# General Purpose Aquabaths™

Operating Manual and Parts List 057-836-00 Rev. 0

**Thermo**
SCIENTIFIC

| Models covered in this manual | | | | |
|---|---|---|---|---|
| **Catalog Number (Model)** | **Catalog Number (Model)** | **Shallow Pan (see Uniformity Specs)** | **Voltage** | **Size** |
| **DIGITAL CONTROL** | **ANALOG CONTROL** | | | |
| 18022AQ (2347) | 18020AQ (2246) | X | 120V | 2L |
| 18052AQ (2349) | 18050AQ (2248) | | 120V | 2L |
| 18002AQ (2343) | 18000AQ (2242) | | 120V | 5L |
| 18007AQ (2345) | 18005AQ (2244) | | 120V | 10L |
| 18802AQ (2354) | 18800AQ (2253) | | 120V | 5/10L |
| 18102AQ (2351) | 18100AQ (2251) | | 120V | 20L |
| 18902AQ (2358) | 18900AQ (2261) | | 120V | 28L |
| 18022A-1CEQ (2346) | 18020A-1CEQ (2245) | X | 240V | 2L |
| 18052A-1CEQ (2348) | 18050A-1CEQ (2247) | | 240V | 2L |
| 18002A-1CEQ (2342) | 18000A-1CEQ (2241) | | 240V | 5L |
| 18007A-1CEQ (2344) | 18005A-1CEQ (2243) | | 240V | 10L |
| 18802A-1CEQ (2353) | 18800A-1CEQ (2252) | | 240V | 5/10L |
| 18102A-1CEQ (2350) | 18100A-1CEQ (2250) | | 240V | 20L |
| 18902A-1CEQ (2357) | 18900A-1CEQ (2254) | | 240V | 28L |

**MANUAL NUMBER 057-836-00 (7002241)**

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|---|---|---|---|---|
| **REV** | **ECR/ECN** | **DATE** | **DESCRIPTION** | **By** |

**CAUTION**
**Contains Parts and Assemblies**
**Susceptible to Damage by**
**Electrostatic Discharge (ESD)**

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

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

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Important operating and/or maintenance instructions. Read the accompanying text carefully.

Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.

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

Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.

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✔   Always use the proper protective equipment (clothing, gloves, goggles, etc.)

✔   Always dissipate extreme cold or heat and wear protective clothing.

✔   Always follow good hygiene practices.

✔   Each individual is responsible for his or her own safety.

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When more extensive service is necessary, we will assist you with direct factory trained technicians or a qualified service organization for on-the-spot repair. If your service need is covered by the warranty, we will arrange for the unit to be repaired at our expense and to your satisfaction.

Regardless of your needs, our professional telephone technicians are available to assist you Monday through Friday from 8:00 a.m. to 6:00 p.m. Eastern Time. Please contact us by telephone or fax. If you wish to write, our mailing address is:

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# Table of Contents

# Section 1 Introduction

Thank you for selecting Thermo Scientific instruments for your equipment needs. The Water baths offer the versatility needed to handle virtually any clinical laboratory procedure – incubation, inactivation, agglutination, as well as most serological, pharmaceutical, biomedical and industrial procedures.

These water baths are available with chamber capacities of 2, 5, 10, 20 and 28 liters. The 2-liter unit is available configured with either a standard or shallow chamber. Also, a dual chamber unit is available with 5 and 10 liter chambers, with independent controls for each. All units are available to operate from either 120 or 230 volts.

## Digital Baths

The baths work equally well with water or bath oil as the medium. All models offer the same temperature ranges: ambient to 60°C without the supplied cover, and ambient to 100°C with the cover in place (within physical limitations).

## Analog Baths

The baths work equally well with water or bath oil as the medium. Most models offer the same temperature ranges: ambient to 75°C without the supplied cover, and ambient to 100°C with the cover in place. The temperature range for 18020AQ and 18020A-1CEQ extends from ambient to 85°C without the cover, while the range for 18050AQ is from ambient to 70°C.

## Digital Control

The baths are microprocessor controlled for precise temperatures and reliable, trouble-free operation. Dual thermostats – one controlling the setpoint temperature and the other operating as a safety – virtually eliminate the possibility of overheating. Although not designed to operate dry, the bath will not be damaged if it is allowed to run dry.

# Analog Control

A hydraulic thermostat for reliable, trouble-free operation controls bath temperatures. Dual thermostats – one controlling the setpoint temperature and the other operating as a temperature limiting - reduce the possibility of overheating; although not designed to operate dry.

# Product Overview

An energy-saving removable cover helps to reduce evaporation while helping to maintain a uniform, constant temperature. The cover also allows the water bath to reach higher temperatures. The hinged, see-through gable cover features unique "fins" that keep hands away from hot vapors for easier, safer opening. The cover stays open at the 90° position or, because of its quick-attach hinge, can be lifted off completely to accommodate large glassware.

A plastic rim remains cool to the touch even when operating the bath at maximum temperature.

The unit features a power-on self-test of vital circuitry. This test will automatically be performed each time you turn on the unit. If problems are detected, the system will indicate a warning message on the display.

The calibration of the water bath can be adjusted to optimize its accuracy for the temperature that is used most often in your application. This can be accomplished through a simple procedure accessed from the front panel.

As a convenience, a drain pump is supplied with 10, 20, 28 and dual 5/10 liter models.

All controls are conveniently located on the front panel for easy access. To assure setpoint security, entering a specific set menu first can only change the temperature. This ensures that the setpoint cannot be accidentally altered during extended or unattended operation.

To allow you to change the configuration of some units, and to permit easy servicing, your water bath provides front service access to the controller without having to empty the bath. The water bath features corrosion resistant construction throughout to withstand the rigors of daily lab use.

# Section 2 Safety Information

These instructions contain important operating and safety information. The user must carefully read and understand these instructions before using the water bath. Your unit has been designed to optimize function, reliability, safety and ease of use. It is the user's responsibility to install the bath in conformance with local electrical codes.

## Warnings

To avoid electrical shock, always:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity. Check the nameplate on the back of the unit for voltage and current rating.

2. Disconnect from the power supply prior to maintenance and servicing.

**Note** 230V units are double pole, neutral fusing. ▲

## To Avoid Personal Injury

1. Do not remove or modify the grounded power plug. Use only properly grounded outlets to avoid a shock hazard. This unit is not rated for use in hazardous atmospheres.

2. (ANALOG) Do not continue to use the bath if the Temperature Control fails (amber indicator cycling on and off) or if the Limit Control fails (amber indicator will not light even if Limit Control is turned fully counterclockwise.)

