

Thermo Scientific X and S Series 4 L Refrigerated Centrifuges



Greener by design™

 **Less hazardous:**
First-to-market general purpose centrifuges that use R290 natural refrigerant (Global Warming Potential of 3)

 **Extended life:**
Have an end-of-life recycling program¹

 Learn more at thermofisher.com/greenerbydesign

Introduction

We are committed to designing our products with the environment in mind. This fact sheet provides the rationale behind the environmental claims that the Thermo Scientific™ X and S Series 4L General Purpose Centrifuges contain less hazardous refrigerants and have an end-of-life recycling program as compared to prior models and other centrifuges currently on the market.

Product description

X and S Series 4L General Purpose Centrifuges offer high performance and high-capacity solutions for a wide range of centrifugation protocols and applications. The refrigerated models, equipped with Thermo Scientific™ GreenCool™ Technology, deliver improved temperature performance alongside more sustainable innovations. Featuring a next-generation natural refrigerant (hydrocarbon) cooling system, these centrifuges significantly reduce environmental impact with a Global Warming Potential (GWP) of 3 and comply with upcoming EU and US EPA F-gas regulations. Additionally, these models use up to 6% less energy than prior models.

The X and S series centrifuges also stand out with proprietary features such as Thermo Scientific™ Auto-Lock™ Rotor Exchange and Thermo Scientific™ Fiberlite™ Carbon Fiber Rotors. Auto-Lock technology offers secure and ergonomic rotor exchange between fixed-angle and swinging-bucket configurations, including wind-shielded rotor options. Additionally, the durable, lightweight Fiberlite carbon fiber rotors achieve higher g-forces with reduced energy consumption.

Green feature

Less hazardous

Thermo Fisher Scientific is committed to a more sustainable future by supporting U.S. Environmental Protection Agency and European Commission's efforts to transition to greener refrigerants by replacing hydrofluorocarbon (HFC) refrigerants. HFC refrigerants have been identified by the U.S. EPA and EU Commission as powerful greenhouse gases with significant global warming potential. Thermo Fisher Scientific is in the process of phasing out the use of these refrigerants in centrifuge products and are replacing them with more sustainable, natural refrigerant alternatives that have a significantly lower Global Warming Potential (GWP).



Figure 1. Thermo Scientific X and S Series Refrigerated Centrifuges

The Thermo Scientific X and S series refrigerated centrifuges utilize R290, a non-HFC alternative that has a lower GWP as compared to refrigerant options commonly used in refrigerated centrifuges (Table 1). R290 is a natural refrigerant that breaks down into carbon dioxide and water and does not release any polyfluoroalkyl substances (PFAS) byproducts into the environment. Studies have shown that synthetic low GWP refrigerant blends, like R1234yf, yield byproducts like TFA that may have adverse environmental impacts.²

In addition to being less hazardous, the centrifuges are more energy efficient with the use of R290 compared to HFC refrigerants like R134a, which are commonly used in most current refrigerated centrifuges on the market.

The Thermo Scientific™ X4TR Centrifuge has 6% lower energy consumption compared to the legacy Thermo Scientific™ Sorvall™/ Multifuge™ X4R Pro centrifuge that utilizes traditional R134a HFC refrigerant. Additionally, R290 is known for its excellent thermodynamic properties and superior energy efficiency compared to R1234yf, as documented in comparative analysis studies testing the performance of these refrigerants in various industrial applications.³

Additionally, the X and S Series centrifuges are compatible with a variety of rotor options, including our Fiberlite carbon fiber and windshilded rotor options. Fiberlite carbon fiber rotors weigh up to 60% less than aluminum rotors (Table 2), enabling faster acceleration and deceleration times and reduced energy consumption per run (Table 3).

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 warranty⁴; for comparison, Table 4 shows the more limited warranty coverage of metal rotors made of aluminum or titanium.



Figure 2. Thermo Scientific Fiberlite Rotors for X Series (all 7 options shown here) and S Series (last 3 options)

Table 1. Comparison of Global Warming Potential (GWP) of natural, synthetic, and hydrofluorocarbon (HFC) refrigerants.

Name	GWP	Refrigerant class
R290	3	Hydrocarbon (HC)
R1234yf	4	Hydrofluoroolefin (HFO)
R134a	1,430	Hydrofluorocarbon (HFC)
R410A	2,088	Hydrofluorocarbon (HFC)
R404A	3,922	Hydrofluorocarbon (HFC)

Table 2. 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 3. 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.

Table 4. 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.

Extended life

The General Purpose X and S Series Centrifuges with GreenCool technology are fully RoHS and WEEE compliant. These units are designed for longevity and when the unit is ready for retirement, we are partnering with reputable and certified recyclers in the United States to offer customers a way to recycle their used instruments. The materials can then reenter the manufacturing stream, which helps reduce additional mining of natural resources. Instructions on how to responsibly dispose of your centrifuge are provided at thermofisher.com/centrifuge-recycling.

Our commitment to environmental responsibility doesn't end there. These centrifuges are manufactured in a certified zero-waste facility in Osterode am Harz, Germany using 100% renewable electricity.⁵

Designing the Thermo Scientific X and S series General Purpose Centrifuges to contain less hazardous refrigerants and have an end-of-life recycling program while delivering excellent versatility and performance is a win for our customers, our company and the planet.



References

1. Details on recycling program for United States can be found at <https://www.thermofisher.com/us/en/home/global/forms/life-science/centrifuge-recycling.html>
2. R1234yf degrades into PFAS: <https://pubmed.ncbi.nlm.nih.gov/29381347/>
3. R290 vs R1234yf comparative study: <https://www.sciencedirect.com/science/article/abs/pii/S0735193324004706>
4. Subject to standard limited warranty by Thermo Fisher Scientific. See thermofisher.com or contact your sales representative for details.
5. Zero Waste is defined as diverting at least 90% of non-hazardous waste from landfill, waste to energy, and incineration.

Find out more at thermofisher.com/centrifuges

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