SHEL LAB

SSI10 SSI10-2
SSI10R SSI10R-2

Orbital Shaking Incubator
Operational Manual

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User Manual 4861628

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These units are TUV CUE listed as orbital shaking incubators for professional, industrial, or educational use where the preparation or testing of materials is done at approximately atmospheric pressure and no flammable, volatile, or combustible materials are being heated.

These units have been tested to the following requirements:

CAN/CSA C22.2 No. 61010-1:2012
CAN/CSA C22.2 No. 61010-2-010 + R:2009
UL 61010-1:2004 + R:2005-07 + R:2008-10
UL 61010A-2-010:2002
UL 61010-1:2012
EN 61010-1:2010
EN 61010-2-010:2003

Using the Unit Safely

Introduction

Thank you for choosing a SHEL LAB shaking orbital incubator. SHEL LAB sets the standard for quality and reliability. Your unit is backed by over 30 years of design and manufacturing excellence in the scientific, research, and medical equipment industries.

Your unit is a general-purpose incubator designed for professional, industrial or educational use where

- the preparation or testing of materials is done at approximately atmospheric pressure, and
- no flammable, volatile or combustible materials are being heated.

These units are not intended for use at hazardous or household locations.

Before you use the unit, read this entire manual carefully to understand how to install, operate, and maintain the unit in a safe manner. Your satisfaction with the unit will be maximized as you read about its safety and operational features. Keep this manual on-hand so it can be used by all operators of the unit. Be sure all operators of the unit are given appropriate training before you put the unit in service.

Use the unit only in the way described in this manual. Failure to follow the guidelines and instructions in this manual may be dangerous and/or illegal.

General Safety Considerations

Your incubator and its recommended accessories have been designed and tested to meet strict safety requirements.

For continued safe operation of your incubator, always follow basic safety precautions including:

- Read this entire manual before using the incubator.
- Be sure you follow any city, county, or other ordinances in your area regarding the use of this unit.
- Use only approved accessories. Do not modify system components. Any alterations or modifications to your incubator may be dangerous and will void your warranty.
- Always plug the unit's power cord into a grounded electrical outlet that conforms to national and local electrical codes. If the unit is not grounded, parts such as knobs and controls may conduct electricity and cause serious injury. Do not connect the unit to a power source of any other voltage or frequency beyond the range stated on the power rating overlay at the rear of the unit.
- Do not modify the power cord provided with the unit. If the plug does not fit an outlet, have a proper outlet installed by a qualified electrician.
- Avoid damaging the power cord. Do not bend it excessively, step on it or place heavy objects on it. A damaged cord can easily become a shock or fire hazard. Never use a power cord after it has become damaged.

Precautions for Your Unit

Observe the following additional safety guidelines for your unit.

- **Operating Conditions** For optimum performance use your incubator at room temperatures between 18 and 25**°**C, at no greater than 80% relative humidity. If you intend to operate the unit in conditions outside of these limits, contact customer service.
- **Installing the Unit** Installation of the unit can be performed by the end user
- **Lifting and Handling** The incubator is very heavy and should be moved by a lifting device, such as pallet jack. If you must lift the device by hand, always observe the following guidelines:
  - Do not move the incubator while it is plugged into the power source.
  - Remove all moving parts, such as shelves and trays, before you move the unit. Make sure the door is securely shut.
  - Use at least four people to lift the incubator.
  - Lift the unit from its bottom surface only.
  - Do not use doors, handles or knobs to lift or stabilize the unit.
  - Keep the unit from tipping.
- **Servicing Your Unit** Only qualified personnel should service your unit. Faulty service may be dangerous and will invalidate the unit's warranty. Do not operate the unit if any parts are damaged or missing.
- **Maintenance** Unplug the unit from its power source before attempting any maintenance.

Meanings of Symbols

In this manual and on labels attached to the product, graphic symbols have the following meanings. Not all symbols are on all models:

Symbol	Indcation
	You should consult this manual for a description or discussion of a control or item
	Temperature
	Over Temperature Safety
°C	Degrees Centigrade
	AC Power
	Manual Adjustable Components
	Oscillator
	Timer
	Light
	Indicates "**Unit should be recycled"** (Not disposed of in land-fill)

About this Manual

Throughout this manual, the words WARNING and CAUTION have the following meanings:

WARNING

If not avoided, a potentially hazardous situation could result in serious injury or death.

CAUTION

If not avoided, a potentially hazardous situation could result in minor or moderate injury or damage to the equipment.

Features of Your Unit

Product description

Your shaking orbital incubator provides:

- **A Controlled environment** for continuous growth of biological organisms.
- **Vibration-free operation.** A unique adjustable counterbalance system provides vibration-free operation regardless of load.
- **Large chamber.** A large nine cubic foot chamber facilitates throughput.
- **Refrigeration.** TheSI9R units are refrigerated to support insect cell culture and entomology studies.
- **Load Flexibility.** Our unique counterbalance system is adjustable to accommodate off-center loads and varying capacities, which in turn allows smoother running.
- **Oxygen transfer.** Inter-changeable orbit hubs are available to provide adjustment for maximum oxygen transfer. Various circular/stroke sizes, from vigorous to gentle, are available to accommodate different types of cells.
- **Sample protection.** All major functions—temperature, RPM, and time—have audio and visual alarms that immediately alert the operator to deviations from set parameters.
- **Over-temperature protection** is provided by an independent safety thermostat, separate from the main temperature controller. Guards your samples from inadvertent overheating.

Key Features

- A brushless DC motor offers quiet and maintenance-free orbital shaking motion.
- A PID microprocessor controller provides precise stability and uniformity.
- The rotation platform included with each unit is self-centering for easy installation.
- Large easy to read LED displays.
- Digital keypad operation allows calibration of the main temperature controller to a reference thermometer.
- A one-inch hermetically sealed, double-paned glass viewing window.
- Unit exteriors are formed of cold-rolled steel finished with corrosion resistant powder coat paint.
- Chamber interiors and shelves are made of polished stainless steel, which provides excellent durability and an easy-to-clean surface.
- An interlock switch stops the shaking mechanism when the door is opened.
- TheSI9R units refrigeration uses a 1/6-horsepower motorized compressor that does not use CFCs or HCFC's.

Receiving Your Unit

Unpacking and Inspecting Your Unit

Before leaving our factory, all units are packaged in high quality shipping materials designed to provide protection from transportation related damage.