3. (DIGITAL) Do not continue to operate the bath if the temperature control fails (displays an "E" code or controls erratically) or the backup control fails (red safety light glows continuously when turned completely clockwise or fails to light when turned completely counterclockwise.)

## To Avoid Personal Injury (continued)

4. Select a fluid that is not corrosive and is not flammable. The following fluids are not recommended and may damage the unit:

   • Chlorides or bleach

   • Strong concentration of any acid

   • Strong concentrations of any salt

   • Weak concentrations of hydrochloric acid, hydrofluoric acid, hydrobromic acid, hydroiodic acid, sulfuric acid or chromic acid

   • Weak salt solutions containing sodium chloride, calcium chloride, chromate or chromium compounds

   • High purity water (deionized water, >1M ohm resistivity)

   • Most photographic solutions

5. Do not use flammable liquid. A fire hazard may result. THIS UNIT IS NOT EXPLOSION PROOF. Unit contains components that may ignite such materials.

6. Use appropriate hand and eye protection when handling hazardous chemicals.

7. The interior of the unit can reach temperatures that can cause burns. Avoid contact. The unit can remain hot without visual indication for some time after power is turned off.

8. If you will use the water bath with any liquid that will give off fumes, be sure to operate the water bath in a fume hood or with proper ventilation.

9. Use the cover to reduce evaporation and to permit reaching higher temperatures.

10. Hot liquids pose a burn hazard. Be careful not to reach into the bath when it contains hot liquids. Also be careful of steam rising from hot liquids.

11. The unit is intended to be operated WITH LIQUID in the chamber. However, it will not be damaged if it TEMPORARILY runs dry unless ignited by melting samples/plastic in the bath.

# To Avoid Personal Injury (continued)

12. Do not use in highly corrosive atmospheres: corrosive fumes and spillage may damage the unit and its internal components, creating a shock hazard.

13. Fumes from acidic solutions cause corrosion of the stainless steel reservoir. Care should be taken to maintain a neutral pH at all times.

14. Refer servicing to qualified personnel.

15. Do not place containers directly on bottom of chamber. Bottom can get extremely hot if no liquid is in the chamber. Always use the diffuser tray.

16. Safety thermostat must be set above temperature setpoint. Safety light ON indicates heater is OFF. USE DISTILLED WATER ONLY.

# Section 3 Specifications

## Electrical Requirements

| Digital Water Baths | |
|---|---|
| **Catalog Number** | **Voltage** |
| 18002AQ | 120V 50/60 Hz |
| 18002A-1CEQ | 230V 50/60 Hz |
| 18007AQ | 120V 50/60 Hz |
| 18007A-1CEQ | 230V 50/60 Hz |
| 18022AQ | 120V 50/50 Hz |
| 18022A-1CEQ | 230V 50/60 Hz |
| 18052AQ | 120V 50/60 Hz |
| 18052A-1CEQ | 230V 50/60 Hz |
| 18102AQ | 120V 50/60 Hz |
| 18102A-1CEQ | 230V 50/60 Hz |
| 18802AQ | 120V 50/60 Hz |
| 18802A-1CEQ | 230V 50/60 Hz |
| 18902AQ | 120V 50/60 |
| 18902A-1CEQ | 230V 50/60 |

| Basic Water Baths | |
|---|---|
| **Catalog Number** | **Voltage** |
| 18000AQ | 120V 50/60 Hz |
| 18000A-1CEQ | 230V 50/60 Hz |
| 18005AQ | 120V 50/60 Hz |
| 18005A-1CEQ | 230V 50/60 Hz |
| 18020AQ | 120V 50/60 Hz |
| 18020A-1CEQ | 230V 50/60 Hz |
| 18050AQ | 120V 50/60 Hz |
| 18050A-1CEQ | 230V 50/60 Hz |
| 18100AQ | 120V 50/60 Hz |
| 18100A-1CEQ | 230V 50/60 Hz |
| 18800AQ | 120V 50/60 Hz |
| 18800A-1CEQ | 230V 50/60 Hz |
| 18900AQ | 120V 50/60 Hz |
| 18900A-1CEQ | 230V 50/60 Hz |

*These are nominal specifications. Thermo Scientific reserves the right to change specifications or designs at any time without incurring obligation.*

### Digital Models

Power requirements: . . . . 120VAC or 230 VAC, ±10%, 50 or 60 Hz

Ambient conditions: . . .+4°C to +35°C, up to 75% relative humidity

Temperature range: . . . . Cover open: Ambient to 60°C; Cover closed: Ambient to 100°C

Control: . . . . . .±0.1°C between ambient and 100°C

Uniformity: . . . . . . . . . . . . . . . . . .±0.24°C at 37°C

. . . . . . . . . . . . . .±0.5°C @ 37°C (Shallow Pan)

Stability: . . . . . . . . . . . . . . . . . . . . .±0.5°C at 37°C

*Max Altitude: . . . . . . . . . . . . . . . . . . . . . . .2000m

*Over Voltage Category II (IEC 664)

*Pollution Degree 2 (EC 664)

### Analog Models

Power requirements: . . . .120VAC or 230VAC, ±10%, 50 or 60 Hz

Ambient conditions . . . . .+4°C to +35°C, up to 75% relative humidity

Temperature range: . . . . Cover open: Ambient to 75°C, Cover closed: Ambient to 100°C

Temperature range:

Model 18050AQ . . . .Cover open: Ambient to 85°C

Model 18020AQ . . .Cover open: Ambient to 70° C

Uniformity: . . . . . . . . . . . . . . . . . . . .±0.2°C at 37°C

0.5°C at 37°C for Shallow Pan Units Only

Stability: . . . . . . . . . . . . . . . . . . . . .±0.2°C at 37°C

*Max Altitude: 2000m

*Over Voltage Category II (IEC 664)

*Pollution Degree 2 (IEC 664)

*

*CE Products meet the relevant EC harmonized standards for safety (IEC1010-1/EN61010 and EMC (EN55014, EN55104, EN61000-4-2, -4-4, -4-6, -4-11 and ENV50140*

