

SunDanzer DCF225

8.1-Cubic-Foot Chest Freezer

Ian Woofenden

©2005 Ian Woofenden

Application: We've used the SunDanzer 8.1-cubic-foot (229 l) DC chest freezer for 2¹/₂ years in our off-grid home, which is powered by solar-electric arrays and wind generators.

System: Our off-grid electrical system has 1,220 W of photovoltaic panels (PVs) in two arrays, two 9-foot-diameter wind generators, and eight L-16 batteries. We have multiple DC and AC loads. We have a DC engine generator that we use on rare occasions (6 or 8 times per year).

Off-Grid Freezer

When you're growing an off-grid renewable energy (RE) system, a good rule to follow is not to add significant electrical loads without adding production capacity. If you bend or break this rule, you'll end up working your batteries harder and running your engine generator more.

But it's an easy rule to break—most of us tend to want more stuff, and that includes more electrical loads. When I decided to buy a freezer, I was worried about whether or not our system would have the energy to run it. Most off-grid homes do not use electricity for hot water, space heating, or cooking; so refrigeration is often the largest electrical load the RE system needs to support.

You might think that I'd be worried more about operating the freezer in the summer, when it's hottest and the freezer has to work the hardest to keep our food frozen. But at that time of year, our PV system is regularly running a surplus. We have lots of sun here in the Northwest during the summer; we aren't using much energy for lights, and we're outside more and at the computers less.

I was much more worried about the winter, when it can be calm and dark for several days in a row, during which our PV arrays and wind generators aren't producing much. Enter the SunDanzer DCF225. This freezer, and the way we use it, have made my worries unnecessary.

Quick & Easy Installation

Installation of the SunDanzer was a snap. It will operate at either 12 or 24 VDC nominal, and automatically senses the system voltage. This makes for user-friendly installation, since there are no voltage-related configurations or settings to make.



Just wire the unit with the correct gauge wire and a breaker for overcurrent protection, and you're in business. Polarity is important, but the terminals are clearly labeled.

The only other thing to do is to set the thermostat—a dial on the outside of the freezer that can be adjusted between “Min.” and “Max.,” which correspond to a range of roughly 0 to 23°F (-18 to -5°C). For freezer operation, the normal internal operating temperature should be from 0 to 10°F (-13 to -12°C).

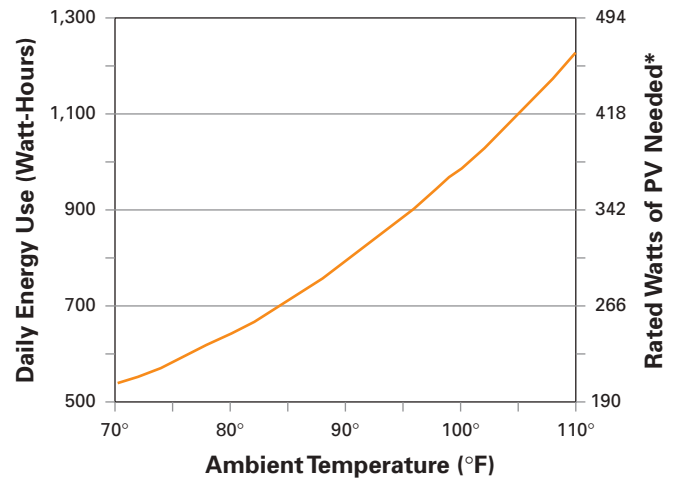
We opted to install our freezer outside, in an open shed on the north side of our house, to take advantage of the natural coolness on this side of the house. It also means that when we're most worried about energy use, we're giving the freezer the least work. Our normal winter temperatures in the 40s and 50s (4–15°C) don't tax the SunDanzer heavily. On a recent winter day, the freezer consumed less than 200 watt-hours of energy in a 24-hour period.

