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1. **INTRODUCTION**

1.1 **Intended Use**

The Cyto-Tek® 2500 Cytocentrifuge is designed for the purpose of transferring cells onto a glass slide from cytological specimens contained in a specimen chamber through the process of centrifugation. The instrument, as part of the cytology process, is intended to facilitate the in vitro examination of human and animal cells for morphology changes by a cytopathologist.

1.2 **General Description**

The Cyto-Tek 2500 Cytocentrifuge (Figure 1A) is a self-contained instrument designed to transfer cells from suspension onto a glass slide by cytocentrifugation. This instrument has the capacity for up to 12 specimen holders. Each specimen holder will accommodate a specimen of up to 12 mL. A mono-layer of cells from the specimen is deposited on a glass slide in a specific, square area; therefore, screening of the slide is simplified.

This instrument ensures specimen integrity through automatic, paced controlled optimal acceleration. The rotor speed is programmable in 10-rpm increments from 200 rpm to 2500 rpm. Centrifugation times are programmable from 1 second to 99 minutes 59 seconds. The software can store up to 30 programs.

The ON-OFF switch, control panel, and digital displays are all located on the front of the instrument for easy access. The Cyto-Tek 2500 was designed with enhanced features focusing on user safety, including a new sealable rotor housing with lid which significantly reduces aerosol exposure. The rotor housing is completely removable and transportable, which enable loading and unloading specimens away from the cytocentrifuge. The Cyto-Tek 2500 Cytocentrifuge is designed for years of reliable, efficient, smooth, and quiet operation.

1.3 **Physical Characteristics**

1.3.1 **Components and Figures (Figure 1B)**

The components of the Cyto-Tek 2500 Cytocentrifuge are shown and described in the following figures and paragraphs. Read and review them carefully. Locate and identify each component of this instrument before attempting to install, program, and operate it.

---

**Figure 1A**

**Figure 1B**
1. INTRODUCTION

① Power Switch
Turns the instrument power on and off.

② Control Panel
Provides the control buttons and indicators to display the instrument status.

③ Instrument Lid
Is opened and closed when the guard bowl unit is placed into the instrument. A lid interlock mechanism is provided to prevent access to the guard bowl unit during operation. Also provided are the lid sensor for detecting that the lid is closed and the lid lock sensor for detecting that the lid is locked properly. The lid has a lid gasket to prevent leakage from the guard bowl.

④ Transparent Window
Is provided in the instrument lid to allow the operator to view the rotation status of the guard bowl.

⑤ Lid Open Push Button
Allows the instrument lid to lift up. By gently pressing the button located in front of the transparent window, the lid is lifted up and then opened by operator to the open position. To close the lid, lower the lid toward the front and push down.

⑥ Emergency Lid Release Opening

⑦ Power Cord Connector (with fuse holders)
Accepts the instrument end of the power cord.

⑧ Lid Gasket

⑨ Spindle
Connects to the bowl shaft housing of the guard bowl to transfer rotation from the motor.

1.3.2 Guard Bowl Unit (Figure 1C & 1D)
The guard bowl unit is comprised of the guard bowl, rotor, and bowl lid.
The bowl lid must be put on the guard bowl during handling and operation.

CAUTION: The guard bowl and bowl lid are adjusted unit by unit. Avoid using a combination of the guard bowl with the bowl lid of a different unit.
1.3.3 Control Panel (Figure 1F)

① **START/STOP key**
Starts and stops the operation.

② **SET key**
Switches the Standby mode to the Program mode and the Set & View mode.

③ **(down-arrow) key**
Changes a program number and decreases a setting value for the rotation speed or process time.

④ **(up-arrow) key**
Changes a program number and increases a setting value for the rotation speed or process time.

⑤ **Program Number display (7-segment display)**
Displays a program number from 1 to 30.

⑥ **Speed display (7-segment display)**
Displays a programmed rotation speed or an actual speed.

⑦ **Time display (7-segment display)**
Displays a programmed process time or a process time left.

⑧ **Lid Lock indicator**
An orange light is displayed when the instrument lid is locked prior to the start of operation and goes out when the lid is unlocked after the motor has stopped.

⑨ **Power indicator**
Lights up while the power is supplied to the instrument.
1. INTRODUCTION

1.4 Specifications

**Power Required:**
- Power Rating: AC100 to 240V, 50/60Hz
- Power Consumption: 100VA
- Power protection: Class I, Pollution Degree 2

**Installation Category:**
- Class II

**Weight Main Body:**
- 10 Kg (22 lbs)

**Weight: Guard Bowl**
- 1.7Kg (3.7 lbs)

**Overall Dimensions:**
- 22.5 cm (8.9 in) high (with lid closed)
- 59.5 cm (23.4 in) high (with lid opened)
- 49.0 cm (19.3 in) deep
- 37.5 cm (14.8 in) wide

**Holder Capacity:**
- 12 Specimen Holders
- 1mL / 6mL / 12mL specimen chambers
- Glass Slide Sizes:
  - Length: 76 +0/-1mm
  - Width: 26 +0/-1mm
  - Thickness: 1.1 +0.1/-0.2mm

**Rotor Operating Speeds:**
- From 200 rpm to 2500 rpm; in 10 rpm increments

**Programmable Time Settings:**
- Program memory-up to 30
- From 1 second to 99 minutes 59 seconds; selectable in minutes and seconds

**Operating Conditions:**
- Operational temperature: 10 to 40°C (50 to 104°F)
- Operational relative humidity: 30 to 85%RH
  (non-condensing)
- Storage temperature: 20 to 60°C (−4 to 140°F)
- Storage relative humidity: 20-90% RH
  (non-condensing)
- Noise level: 50 dBA or lower
  (when properly balanced)

**Instrument Life Expectancy:**
- 7 Years.

Conditions: The safety precautions provided in the operating manual and medical package insert must be observed. The instrument needs to be regularly maintained according to the instructions in Section 4, Care of the Instrument.

**NOTE:** It is recommended that preventative maintenance is performed on the instrument once a year.

1.5 Safety Standards

Complies with:
- UL 61010-1, 2nd:2004
- UL61010-2-020:2006
- CAN/CSA C22.2 No. 61010-1-04
- CAN/CSA C22.2 No. 61010-2-20-09
- CAN/CSA C22.2 No. 61010-2-101
- IEC 61010-2-101

**Safety Features:**
- Lid lock, Guard bowl monitor (imbalanced rotation detector), Over-current protection, Over-heat protection
CAUTION: The instrument is intended to be operated indoors. Do not use it outdoors.

<table>
<thead>
<tr>
<th>Rotation speed (rpm)</th>
<th>Relative Centrifugal Force (g) Appro.</th>
<th>Acceleration (m/s²) Approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>300</td>
<td>11</td>
<td>104</td>
</tr>
<tr>
<td>400</td>
<td>19</td>
<td>184</td>
</tr>
<tr>
<td>500</td>
<td>29</td>
<td>288</td>
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<td>600</td>
<td>42</td>
<td>414</td>
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<td>700</td>
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<td>564</td>
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<td>800</td>
<td>75</td>
<td>737</td>
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<td>900</td>
<td>95</td>
<td>932</td>
</tr>
<tr>
<td>1000</td>
<td>117</td>
<td>1151</td>
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<td>1100</td>
<td>142</td>
<td>1393</td>
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<td>1200</td>
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<td>1400</td>
<td>230</td>
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</tr>
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<td>264</td>
<td>2590</td>
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<td>1600</td>
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<td>1700</td>
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<td>3327</td>
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<td>1800</td>
<td>380</td>
<td>3730</td>
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<td>470</td>
<td>4605</td>
</tr>
<tr>
<td>2100</td>
<td>518</td>
<td>5077</td>
</tr>
<tr>
<td>2200</td>
<td>568</td>
<td>5572</td>
</tr>
<tr>
<td>2300</td>
<td>621</td>
<td>6090</td>
</tr>
<tr>
<td>2400</td>
<td>676</td>
<td>6631</td>
</tr>
<tr>
<td>2500</td>
<td>734</td>
<td>7195</td>
</tr>
</tbody>
</table>

NOTES:

- The distance from the center of the rotor to a specimen chamber installed is 105 mm.
- Relative centrifugal force (RCF) = \( 11.739 \times 10^{-5} \times N^2 \) (g)
- \( N \) = Revolutions per minute (rpm)
2. INSTALLATION AND SETUP

2.1 General Information

This section provides information on selecting a proper location, unpacking, and installing the Cyto-Tek 2500 Cytocentrifuge. The instrument must be installed correctly to ensure proper operation and service. Read this operating manual carefully before attempting to operate the instrument. Follow all instructions carefully.

