5. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon ✕ closes this window and exits without saving.
   You will be returned to the “Display” screen.

3. 7. 2. Language

The **Language** button on the “Display” settings screen opens the “Language” screen where you may choose a display language of your choice, other than English (which is the factory default). This setting overwrites the display language selection made during the initial setup (see “Initial Startup” on page 1-12).

Proceed as follows to set the display language:

1. Tap the **Settings** icon ⚙ on the navigation bar.
2. Tap the **Display** button 🖵 on the “Settings” screen.
   The “Display” screen appears.
3. Tap the **Language** button on the “Display” screen.
   The “Language” screen appears with a wheel picker, prompting you to choose a display language.
4. Swipe your finger up or down across the wheel to set the language (default is English).
   If you make any changes, the Save button at the bottom of the screen is highlighted.
5. When you have finished choosing the language, tap the **Save** button.
6. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon ✕ closes this window and exits without saving.
   You will find the display language changed on the Graphical User Interface.
   You will be returned to the “Display” screen.

3. 7. 3. Auto Date/Time

If the centrifuge is connected to the Local Area Network (LAN) through its ethernet port, setting the “Auto/Date Time” option ensures that it synchronizes its date, time and region information with the active network.

NOTICE The “Auto Date/Time” setting overrides and disables the separate settings for date, time, and region discussed in the following sections. If you prefer to set date, time, and/or region manually, you must turn this setting to “Off”.

Proceed as follows to toggle Auto Date/Time on and off:

1. Tap the **Settings** icon ⚙ on the navigation bar.
2. Tap the **Display** button 🖵 on the “Settings” screen.
   The “Display” screen appears.
3. Tap the **Auto Date/Time** pop-up menu and choose On to enable automatic date and time synchronization, or “Off” to disable it (in which case you have to set date, time and region manually).
   If you make any changes, the Save button at the bottom of the screen is highlighted.
4. When you have finished, tap the **Save** button to save the new setting for the centrifuge.
5. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon ✕ closes this window and exits without saving.
   You will be returned to the “Display” screen.
   With “Auto Date/Time” enabled, you will find the Date, Time, and Region buttons grayed out.

3. 7. 4. Date

The **Date** button on the “Display” screen opens the “Date” screen. The “Date” screen lets you set the date that appears in a date field in the “Info & Health Status” area on top of the “Home” screen.

Proceed as follows to set the date:

1. Tap the **Settings** icon ⚙ on the navigation bar.
2. Tap the **Display** button 🖵 on the “Settings” screen.
3. Tap the **Date** button on the “Display” screen.
   The “Date” screen appears with a wheel picker, prompting you to set the date.
4. Tap the **MM/DD/YYYY**, **DD/MM/YYYY**, or **YYYY/MM/DD** radio button on the left side of the screen to choose a date format.

The segments of the wheel picker screen are rearranged to reflect the selected date format. For example, if you select the DD/MM/YYYY radio button, the wheel picker will change to 28 | Jul | 2018.

5. Tap the up/down arrows or swipe your finger up or down across the wheel to set the current month, day, and year on each of the three wheel picker segments.

   If you have made any changes, the Save button at the bottom of the screen is highlighted.

6. When you have finished setting the date, tap the **Save** button.
7. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon ✕ closes this window and exits without saving.

   You will be returned to the “Display” screen.

3. 7. 5. Time

The **Time** button on the “Display” screen opens the “Time” screen. The “Time” screen lets you set the time of day that appears in a time field in the “Info & Health Status” area on top of the “Home” screen.

Proceed as follows to set the date:

1. Tap the **Settings** icon ⚙ on the navigation bar.
2. Tap the **Display** button 🖵 on the “Settings” screen.
3. Tap the **Time** button on the “Display” screen.

   The “Time” screen appears with a three-segmented wheel picker, prompting you to set the time of day.

4. If desired, tap the **24hr Display** radio button on the left side of the screen to choose the Central European Time (CET; 24-hour) time format. (Default time format is AM/PM, 12-hour format.)

   The segments of the wheel picker screen are rearranged to reflect the Central European Time (CET; 24-hour) time format.

5. Tap the up/down arrows or swipe your finger across each wheel up or down to set the current time in hours and minutes.

   If you have made any changes, the Save button at the bottom of the screen is highlighted.

6. When you have finished setting the time of day, tap the **Save** button.
7. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon ✕ closes this window and exits without saving.

   You will be returned to the “Display” screen.

3. 7. 6. Region

The **Region** button on the “Display” screen opens the “Region” screen. The “Region” screen lets you set the region for your lab location to ensure that Daylight Saving Time (DST) is observed in the time-of-day displays of the centrifuge, and that the time of day is automatically updated when DST changes.

It saves you the trouble of having to change to daylight saving time and back twice a year and keeps the event log and charting data accurate.

Proceed as follows to select your region:

1. Tap the **Settings** icon ⚙ on the navigation bar.
2. Tap the **Display** button 🖵 on the “Settings” screen.
3. Tap the **Region** button on the “Display” screen.

   The “Region” screen appears, prompting you to enter the region where your site is located and specify whether DST is applicable.

4. Tap on the **City/Country** field and type the first three letters of the next larger city.

   The system will automatically start to look ahead after three letters and propose a list of matching cities and countries.

   If you type or select a city and country that does not use DST, the system also automatically deselects the “Adjust for Daylight Saving Time” checkbox.

5. If you wish to disable DST explicitly, deselect the “Adjust for Daylight Saving Time” checkbox. (The default setting is on.)

   If you have made any changes, the Save button at the bottom of the screen is highlighted.

6. When you have finished setting the time of day, tap the **Save** button.
7. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon ✕ closes this window and exits without saving.

   You will be returned to the “Display” screen.

3. 7. 7. Unit Name

The **Unit Name** button opens the “Unit Name” screen, where you can set a name for the centrifuge that will be displayed above the time/date field in the “Info & Health Status” area on top of the “Home” screen.

Proceed as follows to edit the name of the unit:

1. Tap the **Settings** icon on the navigation bar.
2. Tap the **Display** button on the “Settings” screen.
3. Tap the **Unit Name** button on the “Display” screen.
   The “Unit Name” screen appears, prompting you to name the centrifuge.
4. Inspect the “Unit Name” field:
   If no unit name has been previously set, the “Unit Name” field will read “Tap to enter”.
   If a unit name has been previously set, that name appears in the “Unit Name” field.
5. Tap on the **Unit Name** field to display the keypad.
   If no unit name has been previously set, a cursor will appear in the”Unit Name” field and prompt you to start typing.
   If a unit name has been previously set, that name will be selected for overwriting.
6. Type the desired unit name.
7. When you have finished typing, do one of the following:
   a. Tap the **Save** button on the keypad.
   b. Tap anywhere outside of the keypad and the “Unit Name” field to hide the keypad, then tap the **Save** button at the bottom of the screen.
8. To confirm the changes, tap the **OK** button in the pop-up window that appears. Tapping the **X** icon closes this window and exits without saving.
   You will be returned to the “Display” screen.

3. 8. Logs

Tapping the **Logs** button on the navigation bar opens the “Logs” main screen shown in Figure 3–66 below. The “Logs” main screen is the point of entry to all operating data logged by the centrifuge.

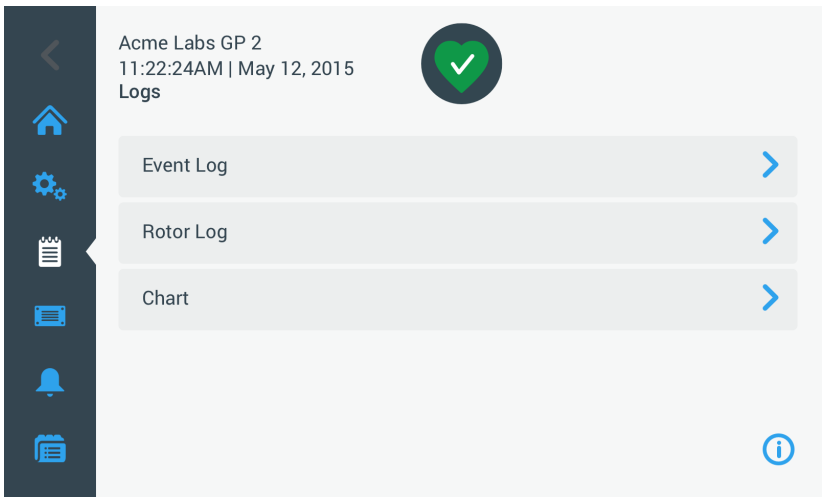


Figure 3–66: Logs Main Screen

The “Logs” main screen features three buttons that open detailed log screens, where you can view and export data:

- Event Log, described in the following section.
- Rotor Log, described in the section “Rotor Log” on page 3-47.
- Chart, described in the section “Chart” on page 3-48.

3. 8. 1. Event Log

Tapping the **Event Log** button on the “Logs” main screen opens the “Event Log” screen shown in Figure 3–67 below. The “Event Log” screen lists the last 100 events logged by the centrifuge with their time of occurrence, including normal operating status as well as abnormal conditions, such as alarms. The newest events appear at the top of the list, the oldest events at the bottom. Once the centrifuge log reaches 100 events, the newest events will replace the oldest ones.

A pop-up menu next to the event list allows for filtering the log to show selected classes of events only.

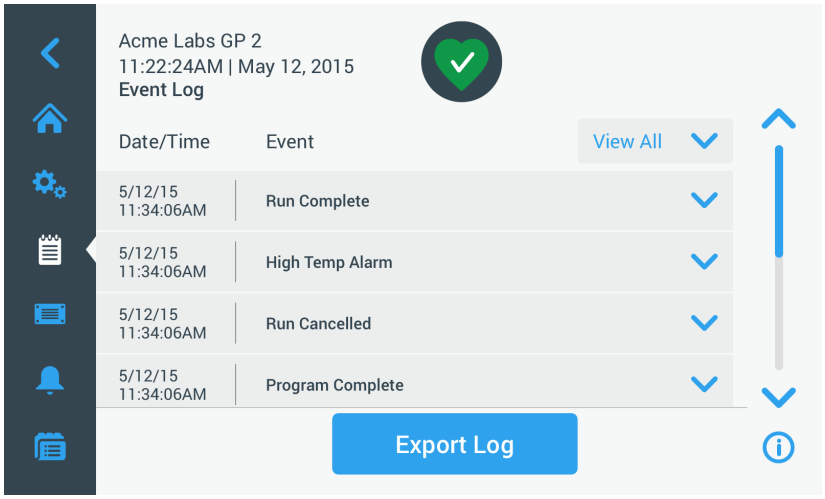


Figure 3–67: Event Log Screen

You can tap on any row to expand it and view additional information about one specific event.

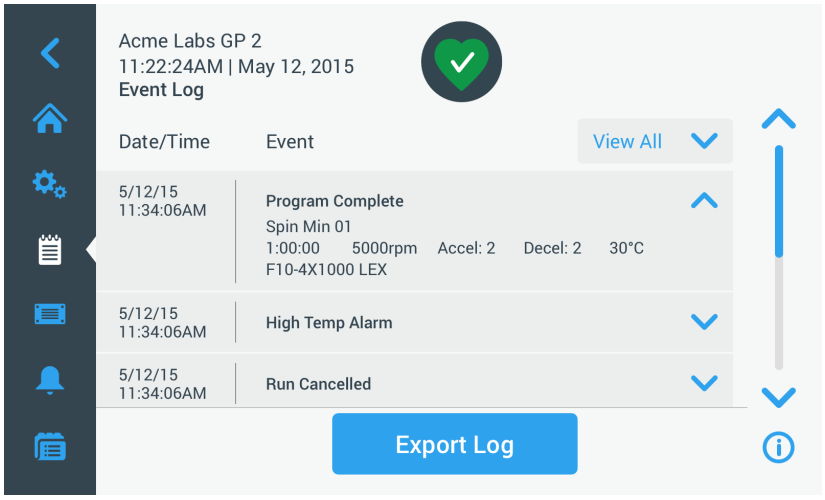


Figure 3–68: Event Log Screen with Event Expanded

Additionally, you can export the event log data in Comma Separated Value format (CSV) for further processing in spreadsheets, or in Portable Document Format (PDF) for instant viewing and printing.

Viewing Events

Proceed as follows to navigate the event list and view more detailed information:

1. Tap the **Logs** icon on the navigation bar.
   The “Logs” main screen appears.
2. Tap the **Events** button.
   The “Event Log” screen appears.
3. If necessary, tap and drag the scrollbar to the right of the events list to see more events.
4. Tap on the chevron on the far right end of each event list item to view more details for an individual event.
5. Tap on the **View All** pop-up menu to expand a list of filtering options.
6. Tap on any checkbox to deactivate a whole class of events.

   NOTICE You can save finger gestures by tapping the “View All” checkbox to deactivate all options, then reactivate the one or two options you wish to retain.

NOTICE The "View All" checkbox is deactivated automatically when you deactivate any of the other options. If you are not satisfied with the selection you have made, it may be helpful to tap "View All" and start over selecting.

7. Tap anywhere outside the filter pop-up menu to return to the "Event Log" screen.

   You will find a reduced event list in the "Event Log" screen and the title of the pop-up menu changed to "Filter ON".

8. To remove the filter and show all events, tap **Filter ON** to expand the filter pop-up menu and reactivate the "View All" option.

   NOTICE The filter is not saved. If you navigate away from the "Event Log" screen, you will find that it has reverted to showing all events the next time you return here.

9. Tap on the **Chart** button to view the events as a chart (see "Viewing Charts" on page 3-48).

Exporting the Event Log

Proceed as follows to export the event log:

1. Tap the **Logs** icon on the navigation bar.

   The "Logs" main screen appears.

2. Tap the **Events** button.

   The "Event Log" screen appears.

3. Tap the **Export Log** button to start the export of the event log.

   The "Export Event Log" screen appears, listing your export options for the event log.

4. Choose either **CSV** if you wish to process the event log data in a spreadsheet, or **PDF** if you want to obtain a document for instant viewing and printing.

5. Tap the **Events to Export** drop-down menu and filter the events as explained further above in the section "Viewing Events" on page 3-45.

6. Select a date range by tapping either **1 Day**, **7 Days**, **60 Days**, or **Custom**.

   Tapping Custom displays two additional date entry fields that let you choose a specific period of time to export.

7. Tap the **Calendar** icon next to the From field.

   The "Custom Date Range From:" wheel-picker shown on the left side appears,

8. Spin the wheel-picker and adjust the calendar to the desired date, for example April 15, 2015.

9. Tap the **Set From Date** button to confirm your choice,

   You will be returned to the "Export Event Log" screen.

10. Tap the **Set To Date** button to confirm your choice,

    You will be returned to the "Export Event Log" screen above.

