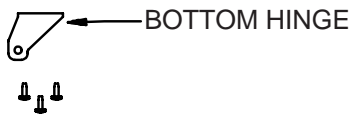
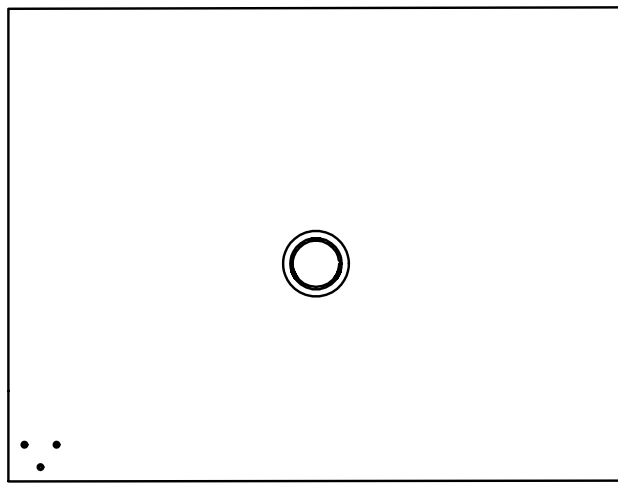


CONTROL PANEL ASSEMBLY

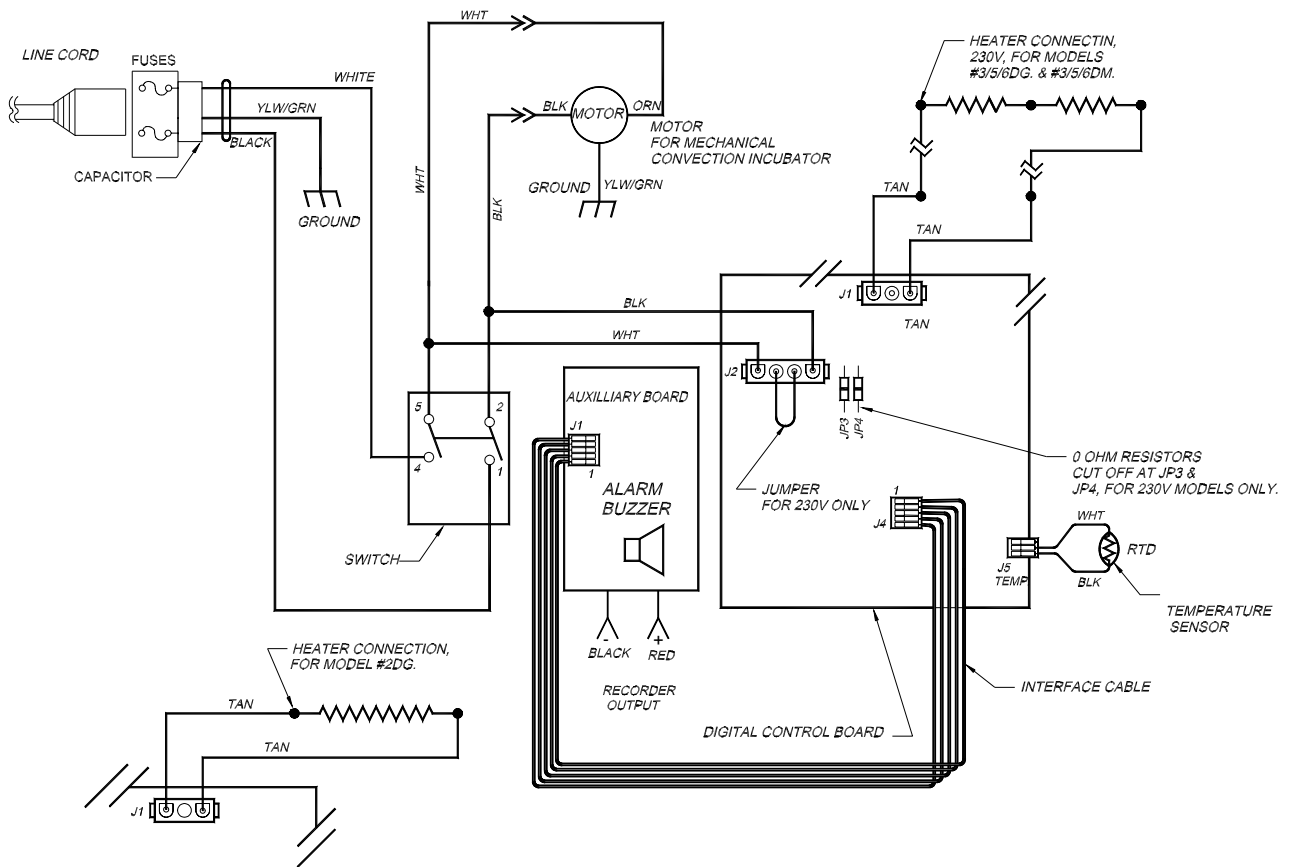


HEATER ASSEMBLY 230V

Model Numbers 3, 5, & 6 DG/DM and Model 2 DG.

