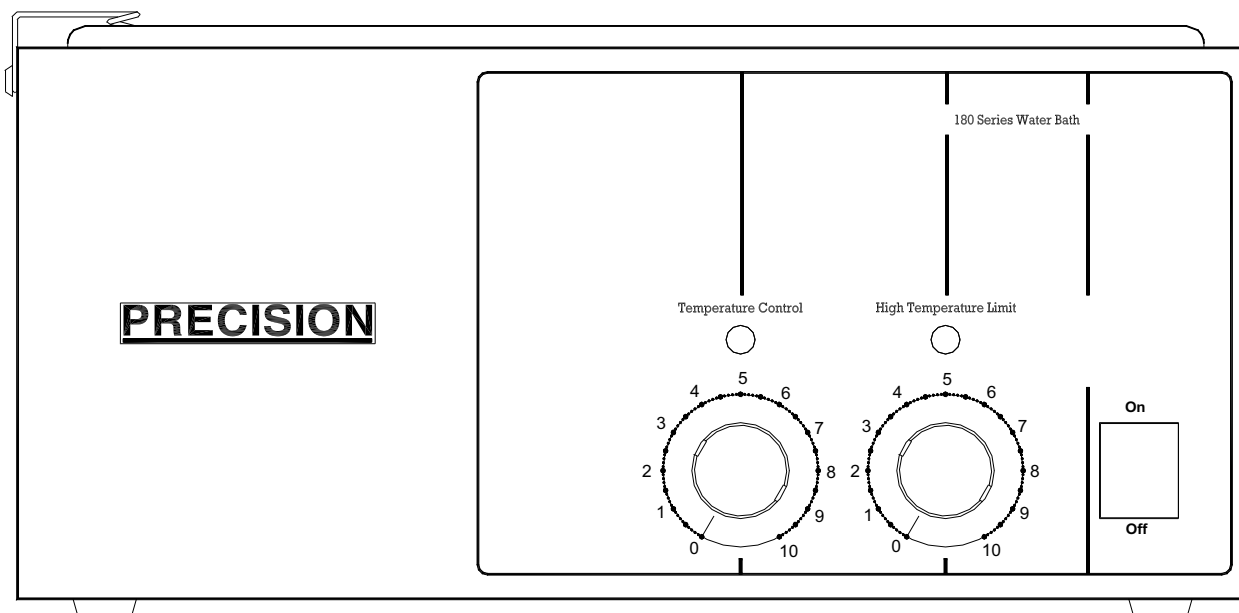


# Installation/Service Manual

## General Purpose Water Baths

**Models 180** (2823/2824), **181** (2827/2828), **182** (2831/2832),  
**183** (2835/2836), **184** (2839/2840), **185** (2843/2844),  
**186** (2847/2848), **188** (2851/2852)



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Manual P/N 3177889  
Rev E Dated 06MAY08

**Thermo**  
SCIENTIFIC

## **NOTE:**

THE 240V 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 SCIENTIFIC 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 Technical Services using our toll free telephone number.

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## **REVISION STATUS**

INDEX	DATE	AMENDED PAGES	NOTES
A	6/99		Initial release
B	11/01	2	Update specs
C	6/05	36100124 (34002480)	new manual #, manufacture location
D	5/06	ECRs 23443 & 23496	consolidated with 240V 3177692 manual, removed CE and declaration
E	5/08	ECR 24571	replaced thermostat part number with kit part number

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## **1. INTRODUCTION**

Precision General Purpose Water Baths are designed for a wide variety of serological research procedures as well as a broad range of other general laboratory applications. Operation and maintenance of these baths are covered in this manual; unless specifically noted otherwise, the information provided applies to all available models.

Precision water baths feature a one-piece, deep-drawn stainless steel chamber with welded and painted galvanized steel outer body. Depending on the model, either one or two heaters are attached to the bottom of the bath chamber. For faster temperature recovery and reduced power consumption, the baths are equipped with a stainless steel cover (except Model 2827/2828, which is equipped with a plastic cover). This cover must be in place to reach and maintain 100°C.

All units (except Model 2823/2824) also feature an adjustable support shelf which may be set at three different height levels by simply changing the position of the legs. Model 2823/2824 is equipped with a non-adjustable diffuser shelf.

As the ultimate user of this apparatus, it is your responsibility to understand its proper function and operational characteristics. 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.*

### **CAUTION**

*MODEL 2847/2848 AND 2851/2852 WATER BATHS REQUIRE TWO PERSONS TO UNPACK AND LIFT THE PRODUCT TO BENCH HEIGHT.*

### **CAUTION**

*THE BENCH TOP MUST BE RIGID AND STRONG ENOUGH TO COMFORTABLY SUPPORT THE WEIGHT OF THE UNIT WHEN FILLED WITH WATER.*

## **2. UNPACKING AND DAMAGE**

This merchandise was carefully packed and thoroughly inspected; save all packing material if apparatus is received damaged.

Responsibility for its 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:

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 a claim will be supplied by the carrier.

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 the carrier's agent within 15 days of delivery date; then file a claim with the carrier since the damage is the carrier's responsibility.

If you follow these instructions carefully, we 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. SPECIFICATIONS**

Precision General Purpose Water Baths feature the following parameters. Volume calculations are based using water level approximately 1" (25mm) from the chamber top.