The Cyto-Tek 2500 Cytocentrifuge is a precision instrument and must be handled accordingly. Rough handling or dropping of the instrument will disturb or damage internal components. Always handle the instrument with care.

2.2 Installation Requirements

The Cyto-Tek 2500 Cytocentrifuge will deliver optimum performance if the following requirements are observed:

1. Place the cytocentrifuge on a strong, level surface away from any induced mechanical vibration.
2. Do not subject the cytocentrifuge to direct sunlight or any other form of heat source.
3. The instrument must be in an area of minimal contact with volatile combustibles and corrosive gases.
4. The instrument should not be on the same electrical circuit servicing equipment with motors, cooling units, heating units, or light sources.
5. Mark a 30 cm (one foot) boundary around the cytocentrifuge and permit no person or hazardous material within this zone while the cytocentrifuge is operating.

2.3 Unpacking

Open the carton. The carton will contain the following accessories:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Check box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Cord</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Paper Filter, 1mL</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Chamber Holder, 1mL</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Specimen Chamber, 1mL</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Chamber Cap, 1mL</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Operating Manual</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Accessories packed in the secondary accessory carton include:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Check box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guard Bowl Unit</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>Medical Package Insert (Japan Customers Only)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Warranty Card</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Unpacking Instructions</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: An English explanatory material on the Japanese warranty card and medical package insert is also included for overseas customers.

If any of these items are missing contact Sakura Technical Support (see Section 5.4).

If there is any visible shipping damage to any item, immediately file a complaint with the carrier. Then notify your Sakura instrument distributor.

2.4 Unpacking the Instrument

CAUTION: Use proper lifting techniques when removing the instrument from packaging.

1. Cut the two plastic straps on the sides of the carton.
2. Remove both cardboard spacers (Figure 2A) and instrument lid gasket (Figure 2B).
2. INSTALLATION AND SETUP

3. Remove box tape.
4. Slightly hold up the instrument lid and remove the foam support inserts (Figure 2C).

5. Remove the top foam block insert (Figure 2D).

6. Unwrap the proactive vinyl sheet from the instrument and completely open the lid (Figure 2E).

7. Remove adhesive tape that holds the guard bowl unit in place and close the lid (Figure 2F).

8. Grasp the bottom of the instrument and carefully remove the instrument from the carton (Figure 2G).
9. Open the lid by pressing the Lid Open button (Figure 2H). Remove the guard bowl unit from the instrument (Figure 2I).

10. Remove a foam cushion (Figure 2J).

11. Install the lid gasket, see Section 4.1.3. (Figure 2K).

12. Replace the guard bowl into the instrument (Figure 2K).
2. INSTALLATION AND SETUP

2.5 Standard Accessories and Options

2.5.1 Standard Accessories

NOTES:

- The cell deposition area of 1mL paper filter is 6 x 6 mm.
- The cell deposition area of 6mL paper filter and 6mL rubber gasket is 14 x 14 mm.
- The cell deposition area of 12mL paper filter and 12 mL rubber gasket is 14 x 30 mm.

2.5.2 Options/Consumables

<table>
<thead>
<tr>
<th>Description/Product Code</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Power Cord (100/115V), A4010548 or Power Cord (230V), A4010549</td>
<td>1</td>
</tr>
<tr>
<td>② Guard Bowl Unit, F60-755-00 (Guard Bowl, Rotor, Bowl Lid)</td>
<td>1 set</td>
</tr>
<tr>
<td>③ Specimen Chamber, 1mL</td>
<td>12 each</td>
</tr>
<tr>
<td>④ Chamber Holder, 1mL</td>
<td></td>
</tr>
<tr>
<td>⑤ Chamber Cap, 1mL</td>
<td></td>
</tr>
<tr>
<td>⑥ Paper Filter, 1mL</td>
<td></td>
</tr>
<tr>
<td>Operating Manual, 0007129-01</td>
<td>1</td>
</tr>
<tr>
<td>Medical Package Insert (Japan Only)</td>
<td>1</td>
</tr>
</tbody>
</table>

2.5.3 Missing or Damaged Items?

Check the contents of all shipping cartons and boxes carefully for all of the listed items. If any items are visibly damaged, or are missing, call 1-800-725-8723 or 1-310-972-7800 (U.S. Customers only). If you are located outside the U.S., contact your nearest Sakura instrument distributor.
3. OPERATING INSTRUCTIONS

3.1 Operating Instructions

3.1.1 Workflow (Figure 3A)

The following is a basic operating flow when using the Cyto-Tek 2500 Cytocentrifuge:

Assemble the specimen chambers, dispense specimen into each chamber and install the chamber cap securely.

CAUTION: Use microscopic glass slides with ground edges.

CAUTION: Glass slides might break, depending on their size and quality. Determine if glass slides you want to use can be safely assembled in the chamber holders and processed on the instrument before use.

Load the rotor in the guard bowl with the assembled chambers. (Balance the rotor while loading).

Put on the bowl lid and lock it.

Open the instrument lid and set the guard bowl unit in place.

Close the instrument lid.

Select the program number of a program to run, using the UP (↑) and DOWN (↓) keys. If a desired program does not exist, edit and save a new program.

Press the START/STOP key to start the operation. The lid is locked and the lid lock indicator is lit.

When the operation is ended, the completion buzzer sounds.

Remove the guard bowl unit and close the instrument lid.

Remove the bowl lid.

Remove the specimen chamber holder assemblies from the rotor. Carefully remove the glass slide from the chamber holder.

Disinfect or sterilize the guard bowl, bowl lid, and others.

Figure 3A

3.2 Customization of Settings

3.2.1 Creating a Program

The instrument starts up in the standby mode after power-on. The control panel displays the program number and settings of a currently-selected program. The instrument saves up to 30 programs.Selectable rotation speed is from 200 to 2500 rpm, and is displayed in multiples of 10 rpm.

NOTE: The factory default settings are 1,000 rpm and 10 minutes. Programs can be edited as desired (Figure 3B).

Setting a Rotation Speed (Figure 3C)

1. Select the program number, then press the SET key.

NOTE: The Speed display starts to flash, indicating that the speed setting mode is up.

2. Determine the desired rotor speed for the program cycle samples. Press the UP (↑) and DOWN (↓) keys until the Speed Display indicates the desired rotor speed. Selectable rotation speed is from 200 to 2500 rpm, and is displayed in multiples of 10 rpm. If these keys are held down for one second or more, the value will change by 50.