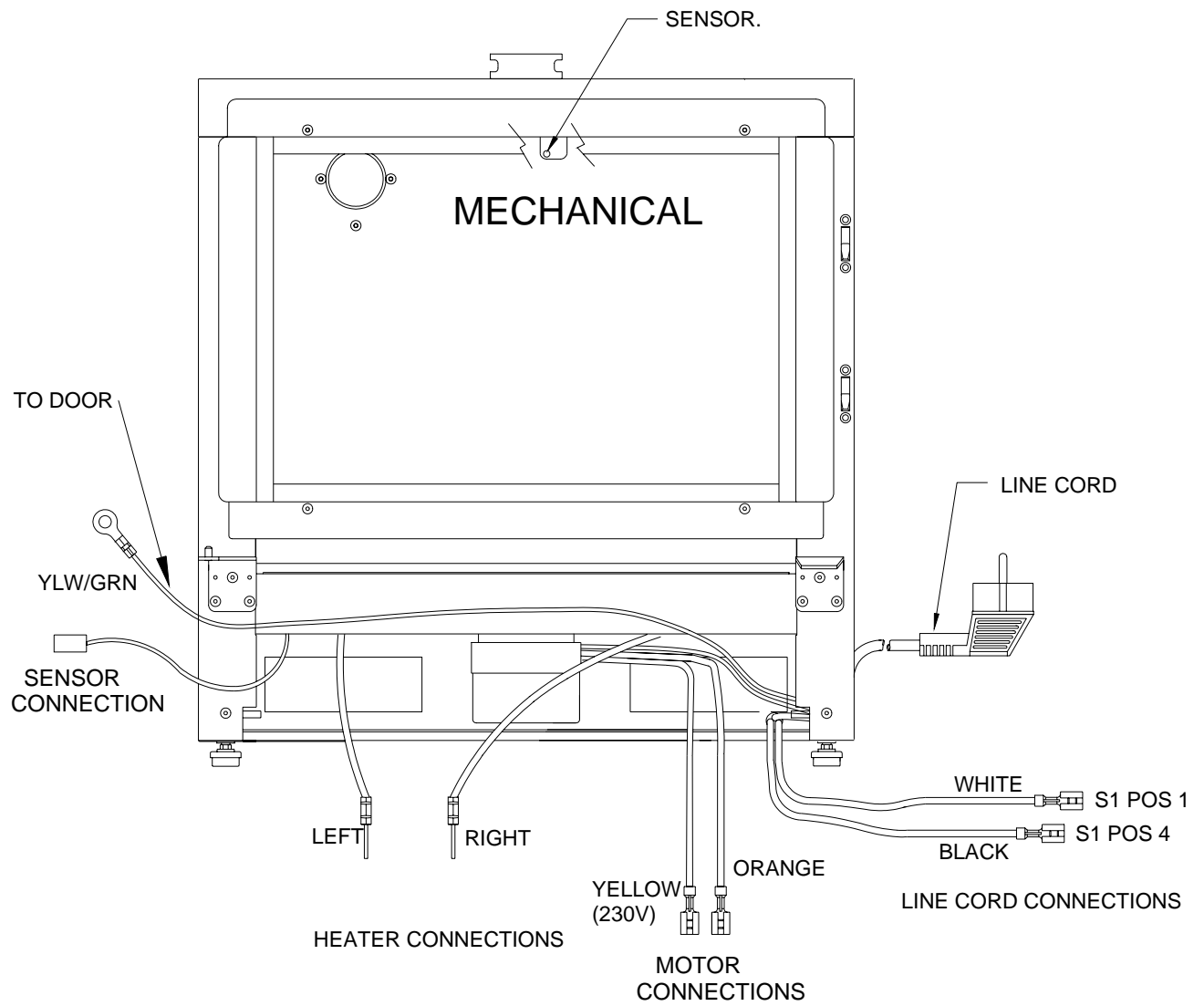


Outer Body Assembly

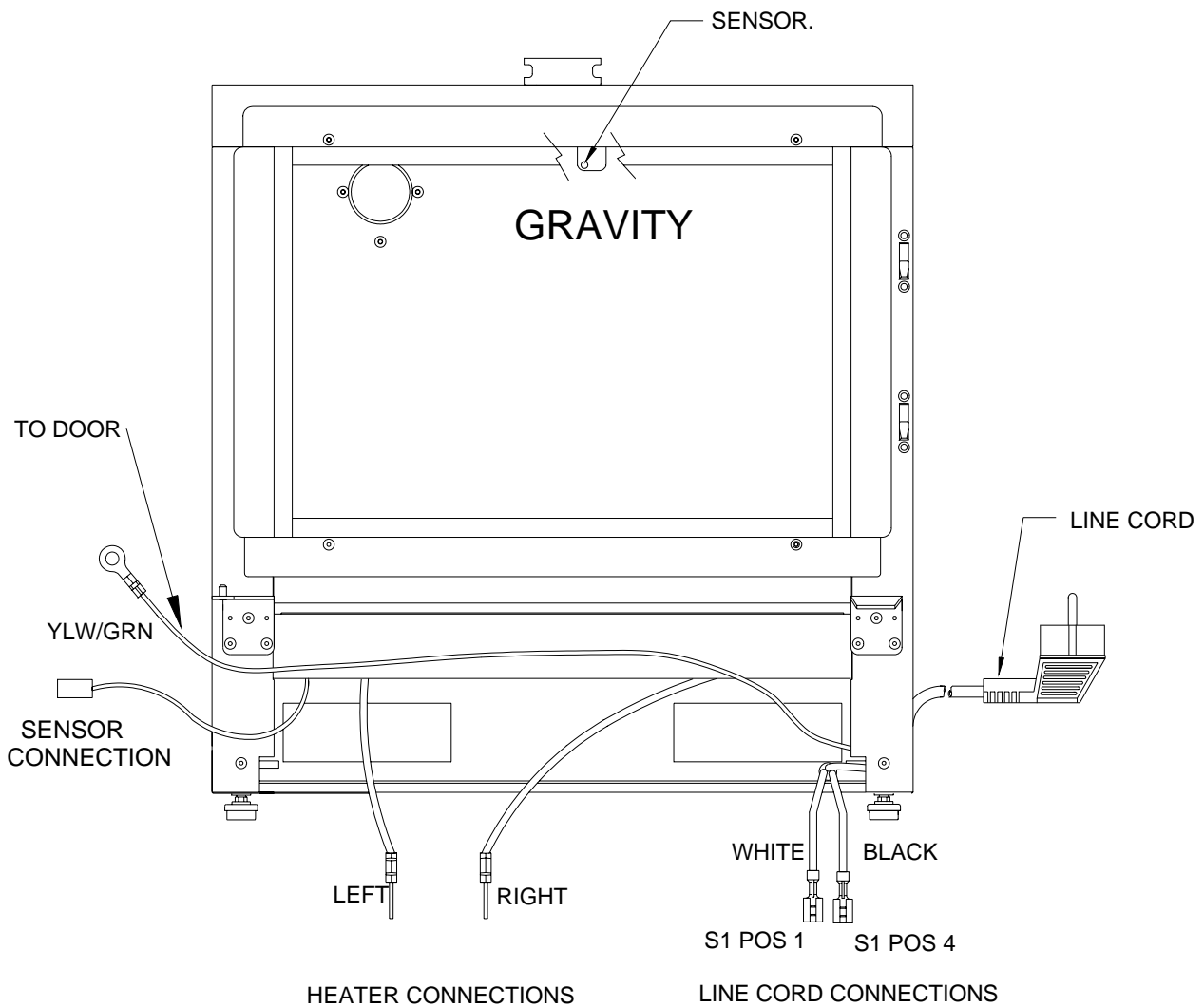


HEATER COLD RESISTANCE ACROSS TOTAL COILS						
HEATER P/N	WATTS	OHMS	MODEL No.		VOLTS	COILS
3175458	100	476	#2DG	----	230V	1
3175514	125	207	#3DG	----	230V	2
3175515	150	173	#5DG	#3DM	230V	2
3175516	175	148	#6DG	#5DM	230V	2
3175517	200	129	----	#6DM	230V	2