11. Tap the **Export** button in the "Export Event Log" screen to start the export,

    The export will start now, as indicated by the "Export Event Log" pop-up window. It shows a cautioning message not to remove the USB drive and a green and gray progress bar that lets you follow the process. If you have not inserted a USB drive into the USB port of the centrifuge, the "Export Event Log" pop-up window appears, prompting you to insert a USB drive.

    NOTICE You may abort a running export at any time by tapping the Cancel button in the "Export Event Log" pop-up window. If you do so, the export is aborted, and the "Export Canceled" message appears. Acknowledge the message and repeat the export with an alternative selection of event log, if necessary.

    NOTICE While the export is running, make sure you do not remove the USB drive from the USB port. If you do so, the export is aborted, and the "Export Error" message appears.

    NOTICE While the export is running, the USB drive may run out of disk space. If that happens, the export is aborted, and the "Export Error" message appears. Free up space on the USB drive and repeat the export of the event log.

    When the export has been successfully completed, the "Export Complete" pop-up window appears. Tap the **OK** button to acknowledge the message and remove the USB drive.

    On your USB drive, you will find a new file with the general filename **UnitName_EventLog_YYYY_MM_DD.csv** or **UnitName_EventLog_YYYY_MM_DD.pdf** now.

3. 8. 2. Rotor Log

Tapping the **Rotor Log** button on the “Logs” main screen opens the “Rotor Log” screen. The “Rotor Log” screen keeps track of how many times individual rotor (bucket) types have been spun in the current centrifuge and issues warnings when a rotor reaches its end of life.

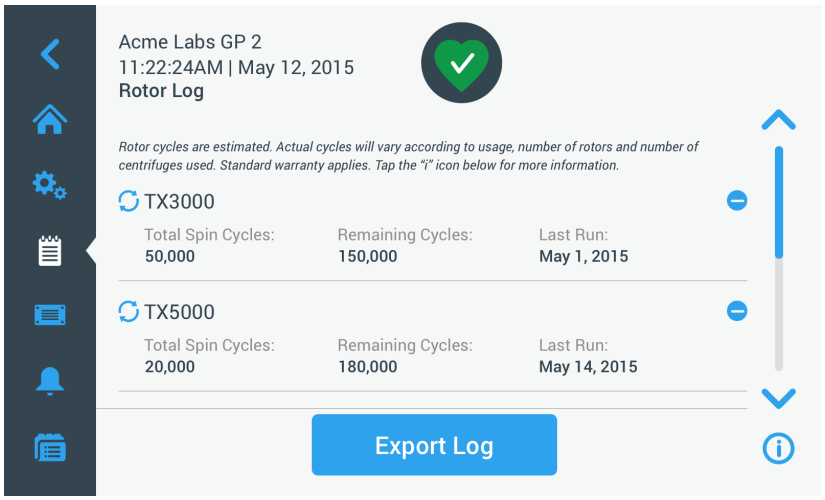


Figure 3–69: Rotor Log Screen

Each time a new rotor is installed in the unit, the rotor log is updated to reflect:

- Rotor Name (if it has not already been listed)
  For a rotor with swinging buckets, the rotor name must also include the bucket type identified by the user (see “Identify Rotor and Buckets” on page 2-10). For example, the name for a TX-750 rotor with round buckets would read TX-750 (Round Bucket - 75003608).
- Total Spin Cycles (how often the rotor type has been spun in the current centrifuge).
- Remaining Cycles (how many times the rotor type can still be spun in the current centrifuge).
- Last Run (last date the rotor type was used in the current unit).

Deleting a Rotor from the Log

The “Rotor Log” screen lets you delete a rotor from the log—for example, one that has reached its end of life.

Proceed as follows to delete a rotor type from the log:

1. Tap the **Minus** icon to the right of the rotor entry:
   The “Delete Rotor” pop-up window appears, asking you to confirm the deletion.
2. Tap the **Delete** button to confirm.

Resetting the Rotor Counter

The “Rotor Log” screen allows you to reset the cycle counter for a rotor type to zero.

Proceed as follows to reset the counter for a rotor type:

1. Tap the **Reset** icon to the left of the rotor type name:
   The “Reset Counter” pop-up window appears, asking you to confirm the deletion.
2. Tap the **Reset** button to confirm.

Exporting the Rotor Log

Proceed as follows to export the rotor log:

1. Tap the **Logs** icon on the navigation bar.
   The “Logs” main screen shown in Figure 3–66 above appears.
2. Tap the **Rotor Log** button.
   The “Rotor Log” screen appears.
3. Tap the **Export Rotor Log** button to start the export of the rotor log.
   The export will start now, as indicated by the “Export Rotor” Log pop-up window below. It shows a cautioning message not to remove the USB drive and a green and gray progress bar that lets you follow the process. If you have not inserted a USB drive into the USB port of the centrifuge, the “Export Rotor Log” pop-up window appears, prompting you to insert a USB drive. If necessary, insert the USB drive into the USB port of the centrifuge.

NOTICE You may abort a running export at any time by tapping the Cancel button in the "Export Rotor Log" pop-up window above. If you do so, the export is aborted, and the "Export Canceled" message appears. Acknowledge the message and repeat the export, if necessary.

NOTICE While the export is running, make sure you do not remove the USB drive from the USB port. If you do so, the export is aborted, and the "Export Error" message appears. Reinsert the USB drive and repeat the export.

NOTICE While the export is running, the USB drive may run out of disk space. If that happens, the export is aborted, and the "Export Error" message appears. Free up space on the USB drive and repeat the export.

When the export has been successfully completed, the "Export Complete" pop-up window appears. Tap the **OK** button to acknowledge the message and remove the USB drive.

On your USB drive, you will find a new file with the general filename **UnitName_Rotor LogData_YYYY_MM_DD.csv** now.

3. 8. 3. Chart

Tapping the **Chart** button on the "Logs" main screen opens the "Chart" screen. The "Chart" screen lists the last 100 runs of the centrifuge. The newest runs appear at the top of the list, the oldest runs at the bottom. Once the centrifuge reaches 100 runs, the newest runs will replace the oldest runs.

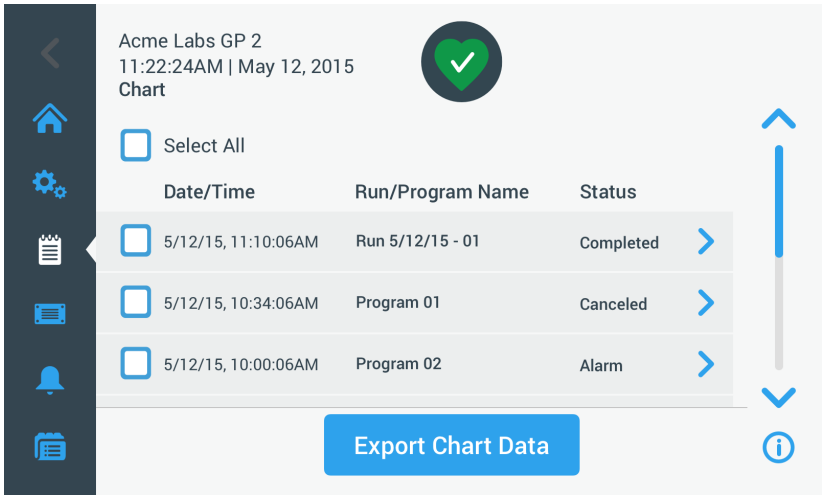


Figure 3–70: Chart Screen

The Chart screen lets you do two things:

- tap on any of the rows in the chart list to display the chart for the selected run
- select all or individual runs and export the data

Viewing Charts

Proceed as follows to view a detailed chart for an individual run:

1. Tap the **Logs** icon on the navigation bar.
   The "Logs" main screen appears.
2. Tap the **Chart** button.
   The "Chart" screen appears.
3. If necessary, tap and drag the scrollbar to the right of the charts list to see more charts.
4. Tap on the **chart list item** you wish to view.
   The "Chart" details screen appears. The left axis shows speed data, the right axis shows temperature data (refrigerated models only; ventilated models will only show speed).

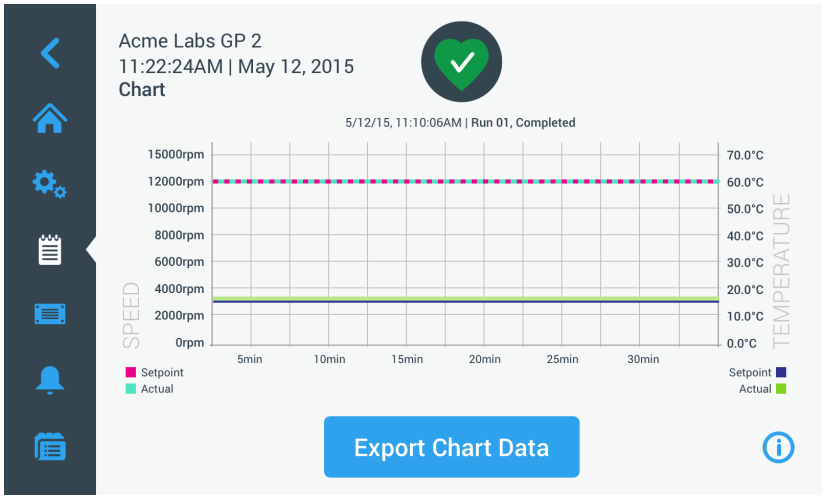


Figure 3–71: Chart Details Screen

5. Use finger gestures to move around the chart:
   - » Pinch to zoom in and out.
   - » Swipe left or right to navigate back in time or back to the current time.
   - » Tap and drag to scroll to a specific time period.

Exporting Chart Data

Proceed as follows to export chart data:

1. Tap the **Logs** icon on the navigation bar.
   The “Logs” main screen appears.
2. Tap the **Chart** button.
   The “Chart” screen appears.
3. If necessary, tap and drag the scrollbar to the right of the charts list to locate the desired chart.
4. **Select individual runs** by activating the checkboxes next to the items you would like to export, **or** tap the **Select All** checkbox at the top of the screen to select all available runs.
5. Tap the **Export Chart Data** button to start the export of the selected charts.
   The export will start now, as indicated by the “Export Chart Data” pop-up window below. It shows a cautioning message not to remove the USB drive and a green and gray progress bar that lets you follow the process. If you have not inserted a USB drive into the USB port of the centrifuge, the “Export Chart Data” pop-up window appears, prompting you to insert a USB drive. If necessary, insert the USB drive into the USB port of the centrifuge.

   NOTICE You may abort a running export at any time by tapping the Cancel button in the “Export Chart Data” pop-up window. If you do so, the export is aborted, and the “Export Canceled” message appears. Acknowledge the message and repeat the export with an alternative selection of charts, if necessary.

   NOTICE While the export is running, make sure you do not remove the USB drive from the USB port. If you do so, the export is aborted, and the “Export Error” message appears.

   NOTICE While the export is running, the USB drive may run out of disk space. If that happens, the export is aborted, and the “Export Error” message appears. Free up space on the USB drive and repeat the export with a new selection of charts.

   When the export has been successfully completed, the “Export Complete” pop-up window appears. Tap the **OK** button to acknowledge the message and remove the USB drive.

   On your USB drive, you will find a new file with the general filename **UnitName_ChartData_YYYY_MM_DD.csv** now.

Files and Info

Tapping the **Files and Info** button on the navigation bar takes you to the “Files and Info” screen. The “File and Info” screen lets you view technical information about the centrifuge, such as serial number and installed firmware versions, and reset the centrifuge to its factory settings.

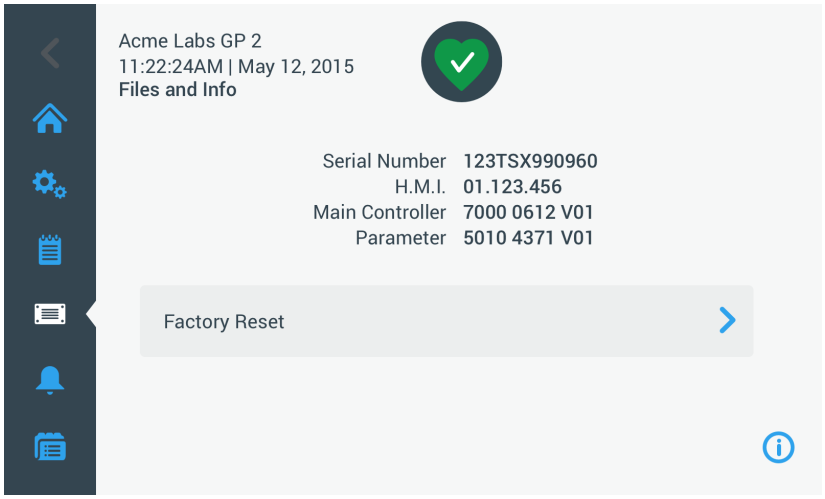


Figure 3–72: Files and Info Screen

Proceed as follows to reset the centrifuge to its factory settings:

1. Back up all data from the centrifuge you wish to preserve, such as user programs (see “Sharing Programs between Centrifuges” on page 3-25) and logs (see “Logs” on page 3-44).
2. Tap the **Files and Info** icon on the navigation bar.
   The “Files and Info” screen appears.
3. Tap the **Factory Reset** button.
   The “Factory Reset” screen appears, cautioning you about the risk of losing settings.
4. If you are absolutely sure that you want to reset the centrifuge to its factory settings, tap the **Start** button to initiate the reset process.
   The “Factory Reset” pop-up window appears. A progress bar lets you follow the process.
   When the “Factory Reset” process is complete, the (Factory Reset) “Complete” pop-up window appears.

3. 8. 4. Service

The **Service** button is reserved to service technicians and requires a special passcode. Its options are not explained in this manual.

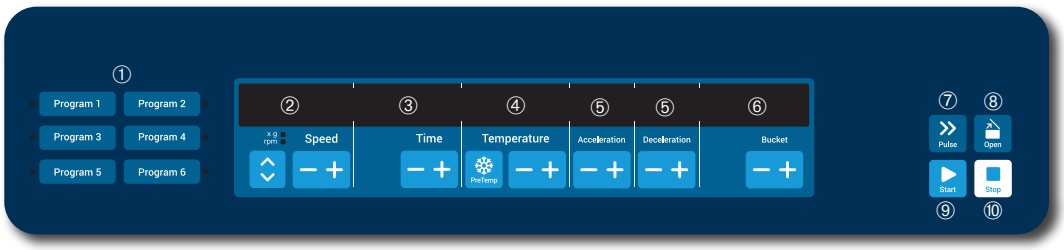
4. LCD Control Panel

This chapter contains details for the centrifuges with the LCD display described in this manual. Pictures shown are examples and may be different in details to your experience–for example, the LCD display for a ventilated unit does not have a key for entering temperature, nor a temperature readout.

NOTICE This chapter shows examples for refrigerated models only.

