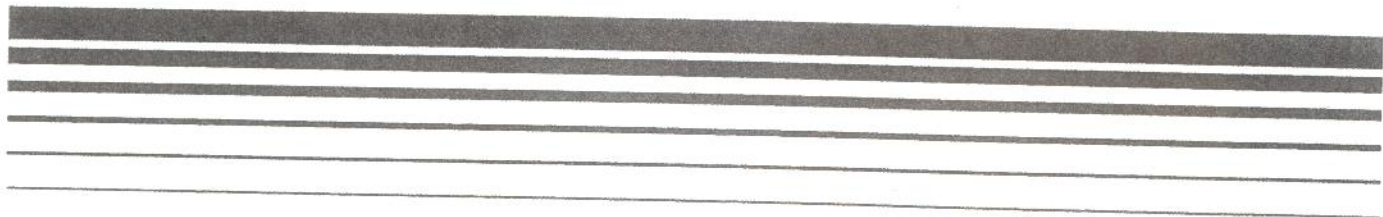


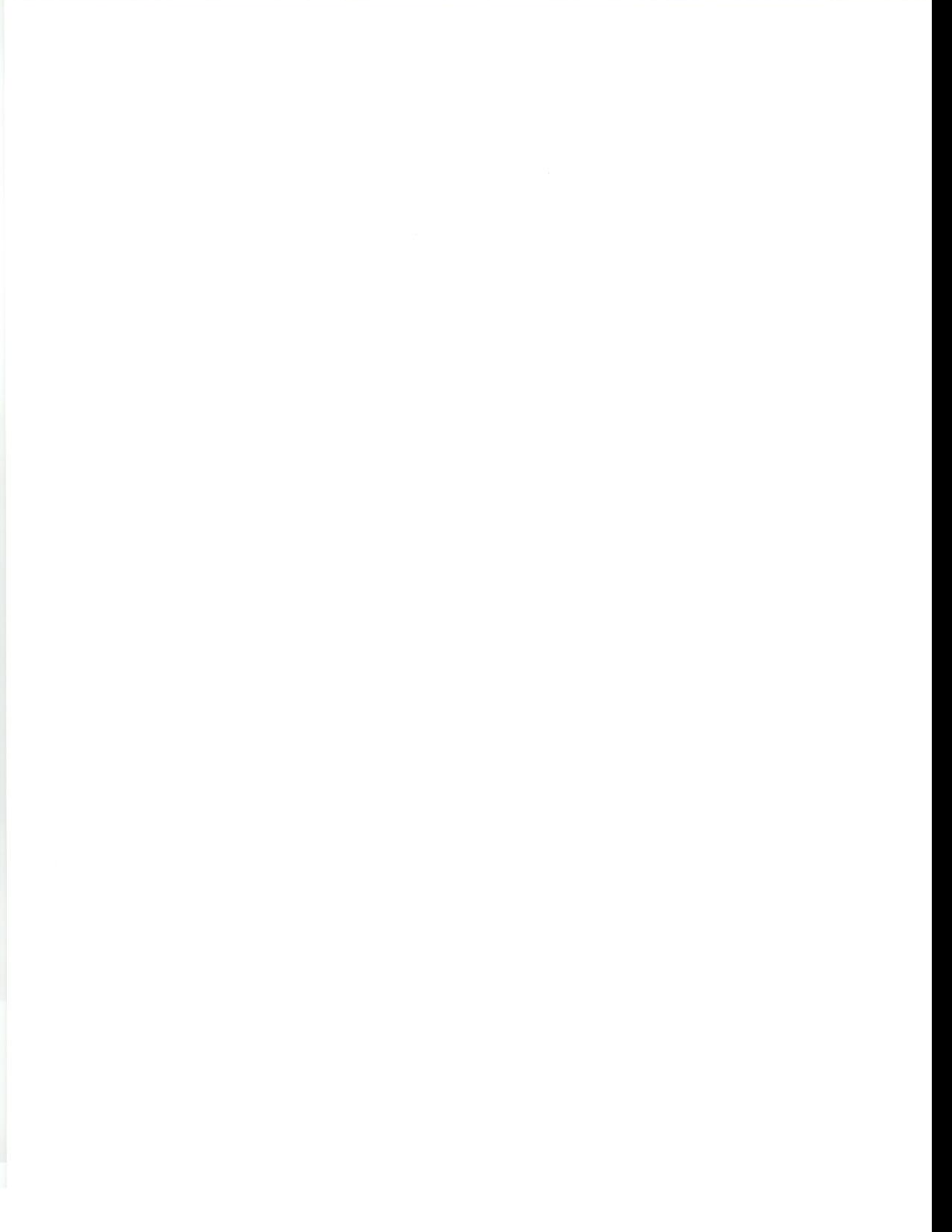
SORVALL®

SORVALL®
RC5B



INSTRUCTION
MANUAL

 **Kendro**
Laboratory Products



OPERATING INSTRUCTIONS

SORVALL[®] RC-5B AUTOMATIC SUPERSPEED REFRIGERATED CENTRIFUGE

Du Pont Company
Medical Products
Sorvall[®] Instruments
Wilmington, Delaware 19898
U.S.A.

Sorvall[®] Centrifuges



This manual is a guide to the use of the

SORVALL® RC-5B AUTOMATIC SUPERSPEED REFRIGERATED CENTRIFUGE

The data contained in this manual has been verified and is believed adequate for the intended use of the instrument. If the instrument or procedures are used for purposes over and above the capabilities specified herein, confirmation of their validity and suitability should be obtained; otherwise DuPont does not guarantee results and assumes no obligation or liability. This publication is not a license to operate under or a recommendation to infringe upon any process patents.

Publications prior to the Issue Date of this manual may contain data in apparent conflict with that provided herein. Please consider all data in this manual to be the most current.

NOTES, CAUTIONS and WARNINGS within the text of this manual are used to emphasize important and critical instructions.

WARNING: A Warning informs the operator of a hazard or an unsafe practice that could result in personal injury, affect the operator's health, or contaminate the environment.

CAUTION: A Caution informs the operator of an unsafe practice that could result in damage of equipment.

NOTE: A Note highlights essential information.

WARNING

Regarding the Use of Hazardous Material

If using radioactive, toxic, or pathogenic material, you should be aware of all characteristics of the material and the hazards associated with it should leakage occur during centrifugation. If leakage does occur, neither the centrifuge nor rotor can protect you from the particles dispersed into the air. To protect yourself, we recommend additional precautions be taken to prevent exposure to these materials, for example controlled ventilation or isolation. **DO NOT USE MATERIALS CAPABLE OF PRODUCING FLAMMABLE OR EXPLOSIVE VAPORS.**

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Warranty

The Sorvall® RC-5B Automatic Superspeed Refrigerated Centrifuge is warranted to be free from defects in material and workmanship for a period of one year from the date of delivery. The compressor, condenser, evaporator and all interconnecting tubing are warranted to be free of defects in material and workmanship for a period of five years from the date of delivery. DuPont will repair or replace and return free of charge any part which is returned to its factory within said period, transportation prepaid by user, and which is found upon inspection to have been defective in materials or workmanship. This warranty does not include normal wear from use, it does not apply to any instrument which has been damaged through accident, negligence, failure to follow operating instructions, the use of electric currents or circuits other than those specified on the plate affixed to the instrument, misuse or abuse.

DuPont reserves the right to change, alter, modify or improve any of its instruments without any obligation whatever to make corresponding changes to any instrument previously sold or shipped.

THE FOREGOING OBLIGATIONS ARE IN LIEU OF ALL OTHER OBLIGATIONS AND LIABILITIES INCLUDING NEGLIGENCE, AND ALL WARRANTIES, OF MERCHANTABILITY OR OTHERWISE, EITHER EXPRESSED OR IMPLIED IN FACT OR BY LAW, AND STATE OUR ENTIRE AND EXCLUSIVE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM OR DAMAGES IN CONNECTION WITH THE SALE OR FURNISHING OF GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION OR OPERATION. DUPONT WILL IN NO EVENT BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, AND OUR LIABILITY UNDER NO CIRCUMSTANCES WILL EXCEED THE CONTRACT PRICE FOR THE GOODS FOR WHICH LIABILITY IS CLAIMED.