Catalog Number	Model Number	Electrical Characteristics			Capacity		230V Units Power Supply Mains Fuse
		Volts	Watts	Amps	Liters	Gallons	
<b>3166711</b> <b>3166712</b>	2823/ 2824	120 230	225	1.9 1.0	1.5	0.4	FST-5x20-1.0A
<b>3166706</b> <b>3166821</b>	2827/ 2828	120 230	225	1.9 1.0	2.5	0.7	FST-5x20-1.0A
<b>3166714</b> <b>3166709</b>	2831/ 2832	120 230	300	2.5 1.3	5.5	1.5	FST-5x20-2.0A
<b>3166702</b> <b>3166704</b>	2835/ 2836	120 230	400	3.3 1.7	12.0	3.2	FST-5x20-2.0A
<b>3166716</b> <b>3166710</b>	2839/ 2840	120 230	600	5.0 2.6	19.5	5.2	FST-5x20-3.15A
<b>3166707</b> <b>3166708</b>	2843/ 2844	120 230	600	5.0 2.6	18.0	4.9	FST-5x20-3.15A
<b>3166713</b> <b>3166715</b>	2847/ 2848	120 230	1200	10.0 5.2	43.0	11.4	FST-5x20-6.3A
<b>3166703</b> <b>3166705</b>	2851/ 2852 Dual	120 230	800	6.7 3.5	12.0 Both Pans	3.2 Both Pans	FST-5x20-4.0A





## **4. INSTALLATION**

### **4.1 Location**

To obtain the most uniform operating conditions and results, place the bath in an area remote from drafts, ventilation outlets, radiators, and other rapidly changing ambient conditions.

To assure proper ventilation, allow at least 4" clearance between the rear, top, and sides of the unit and adjacent wall. If two or more units are positioned side-by-side, allow at least 8" between them.

### **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

### **4.2 Electrical Connections**

***IMPORTANT : PLEASE READ CAREFULLY.***

#### ***WARNING:***

***FOR PERSONAL SAFETY, THIS APPARATUS MUST BE PROPERLY GROUNDED.***

#### ***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***

The power cord of this instrument 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. The user should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly grounded. Where a two-prong receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three-prong receptacle.

#### ***WARNING:***

***DO NOT, UNDER ANY CIRCUMSTANCES, CUT OR REMOVE THE THIRD (GROUND) PRONG FROM THE POWER CORD. DO NOT USE A TWO-PRONG ADAPTER PLUG.***

Determine the total amount of current presently being used by other equipment connected to the circuit that will be used for this unit. It is critical that the added current demand by this appliance and other equipment on the circuit not exceed the rating of the fuse or circuit breaker in use.

## **5. OPERATION**

### ***CAUTION***

***EXERCISE CARE WHEN USING ACIDIC OR CAUSTIC SOLUTIONS AS THEY WILL ATTACK THE GALVANIZED STEEL BATH BODY IF SPILLED INTO THE BATH. IF SPILLS DO OCCUR, THE BATH LIQUID SHOULD BE IMMEDIATELY DRAINED AND THE UNIT THOROUGHLY FLUSHED. SPILLS AND CONDENSATION SHOULD BE CLEANED/REMOVED FROM ALL METAL SURFACES AFTER EACH USE.***

### ***WARNING***

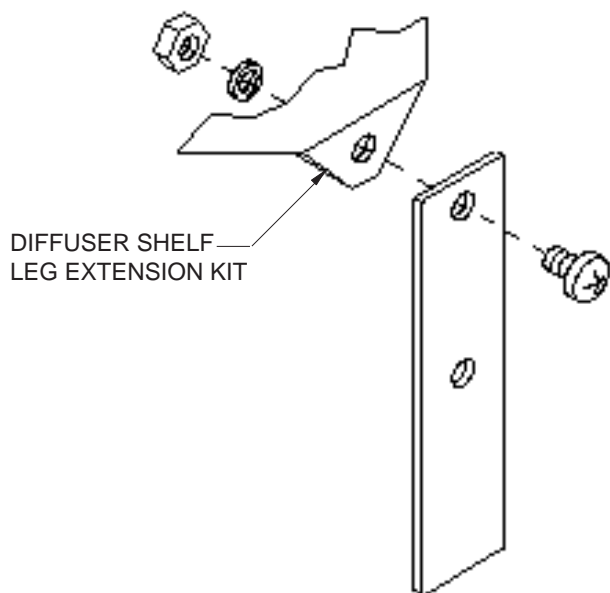
***EXPLOSION, IMPLOSION OR THE RELEASE OF TOXIC OR FLAMMABLE GASES ARISING FROM THE MATERIAL BEING HEATED IS THE SOLE RESPONSIBILITY OF THE USER.***

## 5.1 Shelf Placement

Place the stainless steel metal shelf also called diffuser shelf, (corners facing downward) inside the bath chamber. The shelf provides a sample base and protects samples from touching the hot metal bath bottom.

If it is necessary to increase the height of the diffuser shelf, a Leg Extension Kit is included for this purpose. Model 2823/2824 is excluded.

Following the figure shown below, attach the four extension legs to each of the four corners of the diffuser shelf.



## 5.2 Filling Bath

### **NOTE:**

*DISTILLED WATER IS RECOMMENDED; IT WILL NOT CORRODE THE BATH CHAMBER AND IT REDUCES THE NEED FOR FREQUENT BATH CLEANING.*

DO NOT USE 18 MEG DEIONIZED WATER.

**NOTE:** *If this is the only source of treated water available; mix 50% with regular tap water.*

Before filling, check the power switch and make sure that it is in the "OFF" position.

Fill the bath with distilled water, making allowance for displacement by the sample(s) being immersed and for expansion of the media upon reaching operating temperature.

