SUNPOWER

High Performance Cryocoolers

Field Proven | Energy Efficient | Compact | Unrivaled Pricing | Long-Lived

Experience the Benefits of Dependable Free-Pistion Stirling Technology

Sunpower Delivers the Benefits of Free-Piston Stirling Technology

CryoTel™ cryocoolers, Sunpower's integral free-piston Stirling coolers, represent the results of over thirty years of technical leadership, innovation and evolution in free-piston Stirling technology.

With Sunpower's reputation for quality and performance, CryoTel™ cryocoolers are increasingly used in aerospace, energy, life science, healthcare and industrial laboratory markets. Customers value Sunpower products for pure and applied research, custom engineered applications and energy efficient end products.

Developed to permit cost-effective product development, yet mass producible for higher volume quantities, Sunpower cryocoolers offer unique capabilities that enable innovative new products. The combination of low energy consumption, high performance, life, reliability and environmental friendliness is unrivaled.

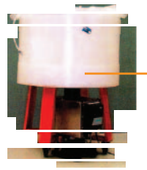
As a result, the Sunpower CryoTel™ Series product line continues to expand as we successfully integrate it into our customers' products.

Typical Applications of Sunpower Cryocoolers

- Telecommunications
- Aerospace
- Gas Liquefaction
- Life Sciences, Biotechnology and Cryopreservation
- Pharmaceuticals
- Superconductivity and Magnetic Solutions
- Clinical and Diagnostic Equipment and Instrumentation

Sunpower cryocoolers are used in the NASA RHESSI satellite launched to study the physics of solar flares.

A Sunpower cryocooler is integral to the In-X Home Away™ oxygen generation system for in-home delivery to respiratory patients.



The LevTech™ biopharmaceutical mixing system uses an integrated Sunpower cryocooler.

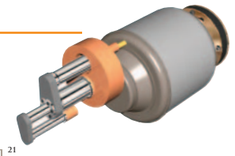
Standard Free-Piston Stirling Cryocoolers

The Sunpower line of CryoTel™ cryocoolers is available in standardized models with digital controllers for expedited delivery. Custom modifications and customer-specified models are available.

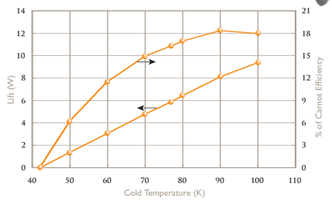
Pulse Tube Cryocoolers

Sunpower Pulse Tube cryocoolers, generally custom engineered for specific applications, are based on the same free-piston linear design qualified in other Sunpower products. The Pulse Tube array includes single stage, two stage and coaxial configurations. Initially developed under NASA funding, the Sunpower Pulse Tube product group offers alternatives and additional features beyond the CryoTel™ free-piston Stirling models.

Pulse Tube Cryocooler



Single Stage In-Line Pulse Tube Measured Performnce



Product Development Support

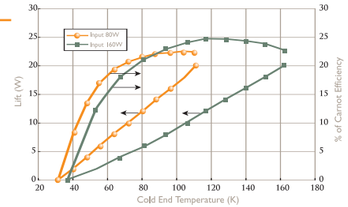
Sunpower's CryoTel™ manufacturing organization is supported by a vibrant R&D group that works closely with customers to develop new solutions or engineer Sunpower's existing coolers into new products. Sunpower also maintains an intellectual property/licensing business which can offer customers unique and exclusive access to our intellectual property.

Sunpower's free-piston technology is being applied in other areas such as power generation and household refrigeration. Some applications include the world's most efficient refrigerator on sale worldwide; natural gas-fueled household cogeneration systems scheduled to enter the market in 2007; and nuclear space power systems.

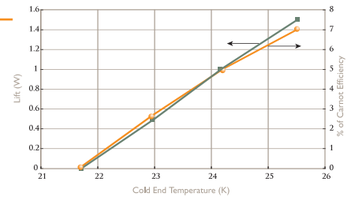
Partnerships and collaboration support the commercialization of innovative new technologies and enable unique products. For any new product, Sunpower's engineering team is available to work directly with partners at all stages from proof-of-concept demonstration to design for manufacturer and manufacturing start-up.