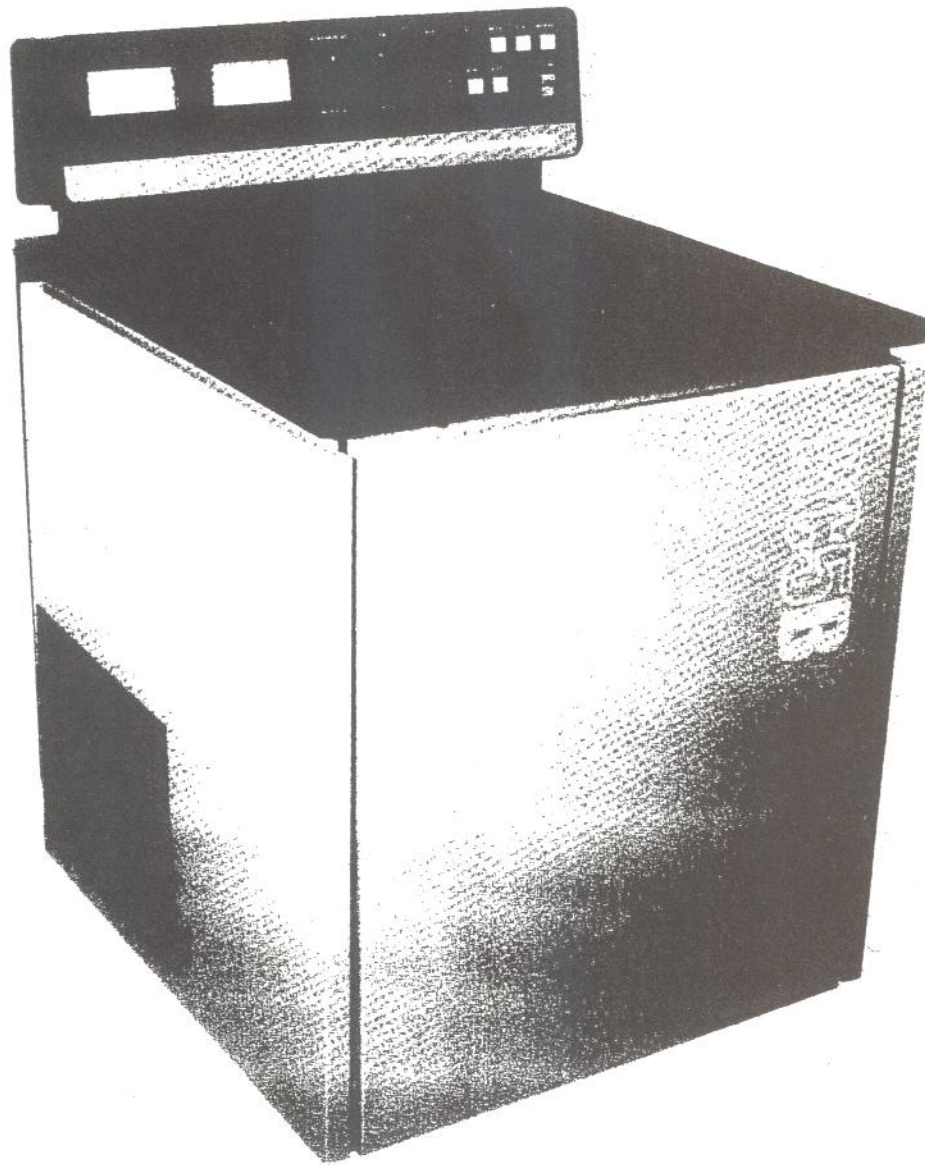


Figure 1-1. Sorvall® RC-5B Automatic Superspeed Refrigerated Centrifuge

Section 1. DESCRIPTION

This manual provides you with the information you will need to install, operate and maintain your Sorvall® RC-5B Automatic Superspeed Refrigerated Centrifuge. If you encounter any problem concerning either operation or maintenance that is not covered in the manual, please contact our Marketing Technical Group for assistance. In the United States, telephone toll free 1-800-551-2121. Outside the United States, contact your local distributor or agent for SORVALL Products.

1-1. Centrifuge Description

The RC-5B is a floor-model, refrigerated superspeed centrifuge that can be used at speeds from 100 rpm to 21 000 rpm*. Its function is to increase the effects of gravity by centrifugal force to separate substances of different size or densities at controlled temperatures.

The centrifuge has a fan-cooled motor that is balanced and enclosed in an air-cooled silencer to ensure smooth, quiet operation over its full speed range and to promote long life for the brushes and bearings. The gyro-action centering drive accepts a variety of SORVALL rotors.

The refrigeration system is a low-temperature, hermetically-sealed unit consisting of a compressor, condenser, evaporator/rotor chamber and interconnecting tubing. During operation, the cooling system will maintain rotor compartment temperature within 1°C of setpoint.

Both the SORVALL SS-34 Fixed-Angle Rotor and the TZ-28 Zonal Rotor can be adapted for continuous flow operation in the RC-5B.

1-2. Specifications

NOTE

Specifications will vary depending on the rotor being used.

Maximum Operating Speed (controllable to within 1% or 100 rpm of set speed, whichever is greater) 21 000 rpm

Temperature Control Range As low as -15°C at reduced speeds; chamber temperature ranges from -20°C to +30°C

(continued on next page)

*Speed in revolutions per minute (rpm) is related to angular velocity, ω , according to the following:

$$\omega = (\text{rpm}) \left(\frac{2\pi}{60} \right) = (\text{rpm}) (0.10472)$$

Where ω = rad/s. All further references in this manual to speed will be designated as rpm.

Electrical Requirements - The RC-5B requires one of the following single phase power sources. (Note: Polyphase operation requires rewiring of power supply.)

- 208 V, 60 Hz, 30 A
- 230 V, 60 Hz, 30 A
- 220 V, 50 Hz, 30 A
- 240 V, 50 Hz, 30 A

Maximum Heat Output 6.9 kW (23 400 Btu/h)

Dimensions:

- Width 76 cm (30 in)
- Depth 99 cm (39 in)
- Height (to top of console) 121 cm (48 in)
- Net Weight 308 kg (680 lb)

1-3. Rotors

The following SORVALL rotors are currently available for use in the RC-5B Centrifuge.

Table 1-1. Sorvall® Superspeed Rotors

Rotor	Maximum Operating Speed (rpm)	Maximum Relative Centrifugal Force (RCF)
FIXED ANGLE		
SS-34	20 000	47 800
SM-24	20 000	49 500*
GSA	13 000	27 500
SE-12	21 000	46 000
GS-3	9 000	13 700
SA-600	16 500	39 400
SWINGING BUCKET		
SH-80	20 000	45 400
HB-4	13 000	27 900
HS-4	7 000	9 430
HORIZONTAL MICROTUBE		
SH-MT	20 000	See SH-MT Instruction Manual
ZONAL		
TZ-28	20 000	42 600
VERTICAL		
SV-80	19 000	41 000
SV-288	20 000	40 300

*Outer Row

1-4. Principles of Operation

Whenever the POWER switch is ON and a rotor is installed but is not spinning or is decelerating from a run, the centrifuge is operating in the standby mode. Temperature control is automatic. During standby, compressor operation is controlled by the red needle setpoint and chamber temperature is indicated by the black needle on the control panel meter. The compressor will cycle on and off, as required, to maintain the selected temperature.

As soon as the rotor begins to accelerate to the selected run speed, the centrifuge is operating in either a timed or hold condition, depending on the setting of the timer. The START light on the control panel will come on and will stay on during the entire run cycle; the light will go out when the selected run time has elapsed or when the timer is set to STOP.

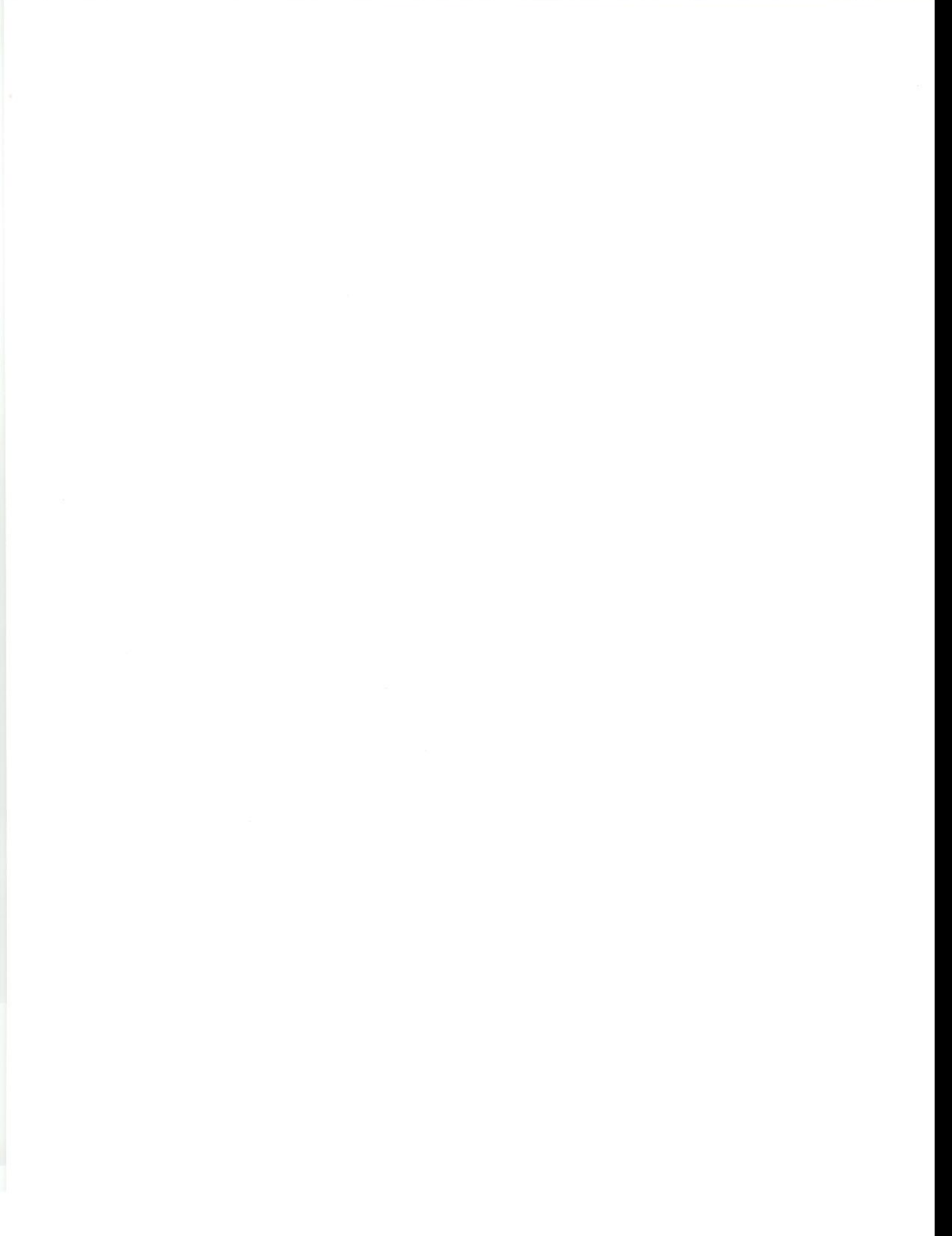
During either a timed or hold run, compressor operation is controlled by the blue needle setpoint and actual temperature is, again, indicated by the black needle. As in standby, temperature control is automatic and the compressor will cycle on and off to maintain selected temperature. If, at any time during a run, the temperature in the chamber rises three degrees or more above the red needle setpoint, an overtemperature detector will activate and place the centrifuge back in standby operation. The rotor will decelerate to a stop, and the centrifuge will not restart until the overtemperature condition is corrected.