4. 1. Overview

The LCD display combines a single-line LCD (Liquid Crystal Display) screen with membrane-protected keys for choosing commands or increasing and decreasing parameter values. Figure 4–1 presents the arrangement of the LCD screen areas and keys described in the following.



No.	Key	Description
①	Programs	Use the program keys to save and load programs.
②	Speed	The speed (rpm) or RCF value (x g) is displayed here. You can modify the value using the PLUS and MINUS key. You can switch between rpm and x g using the **Arrow** keys.
③	Time	The running time is displayed here. You can modify the value using the **+** and **-** key.
④	Temperature	The temperature is displayed here. You can modify the value using the **+** and **-** key. You can pre-temper the centrifugation chamber and the empty rotor before the centrifugation run starts using the **PreTemp** key. ⚠ **NOTICE** This function is only available on refrigerated centrifuges.
⑤	Acceleration / Deceleration	The acceleration and deceleration profile is displayed here. You can modify the set profiles using the **+** and **-** key.
⑥	Bucket	Use the **Bucket** key in order to have all available bucket types displayed in succession.
⑦	Pulse	Press the **Pulse** key to immediately start the centrifugation run and accelerate up to the maximal permissible end speed (depending on the used rotor). Releasing the key initiates a stopping process according to the set acceleration and braking curve.
⑧	Open	Press the **Open** key to activate the automatic door release (possible only if device is powered on and if the rotor is fully stopped).
⑨	Start	Press the **Start** key to start a centrifugation run or to accept the current settings.
⑩	Stop	Press the **Stop** key to manually end the centrifugation run.

Figure 4–1: Functions on the LCD Control Panel

4. 2. Set Basic Centrifugation Parameters

This section explains how to set up the centrifuge with speed / RCF values, acceleration and deceleration profiles, temperature (refrigerated models only), and other operating parameters.

4. 2. 1. Set Speed / RCF-Value

The centrifuge lets you set speed in rpm or as an RCF value (see "RCF Value Explained" below). You may set speed either from within an ongoing centrifugation run (centrifuge running) or for the next centrifugation run (centrifuge at standstill).

RCF Value Explained

The relative centrifugal force (RCF) is given as a multiple of the force of gravity (g). It is a unitless numerical value which is used to compare the separation or sedimentation capacity of various centrifuges, since it is independent of the type of device. Only the centrifuging radius and the speed are used for calculation:

$$RCF = 11,18 \times \left(\frac{n}{1000}\right)^2 \times r$$

r = centrifuging radius in cm

n = rotational speed in rpm

The maximum RCF value is related to the maximum radius of the tube opening.

Remember that this value is reduced depending on the tubes, buckets and adapters used.

This can be accounted for in the calculation above if required.

Proceed as follows to set a speed or RCF value:

1. Press the **Arrow** keys below the xg / rpm LED indicators (left in Figure 4–2) to toggle between RCF (in xg, which means multiples of the force of gravity) and speed (in rpm, which is short for revolutions per minute).

   The LED indicator **xg** or **rpm** is lit to indicate the selected mode, and the value in the LCD display switches to an **RCF** or **rpm** reading. The example in Figure 4–2 shows the rpm reading (bottom) and the equivalent RCF reading (top).

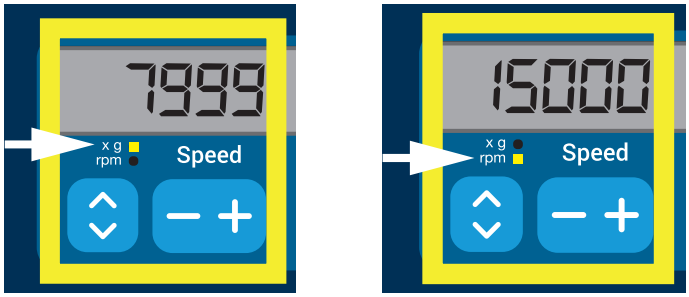


Figure 4–2: Choosing between RCF / rpm and setting the Centrifuge Speed

2. Press the **+** or **-** key below the **Speed** field of the LCD display to set the desired value.

   NOTICE If you select an extremely low RCF value, it will be automatically corrected if the resulting speed is less than 300 rpm. 300 rpm is the lowest selectable speed.

3. Release the **+** or **-** key when the desired value appears.

   Doing so selects the speed setting for future centrifugation runs (until the next time you choose to change this setting).

4. 2. 2. Set Run Time

The centrifuge lets you preset a run time after which the centrifugation run stops automatically.

Proceed as follows to set run time:

1. Press the **+** or **-** key below the **Time** field of the LCD display to set the desired duration for the centrifugation run.

   The value displayed in the **Time** field (see Figure 4–3 below) changes accordingly.

Figure 4–3: Setting the Centrifuge Run Time

2. Release the key when the desired runtime in hours and minutes appears.

   Doing so selects the runtime setting for future centrifugation runs (until the next time you choose to change this setting) .

4. 2. 3. Set Acceleration and Deceleration Profiles

The centrifuge offers a total of 9 acceleration curves (numbered 1 through 9). An acceleration curve gradually increases the speed of the centrifuge after starting the centrifugation run. An acceleration profile gradually increases the speed of the centrifuge after starting the centrifugation run. A deceleration profile gradually reduces the speed of the centrifuge towards the end of the centrifugation run.

NOTICE After the centrifuge is turned on, the last running profile selected is shown.

NOTICE Avoid if possible speed ranges close to natural resonances of the system. Runs at resonance speeds may have show vibration and an adverse effect on the quality of separation.

Acceleration Profile

Proceed as follows to select an acceleration curve:

1. Press the **+** or **-** key below the **Acceleration** field of the LCD display to cycle through the selection of available acceleration profiles.

   Curve number 1 provides the slowest and curve number 9 the fastest acceleration rate.

Figure 4–4: Setting the Acceleration Profile

2. Release the **+** or **-** key when the number of the desired acceleration profile appears in the display window.

   Doing so selects the acceleration profile for future centrifugation runs (until the next time you choose to change this setting) .

Deceleration Profiles

The centrifuge offers a total of 10 deceleration or braking curves (numbered 0 through 9). A deceleration curve gradually reduces the speed of the centrifuge towards the end of the centrifugation run.

NOTICE After the centrifuge is turned on, the last running profile selected is shown.

Proceed as follows to select a braking curve:

1. Press the **+** or **-** key below the **Deceleration** field of the LCD display window to cycle through the selection of available deceleration profiles.

   Curve number 0 disables active deceleration altogether. Curve number 1 provides the slowest active and curve number 9 the fastest active deceleration rate.

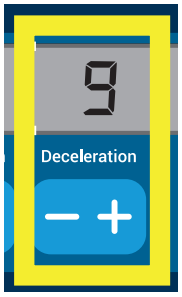


Figure 4–5: Setting the Deceleration Profile

2. Release the **+** or **-** key when the number of the desired deceleration profile appears in the display window.

   Doing so selects the deceleration profile for future centrifugation runs (until the next time you choose to change this setting).

4. 2. 4. Pre-Temper the Centrifugation Chamber

Refrigerated centrifuges allow for pre-tempering, that is pre-warming or pre-cooling, the centrifugation chamber and the empty rotor before the centrifugation run starts. If necessary pre-temper your samples using proper equipment. The centrifuge is not intended to be used to pre-temper your samples. Temperatures displayed by the centrifuge are the estimated sample temperatures.

NOTICE This feature is not available on ventilated models.

To set the pre-tempering temperature for the centrifuge, proceed as follows:

1. Insert the rotor with all buckets installed.
2. Press the **PreTemp** key to enable pre-tempering adjustment.

3.10.
Išankstinio šaldymo mygtukas

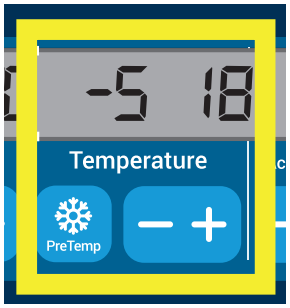


Figure 4–6: Setting the Pre-cooling or Pre-warming Temperature (left)

3. Press the **+** or **-** key and hold it until the desired temperature appears.
4. Release the **+** or **-** key when the desired temperature appears above the **PreTemp** key.

   The centrifuge starts heating or cooling the rotor chamber to the preset temperature. The current rotor chamber temperature displayed to the right of the selected pre-tempering value starts to change towards the desired value.
5. Wait until the sample chamber temperature indicator is at the same value as the pre-tempering temperature.

4. 2. 5. Set Temperature

A refrigerated centrifuge allows for preselecting a rotor chamber temperature between -10 °C and +40 °C for the centrifugation run. Temperatures displayed by the centrifuge are the estimated sample temperatures.

⚠ **CAUTION** Due to air friction sample integrity may be affected.
The temperature of the rotor may rise significantly while the centrifuge is spinning.
Refrigerated units can have a deviation from displayed and set temperature to the sample temperature.
Make sure the centrifuge temperature control capabilities meet your application specification. If necessary make a test run.

NOTICE This feature is not available on ventilated models.

Proceed as follows to preselect a temperature for the centrifugation run:

1. Press the **+** or **-** key below the **Temperature** field of the LCD display window (right side of Figure 4–7, showing 18 degrees Celsius) to adjust the desired rotor chamber temperature.

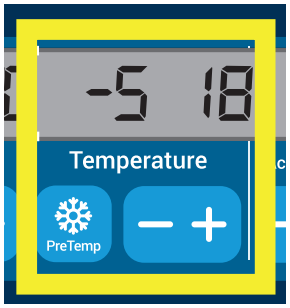


Figure 4–7: Setting the Temperature for the Centrifugation Run (right)

2. Release the **+** or **-** key when the desired temperature appears above the key.

   Doing so selects the temperature for future centrifugation runs (until the next time you choose to change this setting) .

4. 2. 6. Select the Bucket Type

Bucket selection is only possible for swing-out rotors. The bucket code corresponds to the last four digits of the article number of the bucket.

Proceed as follows to select the bucket type installed in the rotor:

1. Press the **+** or **-** key below the **Bucket** field of the LCD display window (see Figure 4–8) to select the correct bucket code for the buckets installed in your rotor.

Figure 4–8: Setting the Correct Bucket Code for the Rotor

2. Press the **Bucket** key repeatedly until the bucketcode of the bucket being used is displayed.
3. Release the **+** or **-** key when the desired bucket code appears above the key.

   Doing so selects the bucket code for future centrifugation runs (until the next time you choose to change this setting).

4. 3. Programs

To reduce the setup effort before a centrifugation run, the centrifuge lets you enter a selection of desired program parameters and store them together as a program that may be retrieved for later use. You can include all or part of the run parameters explained in previous sections of this chapter, including:

- acceleration and braking profile
- speed or RCF value
- running time
- temperature
- bucket type by code

Setting Up and Saving a Program

All centrifuge models described in this section let you store up to six programs using dedicated front panel keys. You can retrieve and start the programs later on by pressing the program key assigned during storage.

Proceed as follows to store a program:

1. Set your choice of run parameters in one go, as explained for your centrifuge model in the previous sections of this chapter.
2. Press any of the program selection keys Program 1 for 4 seconds.

   Your program is stored now.

For instructions on how to start a previously stored program, please refer to the section “Program Mode Operation” on page 4-7.

4. 4. Centrifugation

Mind the safety zone of minimum 30 cm around the centrifuge. Refer to “Safety Zone” on page 1-1. Persons and hazardous substances must be kept out of this safety zone while centrifuging.

Once the rotor has been properly installed, the main power switch has been turned on and the centrifuge lid has been closed, you are ready to start centrifuging.

You have various options to start a centrifugation run:

- Continuous Mode: This is a fully manual mode. In Continuous Mode you use the **Start** key Start and **Stop** key Stop to start and stop centrifugation manually, as explained in the section “Continuous Operation” further below.
- Timed Mode: This is a semi-automatic mode that relies on a timer. If you have preset a runtime (see “4. 2. 2. Set Run Time” on page 4-3), you press the **Start** key Start, then wait for the timer to expire and the centrifuge to stop automatically.
- Program Mode: This is a fully automatic mode. You prepare and save an automated program, as explained in the section “Setting Up and Saving a Program” on page 4-6, then run it by pressing the appropriate program selection key Program 1.

WARNING Damage to health from centrifuging explosive or flammable materials or substances. Do not centrifuge explosive or flammable materials or substances.

Continuous Mode Operation

Proceed as follows to run the centrifuge in continuous, manual stop mode of operation.

1. Set the desired parameters, as explained in the section “4. 2. Set Basic Centrifugation Parameters” on page 4-2.

   NOTICE Speed (see “4. 2. 1. Set Speed / RCF-Value” on page 4-2) must be set as a minimum requirement.
2. Press the **Start** key Start on the control panel.

   The centrifuge starts running up to the pre-set speed. The LCD display changes to reflect the acceleration process until the centrifuge reaches the pre-set speed.

   When the centrifuge has accelerated to the pre-set speed, the timer starts counting the elapsed time.
3. Press the **Stop** key Stop when you have finished centrifuging.

   NOTICE You cannot open the lid as long as the centrifuge is spinning.

Timed Mode Operation

Proceed as follows to run the centrifuge in timed mode of operation.

1. Set the desired parameters, as explained in the section "4. 2. Set Basic Centrifugation Parameters" on page 4-2.

   NOTICE Speed (see "4. 2. 1. Set Speed / RCF-Value" on page 4-2) and runtime (see "4. 2. 2. Set Run Time" on page 4-3) must be set as a minimum requirement.

2. Press the **Start** key  on the control panel.

   The centrifuge starts running and the LCD display changes to indicate the correct speed.

   When the centrifuge has accelerated to the pre-set speed, the timer starts counting the remaining time.

3. When the remaining time has elapsed, the centrifuge will stop automatically.

   NOTICE You cannot open the lid as long as the centrifuge is spinning.

Program Mode Operation

Proceed as follows to start a previously stored program.

1. Press any of the program selection keys  to select a program.

   NOTICE There is no need to set any parameters. All settings are included in the program.

2. Press the **Start** key  to start the centrifugation run with the selected program's settings.

   The centrifuge starts running up to the pre-set speed.

   The LCD display changes to reflect the acceleration process until the centrifuge reaches the pre-set speed.

   When the centrifuge has accelerated to the pre-set speed, the timer starts counting the remaining time.

3. When the remaining time has elapsed, the centrifuge will stop automatically.

   NOTICE You cannot open the lid as long as the centrifuge is spinning.

Handling Error Messages

Error messages may occur when you try to start the centrifuge. Frequent root causes include the following:

- Set speed exceeds admissible speed for rotor
- Imbalanced load
- Unapproved rotor found by rotor detection

A detailed list of error messages and troubleshooting instructions appear in the section "Troubleshooting by Guide" on page 6-2.