*Applies to 230V units only

**Table 3-1.** Tank Capacity and Dimensions - Digital and Analog Water Baths (applies to both 120V and 230V units)

| Model | Type | Capacity - Gals (liters) | Interior Dimensions W x L x D | Exterior Dimensions W x L x D |
|---|---|---|---|---|
| 18022AQ, 18022A-CEQ | Digital | 0.5 (2) Single Chamber, Shallow | 11.75 x 5.88 x 2.5 (30 x 15 x 6) | 14.5 x 10.5 x 7.63 (36 x 27 x 19) |
| 18020AQ, 18020A-1CEQ | Analog | 0.5 (2) Single Chamber, Shallow | 11.75 x 5.88 x 2.5 (30 x 15 x 6) | 14.5 x 10.5 x 7.63 (36 x 27 x 19) |
| 18052AQ, 18052A-1CEQ | Digital | 0.5 (2) Single Chamber | 5.88 x 5.25 x 6 (15 x 13 x 15) | 10.75 x 9.88 x 7.6 (27 x 25 x 19) |
| 18050AQ, 18050A-1CEQ | Analog | 0.5 (2) Single Chamber | 5.88 x 5.25 x 6 (15 x 13 x 15) | 10.75 x 9.88 x 7.6 (27 x 25 x 19) |
| 18002AQ, 18002A-1CEQ | Digital | 1.38 (5) Single Chamber | 11.75 x 5.88 x 6 (30 x 15 x 15) | 14.5 x 10.5 x 7.6 (37 x 27 x 19) |
| 18000AQ, 18000A-1CEQ | Analog | 1.38 (5) Single Chamber | 11.75 x 5.88 x 6 (30 x 15 x 15) | 14.5 x 10.5 x 7.6 (37 x 27 x 19) |
| 18007AQ, 18007A-1CEQ | Digital | 2.63 (10) Single Chamber | 11.75 x 12.88 x 6 (30 x 33 x 15) | 15.38 x 16.38 x 8.88 (39 x 42 x 23) |
| 18005AQ, 18005A-1CEQ | Analog | 2.63 (10) Single Chamber | 11.75 x 12.88 x 6 (30 x 33 x 15) | 15.38 x 16.38 x 8.88 (39 x 42 x 23) |
| 18802AQ, 18002A-1CEQ | Digital | 1.38 (5) Single Chamber | 5.88 x 11.75 x 6 (15 x 30 x 15) | 24.38 x 16.38 x 8.88 (62 x 42 x 23) |
| 18800AQ, 18800A-1CEQ (Sm. bath, Lg. bath) | Analog | 1.38 (5) and 2.63 (10) Dual Chamber | Sm. 5.88 x 11.75 x 6 (15 x 30 x 15) Lg. 12.88 x 11.75 x 6 (33 x 30 x 15) | 24.38 x 16.38 x 8.88 (62 x 42 x 23) |
| 18102AQ, 18102A-1CEQ | Digital | 5.25 (20) Single Chamber | 19.75 x 11.75 x 6 (50 x 30 x 15) | 24.38 x 16.38 x 8.88 (62 x 42 x 23) |
| 18100AQ, 18100A-1CEQ | Analog | 5.25 (20) Single Chamber | 19.75 x 11.75 x 6 (50 x 30 x 15) | 24.38 x 16.38 x 8.88 (62 x 42 x 23) |
| 18902AQ, 18902A-1CEQ | Digital | 7.38 (28) Single Chamber | 19.75 x 11.75 x 8 (50 x 30 x 20) | 24.38 x 16.38 x 10.88 (62 x 42 x 28) |
| 18900AQ, 18900A-1CEQ | Analog | 7.38 (28) Single Chamber | 19.75 x 11.75 x 8 (50 x 30 x 20) | 24.38 x 16.38 x 10.88 (62 x 42 x 28) |

# Section 4 **Unpacking and Installation**

The water bath is shipped in a single carton. When unpacking the unit, check each loose item against the list below. Should a shortage exist, notify Thermo Scientific.

If there is shipping damage, keep the entire shipment intact retaining the carton and all packing material and file a claim with the final carrier. Usually the firm will send an investigator to ascertain liability.

## Unpacking

Use the list below when unpacking to verify that the complete unit has been received. Do not discard packing materials until all is accounted for.

The following items are included in the shipment:

| Item | Qty. |
| --- | --- |
| Water Bath | 1 |
| Cover Assembly | 1 |
| Diffuser Tray | 1 |
| Thermometer Clip and Grommet | 1 |
| Siphon Pump (10, 20, 28 and dual 5/10 only) | 1 |
| Instruction Manual | 1 |
| Warranty Card | 1 |
| Thermometer | 1** |
| (120V units only, not included with 230V units) | |

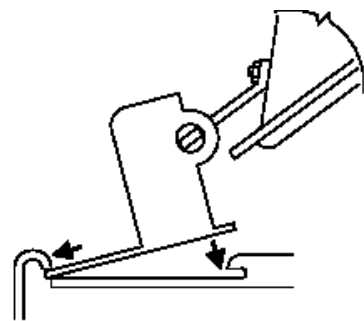*\*\* analog water baths*

# Section 5 Operation

Follow these steps to assemble and install the water bath before operation.

1. The location must:

   - Be indoors.

   - Provide an adequate source of power. Check the label on the back of the unit for voltage and current requirements.

   - Provide adequate clearance to insert samples.

   - Be level, fixed and capable of supporting the weight of the unit when filled with liquid and samples.

   - Be free of drafts and wide ambient temperature variations such as near a heater or air conditioning vents.

   - Provide a fume hood if hazardous fumes are anticipated when using the water bath.

   - Be convenient to a sink for filling and draining the water bath.

2. Install the cover by inserting the hinge into the lip at the rear of the bath. Angle the cover up while pushing down to lock the hinge in place under the stainless steel tank lip. Remove the cover by lifting the lid and pushing the hinge towards the back to release it from under the tank lip. Covers on the 2-liter shallow, 5-liter, and 10-liter model baths can also be installed and removed by sliding the hinge into place under the rim and tank lips from either side.

**Figure 5-1.** Installing Cover

3. Connect the line cord to a suitable grounded electrical outlet.

# Repositioning Control Panel (Digital Units)

With 20 and 28-liter units, the control panel can be positioned on the side or the front of the unit in order to achieve the best use of available bench space. To change the position of the control panel, follow these steps:

**Note** This procedure applies to 20 and 28-liter units only. ▲

1.  Turn off the unit and disconnect from power source.

2.  Allow to cool.

3.  Remove thermometer and clip. Remove the cover.

4.  Assuming that the water bath is empty, turn it over on a protected surface.

5.  Remove two screws retaining the control panel and two screws retaining the blank panel.

**Note** Do not disconnect internal wiring or sensors from control panel. ▲

6.  Remove the blank panel.

7.  Carefully move the control panel to the new location and reinstall.

8.  Install the blank panel at the other location.

9.  Return unit to location of use.

10. Reconnect power, turn on and test unit.

# Filling the Unit

Follow these steps to fill the unit in preparation for use:

1.  Fill the water bath with distilled water or oil so that the liquid level is approximately 1½ inches (¾ inch with 2 liter shallow model) from the top of the tank when full-anticipated load is placed in bath.

