FINISHED SOLUTION

Introduction

FS Co, Ltd, (FINISHED SOLUTION) was established in 1994 and has been expanding its business into the cryogenic cooler and SONAR SENSOR sectors, and is a promising company that continues to grow at 5-10% every year. In particular, the cryogenic cooler business, which requires a high level of precision processing skills, has been recently recognized in the global market. This recognition is mainly resulted from the application of strict quality systems such as **ISO9001 and DQMS(Defense Quality Management System certified by Korean Government).**FS has been steadily working in order to keep the position and lead the world market. FS Vision is to be **"World Leading System Company as the finished solutions provider with the excellence in cryogenic techonology."** We are moving forward step by step for our goals.

Application area

Defense / Automotive / Commercial / Aerospace industries

We will manufacture products from the customer's cooler specifications or work with the customer to develop the new required specifications.



Production / Inspection

The various experienced skills and well trained staffs combined with our fabrication facilities allow FS to perform both large & small tasks in short time frames.

FS has grown to be a full service manufacturing company, offering a wide range of processes and services to a diverse group of customers.






History

Establishment 1994

Best 1, First 1, Only 1

2007 **ISO 9001 Certified**

Korea Quality Foundation

Development 2011

R&D Centre

2012 **New Business, Cryocooler**

The first cryogenic cooler in Korea

Innovation 2013

Awarded Innovation in the field of Business and Technology in the Korea's Government

2014 **Model Expansion**

New linear type cryocooler, widely used in the Korea's boundary

Quality Management 2015

Acquisition of Single PPM and DQ (Defence Quality) from Korea's Government

2018 **Tech Advancement**

Developed IR sensor cooler for satellites

Exploratory Development 2020

Developed more coolers for armoured vehicle in Korea's Miliatry

Developed sonar system for new combat ocean vessels in Korea's Navy

2023 **Award**

Awarded "Export Trade", Korea Trade International Association

Awarded Silver Tower Order of Industrial Service Merit

Optical Development 2025

Acquired government project to develop ultra-small satellite infrared optical material component technology for low-orbit weather observation