After the rotor has accelerated above 100 rpm, a safety interlock prohibits the chamber door from being opened. The door cannot be opened until the rotor decelerates to a speed below 100 rpm. In the case of power loss, the safety interlock can be overridden and the chamber door opened. See the Emergency Sample Recovery procedure given in Section 4.

At the end of a timed run or when the timer is turned to STOP, the rotor will either coast or brake to a stop. The rotor will only brake if the BRAKE switch is ON. As soon as the rotor begins to decelerate, the centrifuge switches back to standby operation and temperature is controlled by the red needle setpoint. The DOOR lamp will come on as soon as rotor speed is below 100 rpm. When the DOOR switch is pressed, the safety interlock releases and the chamber door can be opened.

NOTE

To open the chamber door, the door handle must be lifted while pressing the DOOR switch. However, holding the DOOR switch for more than 3 to 5 seconds will interrupt the circuit to the safety interlock and the door will not open. In this case, release the switch and wait 30 to 80 seconds for the circuit to reset, then press the switch again.



Section 2. INSTALLATION

This section provides the information necessary to unpack, inspect, and install the centrifuge.

2-1. Inspection

As soon as you receive your RC-5B you should carefully inspect it for any shipping damage which may have occurred. If you find any damage, please report it immediately to the transportation company and file a damage claim, then notify Du Pont. If any parts are missing, contact the nearest representative or district office of DuPont listed on the back of this manual.

2-2. Electrical Requirements

The centrifuge is ordered for a specific single phase power source (preferably regulated). The nameplate on the back panel of the centrifuge specifies one of the following classifications:

208 V, 60 Hz, 30 A
230 V, 60 Hz, 30 A
220 V, 50 Hz, 30 A
240 V, 50 Hz, 30 A

CAUTION

The centrifuge can be damaged if it is connected to the wrong voltage. Check the voltage before plugging the centrifuge into any power source. DuPont is not responsible for incorrect installation.

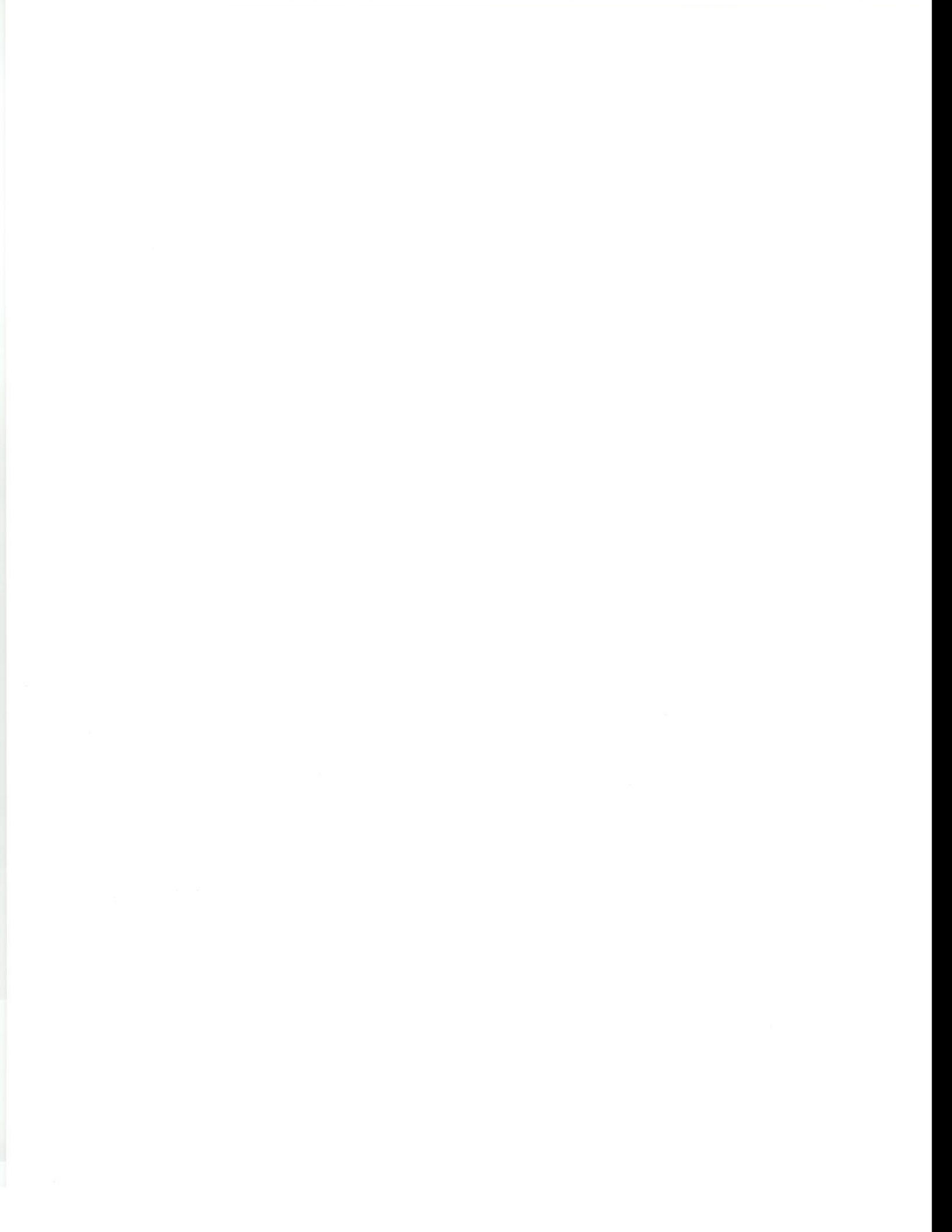
The centrifuge is equipped with a 3-wire power cord with a 3-prong molded cap, including ground connection to fit a NEMA 6-30R receptacle or equivalent. (Centrifuges shipped to Canada have CSA approval and are supplied with a power cord to fit a NEMA 6-50R receptacle or equivalent.) At locations requiring polyphase operation, the power cord will have to be removed and replaced, and the centrifuge will have to be rewired. If rewiring is necessary, contact a DuPont Service Representative.

2-3. Location

The location of the centrifuge should be carefully considered. Free air circulation is very important for proper functioning.

Maintain 15 cm (6 in) clearance between the wall and the left-side (facing front of centrifuge) cabinet panel to allow adequate air circulation. If inlet air temperature exceeds 25°C, low temperature operation at 21 000 rpm may not be possible.

When the centrifuge is in place, lower and secure the front locking stabilizers to prevent the unit from moving on its casters. For best performance, make sure the centrifuge is level.



Section 3. OPERATION

This section describes the function of each operating control and indicator and provides the information necessary to operate the centrifuge.

3-1. Controls and Indicators

Figure 3-1 shows the location of operating controls and indicators. Table 3-1 lists them by item number and describes their function.

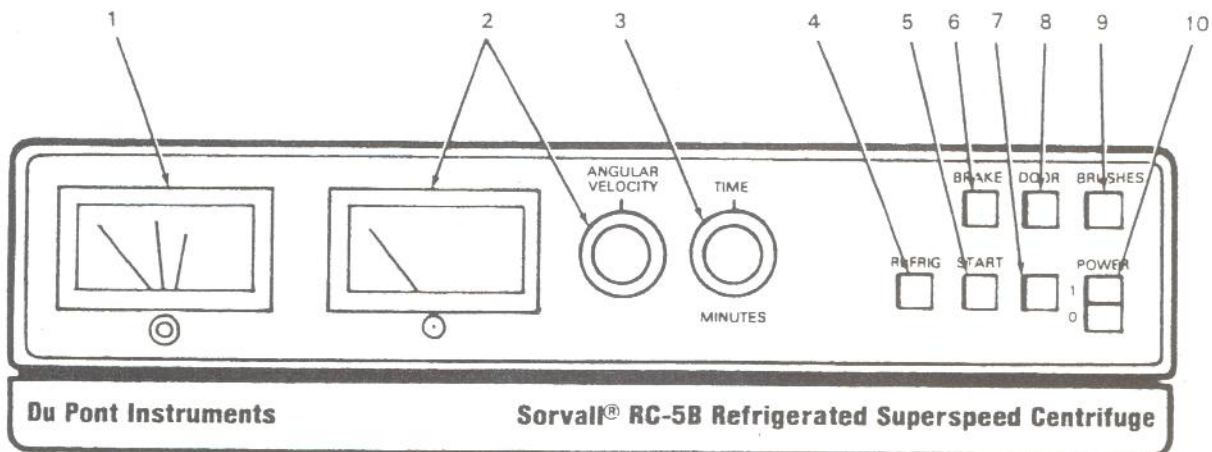


Figure 3-1. Controls and Indicators

Table 3-1. Function of Controls and Indicators

Item Number	Name	Function
1	TEMPERATURE Control, Selectors and Indicator	The blue temperature needle selects desired chamber temperature during timed or hold operation (timer on) and the red needle selects the maximum overtemperature. When timer is off (centrifuge is in standby) the red temperature needle selects desired chamber temperature. The refrigeration system automatically maintains desired temperature during standby, timed, or hold operation. The black needle indicates actual temperature in the rotor chamber.
2	ANGULAR VELOCITY (Speed Control) dial and Indicator	This dial is used to set desired run speed (in rpm). The indicator shows actual rotor speed during a run.