3. Press the SET key to save the changes and enter the time (minutes) setting mode.
3. OPERATING INSTRUCTIONS

**NOTE:** To return to the standby mode without saving the change, press the START/STOP key.

**CAUTION:** The rotation speed is selectable from 200 rpm to 2,500 rpm. However, the morphology of cells may be degraded if a higher rotation speed is selected. Consider an appropriate value before setting the speed.

**Setting a Process Time (minutes) (Figure 3D)**

![Figure 3D](image)

1. Press the SET key.
2. Press the UP (▲) and DOWN (▼) keys until the Time Display indicates the desired time in minutes.
3. Press the SET key to save the changes and enter the time (seconds) setting mode.

**NOTE:** To return to the standby mode without saving the change, press the START/STOP key.

**CAUTION:** The process time is selectable from 0 minute and 1 second to 99 minutes and 59 seconds. However, a prolonged process time may dry out specimens. Consider an appropriate value before setting the time.

**Setting a Process Time (seconds) (Figure 3E)**

![Figure 3E](image)

1. Press the SET key.
2. Press the UP (▲) and DOWN (▼) keys until the Time Display indicates the desired time in seconds.
3. Press the SET key to save the changes.

**NOTE:** To return to the standby mode without saving the change, press the START/STOP key.

**Set and View Mode**

When the SET key is held down for 3 seconds or more and released, the instrument will start the set & view mode for setting system options and viewing the software version number and error logs.

This set & view mode provides the following functions:
- Selecting a completion buzzer
- Turning ON or OFF an alert for preventing slides from drying
- Selecting the volume
- Viewing the software version number
- Viewing the error code of an error occurred

**Selecting a Completion Alarm SET-1 (Figure 3F)**

![Figure 3F](image)

1. In Standby mode, press the SET key for 3 seconds or more. The completion buzzer setting mode displays “SET-1” on the Speed display.
2. Use the UP (▲) and DOWN (▼) keys to change the value in the Time display from 1 to 3. Each setting is as follows:
   1: (Pi-, Pi-, Pi-)
   2: (Pi Pi, Pi Pi, Pi Pi)
   3: (PiPiPi-, PiPiPi-, PiPiPi--)
3. To test the sound in the selected pattern, press the START/STOP key. Press the key again to stop the buzzer.
4. Press the SET key to save the change and enter the alert On/Off setting mode.
Turning an Alert ON or OFF SET-2 (Figure 3G)

1. Press the SET key in the completion alarm setting mode. The alert On/Off setting mode display “SET-2” in the Speed display.

NOTE: Allows the operator to turn On/Off a End of Process alarm to prevent slides from drying.

2. Use the UP (▲) and DOWN (▼) arrow keys once at the end of a run to select “Off” to sound the completion buzzer. Or select a desired time interval in one-second increments (selectable from 0 second to 60 seconds) to keep the completion buzzer sounding. The value is displayed in the Time display, like “On00” or “On60”, and circulated on every key press.

3. Press the SET key to save the change and enter the sound volume setting mode.

Selecting a Sound Volume SET-3 (Figure 3H)

1. Press the SET key in the alert On/Off setting mode. The sound volume setting mode displays “SET-3” in the Speed display.

NOTE: Three sound volume levels are available for the completion and error alarms. Use the UP (▲) and DOWN

(▼) arrow keys to change the value in the Time display from 1 - 3. Each setting is as follows:

1: (Low)
2: (Middle)
3: (Loud)

2. To test the sound volume, press the START/STOP key. Press the key again to stop the alarm.

3. Press the SET key to save the change and switch to the software version number display.

Viewing the Software Version Number (Figure 3I)

1. Press the SET key in the sound volume setting mode. The version number of the software currently installed in the instrument is displayed.

2. Press the SET key to switch to the error code display.

Viewing Error Codes (Figure 3J)

Error Codes have been programmed into the Cyto-Tek 2500 Cytocentrifuge. These 2-digit codes alert the operator to a possible instrument malfunction or operating error. They are displayed in the Speed Display window. An alarm buzzer sounds when an error code is displayed.

1. Press the SET key when the software version number is displayed. The error code display appears.

2. The last three errors codes are listed.
3. OPERATING INSTRUCTIONS

NOTE: The occurrence order of the errors is displayed in the Program display. The error code of each error is displayed in the Speed display. If there is no error stored in memory, the Speed display will show “E---”.

3. Press the SET key to return to the standby mode.

3.3 Assembling the Specimen Chamber and Dispensing the Specimen

CAUTIONS:
- The 1mL specimen chamber, chamber holder, chamber cap and paper filter are disposable. Do not reuse them.
- Confirm that a name and ID on each glass slide match those of individual patients or subject.
- The limit of rotating imbalance of load is 3 grams. Evenly fill the specimen chambers to be placed in the rotor.
- Use the 1mL specimen chamber only with the 1mL chamber holder, chamber cap, and paper filter. Those for the 6mL and 12mL chambers are not compatible.
- When the paper filter is in use, cytocentrifuge the chambers within 2 ~ 3 minutes of dispensing the specimen.
- The 6mL and 12mL specimen chambers, rubber gaskets, 6/12mL specimen chamber holder and cap are reusable after being disinfected and washed. However, if they have cracks or are deformed, do not use them.
- Do not use glass slides that have flaws. They will be broken during operation.
- After the specimen has been dispensed, immediately lock the bowl lid and start the operation.
- Do not place different types of the chamber assemblies in the rotor at a time. Doing so will cause an imbalance error to occur during operation.
- Glass slides might break, depending on their size and quality. Determine if glass slides you want to use can be safely assembled in the chamber holders and processed on the instrument before use.
- If the specimen chamber using the rubber gasket is overfilled, aerosoling will occur inside the guard bowl. If it is under filled, uneven and inadequate smearing will result.

Procedure for Using 1mL Disposable Specimen Chambers

1. Write the name of the specimen on a clean glass slide and place the slide, frosted side up, in the specimen chamber holder (Figure 3K).

2. Place the new paper filter on the slide (Figure 3L).
3. Insert the two tabs at the bottom of a clean specimen chamber into the corresponding holes of the chamber holder, as shown below (Figure 3M).

Figure 3M

4. Align the square hole of the paper filter with the hole in the specimen chamber holder. Press the top of the specimen chamber back toward the specimen chamber holder, flatting it out, until it engages the restraining latch on the top of the specimen chamber holder (Figure 3N).

Figure 3N

5. Prepare other specimen chamber assemblies.

6. Hold the specimen chamber holder vertically, so that the graduations of 0.5 mL and 1.0 mL, marked on the cylindrical portion of the specimen chamber are clearly visible. Dispense from 0.1 mL to 1.0 mL of specimen into the specimen chamber. Then tightly seal the specimen chamber with a specimen chamber cap (Figure 3O).

Figure 3O

NOTE 1: Do not fill the 1.0 mL specimen holder with more than 1.0 mL of specimen, as excess specimen may aerosol into the rotor bowl.

NOTE 2: A better dispersion of cells on the glass slide may be obtained by diluting small volume samples (0.3 mL or less) to a final volume of 0.5 mL with an appropriate diluent.

Handling of 6mL and 12mL Specimen Chambers

1. Write the name of the specimen on a clean glass slide and place the slide, frosted side up, in a specimen chamber holder.

2. Place the 6mL rubber gasket on the glass slide to use for the 6mL specimen chamber. Similarly, to use for the 12mL specimen chamber, place the 12mL rubber gasket on the glass slide (Figure 3P).

Figure 3P

The illustration is the 6mL chamber.
3. OPERATING INSTRUCTIONS

3. Insert a specimen chamber into the bottom of the chamber holder. Press in firmly to properly seat the specimen chamber. Press the chamber holder clip down to make it engage the hooks at each side of the chamber holder (Figure 3Q).