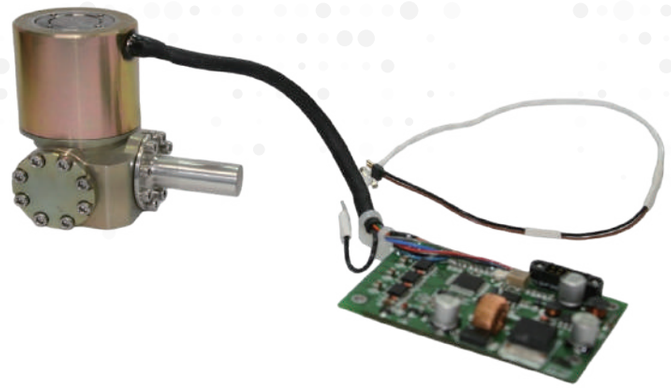
2026 **AS9100 Certified**

Aerospace Standard for Quality Management System

Specification Table of Coolers

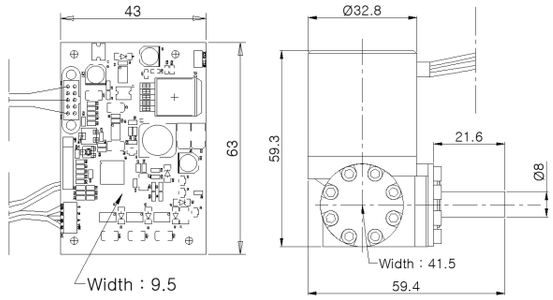
FINISHED SOLUTION

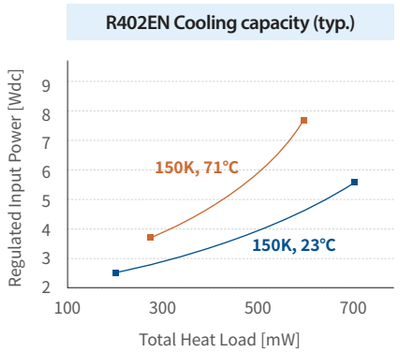
Types	Rotary Type					Rotary Type					Linear Type
Model	R402K	R402EN (HOT SWaP)	R403K	R403EN	R405K	R405E	R405E(N-1)	R405HSM	R407K (R407E)	R408E (R408K)	L413K
Cooling power	200mW @77K @71°C	550mW @150K @71°C	300mW @77K @50°C	300mW @77K @71°C	500mW @77K @60°C	500mW @77K @71°C	300mW @55K @71°C	600mW @77K @71°C	700mW @77K @43°C	750mW @77K @71°C	1,300mW @77K @23°C
Weight	185gr.	185gr.	265gr.	320gr.	470gr.	470gr.	470gr.	440gr.	470gr.	600gr.	1,600gr.
Nominal Input Voltage	12Vdc	12Vdc	14Vdc	12Vdc	28Vdc	24Vdc	24Vdc	24Vdc	12Vdc	24Vdc	24Vdc
Cooling Down Time	4min. (160J@77K @23°C)	3.5min. (150J@150K @23°C)	7.5min. (210J@77K @23°C)	5min. (210J@77K @23°C)	6.5min. (250J@77K @23°C)	5.5min. (250J@77K @23°C)	9.5min (280J@55K @23°C)	4min. (250J@77K @23°C)	3min. (250J@77K @43°C)	5min. (500J@80K @23°C)	5min. (250J@77K @23°C)
Cooling Temperature	77K	150K	77K	77K	77K	77K	55K	77K	77K	77K	77K
Maximum input power	14Wdc	11Wdc	12Wdc	15Wdc	13Wdc	14Wdc	14Wdc	22Wdc	31Wdc	31Wdc	40Wdc
Steady state Input power	6.5Wdc @120mW @77K @23°C	2.7Wdc @210mW @150K @23°C	7Wdc @150mW @77K @23°C	4.5Wdc @150mW @77K @23°C	7Wdc @220mW @77K @23°C	5.2Wdc @220mW @77K @23°C	8Wdc @200mW @55K @23°C	5.9Wdc @220mW @77K @23°C	5.3Wdc @220mW @77K @23°C	8Wdc @320mW @77K @23°C	18Wdc @220mW @77K @23°C
MTTF @Basic Profile	10,000hr.	17,000hr.	10,000hr.		15,000hr.				24,000hr.	15,000hr.	35,000hr.
Cold Finger Diameter	8mm (L : 41.2mm)	8mm (L : 21.6mm)	6.4mm		8mm				6.4mm	9.4mm	6.4mm
Cold tip temperature range	77K…150K	110K…150K	77K…150K		65K…150K				65K…150K	65K…150K	65K…150K
Temperature Stability	±0.1K	±0.1K	±0.3K	±0.1K	±0.3K	±0.1K	±0.1K	±0.1K	±0.1K	±0.1K	±0.1K
	Ambient Temperature Range										
: Operational	-40°C… +71°C	-40°C… +71°C	-32°C… +50°C	-40°C… +71°C	-32°C… +60°C	-40°C… +71°C	-40°C… +71°C	-40°C… +71°C	-32°C… +43°C	-40°C… +71°C	-40°C… +71°C
: Non-Operational	-55°C… +85°C	-55°C… +85°C	-40°C… +63°C	-55°C… +85°C	-57°C… +71°C	-55°C… +85°C	-55°C… +85°C	-55°C… +85°C	-55°C… +85°C	-55°C… +85°C	-55°C… +85°C
Meets Environmental Conditions per	MIL-STD-810G										



R402EN

For Night Vision Systems, from handheld to drone





Overview

The Finished Solution Rotary Drive Cryocooler is designed to meet the requirements of HOT detector specification for a Ultra-miniature Stirling cooler.