For Model 2827/2828 and above, the maximum liquid level should be 1-1/2" from the top surface of the bath after sample(s) are immersed. For Model 2823/2824, the maximum liquid level should be 3/4" from the top of the bath.

## 5.3 Bath Cover

To conserve energy and reduce evaporation, use the cover supplied with the bath throughout the temperature range of the bath. This cover must be in place to reach and maintain 100°C.

### **CAUTION**

*DO NOT USE ALUMINUM FOIL AS A COVER; IT MAY CAUSE CORROSION OF THE STAINLESS STEEL AS A RESULT OF AN ELECTROLYTIC REACTION.*

### **CAUTION**

*WHEN OPERATING AT TEMPERATURES GREATER THAN 60°C, DO NOT TOUCH METAL SURFACE OF GABLE COVER. LIFT GABLE COVER BY KNOB ONLY.*

### **NOTE**

*AS WATER BATHS ARE OPERATED, ESPECIALLY AT ELEVATED TEMPERATURES, CONDENSATION FORMS ON THE UNDERSIDE OF THE GABLE COVER. THE AMOUNT OF CONDENSATION CAN BE CONSIDERABLE. EXERCISE CARE WHEN REMOVING THE COVER SO THAT WATER FALLS BACK INTO BATH CHAMBER, AND NOT ON BATH SURFACE. THE COVER SHOULD BE PLACED UPSIDE DOWN WHEN REMOVED TO MAINTAIN A DRY WORK AREA.*

## 5.4 Bath Thermometer

Each bath is supplied with a thermometer and O-ring (packed separately). The thermometer is attached to the bath via a metal clip on the top of the bath.

Slip the O-ring onto the thermometer; insert this assembly through the metal clip until the immersion depth indicator line is at or below the water surface. The thermometer bulb should always be located above the diffuser shelf.

### **CAUTION:**

*CARE SHOULD BE TAKEN TO PROTECT THE THERMOMETER FROM ACCIDENTAL BREAKAGE AND SPILLAGE OF CONTENTS.*

## 5.5 Power ON

Insert the line cord into the proper receptacle and turn the power switch to the "ON" position. This action energizes the heater and causes the amber pilot lamp to light. The pilot lamp will stay lighted as long as the heater(s) is energized.

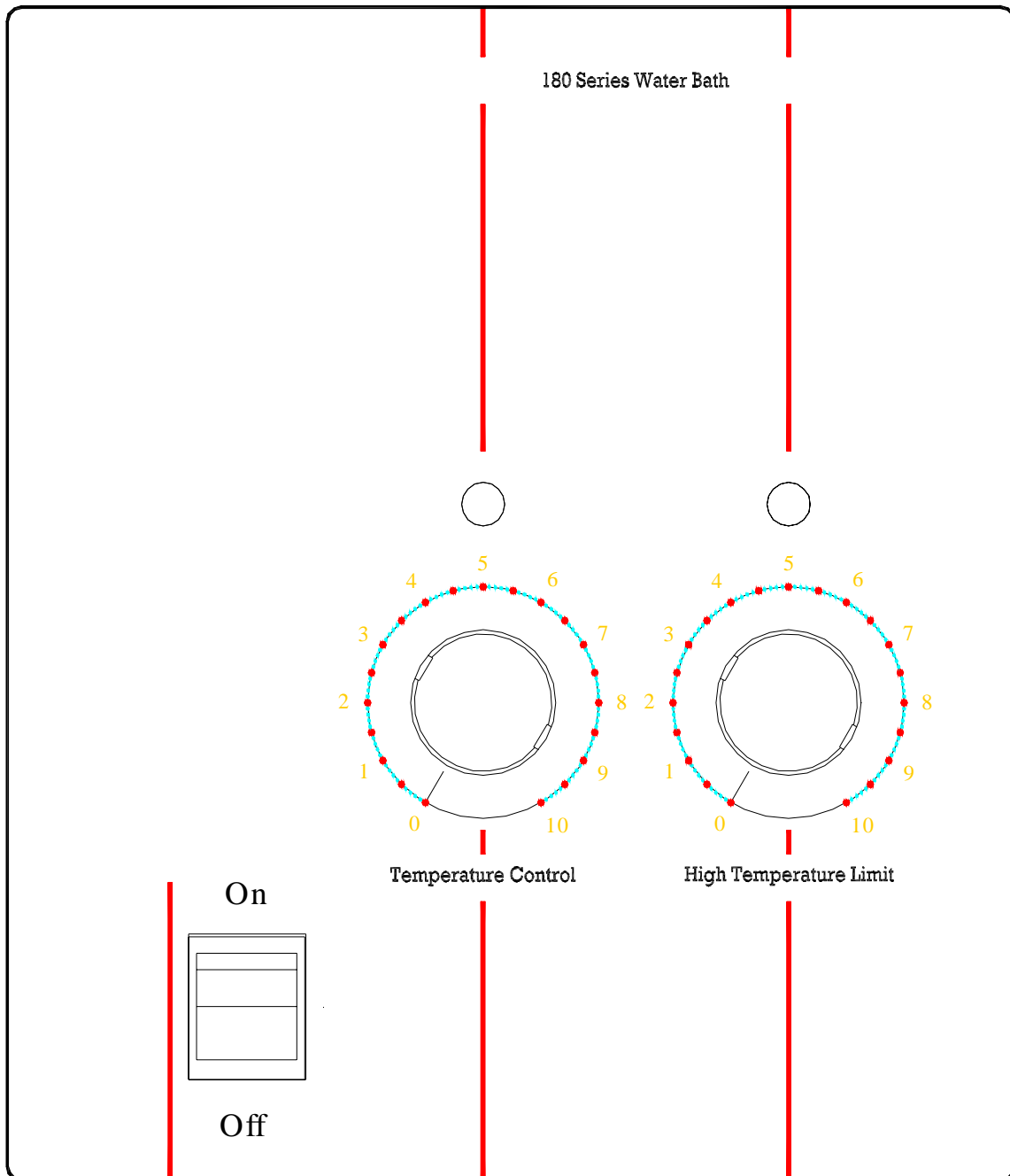


Figure 5.1 Controls



## 5.6 Setting Thermostats

### **NOTE:**

DIAL NUMBERS ON FRONT PANEL ARE FOR REFERENCE ONLY; THEY ARE NOT VALUES FOR WATER TEMPERATURE WITHIN THE UNIT.