Once a unit leaves our factory however, safe delivery becomes the responsibility of the carrier who is liable for loss or damage to your unit. **Damage sustained during transit is not covered under your unit warranty.**

Upon receiving your unit, inspect the exterior and interior for any concealed loss or damage. If you find any damage, follow the carrier's procedure for damage or loss claims.

Inspection Guidelines

- Carefully inspect the package for damage. If the package is damaged, report the damage to the carrier service that delivered the unit.
- If the carton is not damaged, open and remove its contents. Verify that all of the following equipment is included with the unit:
  - **1 sample tray**
  - **5 counterweights (installed)**
  - **16 extra weights**
  - **4 leveling feet**
  - **User's manual**
- Carefully check all packaging before discarding.

Save the shipping crate until you have successfully installed the unit and verified its operation. If you need to return your unit for any reason, see "Getting Your Unit Serviced" on page 22.

Recording Data Plate Information

Once you have determined the unit is free from damage, locate the data plate at the back of the unit. The data plate indicates your unit's model number and serial number. Record this information in the space provided on page 22, "Getting Your Unit Serviced" for easy future reference.

Installing the Unit

CAUTION

THIS INCUBATOR IS VERY HEAVY. DO NOT PERFORM THESE INSTALLATION ADJUSTMENTS WITHOUT PROPER EQUIPMENT OR ADEQUATE ASSISTANCE.

Installation Overview

To install your unit, you need to:

1. Select a suitable operating location for the unit.
2. Level the unit.
3. Sterilize the unit.
4. Install the sample tray.
5. Plug the unit into a power source.

Selecting a Location for the Unit

The operating location of your unit has a significant impact on your unit's performance and how often it must be cleaned and disinfected. Use the following guidelines to select the best location for your unit.

CAUTION

DO NOT MOUNT YOUR UNIT TO A FLAMMABLE SURFACE.

- **Operating Conditions** For optimum performance, use your incubator at room temperatures between 18 and 25**°**C (65 to 77 **°**F) and at no greater than 80% relative humidity.

  If you intend to operate the unit in conditions outside of these limits, contact your customer service representative.

- **Exposure.** Avoid exposing the unit to the following:

  - Direct sun
  - High air movement, such as air vents, heating and cooling ducts, doors and other heavy traffic areas.
  - Extreme heat from steam radiators, stoves, ovens, autoclaves, or other sources of heat.

- **Level Surface.** The unit must be located on a solid, flat and level surface strong enough to support its total weight.

- **Space requirements** Allow a minimum of 20 cm (8 in.) between the rear and sides of the unit, and any walls or partitions that can obstruct free airflow. **Do not block access to the power cord, circuit breaker or fuses.**

- **Cleanliness.** Good laboratory quality control practice is the most efficient and reliable way to keep your unit free from contamination.

  If it is important that the interior of your unit remain sterile, always pay attention to the following guidelines:

  - Keep the air in the laboratory as clean as possible.
  - Keep the floor around the unit clean.
  - If the unit must be placed at floor level, use a sturdy platform. (See Option Accessory List Page 23)
  - Minimize the number of times access is made to the chamber during normal operation. Each time the door is opened; room air is drawn in and can lead to contamination of the unit.

After deciding on the location for your unit, follow the installation instructions below.

Leveling the Unit

The unit must sit level from side to side and from front to back. While the unit does not have to be absolutely level, each of the four feet should be in firm contact with the surface on which the incubator is to be run.

Install the four leveling feet in the four holes in the bottom of the unit. When the feet are installed, you can raise or lower a corner of the unit by turning its foot clockwise or counterclockwise, respectively.

In the case of stacked units, the adjustable feet in the top unit are replaced by stacking pins. These pins will mate and self align with the stacking pin receivers on the top of the bottom unit. These pins are leveled by adjustment in a similar fashion as the leveling feet.

To level the incubator

1. Insert a leveling foot into each of the four holes at the bottom of the unit.
2. Adjust the foot at each corner until the unit stands level and solid without rocking.

If you move the incubator to a different location, be sure to re-level the incubator at the new location.

Sterilizing Your Unit

The interior of your incubator was cleaned at the factory but is not sterile. For information on sterilizing your unit, see “Disinfecting Your Unit“ on page 15.

Installing Sample Tray

Your unit comes with a sample tray as standard equipment.

To install the sample tray

1. Make sure the latches are in the unlatched or UP position.
2. Enclose all corners of the shaking mechanism within the lips of the sample tray. This can be done easily by positioning the front two corners and then setting the rest of the tray down.
3. Shake the tray by its handles to confirm that it is firmly in place.
4. Secure the latches by moving them into the DOWN position.

Plugging the Unit into a Power Source

We recommend that you plug your incubator into a circuit separate from other equipment. This prevents damage or destruction of the incubator caused by overloading or failure of other equipment on the same circuit.

The electrical supply circuit to the incubator must conform to all national and local electrical codes. The voltage supplied to your unit should not vary from the data plate rating by more than 10%.

⚠ WARNING

For your own safety, do not plug the unit into a power source until you have read and understood the safety and operational instructions in this manual.

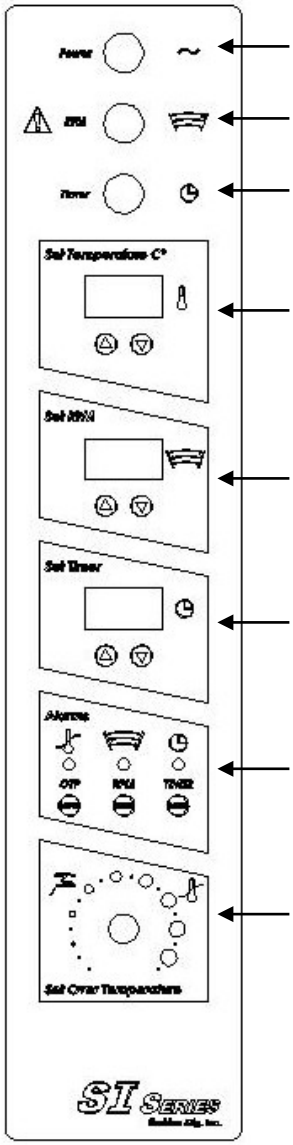
To connect the unit to a power source

1. Be sure the plug and the cord are in good condition. If the power cord is worn, cut or damaged in any way, do not use it. Contact customer service for a replacement power cord. For information on contacting customer service, see page 22.
2. Plug the service cord firmly into a grounded electrical outlet. If the plug does not fit the outlet, have a proper outlet installed by a qualified electrician.