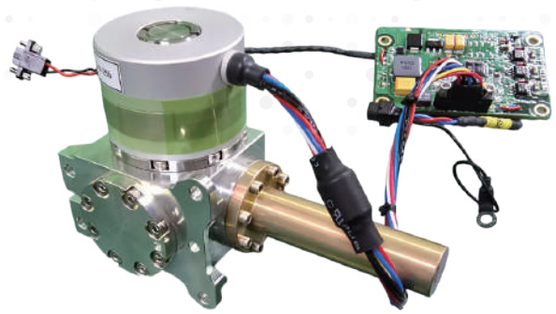
Technical Data

Typical performance @23°C, 12Vdc

- Max. Cooling Power : 550mW @150K @71°C
- Cool Down Time : 3.5min. @150J,150K
- MTTF : 17,000hr. @ Basic profile (Designed)
- Max. Input Power : 11Wdc
- Steady State Input Power : 2.7Wdc @210mW,150K
- Temperature Stability : ±0.1K
- Weight : <185gr. (Cooler Only)
- Ambient Temperature Range : -40°C … 71°C
- Environmental Conditions : MIL-STD-810G

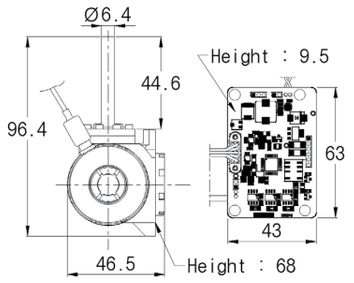
Features & Benefits

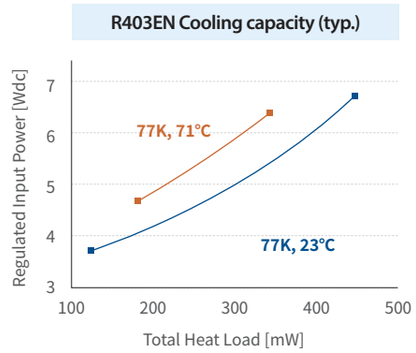
- High reliability
- Ultra-compact for portable systems
- Low acoustic noise
- Low input power



R403EN

For handheld thermal imagers





Overview

The Finished Solution Rotary Drive Cryocooler is designed to meet the requirements of handheld detector specification for a lightweight, low power, compact Stirling cooler.

Technical Data

Typical performance @23°C, 12Vdc

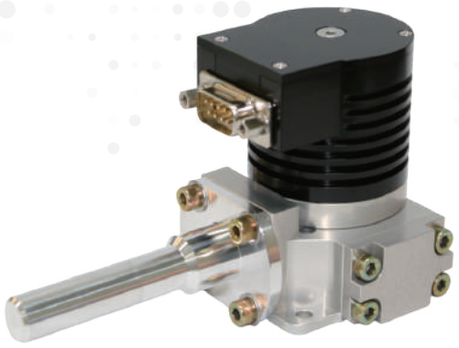
- Max. Cooling Power : 300mW @77K,71°C
- Cool Down Time : 5min. @210J,77K
- MTTF : 10,000hr. @ Basic profile
- Max. Input Power : 15Wdc
- Steady State Input Power : 4.5Wdc @150mW,77K
- Temperature Stability : ±0.1K
- Weight : <320gr. (Cooler Only)
- Ambient Temperature Range : -40°C … 71°C
- Environmental Conditions : MIL-STD-810G

Features & Benefits

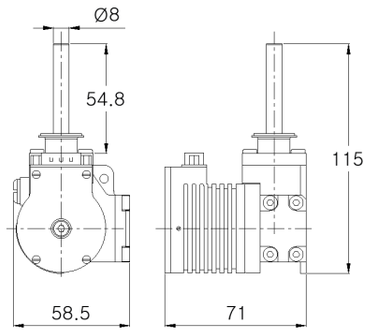
- High reliability
- Compact for handheld systems
- Low acoustic noise
- Can be operated with batteries

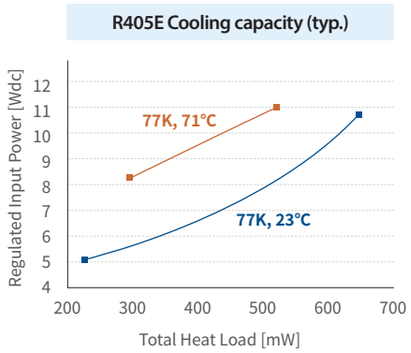
Integral Rotary Cryocooler
Finished Solution Co., Ltd.