(continued on next page)

**Table 3-1. Function of Controls and Indicators
(Continued)**

Item Number	Name	Function
3	TIME Control Dial	This dial is used to select the desired length of a run, up to 120 minutes for a timed run or continuous if set at HOLD. The STOP setting is selected to end a run in HOLD or to end a timed run before the selected time has elapsed.
4	REFRIG Lamp	When lit, indicates that the compressor is on (60 Hz units only).
5	START Switch and Lamp	When pressed, the run will begin and the START light will come on (chamber door must be closed).
6	BRAKE Switch and Lamp	Press on to select brake at the end of a run. With the brake switch on, the rotor will brake (rather than coast) at the end of the run, reducing the stopping time by 30 to 50 percent, depending on the rotor being used. The BRAKE lamp will come on when brake is selected.
7	POWER Lamp	Lights when POWER switch is on.
8	DOOR Switch and Zero-Speed Lamp	Lamp will come on and stay on whenever rotor speed is below approximately 100 rpm, indicating that the chamber door may be opened. Press switch and lift the door handle to open the door.
9	BRUSHES Lamp	Lights to indicate that motor brushes are worn.
10	POWER Switch	When ON applies main power to the centrifuge.

3-2. Operation

Load and balance the rotor according to the instructions in the rotor manual, then operate the centrifuge as follows:

WARNING

Do not exceed the recommended design mass for the maximum speed of the rotor in use. If design mass is exceeded, the operating speed must be reduced accordingly. (See rotor instruction manual for design mass and instruction on how to reduce speed in proportion to actual mass.)

1. Set the POWER switch to ON.
2. Press the DOOR switch, and open the chamber door.

NOTE

Before installing the rotor, make sure that the rotor centerhole and the tapered spindle are clean and free of nicks or scratches. Wipe surfaces clean before each operation to lessen the chance of the rotor sticking to the spindle.

If chamber temperature is below room temperature and the rotor has not been precooled, allow time for the rotor to cool to the lower temperature before clamping it in place.

3. Install a rotor.
4. Close the chamber door.
5. Set the TEMPERATURE select needles at desired settings.

NOTE

To achieve desired rotor temperature, follow the procedure in paragraph 3-3 on rotor speed and temperature differential compensation.

6. Turn the TIME control dial to the desired run time setting or to HOLD.
7. Turn the ANGULAR VELOCITY (speed control) dial to the desired run speed setting.
8. Press the BRAKE switch ON if braking is desired at the end of the run.
9. Press the START switch. The centrifuge will accelerate to the selected speed, run for the selected time, then automatically coast or brake to a stop.

NOTE

If a power interruption occurs during a run, the run may be continued by pressing the START switch.

When the timed portion of the run is finished, the chamber temperature will be controlled by the red temperature needle setpoint (standby).

After the rotor has decelerated below 100 rpm, the DOOR light will come on. Once the light is on, the chamber door can be opened by pressing the DOOR switch and lifting the door handle. Remove rotor.

WARNING

If it is necessary to stop the rotor during HOLD or before the selected time has elapsed, always turn the TIME control dial to STOP. DO NOT stop the rotor by turning the ANGULAR VELOCITY (speed control) dial to 0 rpm.

3-3. Rotor Speed/Temperature Differential Compensation

a. Graphs

The rotor speed/temperature differential graphs in figure 3-2 can be used as guides to determine the approximate temperature setting (blue selector) required to maintain desired sample temperature. The graphs are approximate since the actual temperature offset (difference between indicated chamber temperature and sample temperature) depends on the efficiency of the condensing unit and the ambient temperature. The required offset should be determined for each specific rotor. When sample temperature is critical, more accurate offset data can be obtained by doing a test run (see step b.). A graph is not included for the SH-MT Rotor since required temperature settings vary depending on tube size, tube distribution, and number of tubes used; temperature settings for this rotor should always be determined using the test run procedure.

CAUTION

The temperature offset technique should be used on all runs to prevent overtemperature or freezing of sample.

To create one of these graphs, plot the selected temperature versus the actual sample temperature at a specific speed and ambient condition. For example: To achieve and maintain a +7.5°C sample temperature with a GSA Rotor at 13 000 rpm, the blue needle must be set at approximately +4°C, i.e., 3.5°C colder than the desired temperature.

NOTE

An ambient temperature of 25°C or less is required to obtain optimum cooling efficiency. At higher ambient temperatures, a lower operating speed may be necessary to maintain sample temperature.

b. Test Run Procedure

More accurate temperature offset data can be obtained by doing a test run and dynamically calibrating a specific rotor/centrifuge/desired speed combination and ambient condition. Using an immersible centrifuge thermometer calibrated in 1.0°C increments, perform the following steps.

1. Select the desired sample temperature.
2. Prepare two tubes or bottles of dispensable fluid. Balance according to instructions in rotor instruction manual.

NOTE

The dispensable fluid should have a freezing point somewhat below the desired sample temperature.

3. Precool the thermometer to 1.0°C below the desired sample temperature.
4. Set the blue TEMPERATURE select needle to the desired sample temperature.

5. Install the empty rotor in the centrifuge, and precool the rotor.
6. When precool time has elapsed, load the prepared tubes or bottles into the rotor, and run the rotor for at least one hour at the desired speed.
7. When the run time has elapsed and the rotor has stopped, open the chamber door; then open one rotor compartment, and immerse the precooled thermometer into the liquid. Agitate the thermometer in the liquid for approximately five (5) to ten (10) seconds. Record the indicated temperature.
8. Adjust the blue TEMPERATURE select needle according to the recorded temperature indication. For example: if the recorded temperature is 2°C warmer than the desired temperature, reset the blue TEMPERATURE select needle downward 2°C.
9. Record all data for future use.

NOTE

Although the indicated chamber temperature could vary some 2°C during a run, the actual temperature will vary only a few tenths of a degree. In the standby mode, indicated temperature could vary 10°C, with an actual chamber temperature change of $\pm 1^\circ\text{C}$.

3-4. Precautions to Prevent Samples from Freezing

If a sample freezes, it is not necessarily caused by a malfunction in the centrifuge. Because of the high capacity of the refrigeration system, certain operating conditions can cause a sample to freeze. However, you can prevent this from happening by using the proper technique.

Freezing will occur when the following three conditions happen simultaneously:

1. The speed setting is below 7000 rpm.
2. The blue temperature select needle is set below 5°C.
3. The black temperature indicator needle is several degrees above the setting of the blue needle.

When these conditions occur all together, the temperature control system senses a need to reduce the chamber temperature several degrees. As a result, the refrigeration system turns on, causing liquid refrigerant to enter the evaporator. However, heat is not being generated at a balanced rate in the rotor chamber, so the refrigerant entering the evaporator is more than what is needed to absorb heat from the chamber. As the refrigerant absorbs the heat, naturally, the chamber temperature drops. When the temperature has dropped to the point where the black needle crosses the blue needle, the compressor will shut off. However, the excess refrigerant in the evaporator continues to absorb heat from the chamber. This will lower the chamber temperature several degrees below the desired temperature, and the sample may freeze.

The problem can be overcome in three ways, all of which involve stabilizing the actual chamber temperature (indicated by the black needle) at or below the blue needle setpoint before the run begins. Please try one of the following methods before notifying your service representative.

1. Perform the run with the red and the blue needles at the same temperature setting (one needle directly over the other). In this way, when the TEMPERATURE control switches to the red needle setting during standby, the temperature cannot rise, so Condition 3 will not occur.
2. Set the blue needle at the desired run temperature. Install an empty rotor, and operate it at approximately one-half its maximum rated speed until the black indicator needle stabilizes near the blue needle. Then, stop the centrifuge and load the rotor. DO NOT adjust the blue needle. Set the ANGULAR VELOCITY (speed control) dial at the desired run speed (below 7000 rpm) and restart the centrifuge.
3. During a short run, the temperature of the rotor and the evaporator will not change much. Therefore, if your run is to be less than 15 minutes, stabilize the temperature to a desired level, using either Method 1 or 2. Then, when ready to begin the run, turn both the red and the blue needles to the highest setting. The refrigeration system will not function during the run, but temperature rise will be minimal. Do a trial run at the desired conditions to see if the temperature rise is acceptable.

Using the methods outlined above, the chance of samples freezing will be minimized.