Operating the Unit

Control Panel Overview

Before turning the incubator on for the first time, take a moment to familiarize yourself with its controls and features. Following is an overview of the control panel.



1. Power Switch
   - Controls all power to the unit. The switch is lit by a green light when the power is on.
2. RPM Switch
   - Activates and deactivates the shaker platform.
3. Timer Switch
   - Activates and deactivates the timer.
4. Main temperature control
   - Displays current chamber temperature.
   - Controls temperature set point and calibration.
5. Shaker Speed (RPM) Control
   - Displays shaker platform speed.
   - Controls the rotational speed (RPM) of the shaker mechanism.
6. Oscillation timer
   - Permits timed shaking at a preset RPM.
7. Alarms
   - Error status lights and an audible alarm immed0iately alert you to deviations of temperature, RPM, or time.
8. Over Temperature Protection
   - Provides backup protection for the main temperature control.
   - Keeps the chamber temperature from inadvertently rising above the set point.

Getting the Unit Ready for Use

⚠ WARNING

This equipment is NOT intended for the processing of Flammable materials.

Use the following guidelines to prepare the unit for regular use. The guidelines illustrate how to use all the features of your incubator. Your laboratory protocol will determine your actual use of these features.

1. Turn the unit on.
   See below, "Turning the Unit On".
2. Set the chamber to the desired temperature and wait for the chamber temperature to stabilize.
   See "Setting the Chamber Temperature" on page 11.
3. Calibrate the main temperature control.

At any time, use the following features when appropriate.

- Turn the shaking mechanism on and adjust the speed of the shaking mechanism.
  See on page 12.
- Set the Over Temperature Protection (OTP) to guard your samples from inadvertent over-heating. See on page 13.
- To account for the weight of different sample loads, you will need to adjust the number of counterweights being used. See on page 13.

Turning the Unit On

The unit is equipped with an On/OFF switch that controls power to the entire unit. The switch is lit by a green light when the power is on.

To turn the unit on

1. Be sure the unit is plugged in.
2. Push the Power switch to the On (I) position.
3. When you turn the unit on for the first time, use a screwdriver or coin to turn the Safety Temp knob fully clockwise to its maximum position. This deactivates the Over-Temperature Protection (OTP) feature. For more information on the OTP, see on page 13.

Setting the Chamber Temperature

You raise or lower the temperature in the chamber using the main temperature controller, which consists of a digital display and UP and DOWN arrow pads marked Set Temp.

To set the chamber temperature

- To set temperature, press and release either the up or down key. After approximately 5 seconds, "SP" will be displayed followed by the current temperature set point. While the set point is displayed, alternately press the up and down arrow buttons until your new set point is displayed (If you hold an arrow key, the display will scroll through the temperature settings).
- Approximately 5 seconds after making an adjustment, the display will return to the current process temperature. This indicates the control has recorded the new set point.

After setting the temperature, wait at least 1 hour for the chamber to stabilize. To achieve maximum temperature stability, wait 24 hours before you begin using the unit.

Calibrating the Main Temperature Control

Calibrating your unit ensures that the temperature inside the incubator matches the temperature reading of a certified reference thermometer.

We recommend that you initially calibrate your unit once it has been installed in its working environment. For maximum accuracy, all calibration adjustments should only be performed after the unit has reached and has been stable at set point for several hours.

Your calibration point should be at or as close as possible to your process temperature set point. To maximize your results, calibrate the unit each time you operate it at a new temperature.

Use only a Certified (NIST) temperature-measuring device to calibrate your unit.

To verify that your unit needs calibration

1. Be sure the temperature within the chamber has been stable at set point for twenty-four (24) hours.
2. The best calibration results are achieved when the certified reference thermometer is placed as close as possible to your process samples. Insure that the thermometer is not touching any shelving.
3. Allow the reference thermometer and chamber to stabilize until the thermometer displays a constant value for one (1) hour.
4. Compare the incubator and reference thermometer temperature readings.

If they match, your incubator is calibrated for that set point. No further adjustments are necessary. If they do not match, proceed to the next section.

To calibrate your unit

1. Simultaneously press and hold the Set Temp Up and Down arrow keys. After approximately 5 seconds, the temperature reading will display “CP”. Release the Up and Down arrow keys.
2. While the display is blinking, alternately press the Up and Down arrow keys to select the temperature that matches your reference thermometer (If you hold an arrow key, the display will scroll through the temperature settings). Approximately 5 seconds after making an adjustment, the display will stop blinking. This indicates the control has recorded the new temperature reading and has returned to normal operation.
3. For best results, verify the calibration after the unit has remained on for 24 hours and its temperature has varied by no more than + 0.1 °C.

Setting the Shaker Speed

Your unit is equipped with a shaker mechanism that provides maximum oxygenation of your samples.

You control the shaking mechanism using the shaker function controls. These consist of an RPM on/off switch and a digital display (1 RPM resolution) with up/down arrow pads. This display is marked “Set RPM”.

To turn the shaking mechanism on

1. Be sure the door is completely closed.
2. Push the RPM switch to the On (I) position.
   The shaker mechanism will start and stabilize at the last stored set point. If the door is opened or the RPM switch is set to OFF (O), the mechanism will decelerate and stop.

To adjust the shaker speed (RPM)

1. Press either the Up or Down arrow key once. The display starts to blink from bright to dim and shows the RPM set point.
2. While the display is blinking, alternately press the Up and Down arrow keys to select the desired RPM set point.

   The incubator will store the displayed set point 5 seconds after you release the arrow pads. The display will stop blinking and the present RPM will be displayed.

   If either the Power or RPM switches are turned off (O), the controller remembers the last RPM value stored.

Using the Timer

Using the incubator’s timer, you can run the shaker platform at a preset RPM for a preset time. The timer can be set to a maximum of 999 minutes (16 hours 39 minutes) in intervals of one (1) minute.

Upon completion of the timing cycle, the TIMER alarm LIGHT will turn ON and an alarm will sound, and the shaker mechanism will come to a stop.

You can interrupt the timer if you need to access the shaking platform before the timer completes.

To start a timed shaking process

1. Turn the TIMER switch to the ON (I) position.

2. Press either the UP or DOWN arrow keys once. The display will start blinking off and on while showing the current set time. Alternately press the UP and DOWN arrow key to set the desired time.