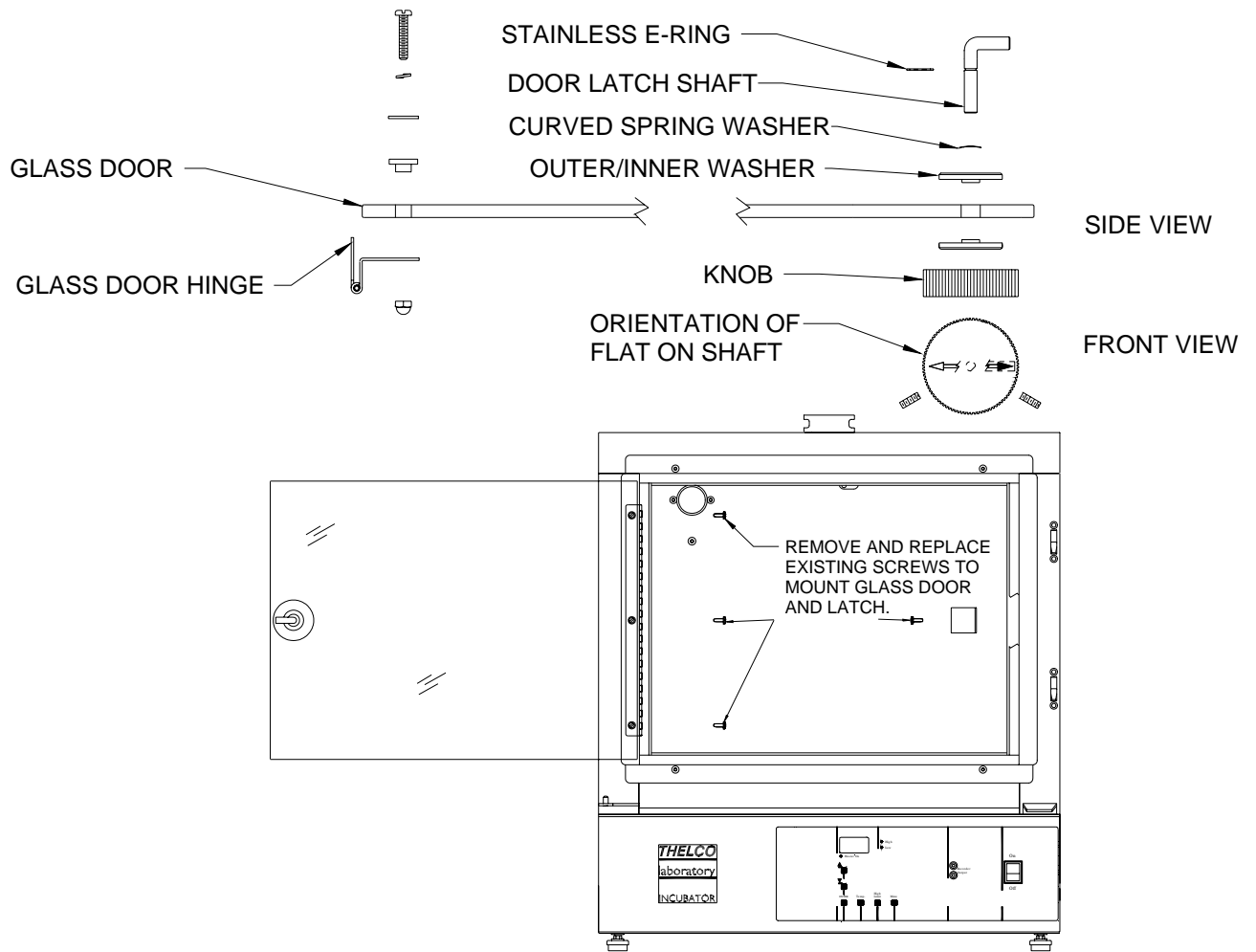
DIGITAL CONTROL WIRING DIAGRAM