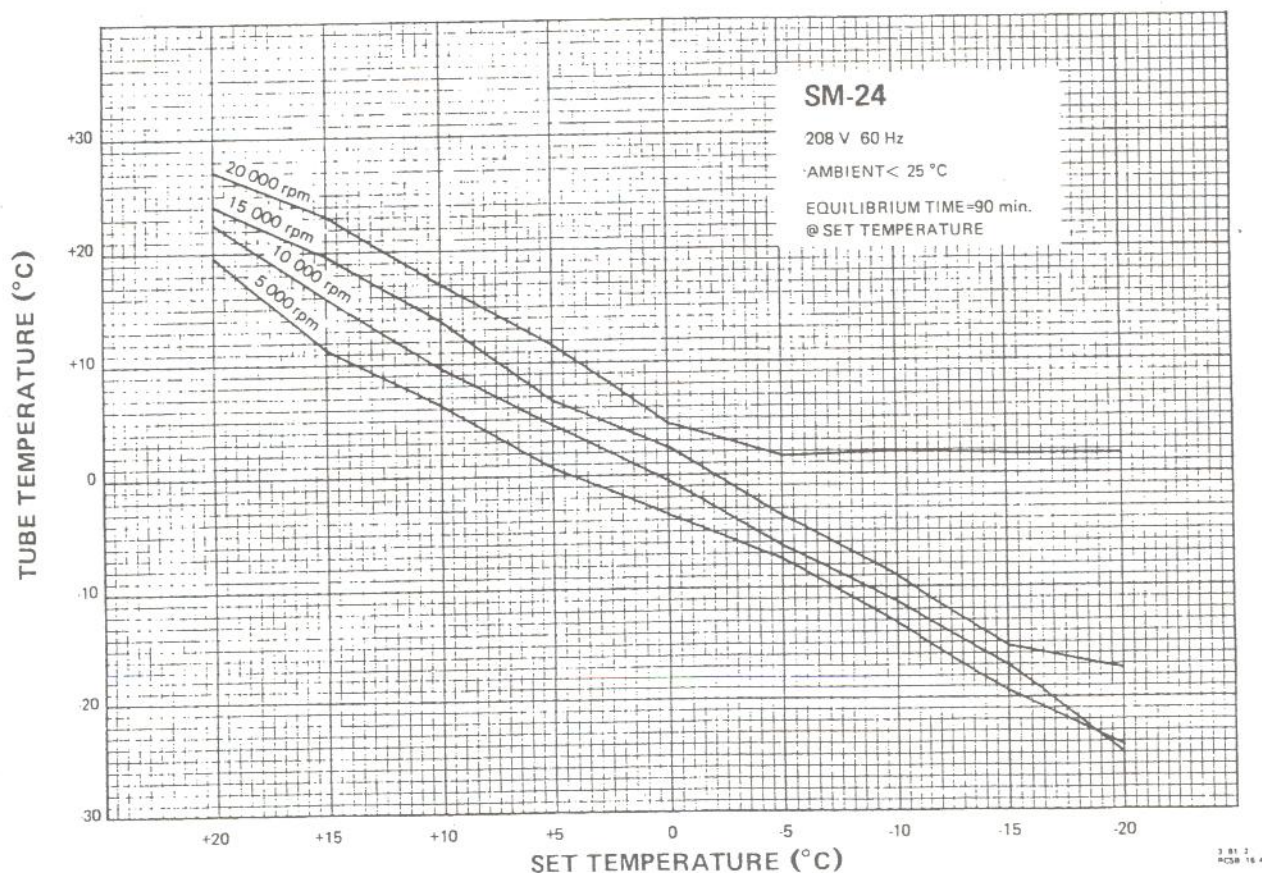


Figure 3-2. Rotor Speed/Temperature Differential Graphs (Sheet 1 of 5)

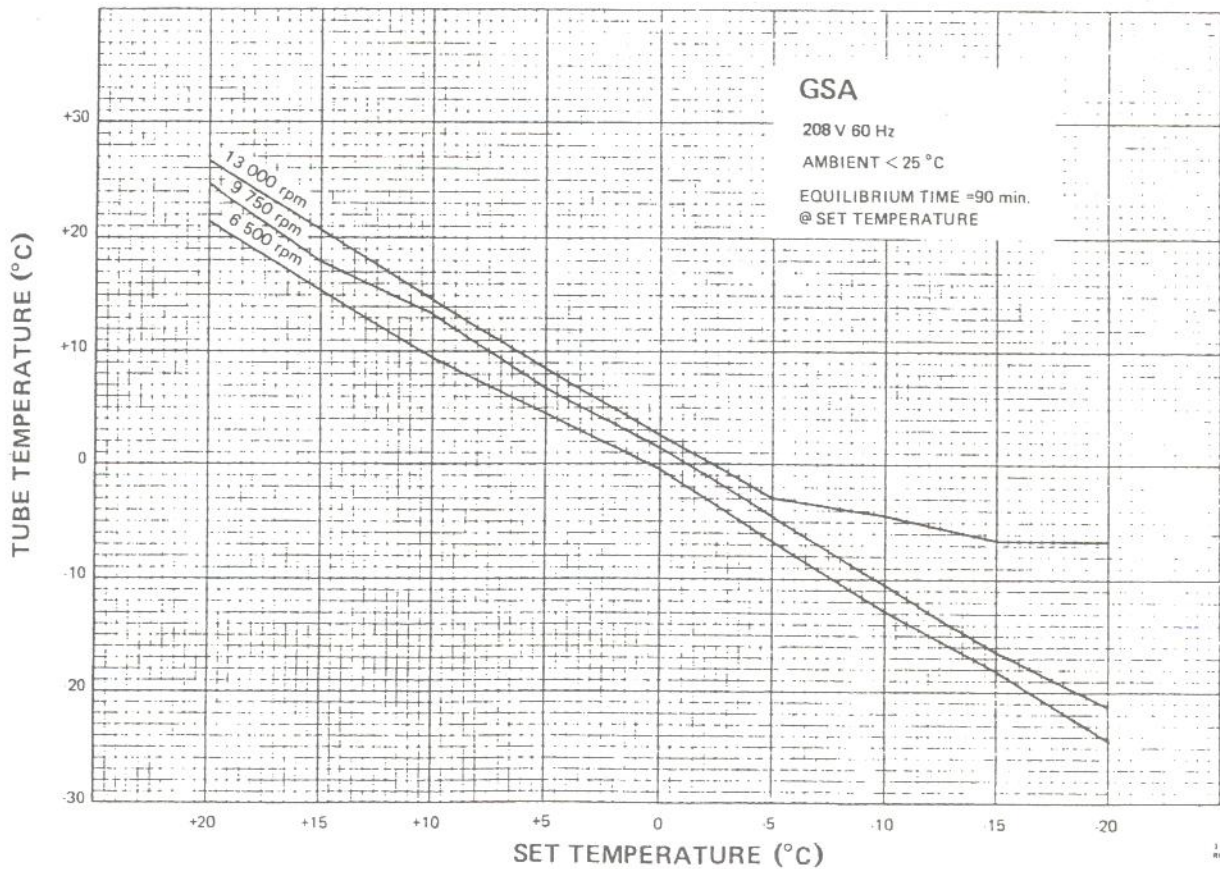
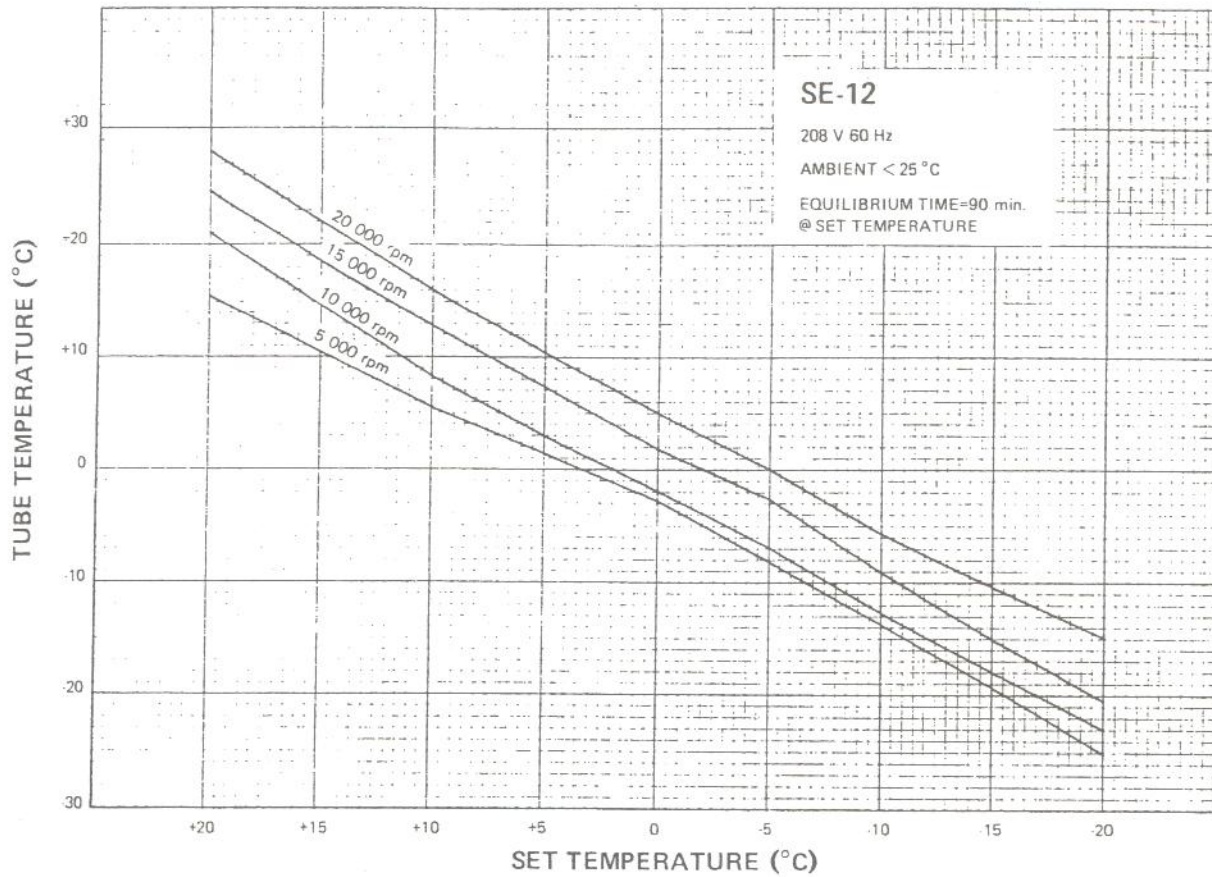