**Note** If the bath has been used previously, the tank should be thoroughly cleaned before refilling. ▲

# Filling the Unit (continued)

For best operation of the equipment, fill the unit with sterilized distilled water or equivalent. The acceptable resistivity range is 50K to 1M ohms (conductivity 1 to 20 micro Siemens).

2.  If a thermometer is used, use the clip provided to hold the thermometer to the side of the bath. Slide the O-ring on the thermometer to position the thermometer to the proper depth.

3.  When closing the cover, place the thermometer along the front edge. A notch along the front of the cover clears the thermometer and clip with the cover closed.

4.  For optimum results, the same fluid level should be maintained throughout the operating period.

5.  If using water, algicide may be added to reduce algae formation. Follow the instruction supplied with the algicide.

**Caution** Using chlorinated tap water or additives that contain chlorine will void the manufacturer warranty. Similarly, high purity (deionized) water outside the resistivity range of 50K to 1M ohm will void the manufacturer warranty. Contact Technical Support with any questions. ▲

**Note** The water bath, full of water (within 1-1.5" of top of tank), with lid, is designed to reach 37°C in less than 60 minutes, or 90°C in less than 180 minutes. ▲

# Controls and Indicators (Digital)

All controls and indicators are located on the front panel for ease of operation.
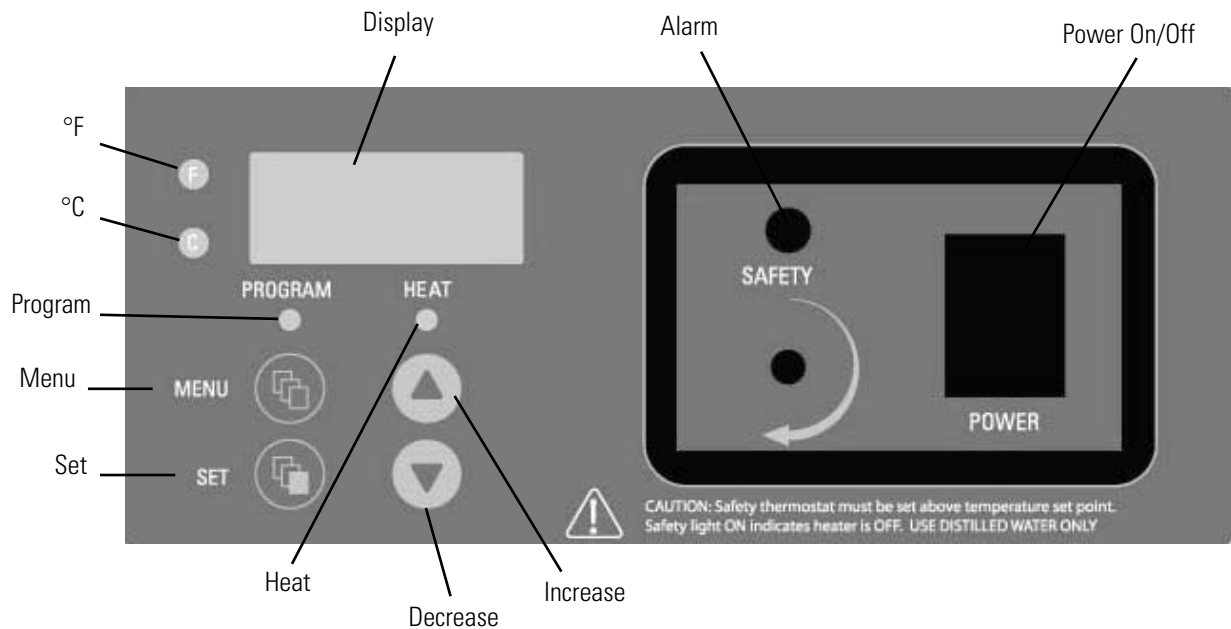


**Figure 5-1.** Control Panel Components

**Power On/Off**

Controls line power to unit. Set to I position to turn on power, O position to turn off power.

**°F or °C**

Shows whether temperature is being displayed in Fahrenheit or Centigrade.

**Display**

During standby shows actual temperature; during setups, shows menu modes and values being selected.

**Alarm**

Lights to show that the backup controller is regulating the temperature rather than the primary controller.

**Program**

Lights to show that unit is in program mode rather than run mode; see menu below.

**Heat**

Lights to show when heat is being supplied to the chamber; cycles on and off as heat is requested by the controller.

# Controls & Indicators (Digital) (cont.)

Menu

Allows you to select the mode of operation. Each time the Menu button is pressed, the mode changes in this sequence:

- Select temperature units in °F or °C (display shows _C_F).

- Calibrate the unit (display shows CAL).

- Display the actual temperature of the chamber (normal mode of operation).

- The unit will return to normal operation, displaying the actual temperature, if you do not touch any control for a few seconds.

Set

When in the normal mode of operation, allows the temperature setpoint to be changed. When in the _C_F mode, allows the temperature units displayed to be changed. When in the Calibration mode, allows the temperature offset to be set, to calibrate the unit.

Increase (^)

After entering other than normal mode, increases the displayed value.

Decrease (v)

After entering other than normal mode, decreases the displayed value.

# Safety Controller

Sets the limit temperature above to the primary setpoint; should be set at a higher temperature than the setpoint to provide safety control in the event that the primary control fails.

**Note** The safety control is not as accurate a control as the digital. ▲

Follow these procedures for the operation of the unit, including:

DIGITAL

- Power up and initial indications.
- Setting the temperature units in °F or °C.
- Setting the temperature setpoint.
- Setting the backup temperature.
- Calibrating the unit.
- Emptying and cleaning the unit.

## Safety Controller (continued)

ANALOG

- Power up and initial indications
- Setting the temperature control
- Setting the limit control.
- Emptying and cleaning the unit.

## Power Up

Follow these steps to turn on the unit to prepare it for use:

1. Set the power switch to the ON position. The unit will go through a power-on self test that will take several seconds. During this time the display will show the unit's capacity in liters.

2. When the unit has completed its self-test it will maintain the bath at the last setpoint temperature. The Heat indicator will light when the unit is applying heat to the bath. This indicator will cycle on and off during normal operation.

3. When the display shows normal operation after completing the self-test, continue by setting the temperature setpoint and backup temperature.

4. If the display shows any message after completing the self-test, do not use the unit. Refer to the Troubleshooting section to determine what is causing the message to appear on the display.