### **WARNING:**

DO NOT LEAVE THE BATH UNATTENDED DURING THE SETTING PROCEDURE.

- A. Turn both the Temperature Control and High Temperature Limit thermostat knobs fully clockwise. The Temperature Control Pilot lamp should illuminate.
- B. When the bath temperature reaches the desired temperature, slowly turn the High Temperature Limit Thermostat counterclockwise and stop when the High Temperature Limit Pilot Lamp illuminates.
- C. Turn the High Temperature Limit Thermostat Knob clockwise to next highest reference number. The High temperature Limit light should go off. The High Temperature Limit thermostat is now set approximately 5° above the desired bath temperature.
- D. Turn the Temperature Control Thermostat counterclockwise until both pilot lamps are off.
- E. Turn the Temperature Control thermostat clockwise until the Temperature Control pilot lamp just lights. Allow the unit to stabilize, readjust/fine tune the Temperature Control thermostat as necessary.

## **6. MAINTENANCE**

### **WARNING:**

UNIT MUST BE DISCONNECTED FROM POWER SOURCE PRIOR TO SERVICING. IT IS RECOMMENDED THAT ALL SERVICE BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.

### **CAUTION:**

ELECTROLYSIS CAN DAMAGE STAINLESS STEEL. THIS CAN OCCUR IF AN OBJECT IS ALLOWED TO REST DIRECTLY ON THE SURFACE, TRAPPING MOISTURE THAT BECOMES OXYGEN STARVED BUT IS SURROUNDED BY WATER CONTAINING OXYGEN. THE RESULTING ELECTROLYTIC ACTION WILL PIT OR CORRODE THE STAINLESS STEEL.

### **Background**

Stainless steel is an alloy of steel with chromium and nickel which increase the metal's resistance to rust and corrosion. However, if not properly cared for it can rust and corrode. Exposure to air provides the passivations for clean stainless steel. This exposure produces a thin, durable chromium-oxide film that forms rapidly on the alloy surface and gives stainless steel its characteristic "stainless" quality. Exposure of the surface to water other oxidizing environments also produces this passivating film. However, if free oxygen is not available due to scale or contamination buildup, the metal surface may become vulnerable to attack.

Maintaining a neutral pH and frequent cleaning with detergent and water will give you years of trouble-free service for your water bath. The following are some guidelines to keep in mind.

### **Water**

Distilled water is recommended. Maintain pH between 7 and 9 to minimize corrosion of the stainless steel.

De-ionized or reverse-osmosis water may be used. However, if this water is very pure, it may be corrosive to stainless steel; **and in such cases always add 20-40 ppm (20 to 40 mg/liter) disodium phosphate or sodium bicarbonate. Adjust dosage to give a pH of 7 to 9. See "pH Control" below.**

If the above water is not available, clean, aerated soft tap water may be used, provided the total solids concentration is <500 ppm.

## pH Control

Be sure to check pH regularly. If pH is <6.0, add disodium phosphate to increase pH to a 7 to 9 value. Sodium carbonate or sodium bicarbonate may be used but tend to form scale which must be rinsed out regularly. If pH is >10.0 add sodium bisulfate to decrease pH to a 7 to 9 value. Avoid adding harsh alkalines or acids since they may cause localized corrosion and result in unstable pH.

## Anti-Fungal -- Anti-Bacterial Additives

These additives are permissible to use as long as the pH of the aqueous solution is kept within the range of 7 to 9. Some of these are available through your supply dealer. Be sure they are not harmful to stainless steel.

## Prevention of Scale Buildup

Additives commonly available for use in swimming pools and spas may be acceptable in circulating baths only. In static baths, these are generally not effective. This is why it is best to use distilled, deionized or RO water treated as described in "WATER" above. If scale buildup is detected (especially around immersion heaters), clean the bath and replace water as soon as practical.

## Other Water Additives

Proper maintenance of the stainless steel bath chamber will help assure many years of service.

It should be cleaned regularly with mild soapy water and rinsed with distilled water.

**IMPORTANT:** *If it is necessary to use the following chemicals, limit the exposure time to a maximum of four hours. Clean surfaces immediately after use by rinsing with distilled water.*

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

## NEVER USE THE FOLLOWING

Aqua Regia	Ferric Chloride	Iodine
Sodium Azide	Sulfuric Acid	

## 6.1 Cleaning

Spills of any chemical, especially those listed above should be removed as soon as possible and the stainless steel surface cleaned with mild soapy water followed by copious rinse with clean water. Do not use soap filled or metallic pads. Even stainless steel pads are to be avoided as they may destroy the passive film on the surface of the metal and create crevices that may harbor contamination. If stubborn stains persist, use a plastic light duty cleansing pad and rub gently in the direction of the metal grain. If stains continue to persist, use one of the following methods.