Figure 3-2. Rotor Speed/Temperature Differential Graphs (Sheet 2 of 5)

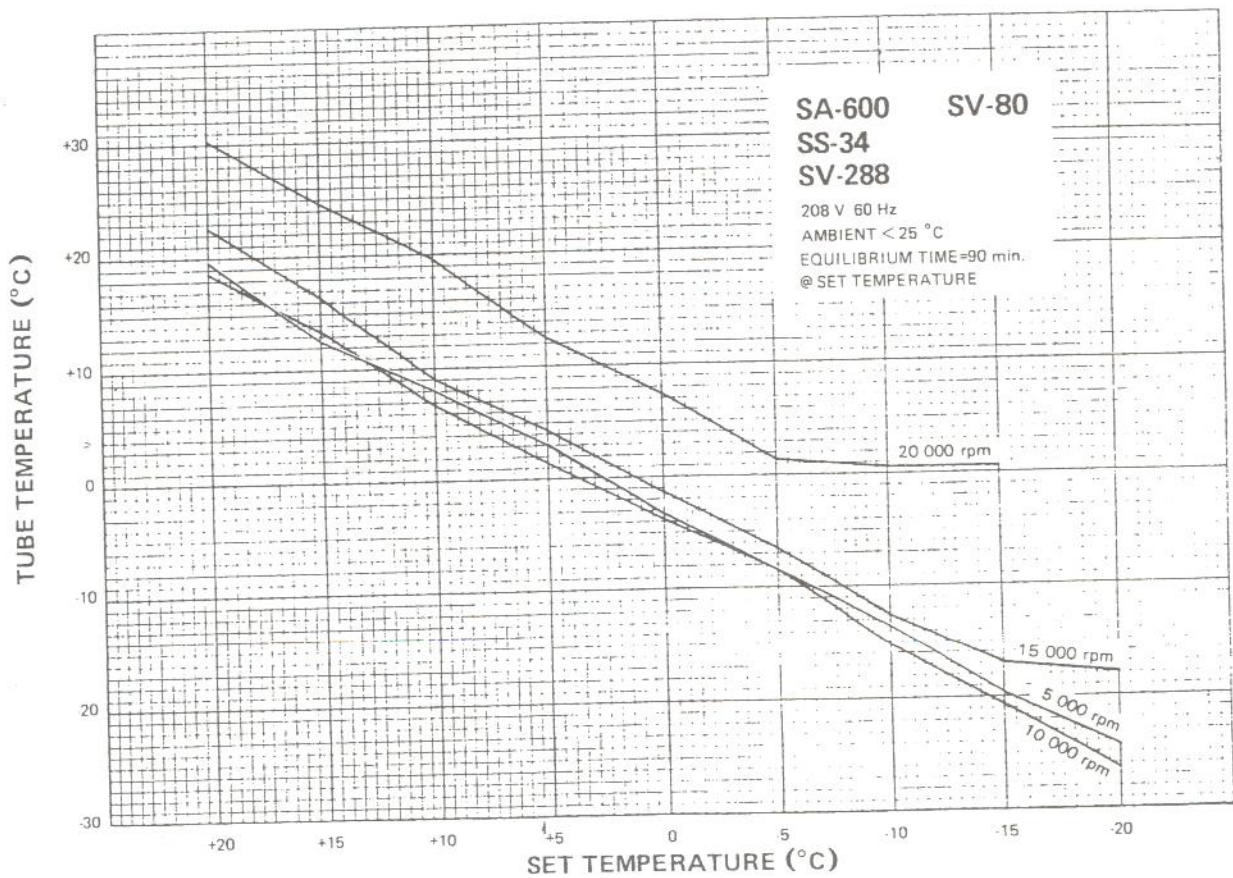
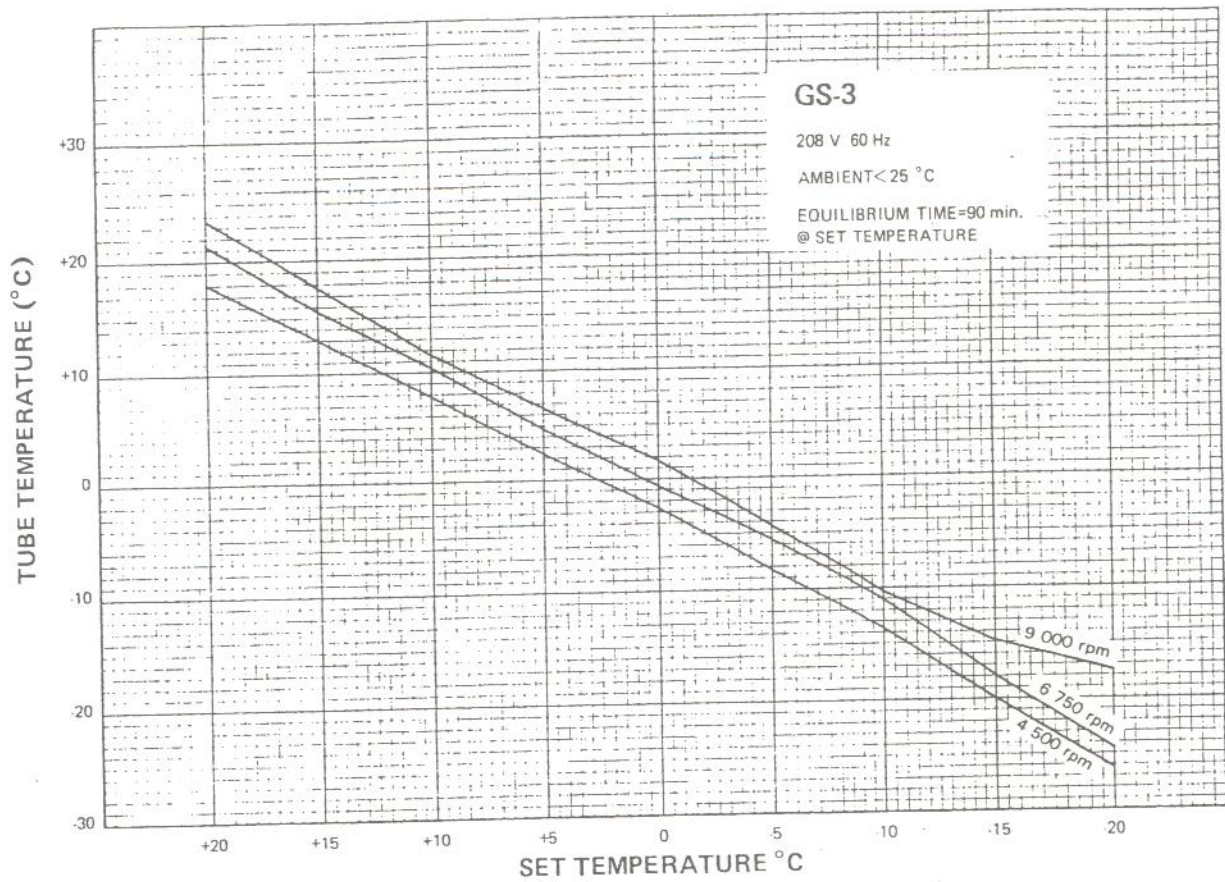


Figure 3-2. Rotor Speed/Temperature Differential Graphs (Sheet 3 of 5)