R405E



For various night vision systems





Overview

The Finished Solution Rotary Drive Cryocooler is designed to meet the requirements of various detector specification for a reliable Stirling cooler.

Technical Data

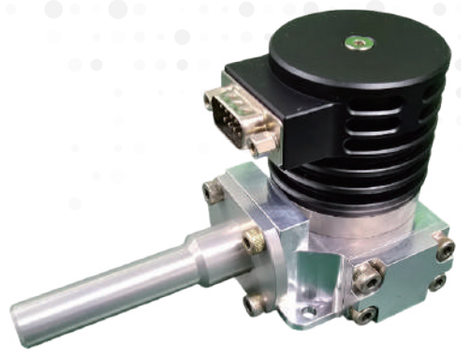
Typical performance @23°C, 24Vdc

- Max. Cooling Power : 500mW @77K,71°C
- Cool Down Time : 5.5min. @250J,77K
- MTTF : 15,000hr. @ Basic profile
- Max. Input Power : 14Wdc
- Steady State Input Power : 5.2Wdc @220mW,77K
- Temperature Stability : ±0.1K
- Weight : <470gr.
- Ambient Temperature Range : -40°C … 71°C
- Environmental Conditions : MIL-STD-810G

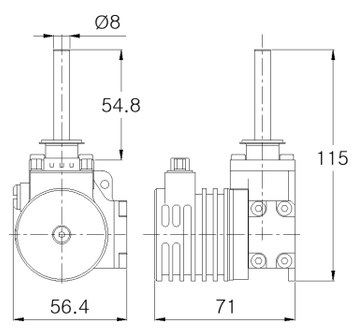
Features & Benefits

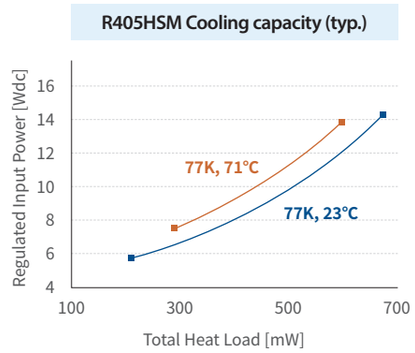
- High reliability
- Low acoustic noise
- Compatible for small to large format array

R405HSM



For portable night vision systems





Overview

The Finished Solution Rotary Drive Cryocooler is designed to meet the requirements of formal detector specification for a reliable Stirling cooler.

Technical Data

Typical performance @23°C, 24Vdc

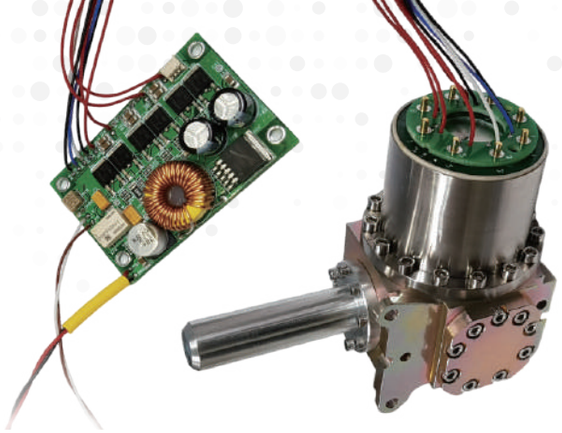
- Max. Cooling Power : 600mW @77K,71°C
- Cool Down Time : 4min. @250J,77K
- MTTF : 15,000hr. @ Basic profile
- Max. Input Power : 22Wdc
- Steady State Input Power : 5.9Wdc @220mW,77K
- Temperature Stability : ±0.1K
- Weight : <440gr.
- Ambient Temperature Range : -40°C … 71°C
- Environmental Conditions : MIL-STD-810G

Features & Benefits

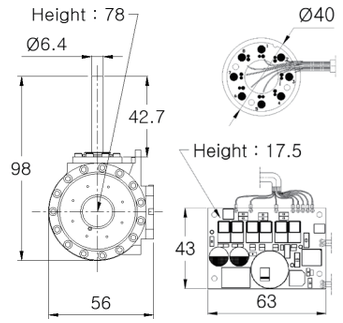
- High reliability
- Low acoustic noise
- High cooling power
- Fast cool down time
- Compatible for small to large format array

Integral Rotary Cryocooler
Finished Solution Co., Ltd.