![Figure 3Q]

Align the opening of the specimen chamber with the opening of the rubber gasket.

4. Dispense the specimen into the specimen chamber up to the level line (6mL or 12mL). Fill the specimen chamber exactly to the level line. (Figure 3R).

![Figure 3R]

NOTE: An optional rubber chamber cap is available for centrifugation of infectious specimens.

3.4 How to Load the Rotor

CAUTION: In order to minimize a risk of infection, place the guard bowl inside a biological safety hood when installing or removing the bowl lid.

CAUTION: Confirm that a name and ID on each glass slide match those of individual patients or subject.

CAUTION: Load the Cyto-Tek 2500 Cytocentrifuge rotor so that it remains balanced. An improperly loaded, unbalanced rotor will cause the cytocentrifuge to vibrate excessively. This can shorten the life of the instrument.

1. Open the instrument lid to remove the guard bowl unit.

2. Place the guard bowl inside a safety cabinet. To unlock the lid, pull the lock button up on the top of the lid (Figure 3S). Remove the lid (Figure 3T).

3. Load the rotor with an even number of assembled chambers. Arrange them in the rotor so that pairs of specimen chamber holder assemblies are opposite one another (Figure 3U).
4. If there are an odd number of specimen samples to process, maintain the rotor balance by adding one specimen chamber filled with water to pair with the last unpaired specimen.

CAUTION: Be sure to orient the tab of the chamber cap so that it will not make contact with the edge of the rotor compartment, as shown by arrows (Figure 3V and 3W).

5. Place the lid back on the rotor and press down on the button with your fingers to lock the lid (Figure 3X).

CAUTION: Make sure that the bowl lid is firmly locked.

CAUTION: If the guard bowl unit needs to be transferred with the specimen-loaded chambers set in the rotor, be sure to lock the bowl lid and carefully carry the guard bowl with both hands.

3.5 Starting the Operation

1. Set the power switch to the **ON** position.
2. Place the guard bowl into the instrument and close the instrument lid (Figure 3Y).

3. Press the **UP** (△) and **DOWN** (▽) arrow keys (a) until the desired program number is obtained (Figure 3Z).

**NOTE:** If a desired program does not exist, make changes to create a new program.
3. OPERATING INSTRUCTIONS

4. Press the **START/STOP** key (b) to start the operation (Figure 3Z).

**NOTE:** The instrument lid is locked during operation.

**CAUTION:** The process time is selectable from 0 minute and 1 second to 99 minutes and 59 seconds. However, a prolonged process time may make specimens dry. Consider an appropriate process time before setting the time.

**CAUTION:** After the start of operation, make sure that the rotation speed reaches the set value and is stable.

### 3.6 Discontinuing the Operation

To discontinue the operation, press the **START/STOP** key. The instrument will start decelerating the motor and unlock the instrument lid when the rotation speed reaches 50rpm or less. An alarm will sound to the operator that the instrument has stopped.

**NOTE:** While the lid is unlocked, the time left is still displayed in the window. The operation, however, cannot be restarted with the time left. When the lid is opened, the instrument returns to the standby mode and resets the displayed time to zero.

### 3.7 Emergency Stop

To stop the operation immediately, switch off the instrument (Figure 3AA).

#### 3.8 Removing the Guard Bowl

**CAUTION:** In order to minimize a risk of infection, place the guard bowl inside a biological safety hood when installing or removing the bowl lid.

1. When the operation has ended, a buzzer sounds to inform the operator the run has completed. Open the instrument lid and remove the guard bowl.
2. Place the guard bowl inside a safety cabinet. Pull up the lock button to unlock the bowl lid and remove (Figures 3BB and 3CC).
3. Remove the specimen chamber holders from the rotor.
4. Remove the glass slide from the chamber holder. Do not let the smeared area go out of alignment.
5. Drain the guard bowl of fluid waste. Disinfect or sterilize the guard bowl and bowl lid. Disinfect the 6mL or 12mL specimen chambers, chamber caps, rubber gaskets, and 6/12mL chamber holders after use. See Section 4.1.4 for cleaning instructions.
6. Dispose of the used 1mL specimen chambers, chamber holders, chamber caps and filter paper, as appropriate.
according to the specimen processed or reagents used, as they are disposable.

**CAUTION:** Drain the fluid waste accumulated in the guard bowl after every run.

**CAUTION:** Do not leave the bowl lid locked after use. If the pressure inside the guard bowl becomes negative, the lid will become difficult to remove.
4. CARE OF THE INSTRUMENT

4.1 General Information

The Cyto-Tek 2500 Cytocentrifuge is a precision instrument designed for trouble-free operation and requires minimal routine maintenance. Handle the instrument with care to avoid damage to the sensitive electronics. The cytocentrifuge may be kept in good operating condition by carefully following these instructions. Before cleaning or performing maintenance on the instrument, place the ON-OFF Switch in the OFF position and unplug the power cord from its electrical outlet.

WARNING: WHEN PERFORMING MAINTENANCE OR CLEANING THE INSTRUMENT, STANDARD LABORATORY SAFETY PROCEDURES AND PERSONAL PROTECTIVE EQUIPMENT SHOULD BE USED.

4.1.1 Cleaning the Control Panel

Wipe the internal surfaces (including the inside lid area and the well) with a clean cloth moistened with neutral detergent. Dry any excessively moist areas.

CAUTION: Do not use volatile liquids such as solvents.

4.1.2 Cleaning the Instrument

Wipe the external surfaces (Lid Gasket area and Guard Bowl Storage area) with a clean cloth moistened with 70-80% ethyl alcohol or isopropyl alcohol for disinfection. Dry any excessively moist areas.

CAUTION: Do not spray a disinfectant directly on or over the instrument.

4.1.3 Disassembling and Cleaning the Guard Bowl Unit

CAUTION: To lessen the infection risk, place the guard bowl unit inside a safety cabinet before removing and the lid.

To clean, disinfect, or sterilize the guard bowl unit, it is necessary to place and disassemble it inside a safety cabinet. Remove the lid gasket from the lid and the rotor unit and the V-shape gasket from the guard bowl before cleaning.

Disassembly of the bowl lid

1. Remove the bowl lid (Figure 4A).

2. Remove the lid gasket (Figure 4B).
4. CARE OF THE INSTRUMENT

Disassembly of the Guard Bowl

1. Loosen two screws that hold the rotor unit in place. Remove the rotor unit (Figure 4C and 4D).

2. Remove the V-shape gasket (Figure 4E).

The guard bowl unit has been disassembled as shown below (Figure 4F).

Assembly of the Guard Bowl Unit

1. Install the V-shape gasket (Figure 4G and 4H).

CAUTION: Install the V-shape gasket on the bowl shaft housing with the projecting part of the gasket facing upward. Failure to do so may weaken the seal capacity.
2. Install the bowl lid gasket to the bowl lid (Figure 4I).

   CAUTION: Install the bowl lid gasket to the bowl lid with the “UPSIDE” facing upward.

   CAUTION: Install the bowl lid gasket so that it is evenly applied around the bowl lid overall. Failure to do so may weaken the seal capacity.