4. 5. Stop an Ongoing Centrifugation Run

You can stop the centrifuge at any time by pressing the **Stop** key  on the control panel.

Proceed as follows to stop an ongoing centrifugation run:

1. Press the **Stop** key  on the control panel.
2. Wait for the speed drop to zero.

   The message END appears in the LCD display.

   You can now open the lid and remove the centrifuged material, as explained in "How to Install and Remove a Rotor" on page 2-5.

4. 6. System Menu

To enter the system menu hold down any of the keys when powering on the centrifuge.

Use the **+** and **-** keys below Speed in order to navigate through the system menu.

Use the **+** and **-** keys below Bucket in order to navigate within the system menu points.

Within the system menu you can change the settings of the centrifuge. Following settings are available:

1. Language – following languages are supported: English, German, French, Spanish, Italian, Dutch, Russian.
2. End of run beep – select **YES** if the centrifuge shall make beep after the run. Otherwise select **NO**.
3. Keypad beep – select **YES** if the centrifuge shall make beep when pressing any key. Otherwise select **NO**.
4. LCD powersave – select **YES** if the centrifuge shall enter a powersave mode after the run. Otherwise select NO.
5. Auto lid open – select **YES** if the centrifuge shall open after the run. Otherwise select **NO**.
6. Software ID – the current software version is shown here.
7. Cycle count – the current numbers of cycles are shown here.

5. Maintenance and Care

5. 1. Cleaning Intervals

For the sake of personal, environmental, and material protection, you must clean and if necessary disinfect the centrifuge and its accessories on a regular basis.

5. 2. Basics

- Use warm water with a neutral detergent that is suitable for use with the materials. If in doubt contact the manufacturer of the cleaning agent.
- Use a soft cloth for cleaning.
- Never use caustic cleaning agents such as soap suds, phosphoric acid, bleaching solutions or scrubbing powder.
- Remove rotor and clean centrifugation chamber with a small amount of cleaning agent on a clean cloth.
- Use a soft brush without metal bristles to remove stubborn residue.
- Afterwards rinse with a small amount of distilled water and remove any remains with absorbent towels.
- Use only cleaning and disinfecting agents with a pH of 6-8.

⚠ CAUTION Not rated procedures or agents could deteriorate the materials of the centrifuge and lead to malfunction. Refrain from using any other cleaning or decontamination procedure, if you are not entirely sure that the intended procedure is safe for the equipment. Use only cleaning agents that will not damage the equipment. In doubt contact the manufacturer of the cleaning agent. If still in doubt, contact Thermo Fisher Scientific.

5. 2. 1. Rotor and Accessories Inspection

After thoroughly cleaning the rotors, they must be inspected for damage, wear and corrosion.

The cycle limits of the rotors and buckets are stated on some rotors and buckets and in the technical data section of each rotor (“Rotor Specifications” on page B-1).

NOTICE Usage beyond these limits might lead to rotor failure, sample loss and damage to the centrifuge.

⚠ CAUTION Do not run any rotor or accessories with sign of damage. Ensure that the rotor, buckets and accessories are within their expected maximum number of cycles. It is recommend that you have rotors and accessories inspected yearly as part of your routine service to ensure safety.

Metal Parts

Make sure that the protective coating is complete. It can be removed through wear and chemical attack and can lead to unseen corrosions. In case of corrosion, such as rust or white / metallic pitting, the rotor or accessories must be removed from service immediately. Particular attention should be paid to the bottom of buckets on swinging bucket rotors and tube cavities on fixed angle rotors.

Slide Coated Rotors

Rotor crosses are provided with an anti-friction and corrosion resistant finish.

The following procedure is for rotor crosses and rotor trunnion bolts:

- Regular cleaning of contact area between the rotor and buckets (rotor cross trunnions and bucket grooves) is recommended with a mild detergent (every 300-500 cycles).
- The rotor cross is coated with a special advanced lubricating and protective coating, therefore no grease is necessary.
- Contaminating particles (dirt, dust or debris) in the rotor cross and bucket grooves may lead to imbalance and cleaning will be required.
- The lubricating coating may, over extended periods or under heavy loads, become worn. If this occurs a small amount of greasing of the rotor cross trunnions will be required with bolt grease (75003786).

Plastic Parts

Check for signs of plastic crazing, fading, bruising or cracking. In case of damage the inspected item must be removed from service immediately.

O-Rings

Make sure that O-rings are still smooth, not brittle nor otherwise damaged. Some O-rings are not autoclavable.

Replace brittle or damaged O-rings immediately. Refer to “Rotor Specifications” on page B-1 for details on O-rings as spare part.

5. 2. 2. Cycles of Rotors and Buckets

You have to count the cycles of the rotors and buckets using your own method. The centrifuge can not detect the change or replacement of rotors of the same type or of buckets of the same type.

The lifetime of a rotor and buckets depends on the amount of physical load. Do not use rotors and buckets that exceed the maximum number of cycles.

The maximum number of cycles for rotors and buckets is given in the chapter “Rotor Specifications” on page B-1. The maximum number of cycles for buckets is marked on the buckets themselves.

Fiberlite rotors are not limited in cycles, but have a limited lifetime of 15 years.

Centrifuges with a GUI

The centrifuge counts cycles for a rotor type or a bucket type. You have to count the cycles of the rotors and buckets using your own method. The centrifuge can not detect the change or replacement of rotors of the same type or of buckets of the same type.

You can check the number of cycles for a rotor type on the user interface of the centrifuge. The rotor log saves the information of the used rotor types and bucket types. Refer to “Rotor Log” on page 3-47 for detailed information and to “Status” on page 3-14 for a quick information.

Centrifuges with a LCD Control Panel

The centrifuge does not count cycles for a rotor type or a bucket type. You have to count the cycles of the rotors and buckets using your own method.

5. 3. Cleaning

Clean as follows:

1. Clean rotor, buckets and accessories outside of the centrifugation chamber.
2. Separate rotor, buckets, lids, adapters, tubes and O-rings to allow thorough cleaning.
3. Rinse rotor and all accessories with warm water and a neutral detergent that is suitable for use with the materials. If in doubt contact the manufacturer of the cleaning agent. Clean away the grease from the rotor trunnions (pivot point for swinging buckets).
4. Use a soft brush without metal bristles to remove stubborn residue.
5. Rinse rotor and all accessories with distilled water.
6. Place the rotors on a plastic grate with their cavities pointing down, to enable the cavities to fully drain and dry.
7. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50 °C. If drying boxes are used, the temperature must never exceed 50 °C. Higher temperatures could damage the material and shorten the lifetime of the parts.
8. Inspect the rotor and accessories for signs of damages (“Rotor and Accessories Inspection” on page 5-1).
9. After cleaning, treat the entire surface of aluminum parts including the cavities with corrosion protection oil (70009824).

   Treat the bolts of swinging bucket rotors with bolt grease (75003786) if necessary.

⚠ CAUTION Before using any cleaning methods, users should check with the manufacturer of the cleaning agents that the proposed method will not damage the equipment.

CAUTION Drive and door lock can be damaged by entering liquids. Do not allow liquids, especially organic solvents, to get on the drive shaft, the drive bearings or the centrifuge door locks. Organic solvents break down the grease in the motor bearing. The drive shaft could lock up.

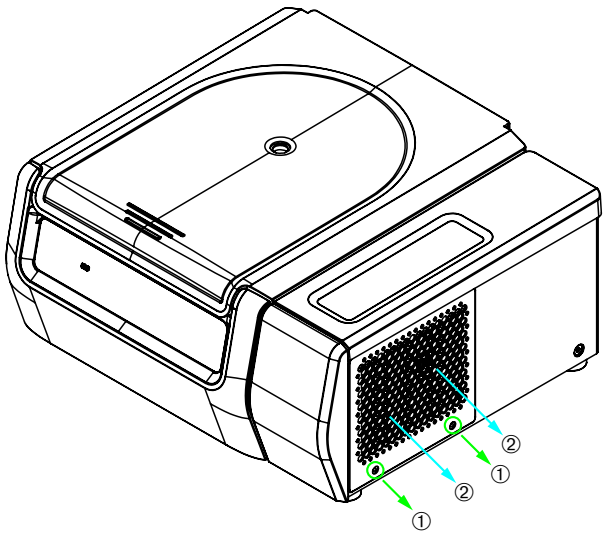
Touchscreen

1. Pull out the power supply plug.
2. Clean the touchscreen using a dry microfiber cloth.
3. If necessary moisten the microfiber cloth and wipe the touchscreen again.

Ventilation Grid

To clean the ventilation grid proceed as follows:

1. Pull out the power supply plug.
1. Remove the 2 screws of the ventilation grid ① on the right side of the centrifuge.
2. Remove the ventilation grid ② by pushing it downwards.
3. Use a vacuum cleaner to clean the ventilation grid and if necessary the condenser. Use a soft brush for detailed cleaning if needed.
4. Reinstall the ventilation grid.



① Screws
② Ventilation Grid

Figure 5–1: Removing the ventilation grid

CAUTION Cutting injuries can occur due to sharp metal. Do not touch the condenser with your hands when the ventilation grid is removed.

5. 4. Disinfection

You are responsible that the level of disinfection is achieved according to your requirements.

After disinfection:

1. Rinse the centrifuge and all affected accessories with water.
2. Allow to fully drain and dry.
3. After disinfecting, treat the entire surface of aluminum parts including the cavities with corrosion protection oil (70009824).

   Treat the bolts of swinging bucket rotors with bolt grease (75003786) if necessary.

WARNING Do not touch infected parts. Hazardous infection is possible when touching the contaminated rotor and centrifuge parts. Infectious material can get into the centrifuge when a tube breaks or as a result of spills. In case of contamination, make sure that no one is put at risk. Disinfect the affected parts immediately.

CAUTION Equipment can be damaged by inappropriate disinfection methods or agents. Make sure that the disinfection agent or the method will not damage the equipment. In doubt contact the manufacturer of the disinfection agent. Observe the safety precautions and handling instructions for the disinfection agents used.

5. 5. Decontamination

You are responsible that the level of decontamination is achieved according to your requirements.

After decontamination:

1. Rinse the centrifuge and all affected accessories with water.
2. Allow to fully drain and dry.
3. After decontaminating, treat the entire surface of aluminum parts including the cavities with corrosion protection oil (70009824).

   Treat the bolts of swinging bucket rotors with bolt grease (75003786) if necessary.

WARNING Do not touch contaminated parts. Exposure to radiation is possible when touching the contaminated rotor and centrifuge parts. Contaminated material can get into the centrifuge when a tube breaks or as a result of spills. In case of contamination, make sure that no one is put at risk. Decontaminate the affected parts immediately.

CAUTION Equipment can be damaged by inappropriate decontamination methods or agents. Make sure that the decontamination agent or the method will not damage the equipment. In doubt contact the manufacturer of the decontamination agent. Observe the safety precautions and handling instructions for the decontamination agents used.

5. 6. Autoclaving

Always disassemble all parts before autoclaving, e.g. lids need to be removed before autoclaving a bucket or rotor.

If not stated otherwise on the parts themselves, all parts can be autoclaved at 121 °C for 20 min. Refer to “Rotor Specifications” on page B-1 for details on rotors.

Make sure that the necessary sterility is achieved according to your requirements.

After autoclaving, treat the entire surface of aluminum parts including the cavities with corrosion protection oil (70009824).

Treat the bolts of swinging bucket rotors with bolt grease (75003786) if necessary.

⚠ CAUTION	Never exceed the permitted temperature and duration when autoclaving.

NOTICE	No chemical additives are permitted in the steam.

5. 7. Maintenance

Lifetime

The centrifuge is specified for a lifetime of 10 years. Decommissioning the centrifuge is suggested when this limit is reached.

The lifetime of rotors, buckets and lids is based on cycles and specified individually for each rotor in the chapter “Rotor Specifications” on page B-1. The lifetime of Fiberlite rotors is limited to 15 years. Other accessories are not limited by a specific lifetime and need only be replaced when damaged or worn.

Preventive Maintenance

In order to keep this product able to perform the intended applications reliably and safely, ongoing preventive maintenance is necessary in accordance with the following recommended schedule:

- The anti-vibration mounts of the motor suspension and motor cover (included in “Preventive Maintenance Kit (PM)” article no 50160419 for refrigerated or 50161150 for ventilated models) are suggested to be replaced at three-year intervals.
- The particle deflection seals for ventilated versions of the centrifuge (Art. No. 50159823) are suggested to be inspected annually and need to be replaced when damaged or exhibiting too much slack, but after 5 years at the latest.
- The gas spring of the centrifuge lid (GP4 Pro: article no 50154683 for refrigerated or 50159920 for ventilated models; GP1 Pro: article no 50154682) is suggested to be inspected annually and to be replaced when spring action deteriorates.
- The anti-vibration mounts (20038955) and the motor cover (20058551) need to be replaced every 3 years.
- For rotors and buckets mind the information in “Rotor and Accessories Inspection” on page 5-1.

⚠ CAUTION	Usage beyond these limits might affect the safety of the overall system.

NOTICE	In the worst case the centrifuge, the used accessories and the samples can be damaged.

NOTICE	Maintenance activities must be performed by Thermo Fisher Scientific authorized service technicians only.

Service

Thermo Fisher Scientific recommends having the centrifuge and accessories serviced once a year by an authorized service technician. The service technician checks the following:

- electrical equipment and connections
- suitability of set-up site
- centrifuge door lock and safety system
- rotor
- fixation of rotor and drive shaft of the centrifuge
- rubber gasket
- protective casing
- anti-vibration mounts

Before service, centrifuge and rotors should be thoroughly cleaned and decontaminated to ensure full and safe inspection can be completed.

Thermo Fisher Scientific offers inspection and service contracts for this work. Any necessary repairs are performed for free during the warranty period and afterwards for a charge. That is only valid if the centrifuge has only been maintained by an authorized Thermo Fisher Scientific service technician.

A validation of the centrifuge is recommended and can be ordered from customer service.

5. 8. Shipping

Before shipping the centrifuge:

- The centrifuge must be clean and decontaminated.
- You must confirm the decontamination with a decontamination certificate.

WARNING Before shipping the centrifuge and accessories you must clean and, if necessary, disinfect or decontaminate the full system. If you are not sure, consult with Thermo Fisher Scientific customer service.

5. 9. Storage

- Before storing the centrifuge and the accessories it must be clean and if necessary disinfected and decontaminated.

  Centrifuge, rotors, buckets and accessories have to be fully dry before storage.
- Keep the centrifuge in a clean, dry and dust-free location.
- Do not store the centrifuge in direct sunlight.

WARNING When you remove the centrifuge and accessories from use, clean and if necessary disinfect or decontaminate the full system. If you are not sure speak to the Thermo Fisher Scientific customer service.