### WARNING:

*THE FOLLOWING CHEMICAL METHODS HAVE PROVEN SUCCESSFUL BUT EXTREME CARE MUST BE TAKEN WHEN HANDLING THESE MATERIALS. ALWAYS WORK IN AN AREA WITH ADEQUATE VENTILATION. USE THE PRECAUTIONS OUTLINED IN THE MATERIAL SAFETY DATA SHEET (MSDS) AND MANUFACTURER'S INSTRUCTIONS FOR THE PRODUCT YOU ARE WORKING WITH. FOLLOW THE PERSONAL PROTECTION INDEX FOUND IN THE HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS) SECTION OF THE MSDS.*

*THE USE AND DISPOSAL OF THESE CHEMICALS MAY BE REGULATED BY YOUR LOCAL MUNICIPALITY. CONSULT THE REGULATIONS BEFORE DISPOSING OF THESE MATERIALS.*

1. Bathroom tub and tile cleaners. Available at supermarkets.
2. Any of a variety of "scale removers" available at your local supermarket or hardware store. Generally sold for cleaning coffee makers, humidifiers and vaporizers.
3. Citric acid based cleaners. Contact your lab supply dealer.
4. A 15 to 35% phosphoric acid solution. Available from chemical supply dealers for scale and rust removal. Allow solution to soak the surface affected until rust and scale is loosened. Immediately rinse with copious amounts of clean water.



5. Oxalic Acid 2% to 5% in warm water. Swab solution on surface allowing it to remain until rust is loosened. Immediately flush with copious amounts of clean water.
6. A mixture of 20% nitric acid and 1.5% hydrofluoric acid (or hydrochloric acid). Swab solution on surface allowing it to remain until rust is loosened. Immediately flush with copious amounts of clean water.

The above are ranked in order of mild to strong cleaning agents. Items 5 and 6 should only be used if severe rust and scale stains have developed and cannot be removed by any other method. In any case the chemical should be allowed to do the cleaning with minimal scrubbing. **Always follow the manufacturer's instructions.**

## 6.2 Chamber Disinfecting

Materials known to be effective in disinfecting:

- \*Household Bleach
- \*Glutaraldehyde
- \*Alcohol

Consult with your staff chemist for advice on using these chemicals.

### **CAUTION:**

*ALWAYS RINSE WITH COPIOUS AMOUNTS OF CLEAN WATER. AIR DRY AND/OR FILL WITH FRESH WATER AND FOLLOW THE GUIDELINES IN "WATER" ABOVE.*

### **CAUTION**

*DO NOT USE OTHER CLEANING OR DECONTAMINATION METHODS WITHOUT FIRST CONTACTING TECHNICAL SERVICES.*

### **IMPORTANT**

*THE USER HAS THE RESPONSIBILITY FOR CARRYING OUT APPROPRIATE DECONTAMINATION IF HAZARDOUS MATERIAL IS SPILLED ON OR INSIDE THE BATH.*

### **DISCLAIMER:**

*The above information is the result of limited investigation and Thermo makes no claims as to the suitability to your particular application. These are intended to be **GUIDELINES ONLY**. Consult your staff chemist to determine what works best in your lab.*

## 7. SERVICE

### **WARNING:**

*UNIT MUST BE DISCONNECTED FROM POWER SOURCE PRIOR TO SERVICING. IT IS RECOMMENDED THAT ALL SERVICE BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.*

### **7.1 General Information**

To service the water bath, turn it on its side or top and remove the bottom plate and insulation. To prevent scratching of the enameled surface, place protective material (such as cardboard, cloth, or newspaper) under unit.

### **7.2 Heater Element Replacement**

- A. Put the power switch in the "OFF" position and disconnect power to the bath.
- B. Turn bath upside down and remove bottom plate & fiberglass insulation
- C. Disconnect the two leads from heater element.
- D. Remove the two hex nuts that fasten the heater element to the pan and remove element.
- E. Remove FiberFax insulation from the old element and insert it into the new element.
- F. Fasten the new heater element to the pan and connect the two leads.

### **CAUTION**

*BE SURE THE WIRE LEADS DO NOT TOUCH THE HEATER ELEMENT.*

- G. Replace insulation and install bottom plate.

### **NOTE:**

*USE NO THERMAL COMPOUNDS OR PASTE ON HEATER.*

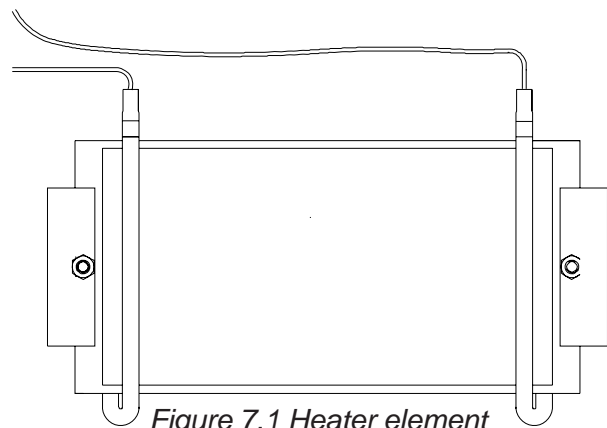


Figure 7.1 Heater element



### 7.3.1 Thermostat Replacement

Use the following thermostat replacement procedure when the sensing bulb is located WITHIN the bathpan. Some models only have externally mounted sensing bulbs on the underside of the pan, if this is the case follow procedure 7.3.2.