   The incubator will store the displayed set point 5 seconds after you release the arrow pads. The display will stop blinking and the present Timer setting will be displayed. The timer will begin counting down to zero.

To interrupt a timed shaking process

- Turn the TIMER switch and the RPM switch to the OFF (O) position.

Note: turning off the timer switch will cause the timer to pause while allowing the shaker to continue running. Turning off the RPM switch by itself will cause the timer to continue counting down while the shaker is stopped.

⚠ CAUTION

Wait for the mechanism to come to a complete stop before entering the chamber.

To restart an interrupted timed shaking process

- Turn the RPM and TIMER switch to the ON (I) position.

Over Temperature Protection, OTP and Safety Temperature Alarms

The Safety Temperature Alarm is a visual and audible alarm indicator. This feature will not disturb the user's heating or cooling process. Its parameters are preset in software and will activate if the process temperature remains 1° or more below the user's set point for more than 15 minutes. Alternatively, the Safety Temperature Alarm will activate immediately if the process temperature exceeds the user's set point by more than 1°. Either activation will illuminate the Temperature light and sound an audible alarm. This audible alarm can be muted by pressing and releasing the MUTE button directly below or adjacent to the Temperature light.

This unit is also equipped with Over Temperature Protection, OTP circuitry. This circuitry is user adjustable and set to an operating point above the process set point, following the instructions below. This circuitry will over ride the main temperature controller and assume control in the event the process temperature exceeds the user's OTP set point.

Setting the Over Temperature Protection, OTP

You can prevent the chamber temperature from inadvertent over-heating by using the unit's Over-Temperature Protection (OTP), which consists of:

- A thermostat which is independent of the main temperature control.
- A knob (labeled Set Over Temp) to set the safety temperature threshold. The numbered scale around the knob is for reference only and does not correspond to any temperature points.
- An OTP indicator light which illuminates if the temperature exceeds the user-defined temperature threshold.

Setting the Over Temperature Protection (OTP) Thermostat

1. For best results, calibrate your unit before you set the OTP thermostat. See "Calibrating the Main Temperature Control" on page 11.
2. Be sure the temperature within the chamber has stabilized at the set point for twenty-four (24) hours.
3. Using a screw driver or a small coin, turn the OTP knob counterclockwise until the OTP light turns on. This designates that your OTP has been activated. Note: The OTP light will cycle ON and OFF as the element is trying to energize on and off.
4. Turn the OTP knob slightly clockwise until the Temp alarm light remains off.

The OTP is now set at approximately 1°C above the main temperature set point. If, for any reason, the chamber temperature rises to the OTP thermostat setting, The OTP light will illuminate and the heating element will not raise the chamber temperature any further. NOTE: This will not produce an audible alarm.

Adding or Removing Counterweights

To allow the smoothest operation of the shaker, you should adjust the number of counterweights used based on the weight of the load and the orbit of rotation.

To add or remove counterweights

1. Unplug the unit from its power source. When the shaker mechanism comes to a complete halt, remove the sample tray.
2. Rotate the counterweight platform until the counterweights appear. Remove the wing nuts and add or remove counterweights according to the total weight of your samples, as shown below.

Total Sample Weight	Number of Counterweights			
	0.5"DIA. ORBIT	0.75"DIA. ORBIT	1.0"DIA. ORBIT	1.5"DIA. ORBIT
Start with these weights	2	3	5	7
Add weight per load:				
2.5 kg (5.5 lbs.)	1	1-2	2	3
5 kg (11 lbs.)	2	3	4	6
7.5 kg (16.5 lbs.)	3	4-5	6	9
10 kg (22 lbs.)	4	6	8	12
12.5 kg (27.5 lbs.)	5	7-8	10	15
15 kg (33 lbs.)	6	9	12	18
17.5 kg (38.5 lbs.)	7	10-11	14	21
20 kg (44 lbs.)	8	12	16	24

3. Replace the wing-nuts and sample tray.

Adjusting the Shaker Movement

The shaker movement can be adjusted to: gentle, moderate or vigorous shaking. The shaking movement you use depends on the oxygenation needed and cell strength of your samples. (Requires optional shaker mechanism parts and instructions) Call SHEL LAB customer service for assistance.

Unit comes with 5 counter weights installed for a 1.0" diameter orbit configuration with no load and an extra 16 counter weights for loads up to 20 kg (44 lbs).

(Extra counter weights and optional shaker mechanism parts can be ordered from SHEL LAB customer service)

⚠ WARNING

Always disconnect the unit from its power supply before attempting this procedure. Serious injury can result if the drive plate operates accidentally.

Maintaining the Unit

The only regular maintenance required for your unit is to keep it clean and free from contamination. Use the guidelines and instructions in this section to maximize the life of your incubator and help prevent contamination of your samples.

⚠ WARNING

Do NOT Use Flammable Cleaning Detergents.

Do NOT store Flammable materials In, On or Near this equipment.

Be careful not to allow cleaners to run down into shaker mechanism parts or remove grease from bearings, etc.

Disinfecting Your Unit

Although your operating conditions and related protocol should determine the actual decontamination procedures you use, always keep the following guidelines in mind when decontaminating your unit:

- **Use cleaning materials known to be compatible with your unit. If any questions arise about compatibility issues, contact Customer Service, see page 22.**
- Clean and disinfect the incubator interior on a regular basis. If the inside of your incubator smells strangely, becomes discolored, shows signs of mold or dirt, cleaning should be performed on a more frequent basis.
- Dust the outside walls of the incubator at least every two (2) months.
- For incubators placed on the floor, move the incubator every two (2) months to clean and disinfect the floor below.
- Clean all gaskets and hinges monthly.
- **Do not use chlorine-based bleaches or cleaners** with abrasives as they will corrode and pit the interior of you incubator and any other stainless steel surfaces. Use only non-abrasive cleaners.
- Do not use spray cleaners that might leak through openings and cracks and get on electrical parts. These cleaners may also contain solvents that will harm the coatings.
- Do not use hard tools such as metal wire brushes or steel wool. Use only soft tools such as plastic brushes.
- Do not depend on the use of antibiotics to maintain completely sterile conditions, as this is an inadequate technique for sterilization. Instead, use the aseptic techniques described in this section to maintain sterile conditions in the incubator.
- You can use an autoclave to decontaminate stainless steel parts by following the manufacturer's instructions.
- Otherwise, wash all parts and surfaces with soap and water to remove any organic material. Disinfect the parts with a 70% alcohol solution. Rinse with **distilled** water and wipe dry with a soft cloth.