## Setting Temperature Units to °F or °C

Note which indicator is lit to the left of the display, either F for Fahrenheit or C for Centigrade. If the desired indicator is lit, omit this procedure. To change the temperature units, follow this procedure:

1. Press Menu button so display shows _C _F. Press and hold the Set while simultaneously pressing the Increase (^) or Decrease (v) button until the display shows the desired temperature units, C for Centigrade or F for Fahrenheit.

2. Release all controls. Within a few seconds, the display will return to normal operation. The desired indicator (F or C) should be lit to the left of the display.

# Setting the Temperature Setpoint

Follow these steps to set the controller so that it maintains the desired temperature.

1.  Turn safety controller knob fully clockwise.

2.  Press and hold the Set button to see the current setpoint. The program indicator lights show that this is the setpoint. If this setpoint is correct, there is no need to change the setting. The display will return to normal operation when the Set button is released, displaying the actual temperature.

3.  To change the setpoint, press and hold the Set button while simultaneously pressing the Increase (^) or Decrease (v) button. The display shows the temperature setpoint as you change it. Release the Set button when you have achieved the desired setting. The display will return to normal operation within a few seconds, displaying the actual temperature.

4.  To check the setpoint without affecting normal operation, press the Set button at any time. To change the setpoint, repeat Step 3.

5.  Set the Safety Temperature according to the procedure below.

# Setting the Safety Temperature

Follow these steps to set the Safety Temperature controller. See Figure 5-1.

1.  Set the temperature setpoint 2 to 5° higher than desired temperature. Wait until bath temperature stabilizes as shown by displayed actual temperature.

2.  Turn backup controller knob counterclockwise until Alarm light just comes on. Turn the knob clockwise slightly until the light goes off.

3.  Set the digital setpoint 5° higher and verify the safety is controlling 2 to 5° above desired setpoint.

4.  Set the temperature control down to desired temperature, allow the temperature to drift down, and verify the alarm light does not come on. If the light does come on, go back to Step 1, setting the safety higher.

**Note** If Alarm Light comes on during normal cycling, turn backup controller knob slightly clockwise and monitor (if backup and digital controls overlap, the bath will have a wider temperature control band). ▲

**Caution** Safety thermostat must be set above temperature setpoint. Safety light ON indicates heater is OFF. USE DISTILLED WATER ONLY. ▲

# Calibrating the Unit

To check the accuracy of the unit, clip a certified thermometer (not supplied with water bath, but available from Thermo Scientific) to the side of the bath as described in the installation instructions. After allowing sufficient time for the temperature to stabilize, compare the thermometer reading to the actual temperature displayed on the unit.

If the displayed temperature does not agree with the thermometer, the controller can be calibrated as follows:

1. Note the difference between the displayed temperature and the thermometer. For example: if the displayed temperature is 37 and the thermometer read 36, the difference is -1, meaning that the display should read 1 lower than it now shows.

2. Press Menu button until display shows CAL.

3. Press and hold the Set button while simultaneously pressing the Increase (^) or Decrease (v) button to set the desired temperature offset. Release the set button when you have achieved the desired setting. The display will return to normal operation within a few seconds, displaying the actual temperature. In the example above, you would set the display to -1.

**Note** The temperature offset can be set up to a range of 5.5°C or 10.0°F. ▲

# Controls and Indicators (Analog)

All controls and indicators are located on the front panel for ease of operation.
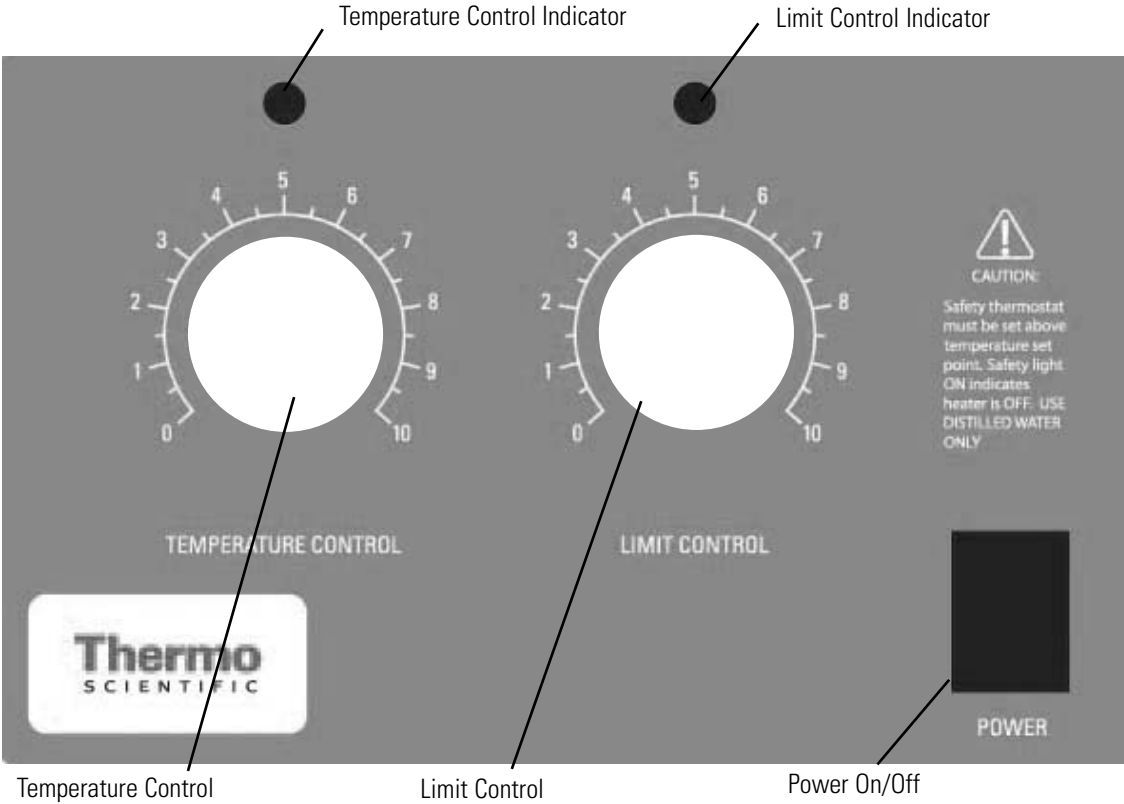


**Figure 5-2.** Analog Control Panel Components

**Power On/Off**

Controls line power to unit. Set to I position to turn on power, O position to turn off power.