**CAUTION:**

*CARE MUST BE EXERCISED WHEN HANDLING THE THERMOSTAT CAPILLARY, SINCE A SHARP BEND WILL CRIMP OFF THE FLOW OF THE HYDRAULIC OPERATING MEDIUM. TO AVOID TWISTING THE CAPILLARY OR DAMAGING O-RING, HOLD THE FITTING UNDER THE BATH STATIONARY, AND FIRMLY TIGHTEN LOCKNUT INSIDE BATH CHAMBER. DO NOT **OVER-TIGHTEN**, AS O-RING COULD BE SQUEEZED OUT OF POSITION, CAUSING BATH TO LEAK. **UNDERTIGHTENING** WILL ALSO CAUSE THE BATH TO LEAK.*

- A. Put switch in "OFF" position and disconnect power to bath.
- B. Remove shelf and drain bath.
- C. Remove thermostat control knob by loosening two set screws on knob.
- D. Place bath on its side and remove bottom plate and insulation to gain access to thermostat fitting.
- E. Remove two screws fastening thermostat to control panel.
- F. Remove wires from thermostat terminals. Mark location of wire leads.
- G. Hold the fitting under the bath stationary, unscrew locknut inside bath chamber, and remove from capillary.
- H. Feed thermostat capillary out through hole in bottom of chamber.
- I. Replace O-ring on bottom side of chamber with new Viton O-ring.
- J. Complete installation by reversing above procedure. Be certain all wiring is away from heater. Insulation must be replaced between heater and bottom plate to prevent possible wire shorting.

### 7.3.2 Thermostat Replacement

Use the following procedure when the sensing bulb is located UNDER the pan.

- A. Put the power in the "OFF" position and disconnect power to the bath.
- B. Turn bath upside down and remove bottom plate and fiberglass insulation.
- C. Mark the location of the wire leads on the thermostat and disconnect.
- D. Remove thermostat control knob by loosening two set screws on knob.
- E. Remove two screws fastening thermostat to control panel.
- F. Loosen the two hex nuts holding thermostat bulb bracket and pull the thermostat and bulb out from behind the control panel.
- G. Mount the new thermostat by reversing steps A through G.