5. 10. Disposal

For the disposal of the centrifuge mind the regulations in your country. Contact the Thermo Fisher Scientific Customer Service for the disposal of the centrifuge. For contact information check the backpage of this manual or visit www.thermofisher.com/centrifuge

For the countries of the European Union the disposal is regulated by the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EC.

Mind the information on transport and shipping ("Shipping" on page 5-6 and "Transporting" on page 1-2).

WARNING When removing the centrifuge and accessories from use for disposal you have to clean and if necessary disinfect or decontaminate the entire system. In doubt contact the Thermo Fisher Scientific customer service.

6. Troubleshooting

6. 1. Mechanical Emergency Door Release

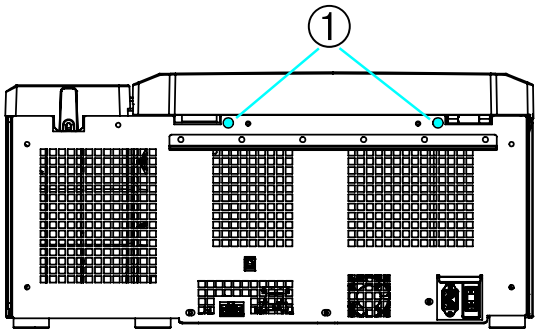
During a power failure, you will not be able to open the centrifuge lid with the regular electric lid release. A mechanical override is provided to allow sample recovery in the case of an emergency. However, this should be used only in emergencies and **after the rotor has come to a complete stop**.

Always wait until the rotor has come to a stop without braking. The brake does not work when there is no power. The braking process lasts much longer than usual.

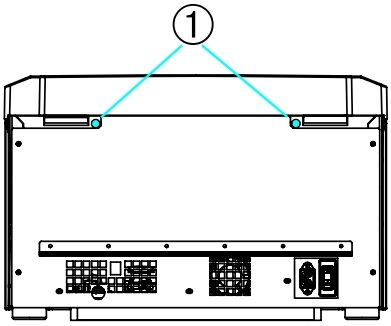
Proceed as follows:

1. **Wait until the rotor has stopped.** This can take longer than 40 minutes.
2. Pull out the power supply plug.
3. On the back side of the housing there are two plastic plugs. You can pry these plugs out of the back plate with a screwdriver. Pull the release cord attached to trigger the mechanical lid release. The lid will open and the samples can be removed.

Refrigerated Benchtop Centrifuge

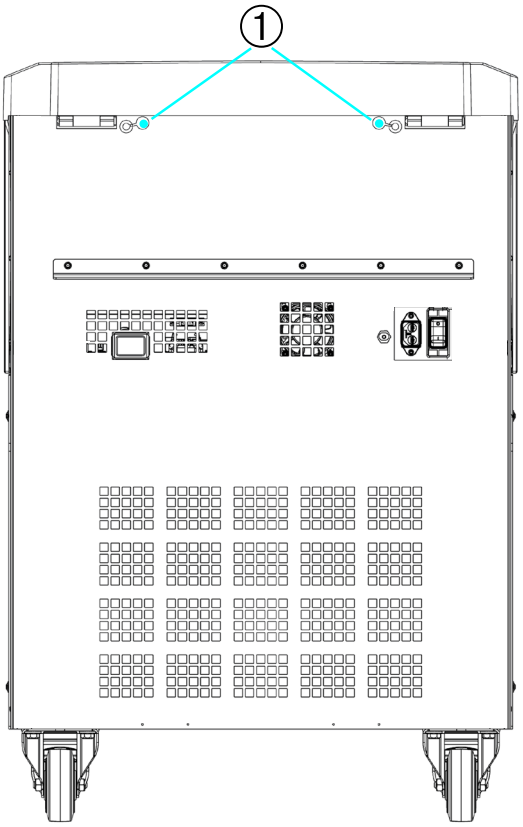


Ventilated Benchtop Centrifuge



① Plastic plugs attached to the release cords

Floorstanding Centrifuge



① Plastic plugs attached to the release cords

Figure 6–1: Emergency door release on the back side

NOTICE You need to pull both cords in order to unlock both locks.

4. Push the cord(s) back into the centrifuge and mount the plug(s).
5. Reconnect the centrifuge once the power has been restored.
6. Switch on the centrifuge.
7. Press the **OPEN** key to have the door locks operative again.

   ⚠ **WARNING** If you pull only one cord or you did not press the **OPEN** key to have the door locks operative again, the door might open while the rotor is still spinning.

⚠ WARNING Serious injuries can occur if you touch a spinning rotor with your hands or tools. A rotor can still be spinning after a power failure occurs. Do not open the centrifuge before the rotor has stopped spinning. Do not touch a spinning rotor. Never use your hands or tools to stop a spinning rotor.

6. 2. Ice Formation

Warm humid air in combination with a cold centrifugation chamber can lead to formation of ice. To remove the ice from the centrifugation chamber, proceed as follows:

1. Open the centrifuge door.
2. Remove the rotor. See “How to Install and Remove a Rotor” on page 2-5.
3. Let the ice melt.

   NOTICE Do not use any sharp tools, aggressive liquids or fire to fasten the melting process. If necessary use warm water to speed up the melting process.
4. Remove the water from the centrifugation chamber.
5. Clean the centrifuge chamber. See “Maintenance and Care” on page 5-1.

6. 3. Troubleshooting by Guide

NOTICE If problems occur other than those listed in this table, the authorized customer service representative must be contacted.

Error Message	Description	Troubleshooting
Numbers not stated here	The centrifuge can not be operated. The run does not start or the centrifuge runs down without being braked.	Restart the centrifuge. If the error message still shows, contact a service technician.
14	Overtemperature detected.	Overheating in chamber. Check the function of the refrigeration unit. Clean the air inlet for the condenser. Restart the centrifuge. If the error message still shows, contact a service technician.
17–23	Rotor detection failed.	Make sure the rotor can be used in the centrifuge. Refer to “Rotor Program” on page A-12. Makes sure the rotor is properly installed. Refer to “How to Install and Remove a Rotor” on page 2-5. Restart the centrifuge. If the error message still shows, contact a service technician.
33	Overpressure in the refrigeration unit.	Clean the air inlet for the condenser. Restart the centrifuge. If the error message still shows, contact a service technician.

Error Message	Description	Troubleshooting
40	The centrifuge accelerates too slowly.	Is the rotor properly installed? Check whether you have selected the right bucket. Is it easy to turn the rotor when the lid is open? Does the rotor rub against the device? Restart the centrifuge. If the error message still shows, contact a service technician.
97	Mechanical emergency door release.	Close the centrifuge lid. Do not touch a spinning rotor. Never use your hands or tools to stop a spinning rotor. Restart the centrifuge. If the error message still shows, contact a service technician.
98	Imbalance detected.	Check the loading of the rotor. Check the lubrication of the trunnion bolts of the rotor body if a swinging bucket rotor is used. Restart the centrifuge. If the error message still shows, contact a service technician.

Table 6–1: Error Messages

6. 4. Information for the Customer Service

If you need to contact customer service, please provide the order no. and the serial no. of your device. This information can be found on the type plate.

To identify the software version on a centrifuge with a LCD control panel, proceed as follows:

1. Hold down any of the keys and then switch on the centrifuge.

   You enter the system menu.
2. Press the **START** key.
3. Press and hold the **ENTER** key, until the following message is displayed:

   Software ID: xxxxxxx

To identify the software version on a centrifuge with a GUI, proceed as follows:

Press the **Files and Info** button on the navigation bar. Product version information is displayed.

A. Technical Specifications

A. 1. Multifuge X Pro Series

Model	Multifuge X1 Pro Multifuge X1 Pro-MD	Multifuge X1R Pro Multifuge X1R Pro-MD
Environmental Conditions	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C
Environmental Conditions during Storage and Shipping	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %
Permissible Ambient Temperature during Operation	+2 °C to +35 °C	+2 °C to +35 °C
Average Heat Dissipation 100–240 V 120 V 220-230 V	 0.65 kW/h - -	 - 1.0 kW/h 1.0 kW/h
Overvoltage Category	II	II
Pollution Degree	2	2
IP	20	20
Running Time	99 h, 59 min (increments of 1 minutes)	99 h, 59 min (increments of 1 minutes)
Maximum Speed n_{max}	15200 rpm (depending on the rotor)	15200 rpm (depending on the rotor)
Minimum Speed n_{min}	300 rpm	300 rpm
Maximum RCF Value at n_{max}	25830 x g (depending on the rotor)	25830 x g (depending on the rotor)
Noise Level at Maximum Speed[1, 2]	< 73 dB (A)	< 68 dB (A)
Maximum Kinetic Energy 100-240 V 120 V 220-230 V	 41 kJ - -	 - 41 kJ 41 kJ
Temperature Setting Range	-	-10 °C to +40 °C
Dimensions Height (lid open / lid closed) Table top height Width Depth (with mains connection)	 855 mm / 364 mm 320 mm 445 mm 660 mm	 855 mm / 364 mm 320 mm 625 mm 660 mm
Weight[3] 100 V-240 V 120 V 220-230 V	 61 kg - -	 - 92 kg 94 kg

[1] 1 m in front of the instrument at 1.6 m height.

[2] Measured with Fiberlite F15-8 x 50cy at 14500 rpm, cooling set to -10 °C (only refrigerated).

[3] Without rotor.

Table A–1: Technical Data Multifuge X Pro Series Centrifuges

Model	**Multifuge X4 Pro** **Multifuge X4 Pro-MD**	**Multifuge X4R Pro** **Multifuge X4R Pro-MD**
Environmental Conditions	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C
Environmental Conditions during Storage and Shipping	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %
Permissible Ambient Temperature during Operation	+2 °C to +35 °C	+2 °C to +35 °C
Average Heat Dissipation 120 V 220 V 208–240 V 220–240 V / 230 V	1.0 kW/h - 1.2 kW/h -	1.1 kW/h 1.6 kW/h - 1.6 kW/h
Overvoltage Category	II	II
Pollution Degree	2	2
IP	20	20
Running Time	99 h, 59 min (increments of 1 minutes)	99 h, 59 min (increments of 1 minutes)
Maximum Speed n_{max}	15200 rpm (depending on the rotor)	15200 rpm (depending on the rotor)
Minimum Speed n_{min}	300 rpm	300 rpm
Maximum RCF Value at n_{max}	25830 x g (depending on the rotor)	25830 x g (depending on the rotor)
Noise Level at Maximum Speed[1, 2]	< 68 dB (A)	< 63 dB (A)
Maximum Kinetic Energy 120 V 220 V 208–240 V 220–240 V / 230 V	51.7 kJ - 62.5 kJ -	51.7 kJ 62.5 kJ - 62.5 kJ
Temperature Setting Range	-	-10 °C to +40 °C
Dimensions Height (lid open / lid closed) Table top height Width Depth (with mains connection)	861 mm / 362 mm 325 mm 566 mm 690 mm	860 mm / 361 mm 325 mm 746 mm 690 mm
Weight[3] 120 V 220 V 208–240 V 220–240 V / 230 V	89 kg 89 kg -	117 kg 126 kg - 125 kg

[1] 1 m in front of the instrument at 1.6 m height.

[2] Measured with Fiberlite F15-8 x 50cy at 14500 rpm, cooling set to -10 °C (only refrigerated).

[3] Without rotor.

Table A–2: Technical Data Multifuge X Pro Series Centrifuges

Model	Multifuge X4F Pro Multifuge X4F Pro-MD	Multifuge X4RF Pro Multifuge X4RF Pro-MD
Environmental Conditions	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C
Environmental Conditions during Storage and Shipping	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %
Permissible Ambient Temperature during Operation	+2 °C to +35 °C	+2 °C to +35 °C
Average Heat Dissipation 120 V 220 V 208–240 V 220–240 V / 230 V	 1.0 kW/h - 1.2 kW/h -	 1.1 kW/h 1.6 kW/h - 1.6 kW/h
Overvoltage Category	II	II
Pollution Degree	2	2
IP	20	20
Running Time	99 h, 59 min (increments of 1 minutes)	99 h, 59 min (increments of 1 minutes)
Maximum Speed n_{max}	15200 rpm (depending on the rotor)	15200 rpm (depending on the rotor)
Minimum Speed n_{min}	300 rpm	300 rpm
Maximum RCF Value at n_{max}	25830 x g (depending on the rotor)	25830 x g (depending on the rotor)
Noise Level at Maximum Speed[1, 2]	< 70 dB (A)	< 69 dB (A)
Maximum Kinetic Energy 120 V 220 V 208–240 V 220–240 V / 230 V	 51.7 kJ - 62.5 kJ -	 51.7 kJ 62.5 kJ - 62.5 kJ
Temperature Setting Range	-	-10 °C to +40 °C
Dimensions Height (lid open / lid closed) Table top height Width Depth (with mains connection)	 1350 mm / 835 mm 800 mm 566 mm 690 mm	 1350 mm / 835 mm 800 mm 566 mm 690 mm
Weight[3] 120 V 220 V 208–240 V 220–240 V / 230 V	 152 kg - 152 kg -	 142 kg 146 kg - 145 kg

[1] 1 m in front of the instrument at 1.6 m height.

[2] Measured with Fiberlite F15-8 x 50cy at 14500 rpm, cooling set to -10 °C (only refrigerated).

[3] Without rotor.

Table A–3: Technical Data Multifuge X Pro Series Centrifuges

A. 2. Megafuge ST Plus Series

Model	Megafuge ST1 Plus Megafuge ST1 Plus-MD	Megafuge ST1R Plus Megafuge ST1R Plus-MD
Environmental Conditions	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C
Environmental Conditions during Storage and Shipping	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %
Permissible Ambient Temperature during Operation	+2 °C to +35 °C	+2 °C to +35 °C
Average Heat Dissipation 100 V-240 V 120 V 220 V-230 V	 0.65 kW/h - -	 - 1.0 kW/h 1.0 kW/h
Overvoltage Category	II	II
Pollution Degree	2	2
IP	20	20
Running Time	99 h, 59 min (increments of 1 minutes)	99 h, 59 min (increments of 1 minutes)
Maximum Speed n_{max}	15200 rpm (depending on the rotor)	15200 rpm (depending on the rotor)
Minimum Speed n_{min}	300 rpm	300 rpm
Maximum RCF Value at n_{max}	25830 x g (depending on the rotor)	25830 x g (depending on the rotor)
Noise Level at Maximum Speed[1, 2]	< 73 dB (A)	< 68 dB (A)
Maximum Kinetic Energy 120 V 100-240 V 220-230 V	 - 41 kJ -	 41 kJ 41 kJ 41 kJ
Temperature Setting Range	-	-10 °C to +40 °C
Dimensions Height (lid open / lid closed) Table top height Width Depth (with mains connection)	 855 mm / 364 mm 320 mm 445 mm 660 mm	 855 mm / 364 mm 320 mm 625 mm 660 mm
Weight[3] 100 V-240 V 120 V 220-230 V	 61 kg - -	 - 92 kg 94 kg

[1] 1 m in front of the instrument at 1.6 m height.