Many people aren't willing to give up the convenience of having their fridge right in their kitchen. But there's an energy price to pay. Increased ambient temperatures intensify the burden on the fridge to keep cool. It's even worse in our kitchen, which has fire burning in the wood cookstove all winter. It may be too much to ask to put your refrigerator in a shed, but it's worth considering putting a freezer there. It's not too inconvenient to run outside when we want to get a fish, a package of steaks, or some frozen blueberries out of the freezer. To keep a few frozen food essentials at hand, we use our refrigerator's small freezer compartment.

Space-Age Energy Sipper

The SunDanzer takes advantage of space-age design—literally. David Bergeron, team leader for NASA's Advanced Refrigerator Technology Team, who was designing battery-free, PV-powered air conditioning and refrigeration systems

Typical SunDanzer DCF225 Energy Use



*Array size is based on 5 average daily peak sun hours

for habitats in space, developed it. Bergeron realized that there was also a need for a solar-electric powered refrigerator here on Earth. In 1999, Bergeron founded Solus Refrigeration Inc. (now SunDanzer Refrigeration Inc.) to make this technology available to consumers.

The SunDanzer has a well-insulated cabinet (produced in Hungary by Electrolux) that features 4.33 inches (11 cm) of polyurethane insulation. This, coupled with a super-efficient Danfoss compressor, gives the SunDanzer its energy edge.

A low voltage disconnect (LVD) built into the compressor electronics helps protect batteries in the event of a very deep discharge of the battery bank. If the input voltage to the

Goodies stay frozen using very little energy in the SunDanzer freezer.



Tech Specs

Power supply: Batteries wired for 12 or 24 VDC nominal (automatic voltage sensing)

Gross capacity: 8.1 cubic feet (229 liters)

Exterior dimensions (W x D x H): 46.9 x 26.2 x 34.5 inches (119 x 66.5 x 87.6 cm)

Shipping weight: 160 pounds (73 kg)

Cost: US\$1,074 (MSRP)

Warranty: 1 year



An efficient Danfoss compressor and lots of insulation combine to make an energy-saving freezer.

freezer falls below 10.4 V (in 12 V mode) or 22.8 V (in 24 V mode), the compressor shuts off. When the voltage rises above 11.7 V (in 12 V mode) or 24.2 V (in 24 V mode), the compressor kicks back on. (All battery-based, off-grid RE systems should have a battery amp-hour meter installed that is regularly monitored by the homeowner. The activation of the built-in LVD feature should never be necessary, but it's nice to have this feature incorporated into the unit to protect the batteries from inattentive homeowners or system malfunctions.)

The SunDanzer's low energy use means that this model can be handled with just a few PV panels. In sunnier, arid or semi-arid climates with at least five daily sun-hours, there's even a batteryless model available for PV-direct use. This model marries a variable-speed compressor with MPPT controls to a nontoxic, low-cost, water-based phase-change material that keeps the cabinet cool overnight.

The SunDanzer is a modern appliance that gives excellent performance with minimal energy use. Besides its thick, insulated walls, a CFC-free refrigerant helps the freezer keep cool. The cabinet is comparable to any freezer on the market, with smooth, cleanable surfaces, handy baskets that hang inside the cabinet, and a tight-fitting, lockable lid. A patented low-frost system reduces frost buildup for easy maintenance. This freezer has been a great addition to our off-grid home, at a very reasonable economic and energy price.

Access

Reviewer: Ian Woofenden, PO Box 1001, Anacortes, WA 98221 • ian.woofenden@homepower.com

Manufacturer: SunDanzer, 11060 Dyer D-12, El Paso, TX 79934 • 915-821-0042 • Fax: 775-201-0236 • info@sundancer.com • www.sundancer.com



SunDanzer
Cool with Solar

Energy-Efficient

- Automatic operation
- Thick polyurethane insulation
- Lockable lid
- Interior light
- Corrosion resistant coated steel exterior
- Patented low-frost system
- Easy to clean interior
- Low maintenance

12/24 VDC Energy Efficient Refrigeration

(866) Sun-Danz
(866) 786-3269
www.sundancer.com