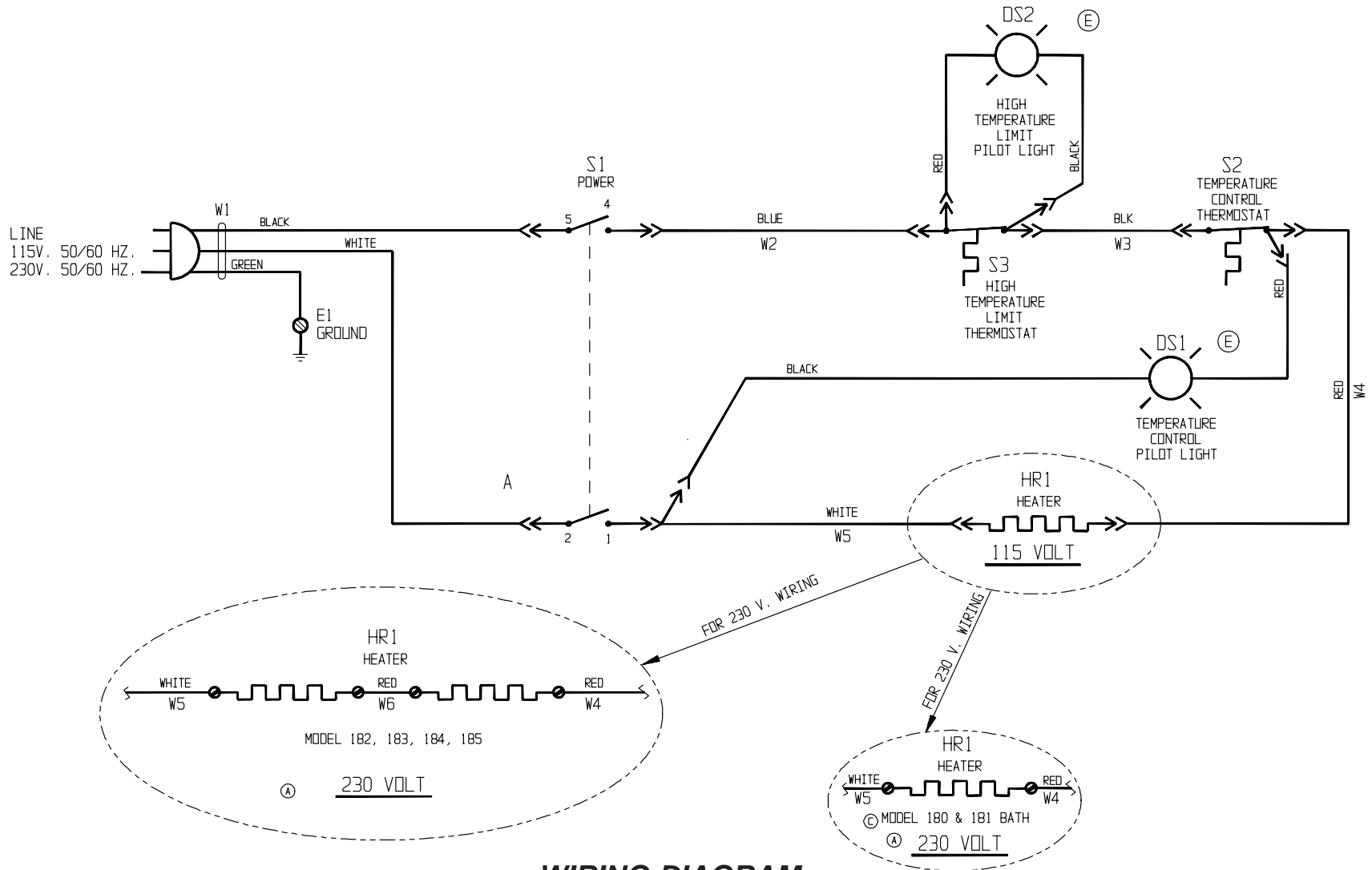
**CAUTION:**

*MAKE SURE THE WIRE LEADS DO NOT TOUCH THE HEATER ELEMENT.*

## 8. REPLACEMENT PARTS

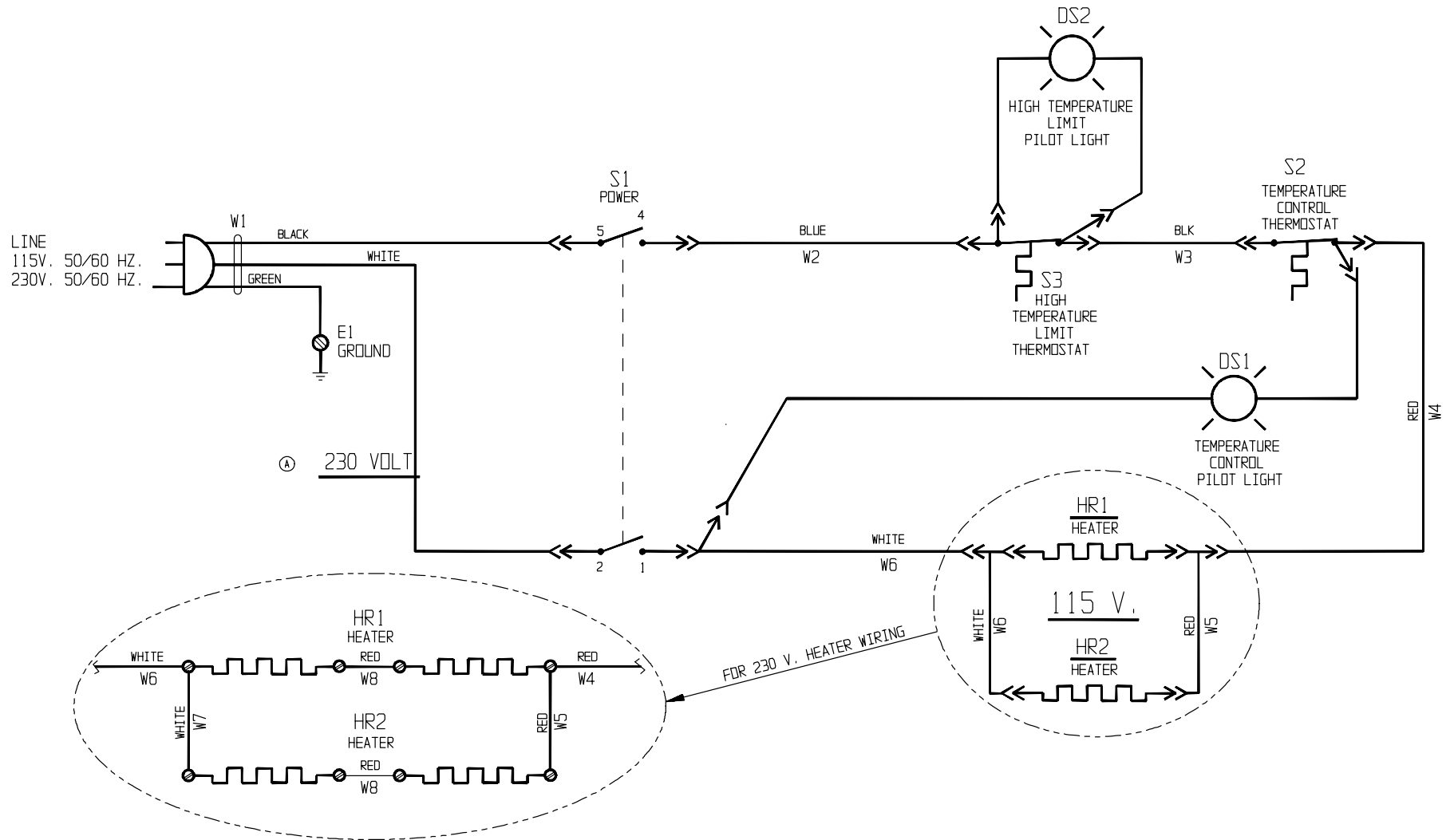
Item #	Symbol Wiring Diagram	Description	Part No.
1	DS1/DS2	Pilot Light Assembly-Amber (120 VAC) Pilot Light Assembly-Amber (240 VAC)	3177575 3173907
2	S1	DPST Switch - Amber (115 & 230 VAC)	3175318
3	S2/S3	Thermostat (120/240 VAC) under pan Thermostat (120/240 VAC) in pan	3167150 3166977
4	HR1/HR2	Heater - Model 2823 (120 VAC) Heater - Model 2824 (240 VAC) Heater - Model 2827 (120 VAC) Heater - Model 2828 (240 VAC) Heater - Model 2831 (120 VAC) Heater - Model 2832 (240 VAC) Heater - Model 2835 (120 VAC) Heater - Model 2836 (240 VAC) Heater - Model 2839 (120 VAC) Heater - Model 2840 (240 VAC) Heater - Model 2843 (120 VAC) Heater - Model 2844 (240 VAC) Heater - Model 2847 (120 VAC) qty 2 Heater - Model 2848 (240 VAC) qty 2	3175493 3175487 3175493 3175487 3175494 3175476 3175495 3175477 3175496 3175478 3175496 3175478 3175496 3175478
5	n/a	Heater Model 2851 equal pans 120V (qty 2) Heater Model 2852 equal pans 220V (qty 2)	3175495 3175477
6	n/a	Thermometer - Model 2823/2824 Thermometer - All Other Models	3175997 3175998
7	n/a	O-Ring, Thermometer	3175049
8	n/a	Knob, Thermostat	3174903
9	n/a	Bracket, Heater Retaining (2/Heater)	3164465
10	n/a	Cord and plug (120 VAC) Cord and plug (240 VAC)	3178034 3176551
11	n/a	Mains Fuse Model 2824 Mains Fuse Model 2828 Mains Fuse Model 2832 Mains Fuse Model 2836 Mains Fuse Model 2840 Mains Fuse Model 2844 Mains Fuse Model 2848 Mains Fuse Model 2852 (Dual)	3172453 3172453 3172461 3172461 3172442 3172442 3172449 3172454