[2] Measured with Fiberlite F15-8 x 50cy at 14500 rpm, cooling set to -10 °C (only refrigerated).

[3] Without rotor.

Table A–4: Technical Data Megafuge ST Plus Series Centrifuges

Model	Megafuge ST4 Plus Megafuge ST4 Plus-MD	Megafuge ST4R Plus Megafuge ST4R Plus-MD
Environmental Conditions	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C
Environmental Conditions during Storage and Shipping	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %
Permissible Ambient Temperature during Operation	+2 °C to +35 °C	+2 °C to +35 °C
Average Heat Dissipation 120 V 220 V 208–240 V 220–240 V / 230 V	 1.0 kW/h - 1.2 kW/h -	 1.1 kW/h 1.6 kW/h - 1.6 kW/h
Overvoltage Category	II	II
Pollution Degree	2	2
IP	20	20
Running Time	99 h, 59 min (increments of 1 minutes)	99 h, 59 min (increments of 1 minutes)
Maximum Speed n_{max}	15200 rpm (depending on the rotor)	15200 rpm (depending on the rotor)
Minimum Speed n_{min}	300 rpm	300 rpm
Maximum RCF Value at n_{max}	25830 x g (depending on the rotor)	25830 x g (depending on the rotor)
Noise Level at Maximum Speed[1, 2]	< 68 dB (A)	< 63 dB (A)
Maximum Kinetic Energy 120 V 220 V 208–240 V 220–240 V / 230 V	 51.7 kJ - 62.5 kJ -	 51.7 kJ 62.5 kJ - 62.5 kJ
Temperature Setting Range	-	-10 °C to +40 °C
Dimensions Height (lid open / lid closed) Table top height Width Depth (with mains connection)	 861 mm / 362 mm 325 mm 566 mm 690 mm	 860 mm / 361 mm 325 mm 746 mm 690 mm
Weight[3] 120 V 220 V 208–240 V 220–240 V / 230 V	 89 kg - 89 kg -	 117 kg 125 kg - 125 kg

[1] 1 m in front of the instrument at 1.6 m height.

[2] Measured with Fiberlite F15-8 x 50cy at 14500 rpm, cooling set to -10 °C (only refrigerated).

[3] Without rotor.

Table A–5: Technical Data Megafuge ST Plus Series Centrifuges

Model	Megafuge ST4F Plus Megafuge ST4F Plus-MD	Megafuge ST4RF Plus Megafuge ST4RF Plus-MD
Environmental Conditions	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C	Use in interior spaces only. Altitudes of up to 3000 m above sea level. Max. relative humidity 80 % up to 31 °C; decreasing linearly to 50 % relative humidity at 40 °C
Environmental Conditions during Storage and Shipping	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %	Temperature: -10 °C to 55 °C Humidity: 15 % to 85 %
Permissible Ambient Temperature during Operation	+2 °C to +35 °C	+2 °C to +35 °C
Average Heat Dissipation 120 V 220 V 208–240 V 220–240 V / 230 V	 1.0 kW/h - 1.2 kW/h -	 1.1 kW/h 1.6 kW/h - 1.6 kW/h
Overvoltage Category	II	II
Pollution Degree	2	2
IP	20	20
Running Time	99 h, 59 min (increments of 1 minutes)	99 h, 59 min (increments of 1 minutes)
Maximum Speed n_{max}	15200 rpm (depending on the rotor)	15200 rpm (depending on the rotor)
Minimum Speed n_{min}	300 rpm	300 rpm
Maximum RCF Value at n_{max}	25830 x g (depending on the rotor)	25830 x g (depending on the rotor)
Noise Level at Maximum Speed[1, 2]	< 70 dB (A)	< 69 dB (A)
Maximum Kinetic Energy 120 V 220 V 208–240 V 220–240 V / 230 V	 51.7 kJ - 62.5 kJ -	 51.7 kJ 62.5 kJ - 62.5 kJ
Temperature Setting Range	-	-10 °C to +40 °C
Dimensions Height (lid open / lid closed) Table top height Width Depth (with mains connection)	 1350 mm / 835 mm 800 mm 566 mm 690 mm	 1350 mm / 835 mm 800 mm 566 mm 690 mm
Weight[3] 120 V 220 V 208–240 V 220–240 V / 230 V	 152 kg - 152 kg -	 142 kg 146 kg - 145 kg

[1] 1 m in front of the instrument at 1.6 m height.

[2] Measured with Fiberlite F15-8 x 50cy at 14500 rpm, cooling set to -10 °C (only refrigerated).

[3] Without rotor.

Table A–6: Technical Data Megafuge ST Plus Series Centrifuges

A. 3. Directives, Standards and Guidelines

Centrifuge	Region	Directive	Standard
Thermo Scientific Multifuge X1 Pro Multifuge X1R Pro Megafuge ST1 Plus Megafuge ST1R Plus Multifuge X4 Pro Multifuge X4R Pro Megafuge ST4 Plus Megafuge ST4R Plus Multifuge X4F Pro Multifuge X4RF Pro Megafuge ST4F Plus Megafuge ST4RF Plus	**Europe** Refrigerated 220–240 V, 50 Hz / 230 V, 60 Hz Refrigerated 220-230 Hz, 50 / 60 Hz Ventilated 208–240 V, 50 / 60 Hz Ventilated 100-240 V, 50 / 60 Hz	**2006/42/EC** Machinery **2014/35/EU** Low Voltage (Protective Goals) **2014/30/EC** Electromagnetic Compatibility (EMC) **2011/65/EC** RoHS Directive on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment	EN 61010-1 3rd Edition EN 61010-2-020 3rd Edition EN 61326-1 Class B EN ISO 13485 EN ISO 14971 ISO 9001
	USA & Canada Refrigerated 220–240 V, 50 Hz / 230 V, 60 Hz Refrigerated / Ventilated 120 V, 60 Hz Ventilated 208–240 V, 50 / 60 Hz Ventilated 100-240 V, 50 / 60 Hz		ANSI/UL 61010-1 3rd Edition UL 61010-2-020 3rd Edition FCC Part 15 EN ISO 14971 EN ISO 13485 ISO 9001
	Japan Ventilated 100-240 V, 50 / 60 Hz **South Korea** Refrigerated 220 V, 60 Hz **China** Refrigerated 220–240 V, 50 Hz / 230 V, 60 Hz Ventilated 208–240 V, 50 / 60 Hz Ventilated 100-240 V, 50 / 60 Hz		IEC 61010-1 3rd Edition IEC 61010-2-020 3rd Edition IEC 61326-1 Class B EN ISO 14971 EN ISO 13485 ISO 9001

Table A–7: Directives and Standards for Multifuge X Pro / Megafuge ST Plus Series Centrifuges

NOTE This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Centrifuge	Region	Directive	Standard
Thermo Scientific Multifuge X1 Pro-MD Multifuge X1R Pro-MD Megafuge ST1 Plus-MD Megafuge ST1R Plus-MD Multifuge X4 Pro-MD Multifuge X4R Pro-MD Megafuge ST4 Plus-MD Megafuge ST4R Plus-MD Multifuge X4F Pro-MD Multifuge X4RF Pro-MD Megafuge ST4F Plus-MD Megafuge ST4RF Plus-MD	**Europe** Refrigerated 220–240 V, 50 Hz / 230 V, 60 Hz Refrigerated 220-230 Hz, 50 / 60 Hz Ventilated 208–240 V, 50 / 60 Hz Ventilated 100-240 V, 50 / 60 Hz	**98/79/EC** In Vitro Diagnostics **2006/42/EC** Machinery **2014/35/EU** Low Voltage (Protective Goals) **2014/30/EC** Electromagnetic Compatibility (EMC) **2011/65/EC** RoHS Directive on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment	EN 61010-1 3rd Edition EN 61010-2-020 3rd Edition EN 61010-2-101 3rd Edition EN 61326-2-6 EN 61326-1 Class B EN ISO 13485 EN ISO 14971 ISO 9001
	USA & Canada Refrigerated 220–240 V, 50 Hz / 230 V, 60 Hz Refrigerated / Ventilated 120 V, 60 Hz Ventilated 208–240 V, 50 / 60 Hz Ventilated 100-240 V, 50 / 60 Hz	FDA listed Product code JQC centrifuges for clinical use Device class 1	ANSI/UL 61010-1 3rd Edition UL 61010-2-020 3rd Edition UL 61010-2-101 3rd Edition FCC Part 15 EN ISO 14971 EN ISO 13485 ISO 9001
	Japan Ventilated 100-240 V, 50 / 60 Hz **South Korea** Refrigerated 220 V, 60 Hz **China** Refrigerated 220–240 V, 50 Hz / 230 V, 60 Hz Ventilated 208–240 V, 50 / 60 Hz Ventilated 100-240 V, 50 / 60 Hz		IEC 61010-1 3rd Edition IEC 61010-2-020 3rd Edition IEC 61010-2-101 3rd Edition IEC 61326-2-6 IEC 61326-1 Class B EN ISO 14971 EN ISO 13485 ISO 9001

Table A–8: Directives and Standards for Multifuge X Pro-MD / Megafuge ST Plus-MD Series Centrifuges

NOTE This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

A. 4. Refrigerants

3.10.3 Šaldymo sistema

Article No.	Centrifuge	Refrigerant	Quantity	Pressure	GWP	CO2e
75009750	Multifuge X1R Pro (220-230 V)	R-134a	0.28 kg	21 bar	1430	0.4 t
75009770	Megafuge ST1R Plus (220-230 V)	R-134a	0.28 kg	21 bar	1430	0.4 t
75009250	Multifuge X1R Pro-MD (220-230 V)	R-134a	0.28 kg	21 bar	1430	0.4 t
75009251	Multifuge X1R Pro-MD (120 V)	R-134a	0.38 kg	21 bar	1430	0.54 t
75009270	Megafuge ST1R Plus-MD (220-230 V)	R-134a	0.28 kg	21 bar	1430	0.4 t
75009271	Megafuge ST1R Plus-MD (120 V)	R-134a	0.38 kg	21 bar	1430	0.54 t
75009915	Multifuge X4R Pro (220-240 V/230 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009916	Multifuge X4R Pro (120 V)	R-134a	0.54 kg	21 bar	1430	0.77 t
75009815	Multifuge X4R Pro (220 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009918	Megafuge ST4R Plus (220-240 V/230 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009919	Megafuge ST4R Plus (120 V)	R-134a	0.54 kg	21 bar	1430	0.77 t
75009818	Megafuge ST4R Plus (220 V)	R-134a	0.54 kg	21 bar	1430	0.77 t
75009515	Multifuge X4R Pro-MD (220-240 V/230 V)	R-134a	0.43 kg	31 bar	1430	0.61 t
75009516	Multifuge X4R Pro-MD (120 V)	R-134a	0.54 kg	21 bar	1430	0.77 t
75009615	Multifuge X4R Pro-MD (220 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009518	Megafuge ST4R Plus-MD (220-240 V/230 V)	R-134a	0.43 kg	31 bar	1430	0.61 t
75009519	Megafuge ST4R Plus-MD (120 V)	R-134a	0.54 kg	21 bar	1430	0.77 t
75009618	Megafuge ST4R Plus-MD (220 V)	R-134a	0.54 kg	21 bar	1430	0.77 t
75009936	Multifuge X4RF Pro (220-240 V/230 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009948	Megafuge ST4RF Plus (220-240 V / 230 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009536	Multifuge X4RF Pro-MD (220-240 V/230 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009537	Multifuge X4RF Pro-MD (120 V)	R-134a	0.60 kg	21 bar	1430	0.85 t
75009962	Megafuge ST4RF Plus-MD (220-240 V / 230 V)	R-134a	0.45 kg	21 bar	1430	0.64 t
75009946	Megafuge ST4RF Plus-MD (120 V)	R-134a	0.60 kg	21 bar	1430	0.85 t

3.10.3

Contains fluorinated greenhouse gases in a hermetically sealed system.

Table A–9: Refrigerants Used for Multifuge X Pro / Megafuge ST Plus Series

A. 5. Mains Supply

The following table contains an overview of the electrical connection data for the Multifuge X Pro / Megafuge ST Plus Series Centrifuges. This data is to be taken into consideration when selecting the mains connection socket.

Art. No.	Centrifuge	Mains Voltage (V)	Frequency (Hz)	Rated Current (A)	Power Consumption (W)	Building Fuse (AT)	Equipment Fuse (AT)
75009710	Multifuge X1 Pro	100-240	50 / 60	8.5	850	15	15 USA 16 Europe
75009750	Multifuge X1R Pro	220-230	50 / 60	6.5	1350	15	16
75009730	Megafuge ST1 Plus	100-240	50 / 60	8.5	850	15	15 USA 16 Europe
75009770	Megafuge ST1R Plus	220-230	50 / 60	6.5	1350	15	16
75009210	Multifuge X1 Pro-MD	100-240	50 / 60	8.5	850	15	15 USA 16 Europe
75009250	Multifuge X1R Pro-MD	220-230	50 / 60	6.5	1350	15	16
75009251	Multifuge X1R Pro-MD	120	60	11	1350	15	15
75009230	Megafuge ST1 Plus-MD	100-240	50 / 60	8.5	850	15	15 USA 16 Europe
75009270	Megafuge ST1R Plus-MD	220-230	50 / 60	6.5	1350	15	16
75009271	Megafuge ST1R Plus-MD	120	60	11	1350	15	15
75009900	Multifuge X4 Pro	208–240	50 / 60	7.5	1 600	15	16
75009915	Multifuge X4R Pro	220–240 230	50 60	8.5 8.5	1 850 1 850	16 15	15 16
75009815	Multifuge X4R Pro	220	60	8.5	1 850	15	16
75009903	Megafuge ST4 Plus	208–240	50 / 60	7.5	1 600	15	16
75009918	Megafuge ST4R Plus	220–240 230	50 60	8.5 8.5	1 850 1 850	15	16
75009818	Megafuge ST4R Plus	220	60	8.5	1 850	15	16
75009500	Multifuge X4 Pro-MD	208–240	50 / 60	7.5	1 600	15	16
75009501	Multifuge X4 Pro-MD	120	50 / 60	10.5	1 300	15	15
75009515	Multifuge X4R Pro-MD	220–240 230	50 60	8.5 8.5	1 850 1 850	15	16
75009615	Multifuge X4R Pro-MD	220	60	8.5	1 850	15	16
75009516	Multifuge X4R Pro-MD	120	60	12	1 400	15	15
75009503	Megafuge ST4 Plus-MD	208–240	50 / 60	7.5	1 600	15	16
75009504	Megafuge ST4 Plus-MD	120	50 / 60	10.5	1 300	15	15
75009518	Megafuge ST4R Plus-MD	220–240 230	50 60	8.5 8.5	1 850 1 850	15	16
75009618	Megafuge ST4R Plus-MD	220	60	8.5	1 850	15	16

Art. No.	Centrifuge	Mains Voltage (V)	Frequency (Hz)	Rated Current (A)	Power Consumption (W)	Building Fuse (AT)	Equipment Fuse (AT)
75009519	Megafuge ST4R Plus-MD	120	60	12	1 400	15	15
75009930	Multifuge X4F Pro	208-240	50 / 60	7.5	1600	15	16
75009936	Multifuge X4RF Pro	220-240 230	50 60	8.5 8.5	1850 1850	15	16
75009947	Megafuge ST4F Plus	208-240	50 / 60	7.5	1600	15	16
75009948	Megafuge ST4RF Plus	220-240 230	50 60	8.5 8.5	1850 1850	15	16
75009530	Multifuge X4F Pro-MD	208-240	50 / 60	7.5	1600	15	16
75009531	Multifuge X4F Pro-MD	120	50 / 60	10.5	1300	15	15
75009536	Multifuge X4RF Pro-MD	220-240 230	50 60	8.5 8.5	1850 1850	15	16
75009537	Multifuge X4RF Pro-MD	120	60	12	1400	15	15
75009961	Megafuge ST4F Plus-MD	208-240	50 / 60	7.5	1600	15	16
75009960	Megafuge ST4F Plus-MD	120	50 / 60	10.5	1300	15	15
75009962	Megafuge ST4RF Plus-MD	220-240 230	50 60	8.5 8.5	1850 1850	15	16
75009946	Megafuge ST4RF Plus-MD	120	60	12	1400	15	15

Table A–10: Electrical Connection Data for Multifuge X Pro / Megafuge ST Plus Series

A. 6. Rotor Program

For more details on rotors and accessories refer to "Rotor Specifications" on page B-1.