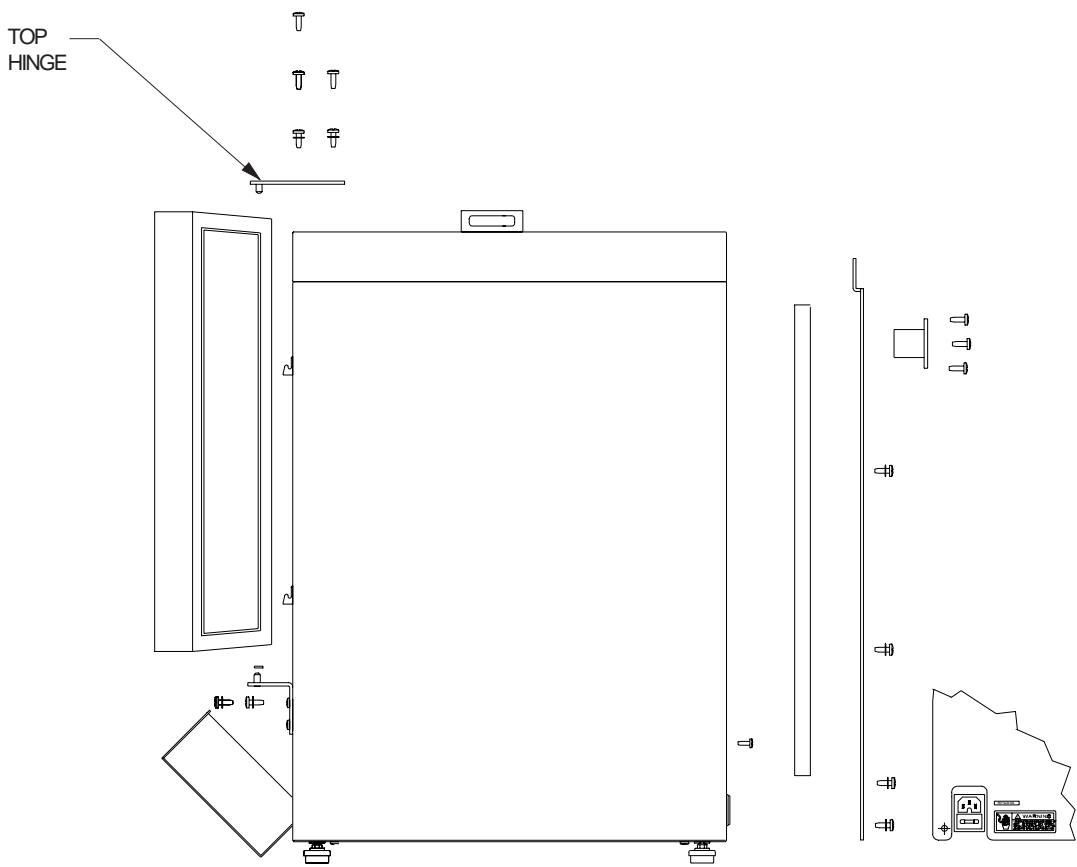
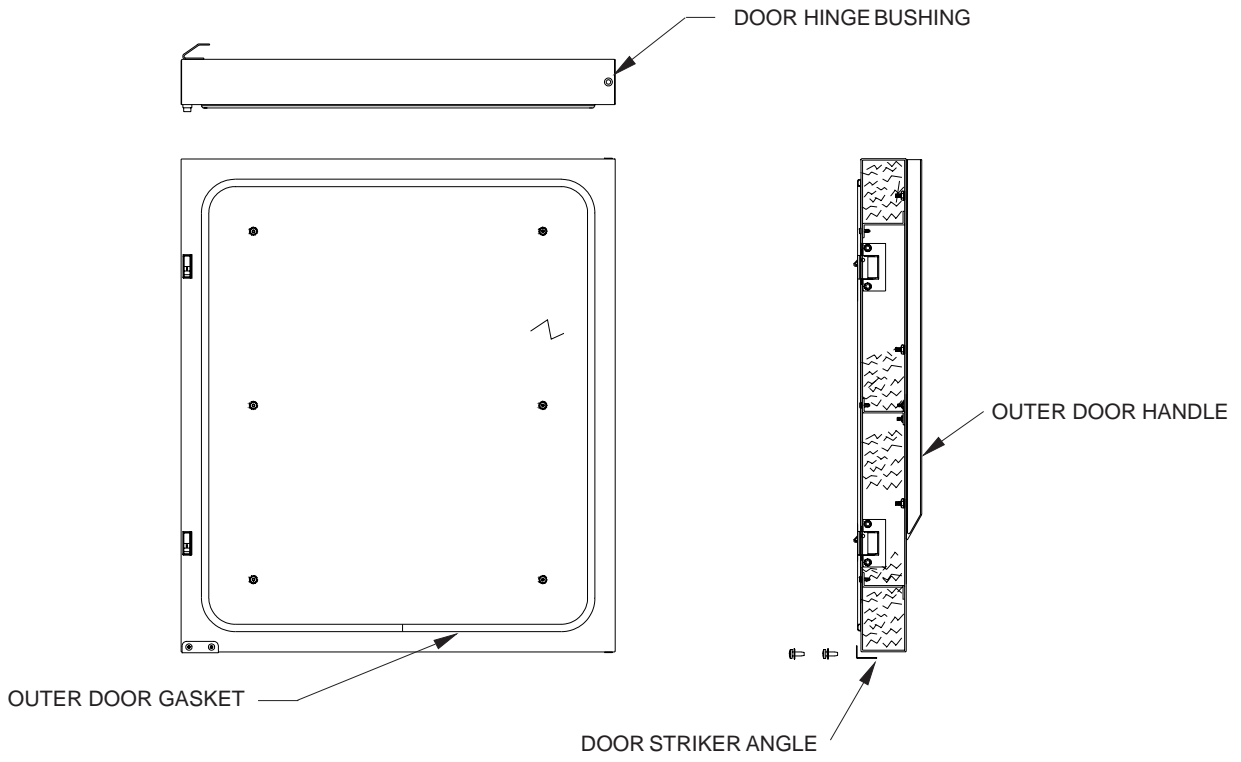
**Front View Mechanical Models
(Door and Control Panel Removed)**