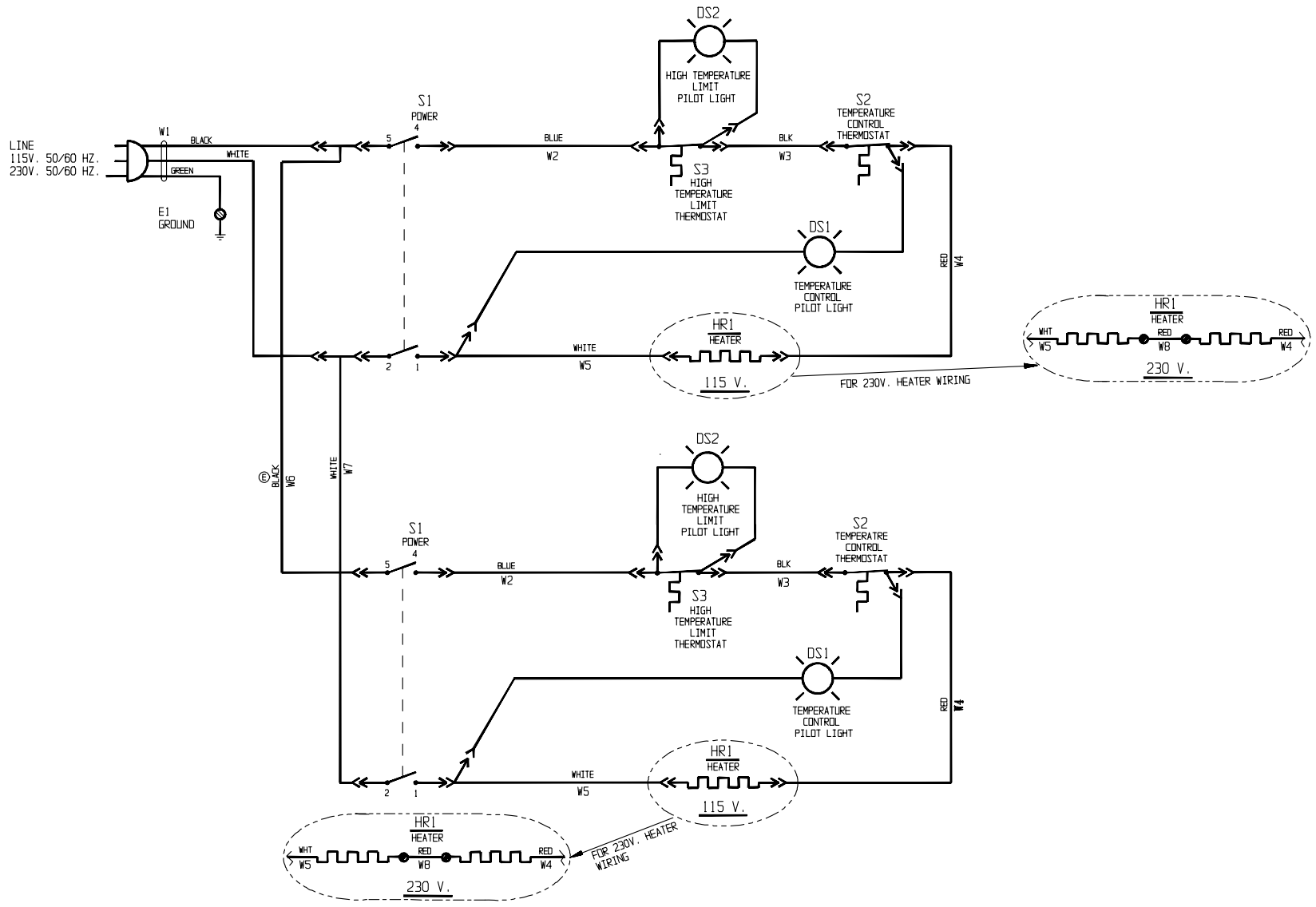


11

**WIRING DIAGRAM  
MODELS 2823 - 2844**



**WIRING DIAGRAM  
MODEL 2847/2848**



**WIRING DIAGRAM  
MODEL 2851/2852**



## **THERMO FISHER SCIENTIFIC STANDARD PRODUCT WARRANTY**

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

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

Replacement or repair of components parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any components or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo Electron Corporation 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 and Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service and special application. Outside the USA, contact your local distributor for warranty information.



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## **THERMO FISHER SCIENTIFIC INTERNATIONAL DEALER WARRANTY**

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

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

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

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