

Thermo Scientific centrifuges



Greener by design™

 **More energy efficient:** features that use up to 74% less energy than features available on prior models, or relative to other centrifuges on the market

 **Less waste:** carbon fiber rotors are repairable and have a 15-year warranty, significantly longer than those of aluminum or titanium rotors

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Introduction

Thermo Fisher Scientific is committed to designing our products with the environment in mind. This fact sheet provides the rationale behind the environmental claims that the following Thermo Scientific™ centrifuges are energy efficient and generate less waste than prior models or other centrifuges on the market. They include the Thermo Scientific™ Sorvall™ LYNX 4000 and 6000 Superspeed Centrifuges, Sorvall™ BP 8 and 16 Blood Banking Centrifuges, Sorvall™ BIOS 16 Bioprocessing Centrifuge, Cryofuge™ 8 and 16 Large Capacity Blood Banking Centrifuges, and Sorvall™ general purpose centrifuges. These products include features that use up to 74% less energy compared to prior models or other centrifuges on the market. They also use unique Thermo Scientific™ Fiberlite™ carbon fiber rotors that are repairable and are covered by a 15-year warranty, significantly longer than warranties for aluminum or titanium rotors.

Product description

The Sorvall LYNX 4000 and 6000 Superspeed Centrifuges, Sorvall BP 8 and 16 Blood Banking Centrifuges, Sorvall BIOS 16 Bioprocessing Centrifuge, Cryofuge 8 and 16 Large Capacity Blood Banking Centrifuges, and Sorvall/ Hera-Series general purpose centrifuges

represent a wide array of centrifuges and their innovative rotors. Covering a broad range of processing needs, these products support labware from microplates and microtubes to large-capacity bottles, and they are designed to deliver outstanding performance, spin after spin.



Sorvall LYNX 6000 Superspeed Centrifuge



Sorvall BIOS 16 Bioprocessing Centrifuge



Thermo Scientific™ Sorvall™ X4R Pro/Multifuge X4R Pro General Purpose Centrifuge

Green features

More energy efficient

A 2015 study on laboratory energy consumption by the Center for Energy Efficient Laboratories (CEEL) [1] determined that laboratories in the state of California alone use at least 800 GWh of energy each year—equivalent to the yearly greenhouse gas emissions from 122,200 passenger cars [2]. Designing our instruments to consume less energy is one step towards more efficient use of resources.

The Thermo Scientific centrifuges listed here offer several key features that contribute to reduced energy use during operation, including Green Mode, Smart Vacuum, windshielded rotors, Fiberlite carbon fiber rotors, efficient cooling system, and Thermo Scientific™ Auto-Door™ centrifuge opening. The following section details the energy efficiency impact of each feature.

Green Mode

To manage energy and environmental impact in high-use environments, the Sorvall LYNX 4000 and LYNX 6000 Superspeed Centrifuges have a Green Mode setting, which puts a centrifuge in sleep mode (idle) when not in use for more than two hours. When the centrifuge is idle, this feature reduces energy usage by 64% compared to the previous generation of Thermo Scientific™ superspeed centrifuges (Table 1).

Smart Vacuum

The Smart Vacuum feature of the Sorvall LYNX 6000 centrifuge enables additional energy savings. This feature removes up to 80% of the air inside the centrifuge chamber, minimizing air friction on the spinning rotor. As a result, it requires up to 74% less power to spin and cool the rotor when compared to identical run conditions on our previous generation of Thermo Scientific superspeed centrifuges (Table 2). As an added advantage, the Smart Vacuum system is turned on selectively based on the rotor and speed setting, unlike other centrifuge models on the market, which apply the vacuum uniformly.

Choosing the Sorvall LYNX 6000 centrifuge over a prior model of superspeed centrifuge reduces energy use by 74%—saving 2,088 kWh of energy over the course of one year when in use for 4 hours per working day. The savings represent 1.5 metric tons of CO₂ equivalents, the greenhouse gas emissions from driving 3,660 miles in an average passenger car [1]. It also translates into energy cost savings of \$231 annually [3], based on commercial sector electricity rates.

Efficient cooling system and Auto-Door centrifuge opening

The Sorvall BP 8 and 16, Sorvall BIOS 16, and Cryofuge 8 and 16 centrifuge models also include an energy-saving mode that shuts off the automatic cooling function when the instrument is not in use. These models also have the Auto-Door centrifuge opening

feature, which shuts off the cooling system when the door opens. This saves energy on refrigeration when the centrifuge is not in use. Compared to a comparable centrifuge on the market, choosing the Sorvall BIOS 16 centrifuge results in a 44% reduction in power consumption (Table 3).

Table 1. Comparison of energy use of centrifuges with and without Green Mode.*

Centrifuge model	Green Mode	Energy usage (Wh)	Energy use reduction with Sorvall LYNX models
Sorvall LYNX 4000	Yes	43	—
Sorvall LYNX 6000	Yes	43	—
Previous generation of Thermo Scientific superspeed centrifuge	No	122	64%

* Energy use while centrifuge is idle.

Table 2. Comparison of energy use of centrifuges with and without Smart Vacuum.*

Centrifuge model	Smart Vacuum	Energy usage (Wh)	Energy use reduction with Sorvall model
Sorvall LYNX 6000	Yes	700	—
Previous generation of Thermo Scientific superspeed centrifuge	No	2,700	74%

* Comparison of 6 x 1,000 mL rotors run at 8,500 rpm at 4°C.

Table 3. Comparison of power consumption of comparable centrifuges with and without efficient cooling and Auto-Door features.