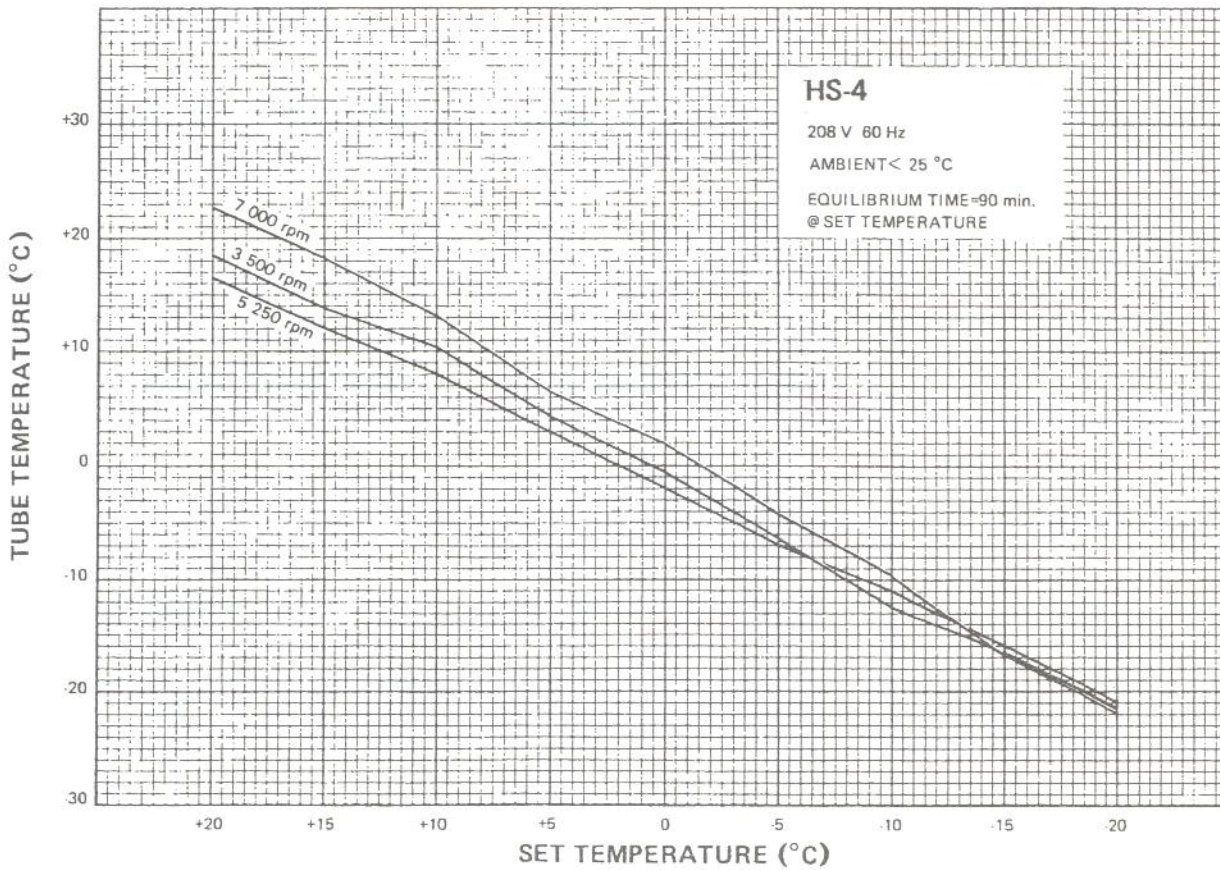
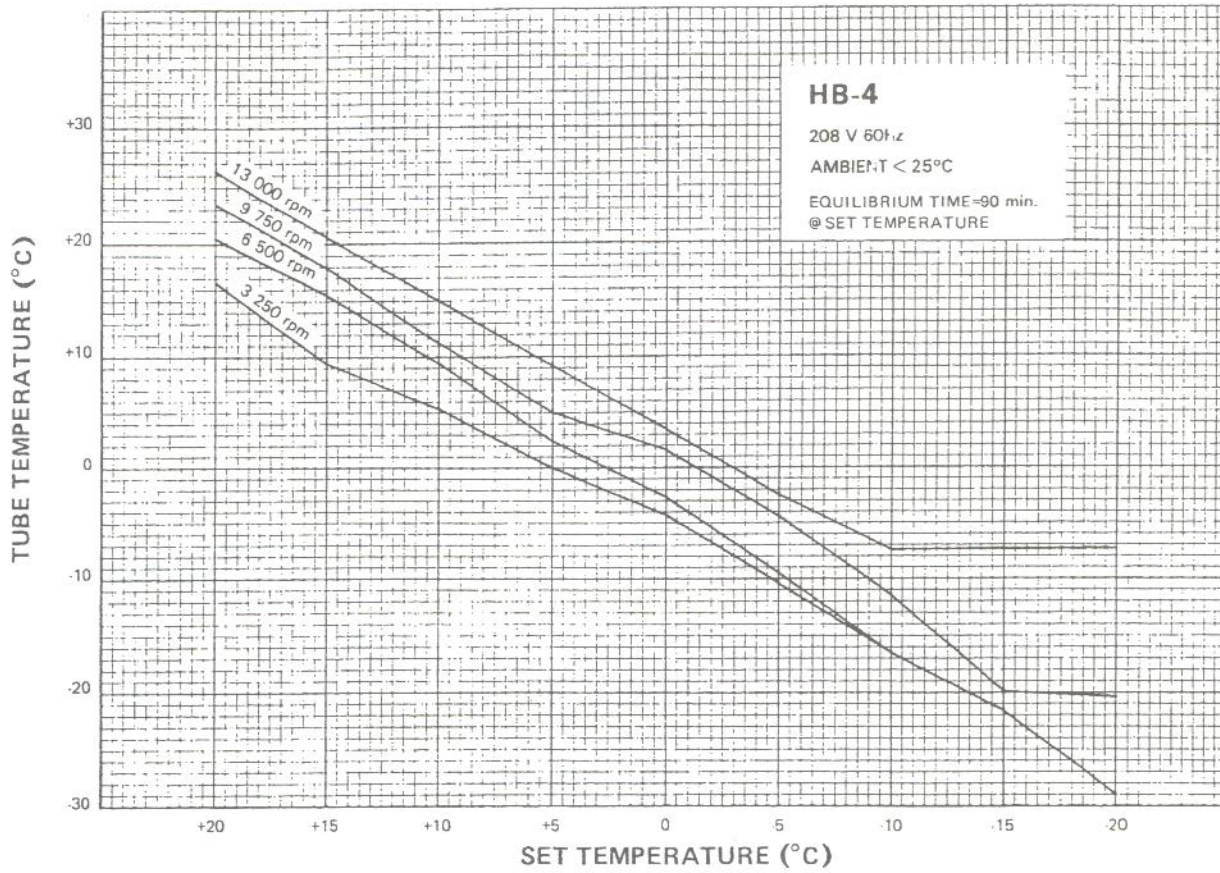


Figure 3-2. Rotor Speed/Temperature Differential Graphs (Sheet 4 of 5)

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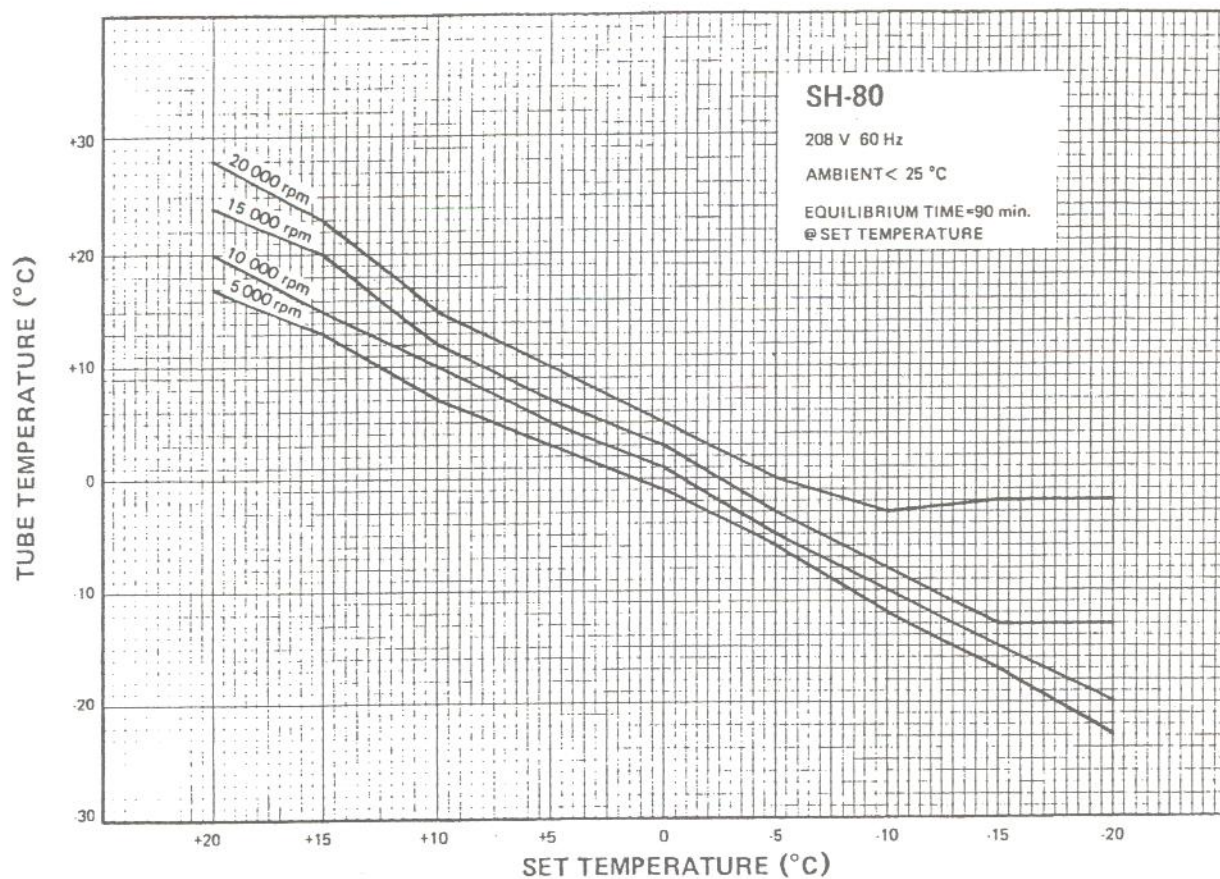


Figure 3-2. Rotor Speed/Temperature Differential Graphs (Sheet 5 of 5)

Section 4. MAINTENANCE

This section describes routine maintenance procedures that should be performed on a regular basis. As the user, it is your responsibility to make certain these procedures are performed when necessary. Also, to keep your centrifuge in good working condition and ensure accurate test results, we recommend that, in addition to these routine procedures, you have the speed control, timer, temperature control, and rotor imbalance detector checked by a DuPont Service Representative or other qualified service personnel because periodically they may need to be recalibrated. If further service is needed, contact DuPont.

WARNING

Because of the high voltages in this centrifuge, anyone who is not properly trained in electronics must not test or repair the electrical circuits.

If hazardous materials have been processed in the centrifuge, observe all necessary precautions when cleaning or servicing the centrifuge to avoid contamination.

4-1. Inspection and Cleaning

a. Inspection

Inspect the centrifuge each week for signs of wear, encrusted biological deposits and general cleanliness.

b. Cleaning

1. Rotor Chamber

The rotor chamber should be defrosted and cleaned periodically to maintain efficient cooling. To defrost the chamber, install a rotor, close the chamber door, set the blue TEMPERATURE select needle above 25°C, and run the centrifuge until the frost melts. When defrosting has been completed, wipe the chamber dry with a damp sponge or cloth.