3. Place the rotor unit into the guard bowl and tighten the two screws (Figure 4J).

   Installation (replacement) of the Instrument Lid Gasket (Figure 4K)

1. Open the instrument lid and pull out the old lid gasket from the groove.
2. Wipe clean the gasket groove with a cloth or paper towel.
3. Confirm which side of the gasket faces inward. Direct the projecting part of the gasket to the back side of the groove as illustrated in the above section view.
4. Determine two points \(a\) and \(b\) so that the gasket is in exact halves. Place the point \(a\) at the top of the gasket groove and the point \(b\) at the bottom and fit two points of the gasket into the groove. Next, determine two points \(c\) and \(d\) so that the upper and lower lengths of the gasket become the same. Fit these points into each side of the groove in an appropriate place. Insert other parts of the gasket into the groove evenly (Figure 4L).
5. Run your fingertip along the surface of the gasket. Push the gasket into the groove where necessary.
4. CARE OF THE INSTRUMENT

List of Disinfection/Sterilization Methods

CAUTION: When sterilizing the guard bowl unit by high pressure steam, wear protective clothing like gloves and take care not to get burned.

CAUTION: All of the components of the guard bowl are autoclaveable. Each component must be sterilized separately.

CAUTION: If the bowl lid, rotor and guard bowl are placed in the same container for disinfection, they may be deteriorated faster (dissimilar metal corrosion). It is recommended to disinfect them separately.

4.1.4 Cleaning 6mL/12mL specimen chambers, 6mL/12mL rubber gaskets, 6mL/12mL chamber cap and chamber holder (Figure 4M)

These assemblies consist of the following four parts:
1. specimen chamber holder
2. rubber gasket
3. specimen chamber
4. specimen chamber cap

<table>
<thead>
<tr>
<th>Component</th>
<th>Disinfection/Sterilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowl Lid</td>
<td>Can be sterilized in an autoclave ($121^\circ$C, 20 minutes). Can be disinfected by soaking in ethyl alcohol (80%), isopropyl alcohol (70%) or sodium hypochlorite solution (0.5% or less in concentration, for less than 20 minutes).</td>
</tr>
<tr>
<td>Rotor</td>
<td>Can be sterilized in an autoclave ($121^\circ$C, 20 minutes). Can be disinfected by soaking in ethyl alcohol (80%), isopropyl alcohol (70%) or sodium hypochlorite solution (0.5% or less in concentration, for less than 20 minutes).</td>
</tr>
</tbody>
</table>
| Guard Bowl     | Can be sterilized in an autoclave ($121^\circ$C, 20 minutes). Can be disinfected by soaking in ethyl alcohol (80%), isopropyl alcohol (70%) or sodium hypochlorite solution (0.5% or less in concentration, for less than 20 minutes).

CAUTION:
If the guard bowl is autoclaved as it is moistened with sodium hypochlorite solution, it will be wear down faster.

| Bowl Lid Gasket | Can be sterilized in an autoclave ($121^\circ$C, 20 minutes). Can be disinfected by soaking in ethyl alcohol (80%), isopropyl alcohol (70%) or sodium hypochlorite solution (0.5% or less in concentration, for less than 20 minutes). |
| V-shape Gasket  | Can be sterilized in an autoclave ($121^\circ$C, 20 minutes). Can be disinfected by soaking in ethyl alcohol (80%), isopropyl alcohol (70%) or sodium hypochlorite solution (0.5% or less in concentration, for less than 20 minutes). |

All these components should be carefully decontaminated and cleaned prior to use.

1. All components should be soaked in an approved disinfectant. A 0.5% chlorhexidine hydrochloride solution or a 0.5% or less sodium hypochlorite solution (common bleach) are the recommended disinfectants.
2. After soaking the components in an approved disinfectant, they should be cleaned in hot water and
detergent. The water temperature should not exceed 40° C (104° F). Rinse the cleaned items thoroughly in clear water and drain to dry.

3. The stainless steel specimen chamber holders a may be soaked in an approved disinfectant for a maximum of 10 minutes, followed by rinsing thoroughly in hot tap water. These specimen chamber holders a may be autoclaved as an alternative to the cleaning procedure. Do not autoclave the plastic and rubber components [rubber gasket b, specimen chamber c, and specimen chamber cap d] and do not expose these items to xylene, thinner, or any solvent. Do not store these items in direct sunlight or near any source of heat. The chamber used to hold the disinfectant for soaking the components may be glass or metal, but not plastic. Be careful not to cause any abrasion to the inner portion of the chamber or the raised portion around the exit port hole of the chamber. Abrasions could have a negative impact on cell harvest by providing a niche (capture space) for the cells on their way to being deposited on the slide.

**CAUTION:** The 6mL and 12mL specimen chambers, rubber gaskets, 6/12mL specimen chamber holder and cap are reusable after disinfected and rinsed. However, if they have cracked or warped, do not use them.

**Decontamination**

If any hazardous material is spilled on or inside the instrument, decontaminate the instrument by following the cleaning procedures contained this Section, Care of the Instrument.

**Transportation**

Disinfect the instrument before transporting. See above, Decontamination.

Please call the Sakura Technical Support Department at 1-800-725-8723, option 2.

If located outside the United States, contact the nearest Sakura instrument distributor or representative for information and assistance.

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### 4.1.5 Gasket Replacement

Replace the bowl lid gasket and V-shape gasket when they get deteriorated or at least once a year.

When installing replacement gasket, note the correct orientation of the gasket.

### 4.1.6 Preventive Maintenance by a Service Contractor

The following components can be inspected and replaced as necessary. For more details, contact our Technical Support Department or your nearest instrument distributor.

- Guard bowl unit
- Imbalance detection mechanism
- Lid lock mechanism
- Lid opening/closing mechanism
- Controller board
- Gaskets and consumables

### 4.1.7 Cleaning the Spindle

Clean the spindle after the end of every day’s work.

Use a soft cloth moistened with ethyl alcohol or isopropyl alcohol for disinfection and wipe off the surface gently.

If the problem persists that the guard bowl unit is difficult to remove from the instrument in spite of daily cleaning of the spindle, apply grease (optional maintenance item) to the spindle. For more information of the grease, contact Sakura’s sales representative.

**CAUTION:** Do not use any grease other than the grease specified by Sakura.

### 4.1.7 Greasing the Spindle

It is recommended to grease the spindle, using the optional item, F61-058-00 Grease (Sealub S-11), whenever the guard bowl unit becomes difficult to be removed easily from the instrument or during periodic maintenance.

1. Open the instrument lid. Remove the guard bowl unit from the instrument.
2. Clean the spindle by wiping gently with a soft cloth moistened with a disinfectant alcohol such as ethyl alcohol or isopropyl alcohol.
3. Put a small amount of grease on the spindle in eight places as shown below.

4. Use a dry paper towel such as Kimwipe to spread the grease evenly over the circumference of the protruding rims on the side of the spindle.
5. TROUBLESHOOTING AND SERVICE

5.1 Power Outage

Unlock the Lid Mechanically During Power Outage

WARNING: MAKE SURE THAT THE ROTATION HAS STOPPED BEFORE PERFORMING THE WORK.

In the event of a power outage, the instrument lid will remain locked. The lid can be manually opened, if needed.

1. Set the power switch to the OFF position.
2. Remove a small cap located on the left side of the instrument (Figure 5A).

![Figure 5A](image)

3. Insert a bar for unlocking the lid into the hole (Figure 5B).

![Figure 5B](image)

4. Push in the bar to release the lock mechanism. The lid can be opened.

CAUTION: Use a rigid bar that is 4 to 6 mm across and more than 5cm long.

WARNING: BEFORE OPENING THE INSTRUMENT LID AFTER IT IS UNLOCKED, TAKE INFECTION CONTROL MEASURES SUCH AS WEARING PROTECTIVE CLOTHING AND PLACING THE INSTRUMENT IN A SAFETY CABINET.

5.2 Actions to be Taken When an Error Occurs

If an error occurs during operation, the instrument immediately decelerates the motor and sounds the alarm. After the motor has stopped, the lid lock indicator (LID LOCK) is turned off. Open the instrument lid and take corrective actions for the error occurred.