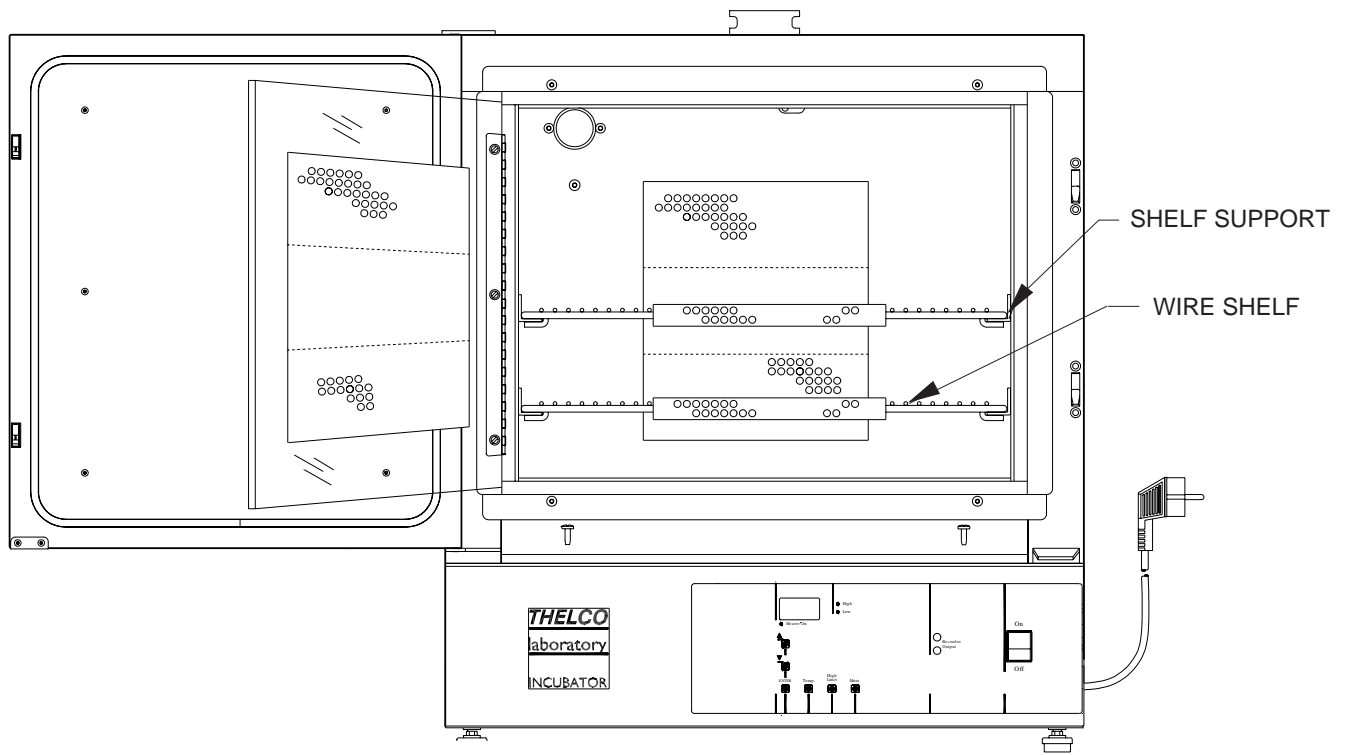
**Front View Gravity Models
(Door and Control Panel Removed)**



Glass Door Assembly



Outer Body



Shelf Assembly

THERMO ELECTRON CORPORATION 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.

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 1-888-213-1790 (USA or 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.