A Typical Decontamination Procedure

Following is decontamination procedure that will suit most situations.

⚠ WARNING

Regardless of which decontamination procedure you follow, always turn the unit off and disconnect the service cord from its power supply.

Before you reattach the unit to its power supply, be sure all cleaners are evaporated and dry.

To decontaminate the unit:

1. Unplug the unit from its power source.
2. Remove all interior parts, including shelves and shelf clips.
3. Remove all gaskets and hinges. Clean and disinfect all mounting grooves for the door gaskets.
4. Clean and disinfect all rubber or plastic tubing, as well as the fan and fan housing.
5. Clean and disinfect all access ports, shaft holes, electrical feed points and any other passages into the chamber.
6. Wash and disinfect all interior surfaces.
7. Let the chamber dry out fully before replacing the removed parts or reattaching the unit to a power supply.

Control Maintenance

The main temperature controller, over-temperature protection thermostat and main temperature probe do not require any maintenance. If the unit appears to be having trouble maintaining a temperature, see “Troubleshooting” on page 17.

Troubleshooting

Solving Problems

Should the proper function of your unit come into question, use this section to help you determine what the problem is and how to fix it.

Check if your question is similar to those listed below. Then follow the guidelines found in that section:

- The temperature control inside the unit does not appear to be working correctly. What's wrong?
- The refrigeration of my SI6R does not appear to be working correctly. What's wrong?

⚠ WARNING

Replacing fuses with wrong type and value can result in serious damage to the equipment and property. ONLY Replace fuses with the same type and amperage indicated on the replacement fuse labels.

There are no user serviceable components inside the unit. Potentially lethal voltages exist. Do not attempt to service your unit beyond the procedures described here. See "Getting Your Unit Serviced on page 22"

Temperature

What is the problem?	Possible Causes	To solve the problem...
The temperature indicated by the Main Temperature Control is higher than my reference thermometer.	• Controller is calibrated too high.	1. Calibrate the Main Temperature Controller. See page 11. 2. Call customer service. See page 22.
Display reads "HI"	• Probe is unplugged • Wire to the probe is broken. • Probe is plugged in backwards.	1. Be sure the temperature probe is properly plugged in. If this doesn't solve the problem... 2. Call customer service. See page 22
Chamber temperature goes over the set point.	• Unit is not calibrated properly. • Unit not stable yet	1. Calibrate the Main Temperature Controller. See page 11.

What is the problem?	Possible Causes	To solve the problem...
The temperature indicated by the Main Temperature Control is lower than my reference thermometer.	• The temperature inside the unit has not yet stabilized after the door has been opened. • The temperature inside the unit has not yet stabilized after the unit has been turned off or a power failure. • Controller is calibrated too low. • Over Temperature Protection (OTP) is set too low. • Heating element failure.	1. Wait for the temperature indicated by the Main Temperature Controller to stabilize. If you have just turned the unit on, wait 24 hours for the incubator to stabilize at a warmer temperature. A fluctuation of no more than + 0.1 °C is normal. If this is not the problem... 2. Recalibrate the Main Temperature Controller. See page 11. If this doesn't solve the problem... 3. Be sure your reference thermometer is certified. If this is not the problem... 4. Turn the OTP fully clockwise. If this doesn't solve the problem... Call customer service. See page 22
The Main Temperature Control displays "LO".	Probe has shorted out.	Call customer service. See page 22
The unit will not heat up to set point.	• The amperage and voltage of the unit's power source do not match the unit's requirements. • Over Temperature Protection (OTP) is set too low.	1. Make sure the power source matches the data plate. (ie. voltage, hz, etc.) If this does not solve the problem... Turn the OTP clockwise until the heating light or safety light turns on.
The unit will not heat at all.	• The OTP is not set high enough. • Temperature Controller failure. • Element failure.	1. For diagnostics purposes, turn the OTP fully clockwise. See OTP section. Call customer service. See page 22
The indicated temperature inside the chamber is fluctuating more than + 0.1 °C.	• The unit has not had time to stabilize to ambient conditions. • Temperature sensor not positioned properly. • The temperature sensor is faulty. • Electrical noise	1. If you have just turned the unit on, wait 24 hours for the incubator to stabilize at a warmer temperature. If this is not the problem... 2. If you have just opened the unit's door, wait for the temperature to stabilize. If this is not the problem... 3. Stabilize ambient conditions. If this is not the problem... 4. Call customer service. See

		page 22
What is the problem?	**Possible Causes**	**To solve the problem...**
Cannot adjust set points or calibration.	• This is a controller failure.	1. Turn entire unit off and then on to reset the unit. This may temporarily solve the problem, but controller may be faulty. If this does not solve the problem... 2. Call customer service. See page 22

Power

What is the problem?	Possible Causes	To solve the problem...
The unit will not turn on.	• Power cord not firmly plugged into the outlet. • The unit or wall fuse/circuit breaker has blown. • The outlet is defective. • The unit is plugged into a circuit that already has too many electrical loads.	1. Be sure the voltage and frequency specifications of the outlet are within the range stated on the power rating overlay at the rear of the unit. If this does not solve the problem... 2. Check the power cord at the electrical outlet for proper fit. 3. Make sure the unit is plugged in firmly. If this does not solve the problem... 4. Replace fuse/circuit breaker in the unit or wall as necessary. If this does not solve the problem... 5. Make sure the outlet is in proper working condition. 6. Replace if defective. If this does not solve the problem... 7. Check to see what other loads are on the same circuit as the unit. We recommend that you plug your incubator into a circuit separate from other equipment. 8. Call customer service. See page 22
The unit fuse/circuit breaker blows often.	• Wrong fuse installed. • Wire is shorting out.	1. Check fuse for right amperage. 2. Call customer service. See page 22

What is the problem?	Possible Causes	To solve the problem...
The wall fuse/circuit break blows often.	• Too many things may be plugged in.	1. Check to see what other loads are on the same circuit as the unit. We recommend that you plug your incubator into a circuit separate from other equipment.
The front panel displays fail to turn on but the rest of the unit receives power.	• Controller failure	1. Call customer service. See page 22
The Main Temperature Controller is locked up.	• Controller failure	1. Turn entire unit off and then on to reset the unit. This may correct the problem, but the controller may still be faulty. 2. Call customer service. See page 22