The alarm buzzer can be silenced by pressing any key on the control panel (START/STOP, SET, UP and DOWN keys).

To exit from the error display, turn the instrument power off and on again.

Description of the Error Display (Figure 5C)

![Figure 5C](image)
5. TROUBLESHOOTING AND SERVICE

1. The error code of an error is displayed in the Speed display window.

2. Up to three errors can be viewed with the latest one first. The occurrence order is displayed in the Program display window like “1”, “2” and “3”. If the same error occurs successively, it is only registered once. If multiple errors occur during one run, only one error that has the highest priority is registered.

3. The error code is displayed as “E-xx”, except for the balance error which is displayed as “bAL”. For details, see the following tables.

5.3 Troubleshooting Charts

The following Troubleshooting Charts list caution messages and error codes that could occur during operation of the Cyto-Tek® 2500 Cytocentrifuge. Possible problems could be electrical, operational, or mechanical. Probable causes and recommended remedies are also included so that isolated problems can be quickly corrected.

If additional assistance is required concerning an instrument problem, an error code displays that is not listed here, or if the problem cannot be isolated or is beyond the scope of this manual, complete the “PreService Checklist” at the end of this section. Then contact the Technical Support Department of Sakura Finetek USA., Inc. by calling toll free 1-800-725-8723, option 2 (U.S. only). If located outside the United States, contact the nearest Sakura instrument distributor or representative for information and assistance.
### 5.3.1 Error Code of Monitored Errors

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description/Symptom</th>
<th>Major Causes</th>
<th>Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>The instrument lid remains locked</td>
<td>Faulty solenoid or wiring</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lid lock detection sensor failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>To remove specimen chambers, see “How to unlock the lid mechanically during power outage”, P2-15.</td>
</tr>
<tr>
<td>86</td>
<td>The instrument lid cannot be locked</td>
<td>Faulty solenoid or wiring</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lid lock detection sensor failure</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>The instrument lid is opened during operation.</td>
<td>Faulty lid sensor or improper wiring</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lid lock detection sensor failure</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>The lock was released during operation</td>
<td>Faulty solenoid or wiring</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lid lock detection sensor failure</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>The instrument lid is open but the solenoid is in the locked condition.</td>
<td>Faulty solenoid or wiring</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lid lock detection sensor failure</td>
<td></td>
</tr>
</tbody>
</table>
## 5. TROUBLESHOOTING AND SERVICE

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description/Symptom</th>
<th>Major Causes</th>
<th>Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>94</td>
<td>Rotation detection error occurred during acceleration (the rotation speed does not increase)</td>
<td>Improper guard bowl placement</td>
<td>Place the guard bowl properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A run is started without the bowl lid put on</td>
<td>Put the bowl lid on the guard bowl and lock properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty motor, motor driver or wiring</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>Rotation detection error occurred during constant rotation (the motor speed deviated ±100rpm from the set value)</td>
<td>Improper guard bowl placement</td>
<td>Place the guard bowl properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td>Place the guard bowl properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td>Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty motor, motor driver or wiring</td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>Rotation detection error occurred during deceleration (the rotation speed does not decrease during deceleration)</td>
<td>Improper guard bowl placement</td>
<td>Place the guard bowl properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor connector contact</td>
<td>Place the guard bowl properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td>Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty motor, motor driver or wiring</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>Motor error (the motor’s alarm function was triggered)</td>
<td>Temperature error</td>
<td>Turn the instrument power off. Operate the instrument again in 30 minutes. If the same error occurs, contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Locked motor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overload</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty motor, motor driver or wiring</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td>bAL</td>
<td>Balance error</td>
<td>Specimen chambers are not properly arranged in the rotor</td>
<td>Always arrange the specimen chambers symmetrically.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specimen volume in each specimen chamber is not even</td>
<td>Fill the specimen chambers evenly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eccentricity of motor shaft and/or spindle</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distortion of guard bowl and/or rotor</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improperly adjusted balance sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rotation mechanism failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fluid is accumulated in the guard bowl (when paper filters are used)</td>
<td>Drain the guard bowl of accumulated fluid.</td>
</tr>
</tbody>
</table>
### 5.3.2 Other Errors

<table>
<thead>
<tr>
<th>Problem</th>
<th>Major Causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instrument lid cannot be opened.</td>
<td>Power was lost/interrupted during operation (due to power failure, etc.).</td>
<td>Inspect power source, power plug and power switch.</td>
</tr>
<tr>
<td></td>
<td>Instrument lid push button failure</td>
<td>The lid lock is released when the rotation speed goes below ±50rpm after power restoration.</td>
</tr>
<tr>
<td></td>
<td>Faulty spring(s)</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td>Worn bushing</td>
<td>To remove specimen chambers, see &quot;How to unlock the lid mechanically during power outage&quot;.</td>
</tr>
<tr>
<td>The bowl lid is locked.</td>
<td></td>
<td>Unlock the bowl lid.</td>
</tr>
<tr>
<td>The pressure inside the guard bowl is negative.</td>
<td></td>
<td>Warm the guard bowl and open the lid.</td>
</tr>
<tr>
<td>Bowl lid lock/unlock mechanism failure</td>
<td></td>
<td>If the problem persists, contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td>The guard bowl is distorted.</td>
<td></td>
<td>Warm the guard bowl and open the lid.</td>
</tr>
<tr>
<td>Keys on the control panel do not react.</td>
<td>Faulty membrane switch</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td>Control panel board failure</td>
<td></td>
</tr>
<tr>
<td>The power is not supplied.</td>
<td>Power supply facility failure</td>
<td>Check if power supply on the facility side is normal.</td>
</tr>
<tr>
<td></td>
<td>Faulty power cord</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switching power supply failure</td>
<td>Confirm that the power cord is firmly plugged.</td>
</tr>
<tr>
<td></td>
<td>Leakage in switching power supply</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td>Blown fuse(s)</td>
<td></td>
</tr>
<tr>
<td>An electric shock occurred.</td>
<td>The grounding wire to the power input is disconnected.</td>
<td>Make sure that grounding wire is firmly connected.</td>
</tr>
<tr>
<td></td>
<td>Leakage in the power input area</td>
<td></td>
</tr>
<tr>
<td>The 7-segment display is broken or flickering.</td>
<td>Poor cable contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control panel board failure</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td>7-segment display malfunction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Controller board failure</td>
<td></td>
</tr>
<tr>
<td>LED indicator is not illuminated.</td>
<td>Faulty membrane switch</td>
<td>Contact Sakura Technical Support or distributor.</td>
</tr>
<tr>
<td></td>
<td>Control panel board failure</td>
<td></td>
</tr>
<tr>
<td>Error/warning.click sounds are not generated.</td>
<td>Specimen chambers are not properly arranged in the rotor.</td>
<td>Always arrange the specimen chambers symmetrically.</td>
</tr>
<tr>
<td>Abnormal noise is heard. The outer casing surface vibrates abnormally.</td>
<td>Specimen volume in each specimen chamber is not even.</td>
<td>Fill the specimen chambers evenly.</td>
</tr>
<tr>
<td></td>
<td>Eccentricity of motor shaft and/or spindle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distortion of guard bowl and/or rotor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improperly adjusted balance sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose mounting screws in each part</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improper instrument installation</td>
<td>Place the instrument on a sturdy laboratory table or bench.</td>
</tr>
</tbody>
</table>

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5. TROUBLESHOOTING AND SERVICE

Guard bowl unit cannot be removed from the instrument

- Water or foreign particle exists between the spindle and bowl shaft housing
  - By gently lifting up the flange of the guard bowl, make a space between the spindle and bowl shaft housing and remove the guard bowl unit from the instrument.
  - Clean the spindle and bowl shaft housing.
  - If the problem often occurs, apply grease (option) to the spindle.
  - If the problem persists, contact Sakura Technical Support or sales representative.