A. 6. 1. Rotors for Laboratory Use and In Vitro Diagnostic (IVD) Centrifuges

Thermo Scientific - Rotor Name	Multifuge X1 Pro / X1R Pro / X1 Pro-MD / X1R Pro-MD	Megafuge ST1 Plus / ST1R Plus / ST1 Plus-MD / ST1R Plus-MD
TX-200 (75003658)	✔	✔
TX-400 (75003181)	✔	✔
TX-750 (75003180)	✘	✘
TX-1000 (75003017)	✘	✘
H-FLEX 1 (75003300)	✔	✔
H-FLEX HS4 (75003330)	✘	✘
HIGHPlate 6000 (75003606)	✘	✘
M-20 Microplate (75003624)	✔	✔
BIOShield 720 (75003183)	✔	✔
BIOShield 1000A (75003182)	✘	✘
CLINIConic (75003623)	✔	✔
8 x 50 ml Sealed (75003694)	✔	✔
HIGHConic II (75003620)	✔	✔
Microliter 30 x 2 (75003652)	✔	✔
Microliter 48 x 2 (75003602)	✔	✔
MicroClick 30 x 2 (75005719)	✔	✔
MicroClick 18 x 5 (75005765)	✔	✔
Fiberlite F13-14 x 50cy (75003661)	✔	✘
Fiberlite F14-6 x 250 LE (75003662)	✘	✘
Fiberlite F15-6 x 100y (75003698)	✔	✔
Fiberlite F15-8 x 50cy (75003663)	✔	✘
Fiberlite F21-48 x 2 (75003664)	✔	✔
Fiberlite H3-LV (75003665)	✘	✘
Fiberlite F10-6 x 100 LEX (75003340)	✔	✔

Thermo Scientific - Rotor Name	Multifuge X4 Pro / X4R Pro / X4 Pro-MD / X4R Pro-MD	Megafuge ST4 Plus / ST4R Plus / ST4 Plus-MD / ST4R Plus-MD
TX-200 (75003658)	✘	✘
TX-400 (75003181)	✘	✘
TX-750 (75003180)	✔	✔
TX-1000 (75003017)	✔	✔
H-FLEX 1 (75003300)	✘	✘
H-FLEX HS4 (75003330)	✔	✔
HIGHPlate 6000 (75003606)	✔	✘
M-20 Microplate (75003624)	✔	✔
BIOShield 720 (75003183)	✘	✘
BIOShield 1000A (75003182)	✔	✔
CLINIConic (75003623)	✘	✘
8 x 50 ml Sealed (75003694)	✘	✘
HIGHConic II (75003620)	✔	✔
Microliter 30 x 2 (75003652)	✔	✔
Microliter 48 x 2 (75003602)	✔	✔
MicroClick 30 x 2 (75005719)	✔	✔
MicroClick 18 x 5 (75005765)	✔	✔
Fiberlite F13-14 x 50cy (75003661)	✔	✘
Fiberlite F14-6 x 250 LE (75003662)	✔	✘
Fiberlite F15-6 x 100y (75003698)	✔	✔
Fiberlite F15-8 x 50cy (75003663)	✔	✘
Fiberlite F21-48 x 2 (75003664)	✔	✔
Fiberlite H3-LV (75003665)	✔	✘
Fiberlite F10-6 x 100 LEX (75003340)	✔	✔

Thermo Scientific - Rotor Name	Multifuge X4F Pro / X4RF Pro / X4F Pro-MD / X4RF Pro-MD	Megafuge ST4F Plus / ST4RF Plus / ST4F Plus-MD / ST4RF Plus-MD
TX-200 (75003658)	✘	✘
TX-400 (75003181)	✘	✘
TX-750 (75003180)	✔	✔
TX-1000 (75003017)	✔	✔
H-FLEX 1 (75003300)	✘	✘
H-FLEX HS4 (75003330)	✔	✔
HIGHPlate 6000 (75003606)	✔	✘
M-20 Microplate (75003624)	✔	✔
BIOShield 720 (75003183)	✘	✘
BIOShield 1000A (75003182)	✔	✔
CLINIConic (75003623)	✘	✘
8 x 50 ml Sealed (75003694)	✘	✘
HIGHConic II (75003620)	✔	✔
Microliter 30 x 2 (75003652)	✔	✔
Microliter 48 x 2 (75003602)	✔	✔
MicroClick 30 x 2 (75005719)	✔	✔
MicroClick 18 x 5 (75005765)	✔	✔
Fiberlite F13-14 x 50cy (75003661)	✔	✘
Fiberlite F14-6 x 250 LE (75003662)	✔	✘
Fiberlite F15-6 x 100y (75003698)	✔	✔
Fiberlite F15-8 x 50cy (75003663)	✔	✘
Fiberlite F21-48 x 2 (75003664)	✔	✔
Fiberlite H3-LV (75003665)	✔	✘
Fiberlite F10-6 x 100 LEX (75003340)	✔	✔

Table A–11: Rotor Program - General and IVD Use

B. Rotor Specifications

This section lists the rotors and their accessories.

For more details on adapters and accessories refer to the separate rotor subchapters in this chapter.

B. 1. TX-200

B. 1. 1. Items Supplied

Article No.	Item	Quantity
75003658	TX-200 Rotor	1
50157859	Rotor safety information	1
75003786	Bolt grease	1
50158588	GP rotors information card	1

B. 1. 2. Technical Data

General Technical Data	
Weight (empty)	2.5 kg
Maximum Permissible Load	4 x 275 g
Max. Cycle Number	82 000
Radius max. / min.	165 / 64 mm
Angle	90°
Aerosol-tight	Yes
Max. Autoclaving Temperature	121 °C

Performance data of the compatible ventilated 1 L centrifuges

Multifuge X1 Pro / X1 Pro-MD	
Centrifuge Voltage	**100-240 V, 50/60 Hz**
Maximum Speed n_{max}	5 500 rpm
Maximum RCF-Value at n_{max}	5 580 x g
K-Factor at n_{max}	7 921
Acceleration / Braking Time	20 s / 30 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C

Megafuge ST1 Plus / ST1 Plus-MD	
Centrifuge Voltage	**100-240 V, 50/60 Hz**
Maximum Speed n_{max}	5 500 rpm
Maximum RCF-Value at n_{max}	5 580 x g
K-Factor at n_{max}	7 921
Acceleration / Braking Time	20 s / 30 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C

Performance data of the compatible refrigerated 1 L centrifuges

Multifuge X1R Pro / X1R Pro-MD		
Centrifuge Voltage	**220-230 V, 50/60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	5 500 rpm	5 500 rpm
Maximum RCF-Value at n_{max}	5 580 x g	5 580 x g
K-Factor at n_{max}	7 921	7 921
Acceleration / Braking Time	20 s / 30 s	20 s / 30 s
Maximum Speed at 4 °C	5 500 rpm	5 500 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	1 °C	6 °C

Megafuge ST1R Plus / ST1R Plus-MD		
Centrifuge Voltage	**220-230 V, 50/60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	5 500 rpm	5 500 rpm
Maximum RCF-Value at n_{max}	5 580 x g	5 580 x g
K-Factor at n_{max}	7 921	7 921
Acceleration / Braking Time	20 s / 30 s	20 s / 30 s
Maximum Speed at 4 °C	5 500 rpm	5 500 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	1 °C	6 °C

B. 1. 3. Accessories

Article No.	Description
Accessories	
75003659	TX-200 round buckets (4x)
75003660	TX-200 round ClickSeal biocontainment lids (4x)
75003687	Replacement TX-200 O-rings for lids (4x)
75003800	180 ml bio-bottle - polypropylene (12x)
Adapters used for Laboratory Use	
75003801	100 ml round bottom open-top tube
75003802	50 ml DIN round bottom tube
75003815	50 ml round bottom tube
75003805	25 ml DIN round/flat bottom tube
75003806	20 ml round bottom tube
75003810	5/7 ml round bottom open-top tube
75003811	3/5 ml RIA or round bottom tube
Adapters used for IVD	
75003803	50 ml conical or skirted tube
75003771	15 ml conical tube
75003809	15 ml blood collection tube
75003807	14 ml conical urine tube
75003808	10 ml blood collection tube
75003804	30 ml Sterilin Universal tube
75003812	1.5/2 ml Microtube
75003785	5/7 ml or 4.5/6 ml blood collection tube

B. 1. 4. Biocontainment Certificate

Centre of Emergency Preparedness and Response
Health Protection Agency
Porton Down
Salisbury
Wiltshire SP4 0JG
United Kingdom

Certificate of Containment Testing

Containment testing of Thermo Scientific swing out bucket rotor 75003658 and buckets 75003659

Report No. 77- 08 G

Report prepared for: Thermo Fisher
Issue Date: 1st June 2009

Test Summary

A Thermo Scientific centrifuge bucket 75003659 with aerosol tight lid (Max speed 5,500 rpm) was supplied by Thermo Fisher and containment tested at 5,500 rpm using the method described in Annex AA of EN 61010-2-020. The rotor was shown to contain a spill when tested in triplicate.

Report Written By **Report Authorised By**

B. 2. TX-400

B. 2. 1. Items Supplied

Article No.	Item	Quantity
75003629	TX-400 rotor	1
50157859	Rotor safety information	1
75003786	Bolt grease	1
50158588	GP rotors information card	1

B. 2. 2. Technical Data

General Technical Data	
Weight (empty)	4.1 kg
Maximum Permissible Load	4 x 570 g
Max. Cycle Number	50000
Radius max. / min.	168 / 68 mm
Angle	90°
Aerosol-tight	Yes
Max. Autoclaving Temperature	121 °C

Performance data of the compatible ventilated 1 L centrifuges

Multifuge X1 Pro / X1 Pro-MD	
Centrifuge Voltage	**100-240 V, 50/60 Hz**
Maximum Speed n_{max}	5000 rpm
Maximum RCF-Value at n_{max}	4696 x g
K-Factor at n_{max}	9153
Acceleration / Braking Time	25 s / 35 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C

Megafuge ST1 Plus / ST1 Plus-MD	
Centrifuge Voltage	**100-240 V, 50/60 Hz**
Maximum Speed n_{max}	5000 rpm
Maximum RCF-Value at n_{max}	4696 x g
K-Factor at n_{max}	9153
Acceleration / Braking Time	25 s / 35 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C

Performance data of the compatible refrigerated 1 L centrifuges

Multifuge X1R Pro / X1R Pro-MD		
Centrifuge Voltage	**220-230 V, 50/60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	5000 rpm	5000 rpm
Maximum RCF-Value at n_{max}	4696 x g	4696 x g
K-Factor at n_{max}	9153	9153
Acceleration / Braking Time	25 s / 35 s	30 s / 35 s
Maximum Speed at 4 °C	5000 rpm	5000 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	-3 °C	2 °C

Megafuge ST1R Plus / ST1R Plus-MD		
Centrifuge Voltage	**220-230 V, 50/60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	5000 rpm	5000 rpm
Maximum RCF-Value at n_{max}	4696 x g	4696 x g
K-Factor at n_{max}	9153	9153
Acceleration / Braking Time	25 s / 35 s	30 s / 35 s
Maximum Speed at 4 °C	5000 rpm	5000 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	-3 °C	2 °C

B. 2. 3. Accessories

Article No.	Description
Accessories	
75003181	TX-400 rotor cross
75003655	TX-400 round buckets (4x)
75003656	TX-400 round ClickSeal biocontainment lids (4x)
75003657	Replacement TX-400 o-rings for lids (4x)
75007585	400 ml bio-bottle - polypropylene (12x)
Adapters used for Laboratory Use	
75003788	250 ml Thermo Scientific Nalgene™ bottle; 200 ml Thermo Scientific Nunc conical bottle (requires Nunc #377585); 225 ml/175 ml BD Falcon conical bottle (requires BD #352090)
75003708	100 ml round bottom open-top tube
75003707	50 ml DIN round bottom tube
75003799	50 ml Nalgene™ Oak Ridge tube
75003703	30/25 ml DIN round/flat bottom tube
75003704	15 ml round bottom tube (Sarstedt)
75003793	3 ml RIA or round bottom tube (without cap)
Adapters used for IVD	
75003683	50 ml conical tube
75003682	15 ml conical tube
75003794	15 ml blood collection tube (17 x 125 mm)
75003798	14 ml round or conical urine tube
75003681	10 ml blood collection (16 x 100 mm)
75003706	30 ml Sterilin Universal tube
75003680	5/7 ml blood collection tube (13 x 75-100 mm)
75003700	1.5/2 ml Microtube
75003825	4.5/6 ml blood collection tube (Greiner)

B. 2. 4. Biocontainment Certificate

Centre of Emergency Preparedness and Response
Health Protection Agency
Porton Down
Salisbury
Wiltshire SP4 0JG
United Kingdom

Health Protection Agency

Certificate of Containment Testing

Containment testing of Thermo Scientific swing out bucket rotor 75003629 and buckets 75003655

Report No. 77- 08 E

Report prepared for: Thermo Fisher
Issue Date: 1st June 2009

Test Summary

A Thermo Scientific centrifuge bucket 75003655 with aerosol tight lid (Max speed 5,000 rpm) was supplied by Thermo Fisher and containment tested at 5,000 rpm using the method described in Annex AA of EN 61010-2-020. The rotor was shown to contain a spill when tested in triplicate.