CAUTION

Chlorides are extremely harmful to aluminum alloy rotors and can cause stress corrosion cracking. Therefore, if chlorides are used to disinfect the chamber, be sure to rinse the chamber thoroughly with water to remove all of the chloride cleanser.

2. Tapered Spindle

Wipe the spindle with a soft cloth each time a rotor is installed to reduce the chance of the rotor sticking. Periodically, wash the spindle with warm water.

3. Cabinet

Clean the enameled cabinet panels with a household wax cleaner. Use a mild detergent and water to clean the top deck and the chamber door.

4. Refrigeration System Condensing Coils

To maintain the efficiency of the refrigeration system, keep the condenser fins (located on the left side of the centrifuge) free of dust and dirt. Clean the fins with a brush or a vacuum cleaner at one to three month intervals. The fins will bend easily so be very careful when cleaning them.

4-2. Lubrication

All components are prelubricated and require no further lubrication. The refrigeration unit is hermetically sealed and the ball bearings in the gyro-action drive assembly and the centrifuge motor are permanently lubricated.

4-3. Emergency Sample Recovery

If the main power shuts off because of a power failure or a system malfunction while the rotor is spinning, the RC-5B chamber door will not open. A mechanical override is provided to allow sample recovery in the case of an emergency. This procedure should never be used routinely and is intended for emergency sample recovery only.

WARNING

When the main power shuts off, the brake will not operate. Wait until the rotor stops before using the mechanical override. Reaching into the rotor chamber before the rotor has stopped spinning could cause personal injury.

The door release lever is recessed beneath the top deck (see figure 4-1). To open the chamber door, push the door release lever with a pencil or similar object, then carefully lift the door latch and pull the door open.

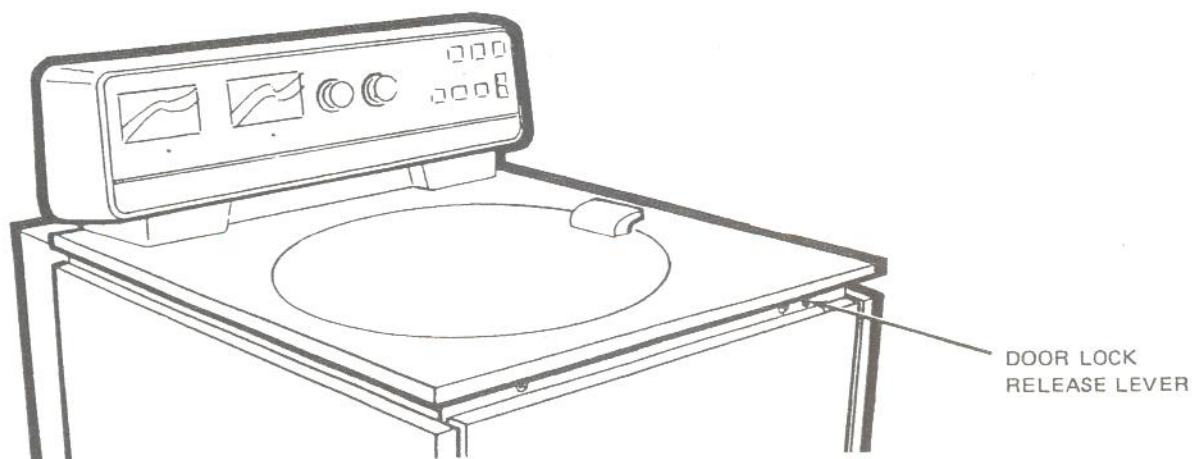


Figure 4-1. Door Lock Release Lever Location

4-4. Motor Brush Replacement

When the drive motor brushes need to be replaced, the BRUSHES lamp on the front control panel will come on. If the light comes on while a run is in progress, the centrifuge will continue to operate for up to eight hours. After the centrifuge has stopped, it cannot be restarted until new brushes are installed. In an EMERGENCY situation, the following procedure can be used to restart the centrifuge before the brushes are replaced.

1. Remove the front cabinet panel.
2. Push both red RESET buttons on the brush warning box.
3. Replace the front cabinet panel.
4. Press the START switch.

CAUTION

Continued operation under this condition can cause permanent damage to the drive motor.

The catalog number to order replacement brushes is 12284; this includes two brushes plus installation instructions.

4-5. Parts Ordering Information

To order replacement parts, telephone (800) 551-2121 in the United States. Outside the United States, contact your local Du Pont representative. Be sure to provide a description of the part and the centrifuge model and serial number.

4-6. Service Decontamination Policy

WARNING

Either biological or radioactive contamination of the centrifuge can occur because of the samples likely to be processed. Always be aware of this possibility and take normal precautions. Use appropriate decontamination procedures should exposure occur.

If a centrifuge or rotor that has been used with radioactive or pathogenic material requires servicing by DuPont personnel, either at the customer's laboratory or at DuPont facilities, comply with the following procedure to ensure the safety of DuPont personnel.

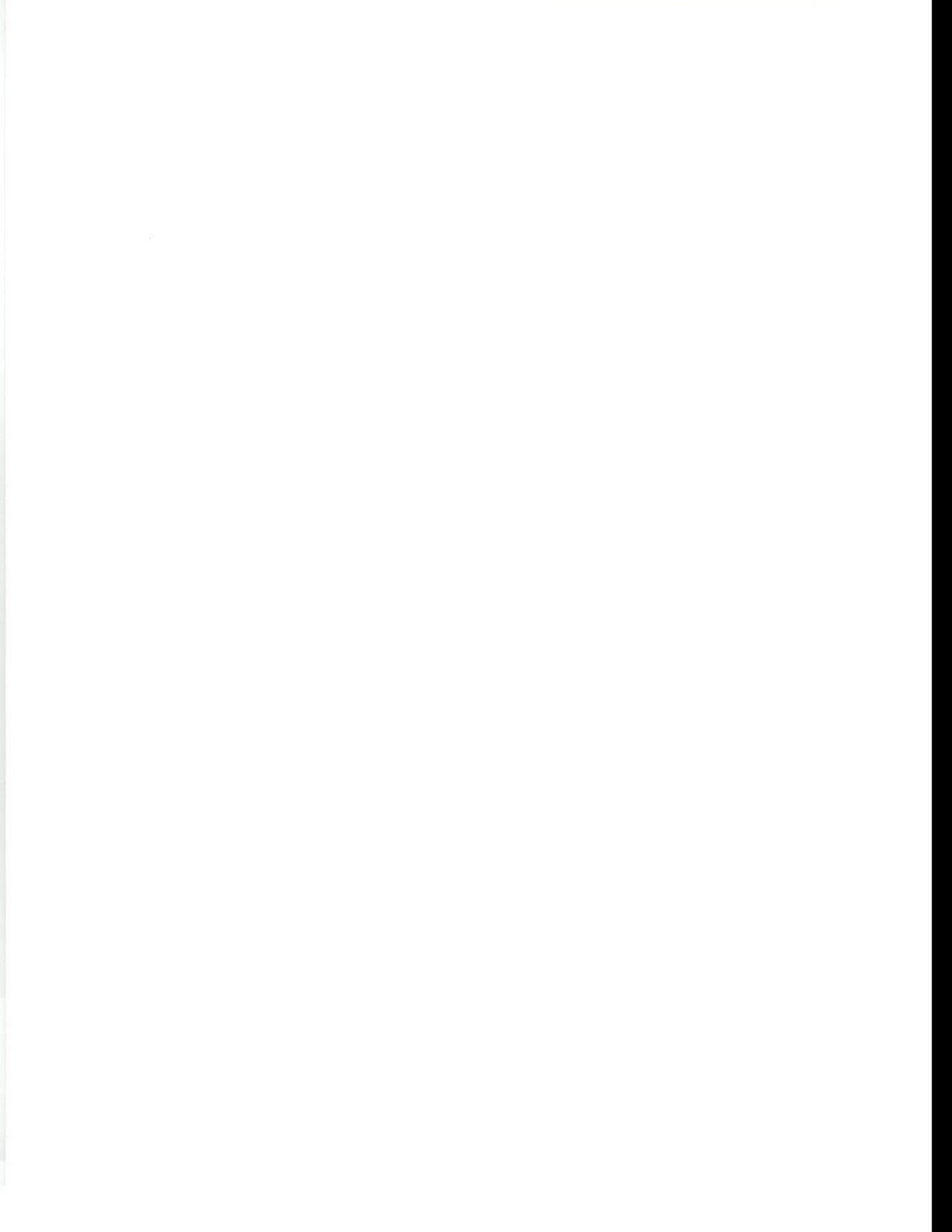
- Clean the centrifuge and/or rotor to be serviced of all encrusted material and decontaminate it prior to servicing by our representative. There must be no radioactivity detectable by survey equipment.
- Attach a completed Decontamination Information Certificate (Sorvall® Instruments Form No. IPDP-59 or E53603) to the centrifuge or rotor.

If the centrifuge or rotor to be serviced does not have a Decontamination Information Certificate attached and, in our opinion, presents a potential radioactive or biological hazard, our representative will not service the equipment until proper decontamination and certification is complete. If we receive a centrifuge or rotor at our Service facility which, in our opinion, is a radioactive or biological hazard, the sender will be contacted for instructions as to the disposition of the equipment. Disposition costs will be borne by the sender.

Decontamination Information Certificates are included with these instructions. Additional certificates are available from the local Technical or Service Representative. In the event these certificates are not available, a written statement certifying that the unit has been properly decontaminated and outlining the procedures used will be acceptable.

NOTE

The Service Representative will note on the Customer Service Repair Report whether or not decontamination was required. When decontamination is required, the representative will specify the contaminant and the decontamination procedure used.



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