**Temperature Control**

Serves as the primary temperature control for the bath. Turns the heater on or off to maintain the bath at the set temperature.

**Limit Control**

Sets the backup temperature to the primary setpoint: should be set at a slightly higher temperature than Temperature Control setpoint to give safety control in the event that the primary control fails.

**Temperature Control Indicator**

The green indicator lights to show when heat is being supplied to the chamber; cycles on and off as heat is requested by the controller.

**Limit Control Indicator**

The amber indicator lights to show that the Limit Control is regulating the temperature rather than the primary Temperature Control.

## Operation

Follow these procedures for the operation of the unit, including:

- Power up and initial indications.

- Setting the temperature control

- Setting the limit control.

- Emptying and cleaning the unit.

## Power Up

Follow these steps to turn on the unit to prepare it for use:

1. With the unit connected to an appropriate power source, set the power switch to the ON position.

2. The green indicator will light when the unit is applying heat to the bath. This indicator will cycle on and off during normal operation.

## Setting the Temperature Control

Follow these steps to set the Temperature Control so that it maintains the desired temperature:

1. Turn Limit Control knob fully clockwise.

2. Turn the Temperature Control to a setting which approximates the desired temperature. Measure the bath temperature with the supplied thermometer or other temperature measuring device. Allow the bath temperature to stabilize, then re-adjust the control knob as necessary to achieve the proper temperature.

3. Set the Limit Control according to the procedure below.

# Setting the Limit Control

Proper setting of the Limit Control is important. The Limit Control must be set far enough above the control temperature such that it does not operate unless the Temperature Control malfunctions. Wide temperature swings are an indication that the two controls are set too close.

There are two methods that can be used to set the Limit Control. Follow the steps in either Procedure 1 or Procedure 2 to set the bath's Limit Control.

## Procedure 1

1. After the bath has stabilized at the desired setpoint temperature, note the cycling of the heater as indicated by the green lamp.

2. Note the length of time that the green lamp is lit. Depending upon setpoint and ambient temperature, the lamp will cycle on for a few seconds and then off for a period of time.

3. While the green lamp is lit, rotate the Limit Control knob counterclockwise until the amber limit lamp lights (the green lamp will turn off), then quickly clockwise again until the amber lamp turns off (the green lamp will come back on).

4. Observe a few cycles of the green lamp. If the yellow lamp lights, turn the Limit Control knob clockwise until the unit cycles without the yellow lamp lighting.

## Procedure 2

1. Using the Temperature Control setting instruction above, set the water bath 1 to 5° above desired control temperature.

2. Wait until the bath temperature stabilizes.

3. Turn the Limit Control knob counterclockwise and listen for the click of the control. Turn the knob clockwise slowly and listen for click. Repeat this step as necessary, each adjustment being less than the last one.

4. Once the narrow band is established in Step 3, turn the Temperature Control up to call for a higher temperature (heater on, green lamp on). The amber lamp will turn on when the limit opens turning off the heater. Note: The amber limit lamp has no power to light when the temperature control is not calling for heat (green lamp off). The green lamp goes off when the amber lamp is on.

5. Without adjusting the Limit Control, set the Temperature Control to the desired temperature below the limit control.

6. Check that the amber lamp does not light during the control mode. If it does, the Limit Control is set too close to the Temperature Control. Start back at step 1 to reset the Limit Control.

# Emptying and Cleaning the Unit

**Please be advised that stainless steel can and will rust if not regularly cleaned and properly maintained.** It is recommended that the bath be cleaned at least on a monthly basis for moderate to heavy-use installations. Follow these steps to empty and clean the unit after using it.

1.  Turn off power, unplug the unit, and allow to cool completely.

2.  With a water bath of 2 or 5 liter capacity, pour the liquid from the unit into an appropriate disposal container.

3.  With a larger size water bath, allow the unit to cool and use a pump or siphon to empty the unit into an appropriate disposal container.

4.  Remove the diffuser tray from the bottom of bath chamber. (**Note:** *While cleaning the chamber, be careful not to bend the temperature control capillary tube which is located along the bottom of the bath chamber.*)

5.  Clean the inside of the water bath with mild detergent (such as Joy dishwashing detergent) and warm water. Do not scrub any surface with steel wool. (Steel wool leaves small metal particles behind that will rust, causing the pan to look rusty). In instances where a heavy coating of residue has accumulated inside the tank or where there is evidence that corrosion is beginning, the use of a stainless steel cleaner (such as 3M Stainless Steel Cleaner and Polish) is recommended.

6.  Rinse and wipe all tank surfaces with distilled water. The bath is now ready for use.

# Section 6 **Troubleshooting**

**Digital Controlled Units**

If you have problems using the unit, follow these general procedures to determine the cause from the symptoms you are experiencing. If an error message appears on the display, refer to the specific error in this chart.

If the problem is not resolved using the table below, contact Technical Services.

| Symptom | Possible Causes of Problem |
|---|---|
| No power indication | Unit not plugged in: no power at the outlet: incorrect power (make sure outlet matches label on back of unit): defective power cord, defective power switch or fuse(s): call Technical Services. |
| No heating | Setpoint or backup not set properly: defective heater or controller: call Technical Services. |
| Always heating: temperature greater than setpoint | Defective controller (call Technical Services) |
| Very slow heating of samples | Empty tank or extremely low liquid level in tank (add liquid to the tank to improve heating) |
| Unit heating up slower than normal | Defective controller (call Technical Services) |
| Alarm light on constantly | Setpoint or backup not set properly: defective primary controller (call Technical Services) |
| Display not correct | Temperature F or C set in error: temperature not calibrated (perform calibration procedure with thermometer): defective controller (call Technical Services) |
| Erratic operation | Broken internal electrical connection; defective heater or controller (call Technical Services) |
| Error message: E1 | Failure of temperature sensor or controller (call Technical Services) |
| Error message: E2 | Failure of controller (call Technical Services) |
| Display shows LLLL at power up | Wrong voltage, controller not set up properly (call Technical Services) |

### Analog Controlled Units

| Symptom | Possible Causes of Problem |
| --- | --- |
| No power indication | Unit not plugged in: no power at the outlet: incorrect power (make sure outlet matches label on back of unit): defective power cord, defective power switch or fuse(s): call Technical Services. |
| No heating | Temperature or Limit Control not set properly: defective heater or control: check settings. |
| Always heating: temperature greater than setpoint | Check settings: defective Temperature Control (call Technical Services). |
| Very slow heating of samples | Empty tank or extremely low liquid level in tank (add liquid to the tank to improve heating) |
| Unit heating up slower than normal | Defective temperature controller (call Technical Services) |
| Amber Limit Control Indicator on constantly | Temperature or Limit Control not set properly: defective Temperature Control, check setting |