Measured Performance

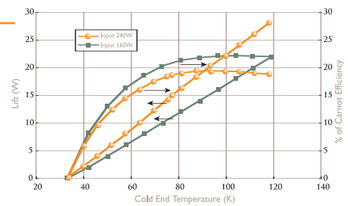
CryoTel™ CT



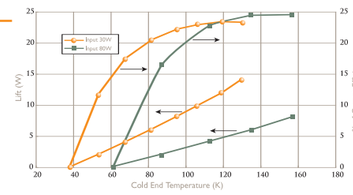
CryoTel™ LT



CryoTel™ GT



CryoTel™ MT



Sunpower Cryocooler Summary Specifications

CryoTel™ Cryocoolers

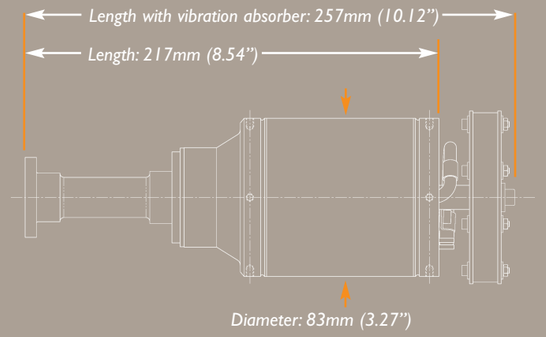
Sunpower CryoTel™ Model	Ambient Operation	Orientation	Cooler Input Power (nominal)	Lift at 77K at 35˚C Reject (nominal)	Lift at 25.5K at 35˚C Reject (nominal)	No Load Temp	Mass	Dimensions, Diameter x Length (nominal)	Vacuum Flange	Rejection Method
CT	-40˚C to +60˚C	Any	160 Watts	10 Watts	n/a	35K	3.1 kg	83 x 257 mm	ISO NW50 or customized to suit application	Air, liquid or customized to suit application
LT			235 Watts	n/a	1.5 Watts	22K				
GT			240 Watts	15 Watts	n/a	33K				
MT			80 Watts	5 Watts	n/a	40K	2.1 kg	73 x 240 mm		

Pulse Tube Cryocoolers

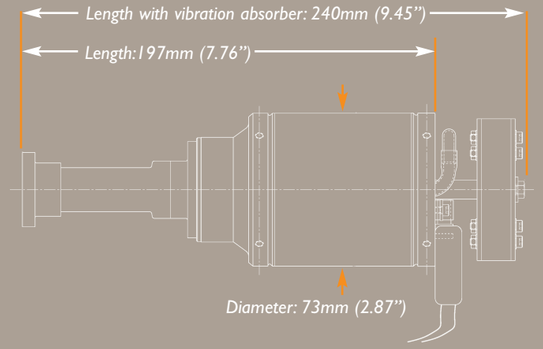
Configuration	Ambient Operation	Best Performance Orientation	Cooler Input Power (nominal)	Nominal Performance	No Load Temperature	Vacuum Flange	Rejection Method	Status
In-Line Single Stage	-40˚C to +60˚C	Cold-end down	100 Watts	6 Watts lift at 77K at 20˚C reject	40K	ISO NW50 or customized to suit application	Air, liquid or customized to suit application	Prototype demonstrator
Two-Stage				2nd Stage: 0.26 Watts at 30K	24.4K (19.8K at 300 Watts)			
				1st Stage: No active load at ~80K at 20˚C reject				
Coaxial Pulse Tube		Any		2 Watts lift at 60K at 37˚C reject	44K (40K at 140 Watts)			Pre-production demonstrator

For the latest information on Sunpower products, services, corporate news and our online library, visit our Web site at **www.sunpower.com.**

Design Features



CryoTel™ CT, LT and GT



CryoTel™ MT

Working with Sunpower

Sunpower's cryocooler products, free-piston R&D services and intellectual property are sold direct from our corporate development center in Athens, Ohio USA. Evaluation prototypes for selected products are available to qualified customers. For information please contact Sunpower, Inc.

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Sunpower products are precision manufactured and tested in a modern production facility adjacent to our research, development and administrative center in Athens, Ohio USA. Manufacturing proximity provides our customers with the highest level of flexibility to meet customization demands.

Sunpower is a world-leading developer of energy efficient, environmentally friendly free-piston machines for power generation and cooling. These machines include free-piston Stirling engines and cryocoolers, pulse tube cryocoolers, and linear compressors. The company is comprised of manufacturing, contract R&D, and intellectual property licensing departments. Sunpower is privately held and is situated in Athens, Ohio USA.

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