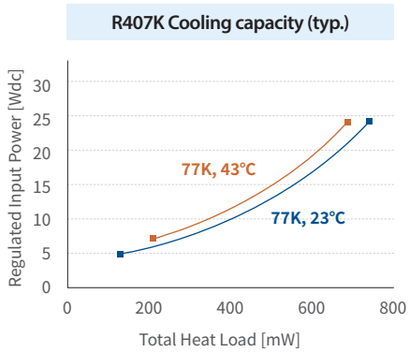
R407K



For embedded applications (vehicles, ships)



Dimensions in mm



Overview

The Finished Solution Rotary Drive Cryocooler is designed to meet the requirements of detector specification for a short cool down time Stirling cooler.

Technical Data

Typical performance @23°C, 12Vdc

- Max. Cooling Power : 700mW @77K,43°C
- Cool Down Time : 3min. @250J,77K
- MTTF : 24,000hr. @ Basic profile
- Max. Input Power : 31Wdc
- Steady State Input Power : 5.3Wdc @220mW,77K
- Temperature Stability : ±0.1K
- Weight : <470gr. (Cooler Only)
- Ambient Temperature Range : -32°C … 43°C
- Environmental Conditions : MIL-STD-810G

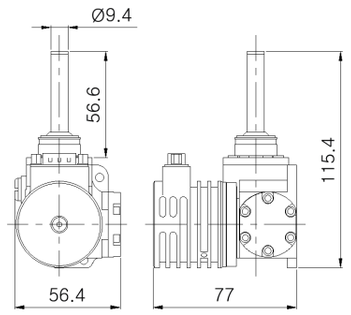
Features & Benefits

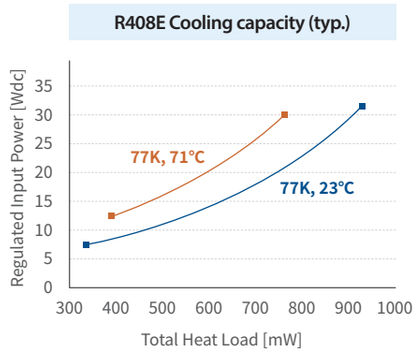
- High reliability
- Suitable for embedded systems
- Short cool down time
- High cooling power

Integral Rotary Cryocooler
Finished Solution Co., Ltd.

R408E

For portable night vision systems, also QWIP type





Overview

The Finished Solution Rotary Drive Cryocooler is designed to meet the requirements of detector specification for a Stirling cooler used in harsh applications.

Technical Data

Typical performance @23°C, 24Vdc

- Max. Cooling Power : 750mW @77K,71°C
- Cool Down Time : 5min. @500J,77K
- MTTF : 15,000hr. @ Basic profile
- Max. Input Power : 31Wdc
- Steady State Input Power : 8Wdc @320mW,77K
- Temperature Stability : ±0.1K
- Weight : <600gr.
- Ambient Temperature Range : -40°C … 71°C
- Environmental Conditions : MIL-STD-810G

Features & Benefits

- High reliability
- Suitable for large format arrays
- Sturdy design
- High cooling capacity

CERTIFICATION

FS's main customer is Korea Government, which requires an equipment to confirm the most high level of Quality standard for assuring operation in the extreme environmental condition. So our products were designed to be satisfied with their strict requirements. Also, environmental testing and performance verification was performed by external authorized agencies in the performance verification phase to ensure the result be fairly evaluated. Finally, during the mass production phase for delivery, **the whole process from initial material inspection to final product inspection is controlled and monitored by DQMS as well as ISO 9001**.

As a result of this activity,
we received the award from the Korean government as a quality company.

Finished Solution
FS Co.,Ltd.