Mechanical

What is the problem?	Possible Causes	To solve the problem...
The door is not sealing.	• The door gasket does not function properly. • The door latch bolts are not tightened enough. • The hinges are not adjusted properly. • The door has been twisted. • The unit has been damaged and the body is not square.	1. Check the gasket visually. Make sure it's secure and smooth and free from rolls or tears, which would interfere with the magnetic seal. If this does not solve the problem... 2. Tighten the door latch bolts with a screwdriver. If this does not solve the problem... 3. To tighten hinges, use wrench to adjust and to check if the bolts are tight. If this does not solve the problem... 4. Call customer service. See page 22
The shaker motor squeals continuously with a constant pitch. Changes in intensity only when rpm varies. Stops when the oscillate switch is turned off. Sound appears to be coming directly from the motor, not the mechanism.	• Motor cable plugs not seated properly. • May have motor bearing failure..	1. May need to replace motor. Perform a visual inspection on motor to decide. If this does not solve the problem... 2. Call customer service. See page 22

Contamination

What is the problem?	Possible Causes	To solve the problem...
The chamber is contaminated.	• Your unit is not cleaned and decontaminated often enough. • If your unit becomes contaminated even after you follow an appropriate maintenance regimen, the source of the contamination is probably not the incubator.	1. See “Maintaining the Unit” on page 15 for recommendations and instructions on decontaminating your unit. If this does not solve the problem... 2. There are many sources of contamination, such as water baths, hoods, autoclaves, reagents, disposables, incubators and personnel. If your unit becomes contaminated even after you follow an appropriate maintenance regimen, the source of the contamination is probably not the incubator. 3. Call customer service. See page 22

Refrigeration: SI9R models only

What is the problem?	Possible Causes	To solve the problem...
The unit will not cool.	• The evaporator has too much ice built up on it. • The unit is not calibrated correctly. • There is not enough space between the unit and adjacent walls or partitions. • The door seal does not work properly.	1. For diagnostics purposes, turn the OTP fully clockwise. See OTP section. If this does not solve the problem... 2. Recalibrate the Main Temperature Controller. See “ “ on page 11. If this does not solve the problem... 3. Be sure there is 5 cm (2 in.) of space between the rear and sides of the unit, and any walls or partitions that can obstruct free airflow.
Ice built up in the chamber.	• The door gasket leaks. • The door is opened too often. There’s an open container letting moisture collect inside the chamber.	1. Check door seal. 2. Try to limit door opening/closing. 3. Seal the container.

Getting Your Unit Serviced

Getting Assistance

While your unit is still covered under warranty, repair or replacement will be made at no cost to you according to the terms and conditions detailed at the back of this manual. Once the warranty period has expired, we will gladly provide telephone support for the life of your unit and can recommend an authorized service center to perform routine maintenance and to make any necessary repairs.

Obtaining Nameplate Information

Before you contact customer service, obtain the following information about your unit from the data plate at the back of the unit. Use the spaces below to record the information.

- _____
Model Number

- _____
Serial Number

Returning Your Unit

In the rare event that a Sheldon customer service representative directs you to return your unit under warranty to our facility for testing, repair or replacement, you will be provided with a Return Authorization (RA) number. Please note that the following are required before returning a unit to Sheldon Manufacturing, Inc.:

- Prior authorization by a Shellab representative

The unit must be carefully packaged prior to return. If the unit is new, please retain the original packaging and use this material to re-package the unit before transit. If packaging material is no longer available, please inform your customer service representative and arrangements will be made to deliver proper packaging to you.

- The RA must be clearly visible on the packaging.

SHEL LAB Contact Information

Please allow at least 24 hours from the time that you contact our service manager for service to be scheduled.

Contact Information

Sheldon Manufacturing Inc.
P.O. Box 627
Cornelius, Oregon 97113

Phone: (503) 640-3000
Toll free: 1-800-322-4897
Fax: (503) 640-1366

Email:**tech@Shellab.com**
Internet:http://www.Shellab.com/~Shellab

Replacement Parts and Accessories

Replacement Parts

Part	110-120V	220-240V
Adjustable feet	2700500	
Alarm Display Horizontal	1750680	
Counterweight, Single	5121497	
Door Gasket	3450642	
Drive Belt, Oscillator	0500516	
Driver Board	1750793	
Element Coils	2350509	
Flask Clamps, 1 Liter	9530532	
Flask Clamps, 125ml	9530530	
Flask Clamps, 250ml	9530531	
Flask Clamps, 500ml	9530526	
Fuse 120V 250V/16A “T”	3300513	NA
Fuse 230V 250V/10A “T”	NA	3300516
Fuse Holder	3300501	
Knob, Safety Thermostat	4450506	
Motor, Circulation	4880549	
Motor, Oscillator	4880514	
Platform (Sample Tray)	9751186	
Power Cord	1800510	1800500
Refrigeration Unit, SI9Rs	7010521	7010541
Refrigeration Expansion Valve		9740556
Refrigeration Receiver	7010536	
RPM Display Board	1750795	
Safety Thermostat	1750862	
Switch, Door	7850578	
Light Bulb, Door	4650528	
Switch, RPM, Timer Light	7850532	
Switch, Power	7850553	
Temp. Display Board	1750921	
Timer Display Board	1750922	
Transformer, Speed Control	8350509	