Instrument	Average power usage (kVA)	Power consumption reduction with Sorvall model
Sorvall BIOS 16, with efficient cooling and Auto-Door feature	5.40	—
Equivalent model on market	9.70	44%

Windshielded rotors

The Sorvall BP 8 and 16, Sorvall BIOS 16, and Cryofuge 8 and 16 centrifuge models include the Thermo Scientific™ Eco-Spin™ windshielded rotors, which use up to 64% less energy than non-windshielded designs of the same rotor body (Table 4).

Choosing Sorvall or Cryofuge centrifuge models with the windshielded rotors reduces energy use by an average of 57%. For the 16 x 500 mL rotor size, this would be equivalent to saving 3,919 kWh of energy over the course of one year when in use for 4 hours per working day. The savings represent 2.8 metric tons of CO₂ equivalents, the greenhouse gas emissions from driving 6,876 miles in an average passenger car [2]. It also translates into energy cost savings of \$434 annually [3], based on commercial sector electricity rates.

Fiberlite carbon fiber rotors

The Fiberlite carbon fiber rotors used in our centrifuge models improve energy efficiency compared to aluminum and other metal rotors. Fiberlite rotors weigh up to 60% less than aluminum rotors (Table 5). Less weight allows for faster acceleration and deceleration rates for shorter run times (Table 6). The decrease in time of use can result in less energy used per run.



Fiberlite carbon fiber rotors



Thermo Scientific™ HAEMAFlex™ 6 windshielded swinging-bucket rotors, 6 x 550 mL

Table 4. Comparison of energy use of centrifuges with and without Eco-Spin windshielded rotors.*

Rotor size	Energy usage with windshield (Wh)	Energy usage without windshield (Wh)	Energy use reduction with windshield
6 x 550 mL	1,834	5,079	64%
8 x 550 mL	2,648	5,061	48%
12 x 500 mL	2,211	5,522	60%
16 x 500 mL	2,782	6,536	57%

* Based on an engineering evaluation of windshielded and non-windshielded designs of the same rotor body. Comparison of Sorvall BP 8 and 16, Cryofuge 8 and 16, and Sorvall BIOS 16 centrifuge models with defined rotor size and equivalent centrifuge model on the market.

Table 5. Comparison of weight of Fiberlite carbon fiber rotors and aluminum rotors.*

Rotor type and capacity	Rotor weight (kg)	Rotor weight difference compared to an aluminum rotor (kg)	Weight reduction with Fiberlite rotors
Fiberlite carbon fiber rotor, 6 x 250 mL	8.0	–	
Aluminum rotor, 6 x 250 mL	14.0	6.0	43%
Fiberlite LEX carbon fiber rotor, 6 x 500 mL	8.6	–	
Aluminum rotor, 6 x 500 mL	21.4	12.8	60%
Fiberlite LEX carbon fiber rotor, 6 x 1,000 mL	15.2	–	
Aluminum rotor, 6 x 1,000 mL	20.9	5.7	27%

* Based on a comparison with the manufacturer's published specifications.

Table 6. Comparison of acceleration and deceleration rates of Fiberlite carbon fiber rotor and aluminum rotor.*

Rotor type and capacity	Acceleration time (hr:min)	Deceleration time (hr:min)	Total accel./decel. time (hr:min)
Fiberlite carbon fiber rotor, 6 x 250 mL	1:35	1:15	2:50
Aluminum rotor, 6 x 250 mL	3:45	2:00	5:45
Time saved	2:10	0:45	2:55

* Based on a comparison with the manufacturer's published specifications.

Less waste

The Fiberlite rotors also offer additional benefits that extend their useful lifespan beyond that of rotors made from aluminum and other metals. Carbon fiber composite rotors are corrosion-resistant, unlike metal rotor surfaces that can be damaged by moisture, chemicals, or alkaline solutions. The Fiberlite rotors are also fatigue-resistant, which mitigates the effects of substantial load or stress that—due to high rotational speeds and repeat cycles—can threaten metal rotor structure by causing it to stretch and change in size. Such changes can limit rotor life or lead to failure. Fiberlite rotors, by contrast, can be repaired if damaged. They are backed by a 15-year warranty [4]; for comparison, Table 7 shows the more limited warranty coverage of metal rotors made of aluminum or titanium.

Our commitment to environmental responsibility doesn't end there. Our centrifuges are also manufactured at the Osterode am Harz, Germany site, that procures 100% of their electric energy from renewable sources.

Thermo Scientific centrifuges and rotors offer many options to complement a broad range of research needs and were designed with the environment in mind. The advantages they provide through innovative features and advanced materials are a win for our company, our customers, and the planet.

Table 7. Comparison of average warranty periods for Fiberlite carbon fiber rotor and metal rotors.*

Rotor type	Warranty (years)
Fiberlite carbon fiber rotor	15
Aluminum rotor**	7
Titanium rotor**	5

* Average warranty periods were calculated based on industry averages of years an aluminum or titanium rotor may be covered under warranty per manufacturers' published specifications.

** Warranty coverage may vary by rotor. Please refer to the manufacturer for specific warranty coverage for each rotor.

References

1. Allison Paradise (2015) Market Assessment of Energy Efficiency Opportunities in Laboratories.
2. US EPA Greenhouse Gas Equivalencies Calculator, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>. Accessed 03 December 2020.
3. Based on an energy rate of \$0.1107 as reported as the national average commercial rate by the US Energy Information Administration. https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a. Accessed 23 July 2019.
4. Subject to standard limited warranty by Thermo Fisher Scientific. See thermofisher.com or contact your sales representative for details.

 Find out more at thermofisher.com/centrifuges

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