- Worn spindle or bowl shaft housing
  - Contact Sakura Technical Support or sales representative.

Rotor mounting screws cannot be loosened by hand

- Worn or corroded rotor mounting screw threads
  - Apply a flat-head screwdriver to a slot on the screw head and loosen the mounting screw. Clean the mounting screws.
  - If the problem persists, contact Sakura Technical Support or sales representative.

- Worn or corroded female threads in bowl shaft housing
  - Contact Sakura Technical Support or sales representative.

Corrosion of screw threads

5.4 Service Information

5.4.1 When there is a Problem with the Instrument

Avoid problems by carefully following proper operating and cleaning procedures for the Cyto-Tek 2500 Cytocentrifuge and the specimen chamber holders. If problems arise during the operation of the instrument, first refer to TROUBLESHOOTING Section.

If the problem cannot be solved and an instrument failure is apparent, our Technical Support Department is available to assist you. Before calling for instrument service, collect the information requested in the “PreService Checklist” of this section. This information will help the Technical Support Representative identify the probable cause of the instrument malfunction. The instrument should be disinfected prior to being serviced (See Section 4, CARE OF THE INSTRUMENT, for disinfection instructions).

Where to Call for Service

If located within the United States, contact the Technical Support Department of Sakura Finetek USA, Inc. by calling toll free: 1-800-725-8723, option 2.

In countries other than the United States, contact the nearest authorized Sakura instrument distributor or representative for service information and assistance.

5.4.2 Cyto-Tek 2500 Cytocentrifuge PreService Checklist

Serial Number: ______________________________
Date of Installation: _________________________
Model Number: ______________________________
Warranty Period Date: _______________________

1. Is the power cord plugged into an appropriate power source?
2. When the power switch is turned on, is the display panel illuminated and are the Mode lights lit?
3. Is there electricity with the correct voltage in the outlet the instrument is plugged into? If not, check the corresponding fuse or circuit breaker.
4. What Error Codes(s), if any, are indicated on the control panel?
5. Was the centrifugation interrupted for any reason after START had been pressed?
6. Was there a power failure during operation?
5.4 Accessory Items

Product Number/Description

<table>
<thead>
<tr>
<th>Product Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4301</td>
<td>Specimen Chambers Kits (1 mL)-Disposable</td>
</tr>
<tr>
<td>4331</td>
<td>Specimen Chambers (6 mL)</td>
</tr>
<tr>
<td>4328</td>
<td>Specimen Chambers (12 mL)</td>
</tr>
<tr>
<td>4334</td>
<td>Specimen Chamber Caps (6 mL or 12 mL)</td>
</tr>
<tr>
<td>4326</td>
<td>Specimen Chamber Holder with Clip Stainless Steel (6 mL or 12 mL)</td>
</tr>
<tr>
<td>4327</td>
<td>Silicon Rubber Gasket (6 mL)</td>
</tr>
<tr>
<td>4337</td>
<td>Silicon Rubber Gasket (12 mL)</td>
</tr>
</tbody>
</table>

5.5 Replacement and Maintenance Parts

Part Number/Description

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F60-755-00</td>
<td>Guard Bowl Unit</td>
</tr>
<tr>
<td>F60-895-00</td>
<td>Bowl Lid</td>
</tr>
<tr>
<td>F60-896-00</td>
<td>Bowl Unit</td>
</tr>
<tr>
<td>F60-97-00</td>
<td>Rotor Unit</td>
</tr>
<tr>
<td>A3-400-048</td>
<td>Time Delay Fuse, HT 2AN5</td>
</tr>
<tr>
<td>B3-01-0000</td>
<td>V-Ring</td>
</tr>
<tr>
<td>0007129-01</td>
<td>Operating Manual</td>
</tr>
<tr>
<td>D9-60-003A</td>
<td>Grease; 10 g (North America)</td>
</tr>
<tr>
<td>F61-058-00</td>
<td>Grease; 10 g (other than North America)</td>
</tr>
</tbody>
</table>

5.6 Where to Order

If located within the United States Accessory Items and Replacement Parts are available directly from:
Order Management
Sakura Finetek USA, Inc.
1750 West 214th Street
Torrance, CA 90501 U.S.A.
1-800-725-8723, option 1

Or contact the nearest authorized Sakura distributor or representative. In countries other than the United States, contact the nearest authorized Sakura distributor or representative for service information and assistance.
6. SAFETY PRECAUTIONS

6.1 Safety Precautions

Operation of the Cyto-Tek® 2500 Cytocentrifuge requires expert knowledge of the intended application, instructions for use, etc. Therefore, appoint a person responsible for operation of the instrument in order to use it properly and safely.

When the instrument is delivered, the responsible person should receive full explanation on the handling of the instrument from our sales representative.

- Read this “Safety Precautions” beforehand to operate the instrument properly.
- The cautionary instructions provided herein are intended to secure safety operation of the instrument and prevent physical damage and injury to the operator. Follow these important safety instructions fully.
- In this manual, potential hazards at different levels are classified as “Danger”, “Warning”, “Caution” and “Note” indicated respectively where applicable. They are defined as follows.

  **<Danger>** identifies a potential hazard in which failure to follow instructions may result in death or serious injury to the operator and/or other personnel.

  **<Warning>** indicates a potential hazard in which failure to follow instructions may result in serious injury to the operator and/or other personnel.

  **<Caution>** indicates a potential hazard in which failure to follow instructions may result in injury to the operator and/or other personnel or damage to the instrument and/or other property.

  **<Note>** indicates a reminder or other helpful information.

- Images shown in this manual may be partially different from those of the actual instrument.
- Please note that we are not responsible for any effect of the slides prepared by the instrument on diagnosis or any effect derived from the instrument’s specification on specimens and slides.

A label bearing this symbol specifies a cautionary item. Improper handling against the instruction may endanger the operator or damage the instrument. Always follow the instruction.

A label bearing this symbol requires the operator or other personnel to wear protective clothing for infection control when using, inspecting, or disassembling any part of the instrument where this label is attached. Also, wash hands thoroughly after use of the instrument.
6. SAFETY PRECAUTIONS

6.1.1 Dangers

Do not wet the instrument.
Wetting any part of the instrument other than those specified in “Daily Care and Maintenance” or other applicable sections may cause fire or electric shock due to leak current.

Do not power the instrument if it is not free from dew condensation.
Powering the instrument with condensation formed may cause fire or electric shock due to leak current.

Do not bring fire sources close to the instrument.

Do not disassemble or modify the instrument.
The instrument may malfunction or cause an accident.

Do not pinch your hand between gaps in movable components.
Your hand may be injured when pinched.

Do not operate the switches with wet hands or connect/disconnect the power plug with wet hands. Connect/disconnect the power plug by holding the plug.
Doing so may result in electric shock.

Use only the supplied power cord.
Use of a power cord with inadequate current capacity may cause electric shock or fire by short circuit. Use the power cord appropriate to your local current capacity.

Regional safety regulations may require using a standard power cord designated by statute. If any other power cord than a PSE-certified or UL/CSA-approved or European-made power cord is needed, contact the nearest instrument distributor.

Connect the power plug to an outlet with a grounding terminal.
Connect the power plug to a dedicated, D-class grounded power receptacle. Failure to do so may cause fire or electric shock due to leak current.