# Section 7 **Schematics**
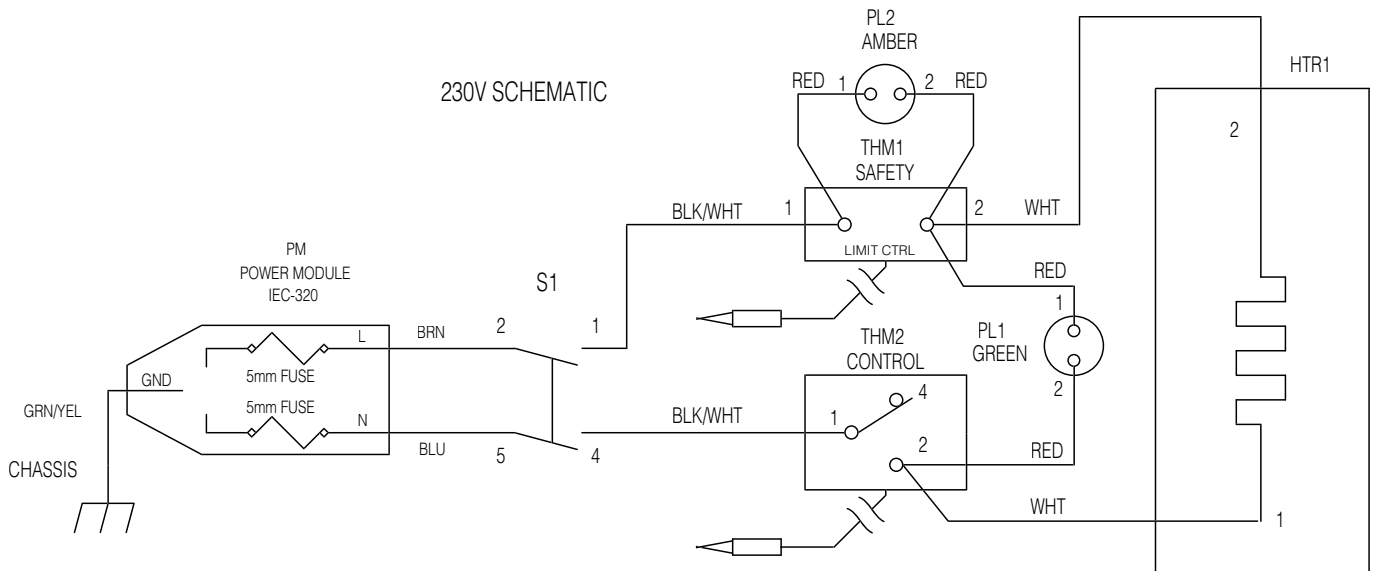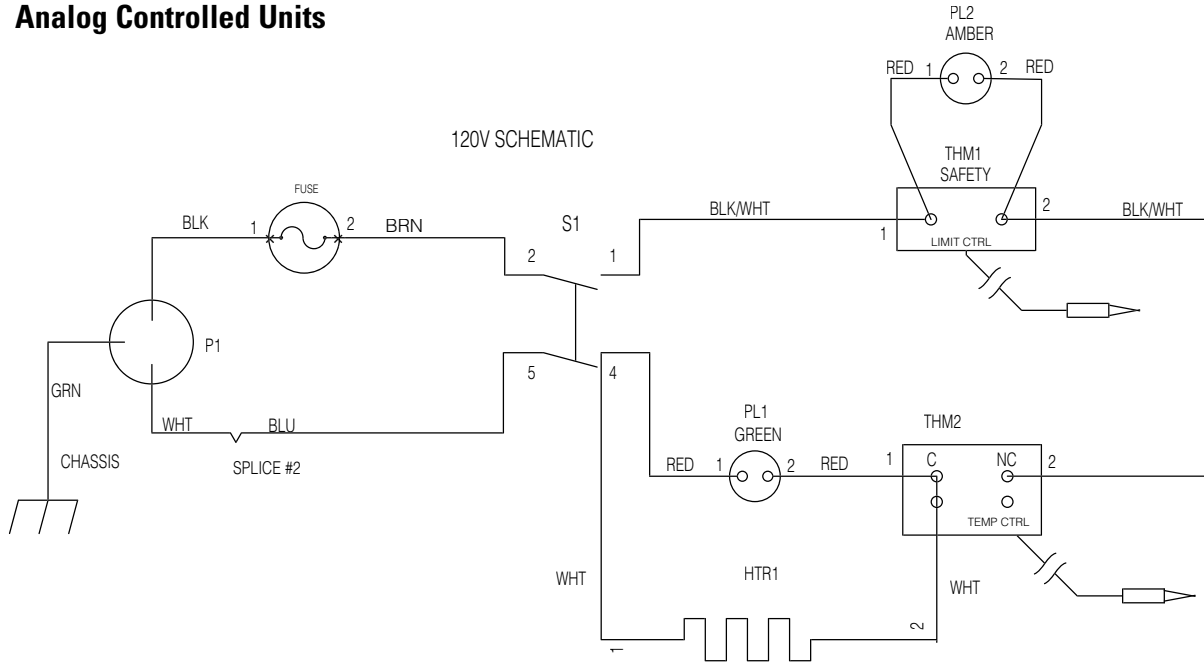
**Digital Controlled Units**
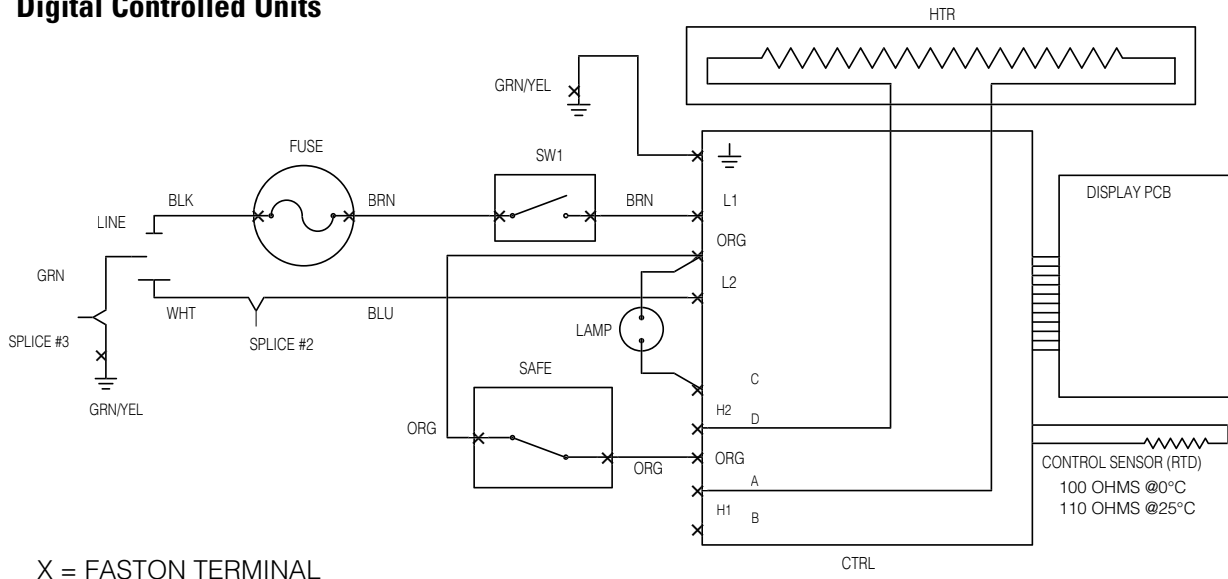