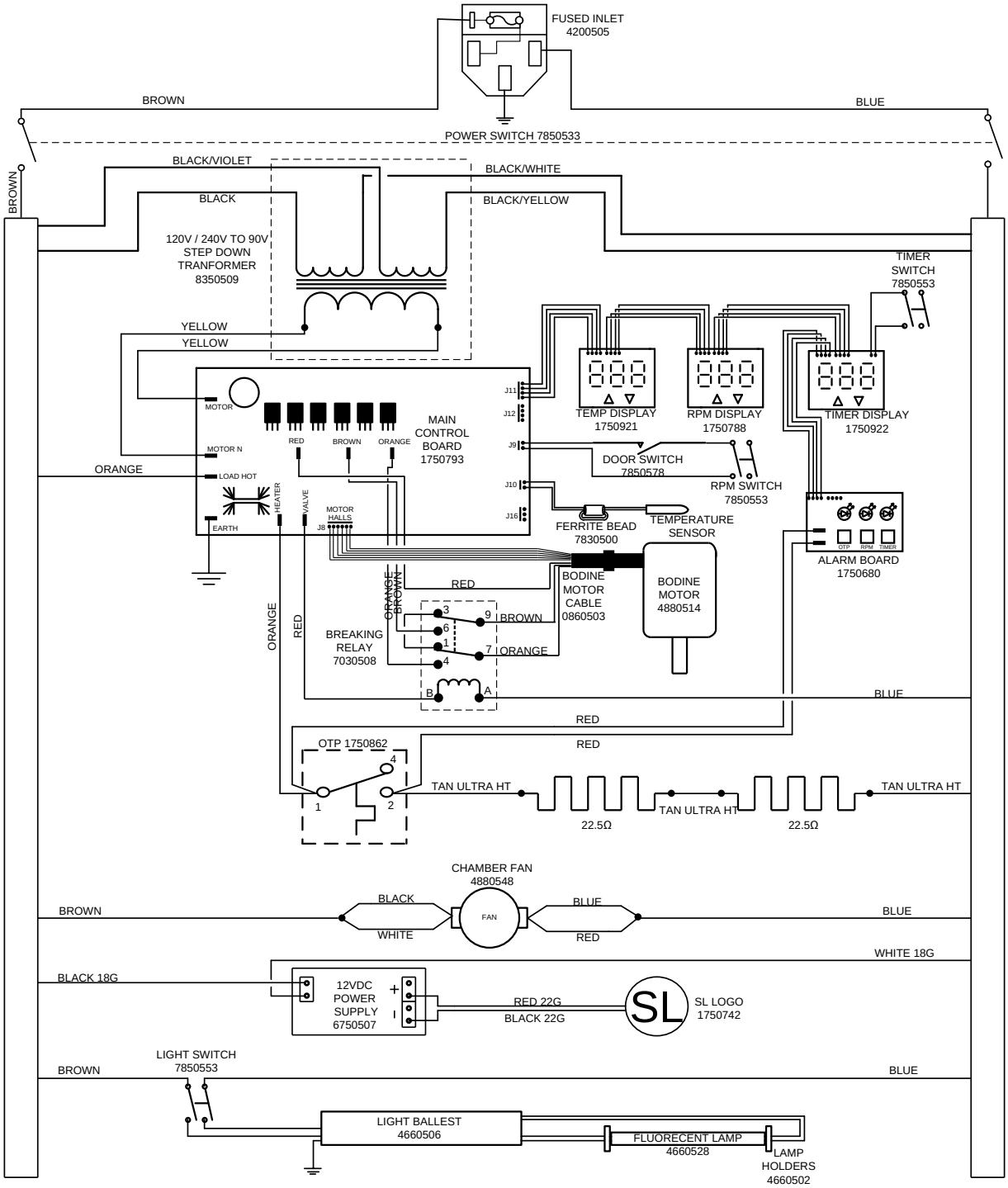
OPTION ACCESSORY LIST

Part Number	Description
SSI10-12STAND	SSI10 12” Open Stand
SSI10-24CAB	SSI10 24” Cabinet Stand
SSI10-24STAND	SSI10 24 Open Stand
9990717	HD Hub Assembly 0.5” Orbit
9990718	HD Hub Assembly 0.75” Orbit
9990719 (Supplied w/unit)	HD Hub Assembly 1.0” Orbit
9990720	HD Hub Assembly 1.5” Orbit