Report Written By **Report Authorised By**

B. 3. TX-750

B. 3. 1. Items Supplied

Article No.	Item	Quantity
75003180	TX-750 rotor	1
50157859	Rotor safety information	1
75003786	Bolt grease	1
50158588	GP rotors information card	1

B. 3. 2. Technical Data (Round Buckets)

General Technical Data	
Weight (empty)	7.4 kg
Maximum Permissible Load	4 x 800 g
Max. Cycle Number Rotor Cross Bucket	 120000 70000
Radius max. / min.	195 mm / 83 mm
Angle	90°
Aerosol-tight	Optional
Max. Autoclaving Temperature	121 °C
Not Autoclavable Parts	O-ring 75003610

Performance data of the compatible ventilated 4 L centrifuges

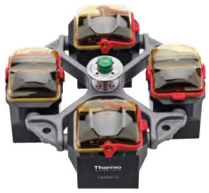
Multifuge X4 Pro / X4 Pro-MD Multifuge X4F Pro / X4F Pro-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4700 rpm	4700 rpm
Maximum RCF-Value at n_{max}	4816 x g	4816 x g
K-Factor at n_{max}	9783	9783
Acceleration / Braking Time	40 s / 45 s	55 s / 45 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C	13 °C

Megafuge ST4 Plus / ST4 Plus-MD Megafuge ST4F Plus / ST4F Plus-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4700 rpm	4700 rpm
Maximum RCF-Value at n_{max}	4816 x g	4816 x g
K-Factor at n_{max}	9783	9783
Acceleration / Braking Time	40 s / 45 s	55 s / 45 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C	13 °C

Performance data of the compatible refrigerated 4 L centrifuges

Multifuge X4R Pro / X4R Pro-MD Multifuge X4RF Pro / X4RF Pro-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4700 rpm	4700 rpm
Maximum RCF-Value at n_{max}	4816 x g	4816 x g
K-Factor at n_{max}	9783	9783
Acceleration / Braking Time	40 s / 45 s	45 s / 50 s
Maximum Speed at 4 °C	4700 rpm	4400 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	1 °C	11 °C

Megafuge ST4R Plus / ST4R Plus-MD Megafuge ST4RF Plus / ST4RF Plus-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4700 rpm	4700 rpm
Maximum RCF-Value at n_{max}	4816 x g	4816 x g
K-Factor at n_{max}	9783	9783
Acceleration / Braking Time	40 s / 45 s	45 s / 50 s
Maximum Speed at 4 °C	4700 rpm	4400 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	1 °C	11 °C



B. 3. 3. Technical Data (Rectangular Buckets)

General Technical Data	
Weight (empty)	6.8 kg
Maximum Permissible Load	4 x 750 g
Max. Cycle Number Rotor Cross Bucket	 120 000 100 000
Radius max. / min.	195 mm / 89 mm
Angle	90°
Aerosol-tight	Optional
Max. Autoclaving Temperature	121 °C
Not Autoclavable Parts	O-ring 75003610

Performance data of the compatible ventilated 4 L centrifuges

Multifuge X4 Pro / X4 Pro-MD Multifuge X4F Pro / X4F Pro-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 500 rpm	4 300 rpm
Maximum RCF-Value at n_{max}	4 415 x g	4 031 x g
K-Factor at n_{max}	9 800	10 732
Acceleration / Braking Time	40 s / 40 s	50 s / 40 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C	10 °C

Megafuge ST4 Plus / ST4 Plus-MD Megafuge ST4F Plus / ST4F Plus-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 500 rpm	4 300 rpm
Maximum RCF-Value at n_{max}	4 415 x g	4 031 x g
K-Factor at n_{max}	9 800	10 732
Acceleration / Braking Time	40 s / 40 s	50 s / 40 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	13 °C	10 °C

Performance data of the compatible refrigerated 4 L centrifuges

Multifuge X4R Pro / X4R Pro-MD Multifuge X4RF Pro / X4RF Pro-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 700 rpm	4 300 rpm
Maximum RCF-Value at n_{max}	4 816 x g	4 031 x g
K-Factor at n_{max}	8 983	10 732
Acceleration / Braking Time	40 s / 45 s	45 s / 45 s
Maximum Speed at 4 °C	4 600 rpm	3 800 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	7 °C	10 °C

Megafuge ST4R Plus / ST4R Plus-MD Megafuge ST4RF Plus / ST4RF Plus-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 700 rpm	4 300 rpm
Maximum RCF-Value at n_{max}	4 816 x g	4 031 x g
K-Factor at n_{max}	8 983	10 732
Acceleration / Braking Time	40 s / 45 s	45 s / 45 s
Maximum Speed at 4 °C	4 600 rpm	3 800 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	7 °C	10 °C

B. 3. 4. Technical Data (Microplate Carriers)

General Technical Data	
Weight (empty)	7.3 kg
Maximum Permissible Load	4 x 500 g
Max. Cycle Number Rotor Cross Bucket	 120 000 120 000
Radius max. / min.	155 mm / 99 mm
Angle	90°
Aerosol-tight	No
Max. Autoclaving Temperature	121 °C

Performance data of the compatible ventilated 4 L centrifuges

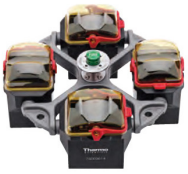
Multifuge X4 Pro / X4 Pro-MD Multifuge X4F Pro / X4F Pro-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 700 rpm	4 700 rpm
Maximum RCF-Value at n_{max}	3 828 x g	3 828 x g
K-Factor at n_{max}	5 135	5 135
Acceleration / Braking Time	35 s / 40 s	45 s / 40 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	10 °C	10 °C

Megafuge ST4 Plus / ST4 Plus-MD Megafuge ST4F Plus / ST4F Plus-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 700 rpm	4 700 rpm
Maximum RCF-Value at n_{max}	3 828 x g	3 828 x g
K-Factor at n_{max}	5 135	5 135
Acceleration / Braking Time	35 s / 40 s	45 s / 40 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	10 °C	10 °C

Performance data of the compatible refrigerated 4 L centrifuges

Multifuge X4R Pro / X4R Pro-MD Multifuge X4RF Pro / X4RF Pro-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 700 rpm	4 700 rpm
Maximum RCF-Value at n_{max}	3 828 x g	3 828 x g
K-Factor at n_{max}	5 135	5 135
Acceleration / Braking Time	30 s / 45 s	40 s / 45 s
Maximum Speed at 4 °C	4 700 rpm	4 400 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	< 0 °C	11 °C

Megafuge ST4R Plus / ST4R Plus-MD Megafuge ST4RF Plus / ST4RF Plus-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4 700 rpm	4 700 rpm
Maximum RCF-Value at n_{max}	3 828 x g	3 828 x g
K-Factor at n_{max}	5 135	5 135
Acceleration / Braking Time	30 s / 45 s	40 s / 45 s
Maximum Speed at 4 °C	4 700 rpm	4 400 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	< 0 °C	11 °C



B. 3. 5. Accessories

TX-750 (round buckets)

Article No.	Description
Accessories	
75003180	TX-750 rotor cross
75003608	TX-750 round buckets (4x) *
75003609	TX-750 round ClickSeal biocontainment lids (4x)
75003610	Replacement TX-750 round O-rings for lids (4x)
75006443	750 ml Bio-Bottle - Polypropylene (1 each)
75003795	Microplate Carriers and T-75 Flask (includes tray and pads) (2x)
75003617	Microplate Carriers and T-75 Flask (includes tray and pads) (4x)
Adapters used for Laboratory Use	
75003792	250 ml Corning conical bottle (unsealed buckets only)
75003710	250 ml Nalgene bottle
75003710	225 ml/175 ml BD Falcon conical bottle (requires BD #352090) (open buckets only)
75003710	200 ml Nunc conical bottle (open buckets only) (requires Nunc #377585)
75003710	175 ml Nalgene conical bottle (requires Nalgene #DS3126-0175) (open buckets only)
75003713	100 ml round bottom open-top tube
75003715	50 ml Nalgene Oak Ridge tube
75003724	5 ml RIA or round bottom tube (with out cap)
75003732	5/7 ml round bottom tube (without cap) with decanting aid
75008383	T-75 Nunc Easy Flask
75008384	T-25 Nunc Easy Flask
Adapters used for IVD	
75003714	50 ml conical tube (includes sealing vessel) can be combined with ClickSeal lids
75003638	50 ml conical tube
75003824 (New number: 75006533 x 4)	50 ml conical or skirted tube
75003716	30 ml Sterilin Universal tube
75003639	15 ml conical tube
75003719	15 ml blood collection tube (17 x 125 mm) (inner circle only)
75003719	10 ml blood collection (16 x 100 mm) or 15 ml Corex/Kimble tube
75003718	14 ml round or conical urine tube
75003723	5/7 ml or 4.5/6 ml blood collection tube (13 x 75-100 mm)
75003733	1.5/2 ml Microtube

TX-750 (rectangular buckets)

Article No.	Description
Accessories	
75003180	TX-750 rotor cross
75003614	TX-750 rectangular Buckets (4x)
75003615	TX-750 rectangular ClickSeal biocontainment lids (4x)
75003616	Replacement TX-750 rectangular O-rings for lids (4x)
Adapters used for Laboratory Use	
75003737	250 ml flat bottom bottle
75003738	150 ml round bottom open-top tube
75003742	100 ml round bottom open-top tube
75003749	50 ml round bottom tube
75003750	45 ml flat/round tube
75003756	25 ml DIN round bottom tube
75003758	14 ml flanged round bottom tube
75003769	5/7 ml round bottom tube (13 x 75-100 mm)
Adapters used for IVD	
75003685	50 ml conical tube
75003684	15 ml conical tube
75003759	14 ml round or conical urine tube
75003767	10 ml blood collection
75003768	5/7 ml or 4.5/6 ml blood collection tube
75003755	30 ml Sterilin Universal tube
75003770	1.5/2 ml Microtube

TX-750 (microplate carriers)

Article No.	Description
Accessories	
75003180	TX-750 rotor cross
75003795	Microplate carriers and T-75 flasks (including plate trays and rubber pad) (2x)
75003617	Microplate carriers and T-75 flasks (including plate trays and rubber pad) (4x)

** Mind the information on assembling on page 2-7.*

B. 3. 6. Biocontainment Certificate

Centre of Emergency Preparedness and Response
Health Protection Agency
Porton Down
Salisbury
Wiltshire SP4 0JG
United Kingdom

Health Protection Agency

Certificate of Containment Testing

Containment testing of Thermo Scientific Swing out bucket rotor 75003607 and bucket 75003608

Report No. 59-08 C

Report prepared for: Thermo Fisher
Issue Date: 15th January 2009

Test Summary

A Thermo Scientific 75003608 centrifuge bucket with aerosol tight lid (Max speed 4,700 rpm) was supplied by Thermo Fisher and containment tested at 4,700 rpm using the method described in Annex AA of EN 61010-2-020. The rotor was shown to contain a spill when tested in triplicate.

Report Written By **Report Authorised By** (28/1/09)

Centre of Emergency Preparedness and Response
Health Protection Agency
Porton Down
Salisbury
Wiltshire SP4 0JG
United Kingdom

Health Protection Agency

Certificate of Containment Testing

Containment testing of Thermo Scientific swing out bucket rotor 75003607 and bucket 75003614

Report No. 59-08 D

Report prepared for: Thermo Fisher
Issue Date: 15th January 2009

Test Summary

A Thermo Scientific 75003614 centrifuge bucket with aerosol tight lid (Max speed 4,700 rpm) was supplied by Thermo Fisher and containment tested at 4,700 rpm using the method described in Annex AA of EN 61010-2-020. The rotor was shown to contain a spill when tested in triplicate.

Report Written By **Report Authorised By** (28/1/09)

B. 4. TX-1000

B. 4. 1. Items Supplied

Article No.	Item	Quantity
75003017	TX-1000 rotor cross	1
75003001	TX-1000 buckets	4
50157859	Rotor safety information	1
75003786	Bolt grease	1
50158588	GP rotors information card	1

B. 4. 2. Technical Data

General Technical Data	
Weight (empty)	9.8 kg
Maximum Permissible Load	4 x 1500 g
Max. Cycle Number	55000
Radius max. / min.	209 mm / 108 mm
Angle	90°
Aerosol-tight	Optional
Max. Autoclaving Temperature	121 °C

Performance data of the compatible ventilated 4 L centrifuges

Multifuge X4 Pro / X4 Pro-MD Multifuge X4F Pro / X4F Pro-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	3800 rpm	3800 rpm
Maximum RCF-Value at n_{max}	3374 x g	3374 x g
K-Factor at n_{max}	11567	11567
Acceleration / Braking Time	60 s / 60 s	75 s / 65 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	9 °C	9 °C

Megafuge ST4 Plus / ST4 Plus-MD Megafuge ST4F Plus / ST4F Plus-MD		
Centrifuge Voltage	**208-240 V, 50/60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	3800 rpm	3800 rpm
Maximum RCF-Value at n_{max}	3374 x g	3374 x g
K-Factor at n_{max}	11567	11567
Acceleration / Braking Time	60 s / 60 s	75 s / 65 s
Temperature increase in the sample after 1 h of continuos run, tolerance ±2K	9 °C	9 °C

Performance data of the compatible refrigerated 4 L centrifuges

Multifuge X4R Pro / X4R Pro-MD Multifuge X4RF Pro / X4RF Pro-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4200 rpm	4200 rpm
Maximum RCF-Value at n_{max}	4122 x g	4122 x g
K-Factor at n_{max}	9469	9469
Acceleration / Braking Time	65 s / 75 s	85 s / 75 s
Maximum Speed at 4 °C	4200 rpm	4000 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	2 °C	10 °C

Megafuge ST4R Plus / ST4R Plus-MD Megafuge ST4RF Plus / ST4RF Plus-MD		
Centrifuge Voltage	**220 V, 60 Hz 220-240 V, 50 Hz 230 V, 60 Hz**	**120 V, 60 Hz**
Maximum Speed n_{max}	4200 rpm	4200 rpm
Maximum RCF-Value at n_{max}	4122 x g	4122 x g
K-Factor at n_{max}	9469	9469
Acceleration / Braking Time	65 s / 75 s	85 s / 75 s
Maximum Speed at 4 °C	4200 rpm	4000 rpm
Sample Temperature at max. Speed (ambient temp. at 23 °C, run time 2 h), tolerance ±2 K	2 °C	10 °C