In the event of system malfunction, turn off the power and then remove the power plug from the power outlet.
In the event of instrument malfunction, turn off the instrument power and call Sakura Technical Support Center. Unplugging the instrument can also turn off the main power supply. If the instrument malfunctions, remove the power plug from the power receptacle. At instrument installation, choose such a place as a wall outlet is not hidden behind the instrument so that you can quickly unplug the instrument in the event of emergency.

Do not connect to a piggybacked electric outlet.

Do not use an extension cord.
Doing so may cause breakdown by low voltage or fire due to heat generation.

Do not use with incorrect power voltage.

Do not alter power supply components and cables.

Do not use improper fuses.
Fuses must be replaced by authorized service personnel.

Contact Sakura Technical Support when needed.

Unplug the instrument before replacing fuses.
Failure to do so may cause the instrument to overheat or may lead to electric shock, short circuit, or accidental fire. Check for working voltage prior to operation of the instrument.

Do not damage the power cord.
Do not cut, break, modify, forcibly bend, twist, or bundle the power cord. Do not put heavy things on the power cord or store in a small place. Doing so may damage the power cord, leading to fire or electric shock.

Do not locate the instrument in a place exposed to direct sunlight or possibly getting wet with splashes from rain or snow.
Ultraviolet rays or extreme temperature may cause breakdown.

Operate the instrument in a clean, less humid place.
The instrument is intended to be operated indoors. Do not use it outdoors.

Do not use the instrument in a place under following conditions:

- A place where it will be subjected to low or high temperatures (allowable operating range is from 10°C to 40°C).
- A humid place where condensation can build.
- A place exposed to a lot of dust, oily smoke or steam.
- Outdoors.
- If the instrument needs to be installed in a special place, contact a Sakura sales representative.

Be sure to open and close the guard bowl or handle specimens in a safety cabinet.
Specimens should be regarded as biologically hazardous. Use of the components like the guard bowl for biological safety may not be enough to prevent contamination with pathogenic organisms. The instrument and guard bowl, however, are not resistant to an UV germicidal lamp or ozone.

6.1.2 Warnings

Avoid using deteriorated or broken or deformed components, for instance, a specimen chamber, chamber holder, guard bowl and gaskets.

Do not open the instrument lid when the rotor (guard bowl) is rotating.
Doing so may result in an accident or injury.

Do not move the instrument when the rotor (guard bowl) is rotating.
Doing so may result in accident or injury. After the rotor has stopped, unplug the power cord before moving the instrument.

Arrange specimen chambers diagonal to each other when placing them into the rotor.
Loading only one or an odd number of specimen chambers will cause the rotor to become unbalanced during rotation, resulting in abnormal, dangerous vibration. In the event of abnormal vibration, immediately switch off the instrument.

Avoid selecting a longer process time.
The process time is selectable from 0 minute and 1 second to 99 minutes and 59 seconds. However, a prolonged process time may make specimens dry. Consider an appropriate process time before setting the time.

Connect the power cord firmly
Loose connections may cause the connected part to generate heat or the voltage to decline, leading to not only improper operation of the instrument but also unexpected accident or injury.

Turn off the power before performing cleaning.
Turn off the power before performing cleaning unless otherwise instructed in this manual.

After sterilized by an autoclave, the guard bowl and other components will be very hot. Be careful not to get burned.

Use specified fuses.

Place the instrument on a sturdy laboratory table or bench.
Failure to do so may result injury or accident.

Install the instrument in a horizontal and vertical posture.
The instrument in a slanted posture may lead to an accident.

Leave 30cm or more of clearance around the instrument.

Do not remove caution labels from the instrument.
Without these labels, the operator cannot be reminded of necessary warnings and cautions for daily handling of the instrument, which may result in an accident or injury.

Do not place obstruction on movable components.

Do not spill any organic solvent on the instrument.

Open and close the guard bowl lid and instrument lid slowly.

6.1.3 Cautions

Be careful not to pinch your hand when opening or closing the instrument lid.

Do not make a strong impact on the transparent window.
Doing so may break the transparent window and cause injury.

Do not remove warning/caution labels from the instrument.
Without these labels, operator cannot be reminded of necessary warnings and cautions for daily handling of the instrument, which may result in an accident or injury.

When sterilizing the guard bowl unit by high pressure steam, wear protective clothing like gloves and avoid getting burned.

When disinfecting the exterior and interior of the instrument, wear protective clothing and place the instrument inside a safety chamber.

Do not use the disinfectants other than listed below. Doing so may result in an accident.

- Cleaning ethyl alcohol (80% or less)
- Cleaning isopropyl alcohol (70% or less)
- Sodium hypochlorite solution (0.5% or less, within 20 minutes)
6. SAFETY PRECAUTIONS

Do not block the ventilation ports of the instrument. Blocking the ventilation ports may cause improper ventilation and instrument failure.

Do not put an object and reagent on top of the instrument. Doing so may cause an accident. Spillage of a chemical solution may damage or break down the instrument.

Open and close the instrument lid and guard bowl lid slowly. A strong impact may break the lid.

Do not open the instrument lid unless needed. Open the instrument lid only when needed to operate the instrument as instructed in this manual. The time the lid is opened should be as short as possible.

Perform a test run before determining operating parameters. Operating parameters vary depending on specimen type. Test operating parameters on the instrument actually before determining them.

Use designated instrument accessories and consumables. Use consumables specified in this manual for replacement. Use of wrong components will cause malfunction or failure.

Do not spill fluids like specimens or water on the lid latch hole and the control panel. Wipe spillage off immediately.

Do not put foreign matter into the lid latch hole and the louver on the back and sides of the instrument. Doing so may cause instrument malfunction.

Always keep the spindle and bowl shaft housing clean and dust-free.

Keep the guard bowl unit removed from the instrument when it is not in use. Failure to do so may cause the guard bowl to seize and make it unable to remove.

Use microscopic glass slides (edge-ground). Glass slides might break, depending on their size and quality. Determine if glass slides can be safely assembled in the chamber holders and processed on the instrument before use.

Confirm that a name and ID on each glass slide match those of individual patients or subjects. Do not leave the guard bowl lid locked after use.

The bowl lid left locked after use may become difficult to remove if pressure inside the guard bowl becomes negative.

Do not put an obstruction on movable components. Doing so may cause instrument failure.

Store the instrument with the power cord unplugged for extended non-use. If the instrument is not used for a long period, clean the instrument lightly, put the dust cover on to avoid dust and foreign matter, and store in a place with low humidity.

Perform a periodic inspection once a year. In order to operate the instrument safely and maintain its capabilities, conduct a periodic inspection once a year. Contact a Sakura sales representative for details.

Do not clean the instrument with benzene or thinner. Do not wipe the instrument surface with benzene or thinner. Doing so may cause the surface to dissolve or crack or its rigidity to decrease. Wipe with a paper towel moistened with alcohol. Do not spray with alcohol. Fluids running into electric components may cause insulation failure or deterioration like corrosion.

Use specified cleaning agents. Use a mild detergent. If an unspecified agent is used, the instrument may corrode or malfunction.

Exercise due caution when handling reagents. Wear gloves, mask and/or safety goggles, or take other proper measures designed to protect the operator, by following the applicable regulation or guideline in your country or region.

Some reagents are a hazard to human health. If any biologically hazardous substance is handled, follow applicable regulations or guidelines in your country or region to ensure safety. Wear protective clothing and work in a safety cabinet as appropriate to protect the operator. Sterilize possible infectious waste and infectious medical waste and dispose of them properly as per regulations and guidelines in your country or region.