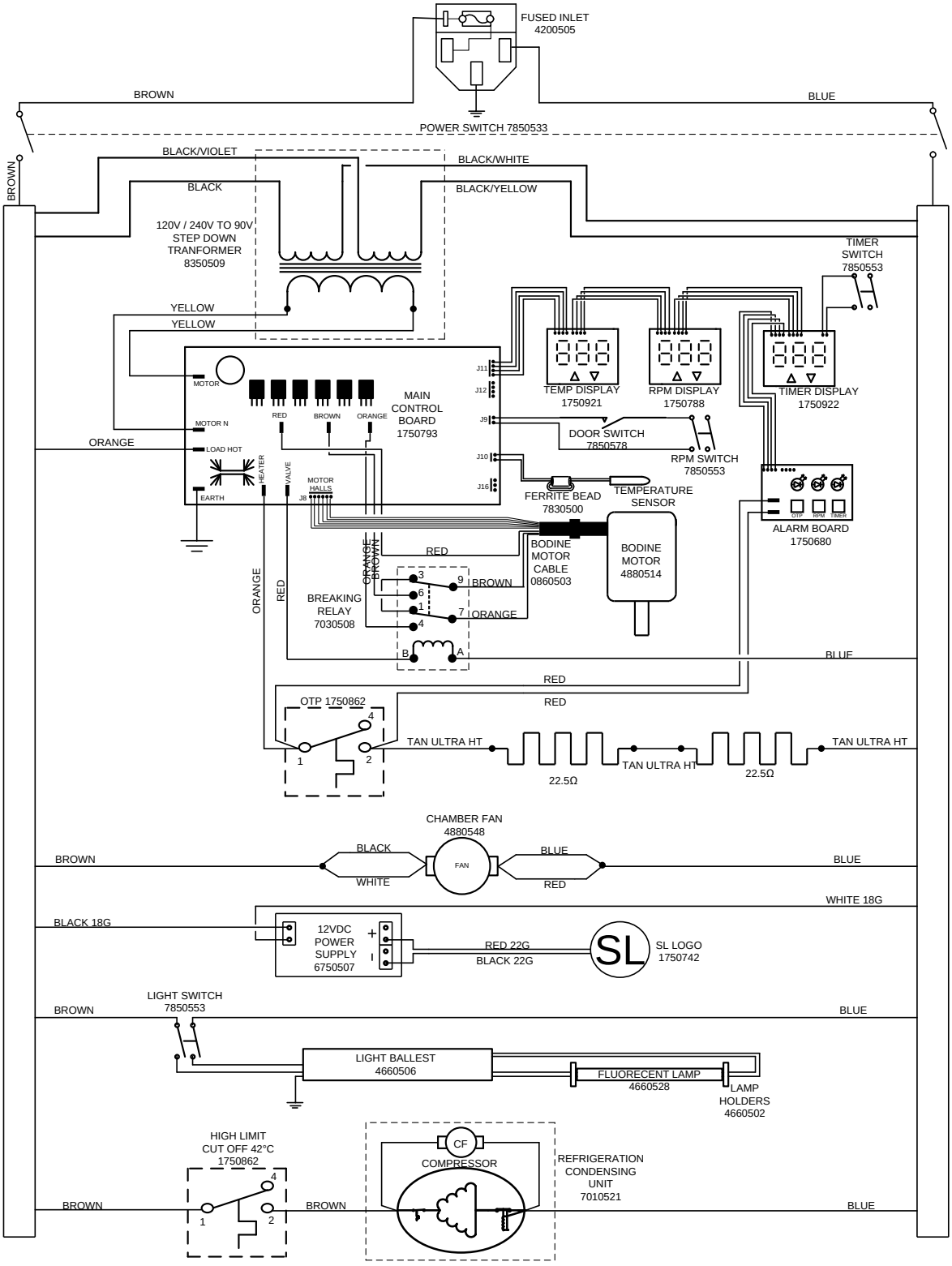
Specifications

		SSI10s	SSI10Rs
Temperature			
Unit Range		**Ambient +8°C to 60 °C)**	**10°C Minimum to 60°C**
Uniformity		**±0.8°C at 37 °C**	
Accuracy		**±0.1 °C**	
Alarms		**Audible/Visible**	
Capacity			
Volume		**9.5 cu ft 269.0 Liters**	
Dimensions			
Interior (Width × Depth × Height)		**902 × 648 × 500 mm (35.5 × 25.5 × 19.7 in.)**	
Exterior (Width × Depth × Height)		**1397 × 902 × 902 mm (55.0 × 35.5 × 35.5 in.)**	
Platform Dimensions (Width × Depth × Height)		**81.3 × 55.9 x 6.4 cm (32 x 22 x 2.25 in.)**	
Motor		**Brushless DC**	
Speed, Sample		**30 to 400rpm, ±4 rpm (1 rpm increments)**	
Controller		**Microprocessor/Digital LED**	
Stroke Length (Orbit Diameter) Interchangeable drive hubs opt. 1" STD		**13, 19, 25.4, 38 mm (0.5, 0.75, 1.0, 1.5 in.)**	
Shaking Capacity (stroke-limited)		**20 kg (45 lbs.)**	
Door Switch		**Yes**	
Refrigeration			
Refrigerant		**N/A**	**R134A/140Z**
Electrical			
Watts / Amps	**110 – 120V~**	**10.5A**	**13.5A**
Watts / Amps	**220 – 240V~**	**5.5A**	**7.0A**
Cycle / Phase		**50/60 Hz / Single Phase**	**50/60 Hz Single Phase**
Certifications		**TUV SUD CUE**	
Weight			
Net Weight		**193.2 kg (426 lbs.)**	**204 kg (450 lbs.)**
Shipping Weight		**232 kg (712 lbs.)**	**338 kg (744 lbs.)**

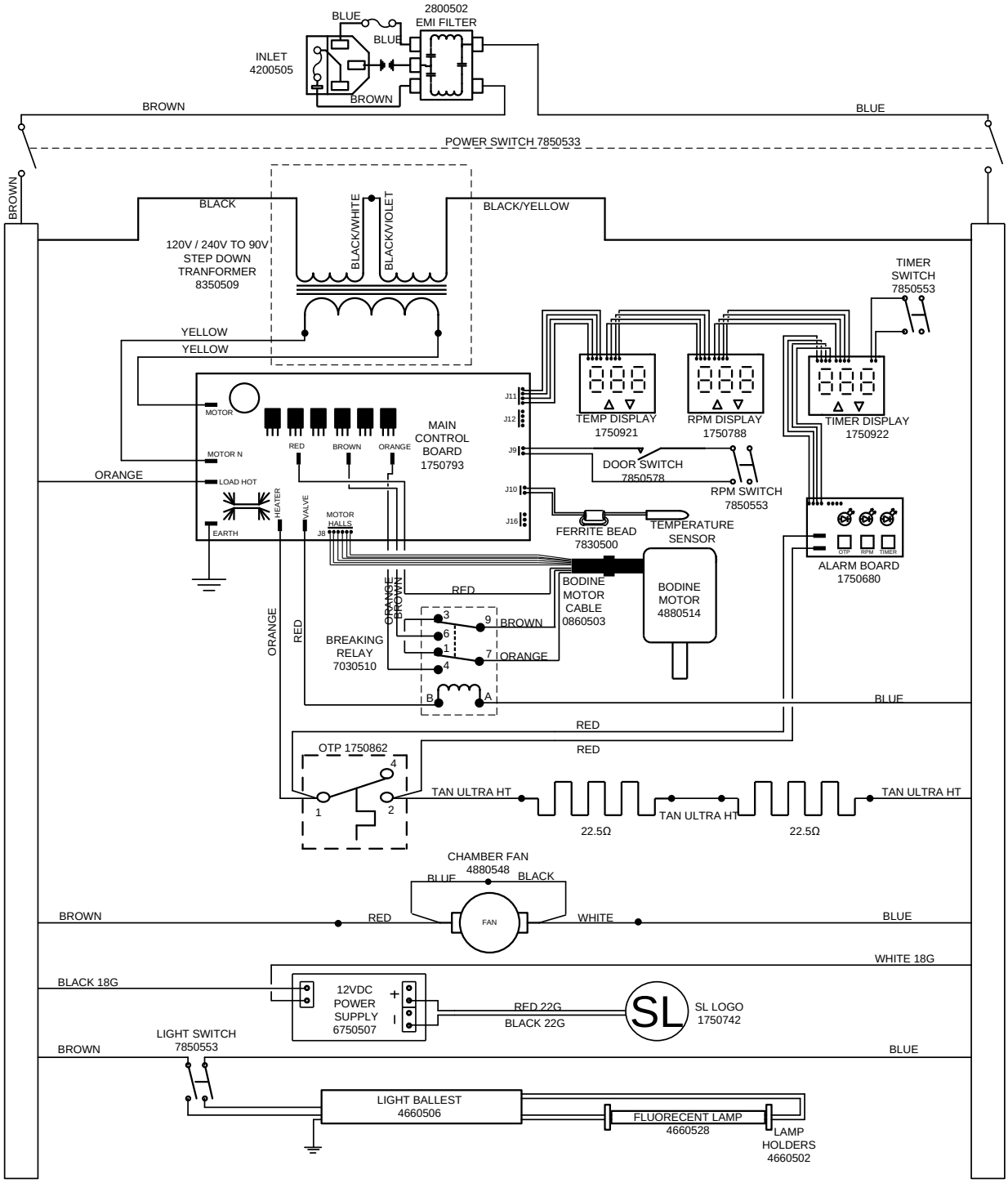
Wiring Diagrams
SI9
(9851377)



SI9R
(9851378)



SI9-2
(9851379)



SI9R-2

(9851380)