X = FASTON TERMINAL

120VAC SCHEMATIC
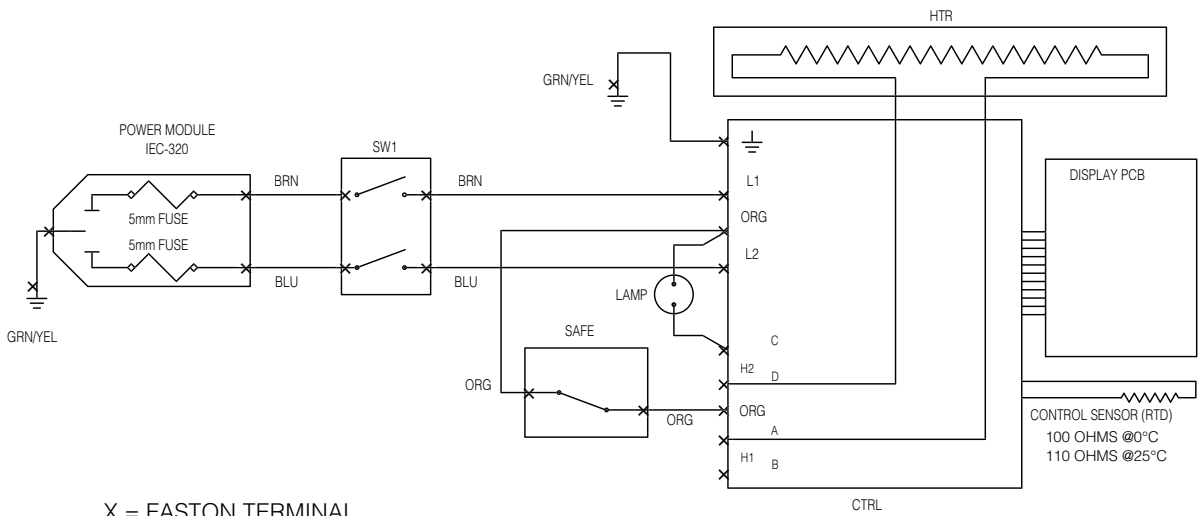


X = FASTON TERMINAL

230VAC SCHEMATIC

## Analog Controlled Units

### 120V SCHEMATIC



### 230V SCHEMATIC

# Section 8 Replacement Parts

| Description | Part Number |
|---|---|
| Cover, 2 Liter Stainless Steel Lid | 19000-11Q |
| Cover, 2 Liter Shallow and 5 Liter Plastic | 107649 |
| Cover, 2 Liter Shallow and 5 Liter Stainless Steel Lid | 19000-13Q |
| Cover, 2 Liter Plastic Lid | 107648 |
| Cover, 10 Liter Plastic Lid | 107650 |
| Cover, 10 Liter Stainless Steel Lid | 19000-15Q |
| Cover, 20 & 28 Liter Plastic Lid | 107651 |
| Cover, 20 & 28 Liter Stainless Steel Lid | 19000-17Q |
| Hinge, Lid (2 Liter) | 102383 |
| Hinge, Rim (2 Liter) | 102384 |
| Hinge, Lid (All Except 2 Liter) | 102386 |
| Hinge, Rim (28L and Dual Models) | 102387 |
| Hinge, Rim (10 & 20 Liter) | 102459 |
| Hinge, Rim (2 Liter Shallow & 5 Liter) | Hgmx1 |
| Clip, Thermometer (2L Shallow) | 102423 |
| Clip, Thermometer (All Except 2 LS) | 102424 |
| Pump, Siphon | 102391 |
| Temperature Control (120V/230V) (Analog) Pc Board | 103394 (120V), 103521 (230V) |
| Limit Control (Analog) | 102499 |
| Power Switch (Analog) | 102627 |
| Controller PC Board (120V) Digital | 102419 |
| Controller PC Board (230V) Digital | 104068 |
| Display PC Board Digital | 102420 |
| Sensor, RTD Digital | 102331 |
| Diffuser Tray, 2 Liter (Analog) | 103410 |
| Diffuser Tray, 2 L Shallow or 5 Liter (Analog) | 103462 |
| Diffuser Tray, 2 Liter (Digital) | 102352 |
| Diffuser Tray, 2 L Shallow or 5 Liter (Digital) | 102353 |
| Diffuser Tray, 10 Liter | 102354 |
| Diffuser Tray, 20 or 28 Liter | 102355 |
| Fuse, Type 3AG 1.25 X .25, 10 AM | 45920 |
| Fuse, 5 X 20mm, F5A 250V | 102487 |

**Note** The stainless steel water bath cover was designed as an alternate to the see through plastic (polycarbonate) cover. No material is impervious to attack by all chemicals. The stainless lids are made of a good quality 304 stainless steel that is the same as the tank. Clean with mild soap and water. Rinse with distilled water. ▲

**Warning** To avoid electrical shock, always disconnect from power supply before maintenance and servicing. Refer servicing to qualified personnel. ▲

## Ordering Procedure

Refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the Thermo Scientific dealer from whom you purchased this unit, or can be obtained promptly from the factory. When service or replacement parts are needed, check first with your dealer. If the dealer cannot process your request, then contact our Technical Services Department.

Prior to returning any materials to Thermo Scientific, please contact our Technical Services Department for a "Return Goods Authorization" number (RGA). Material Returned without an RGA number will be returned.

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**Thermo Fisher**
S C I E N T I F I C