



CRYOCOOLER PRODUCT CATALOGUE

Sumitomo Heavy Industries, Ltd. (SHI) has a tradition of excellence and innovation that spans over 400 years. From its very beginning as a small shop selling medicines and books in Kyoto, Japan in the early 17th century, to its current status as a diverse, \$6 billion corporation, SHI has continued to grow and flourish in an ever-changing international market.

SHI's acquisition of IGC-APD Cryogenics, Inc. in 2002 brought together two of the world's leading cryogenic companies to form the SHI Cryogenics Group, with an unsurpassed tradition of design, development and success in the manufacture of cryogenic equipment.

SHI Cryocoolers continue this tradition by supporting both global research & development as well as state-of-the-art technologies. Today, applications of cryogenic technologies can be found in our daily lives. SHI Cryocoolers are used directly or in the manufacturing of many of the world's medical, semiconductor, telecommunications, electronics, biochemical and other industrial products.

SHI offers a wide range of Cryocooler products: Gifford-McMahon, Pulse Tube and GM-JT Cryocoolers, with temperatures ranging from below 4K to 77K and higher. SHI Cryocoolers are built in world-class manufacturing facilities using the latest Six Sigma manufacturing and process capabilities. The result is a product portfolio that offers flexibility, high reliability and is supported by a global sales, service and support network.

SHI Cryogenics Group 4K Gifford-McMahon Cryocoolers are recognized as the most reliable and versatile systems available in the marketplace. These Cryocoolers feature high cooling capacities, compact designs and are orientation-free. Models like the RDK-408D2 are the standard for MRI and other superconducting magnets and can be found cooling a wide variety of analytical and experimental devices and offer a very cost effective alternative to open-cycle liquid helium systems.

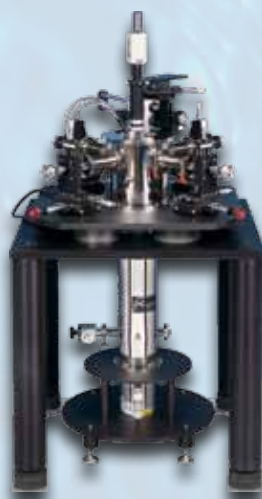
SHI's 4K Pulse Tube Cryocoolers embody leading-edge technology and provide low vibration, high reliability and low maintenance requirements. They are uniquely designed with no moving parts inside the coldhead. In addition, they feature an optional separated valve unit to further reduce vibration, enable operation in higher magnetic fields and ease maintenance requirements. SHI Pulse Tube Cryocoolers provide a stable low-temperature solution for sensitive measurement and analytical applications.

SHI Cryogenics Group's 10K Gifford-McMahon Cryocoolers are versatile, closed-cycle systems that feature the same Displex® technology found in the complete line of Marathon® CP Cryopumps and MRI shield coolers, proven the world over with millions of reliable operating hours. They have been recognized as the industry standard since we developed the technology over 40 years ago. Our original pneumatic drive, which limits the number of wear parts in the refrigerator, combined with state-of-the-art design features, results in superior performance and low maintenance costs. Select models also feature Whisper® technology for quieter operation. SHI's 10K Cryocoolers have proven reliability in thousands of applications, including MRI, cryopumping, research and other custom low-temperature applications.

APPLICATIONS

Cryostats & Interfaces

Sample Cooling
Spectroscopy
Goniometry
Mossbauer
Optical
Laser



Astronomy
Sensor Cooling
Lens Cooling

Vacuum
Cryopumping

Electronics & Power

HTC Transmission Lines
Supercomputers

High TC Lead & Coil Cooling
Shield Cooling

Magnets

Six Sigma

Easy, In-situ

ISO 9001 & 14001 Manufacturing

High Reliability

Global Service & Support

Six Sigma Quality

ISO 9001 & 14001

High Reliability

SHI & APD CRYOGENICS: A HISTORY

Masatomo Sumitomo, founder of the Sumitomo family, opens a shop dealing in medicines and books in Kyoto, Japan

**17th
Century**

Discovery of Besshi Copper Mine—Sumitomo receives exclusive mining rights

1690

Precursor to Sumitomo Heavy Industries, Ltd. established as a machinery production and repair facility at the Besshi Mine Plant

1888

Establishment of Sumitomo Machinery Works, Ltd.

1934

1959

Precursor to APD Cryogenics established as Space and Missile Department of Air Products in Allentown, Pennsylvania, USA

Sumitomo establishes its cryogenics business at the Hiratsuka Research Laboratory in Hiratsuka City, near Tokyo.

1962

Renamed the Advanced Product Development Department of Air Products

1968

Introduces Displex® cryocooler systems

Merger between Sumitomo Machinery and Uruga Heavy Industries results in the establishment of Sumitomo Heavy Industries, Ltd.

1969

1976

Pioneers current generation cryopump technology

1982

Merger with Nittoku Metal Industries results in the establishment of the Precision Business Division, which today includes the Cryogenics Group

1987

Becomes a subsidiary of Intermagnetics General Corporation

2002

Becomes a subsidiary of Sumitomo Heavy Industries, Ltd.

CRYOCOOLER PRODUCT SPECIFICATION

Cold Head Model		RDK-101D	RDK-305D	RDK-205D	RDK-408D2	RDK-415D	RP-062B	RP-082B	CH-204N
1st Stage Capacity	50 Hz	3.0 W @ 60 K	15 W @ 40 K	3.0 W @ 50 K	40 W @ 43 K	35 W @ 50 K	30 W @ 65 K	40 W @ 45 K	—
	60 Hz	5.0 W @ 60 K	20 W @ 40 K	4.0 W @ 50 K	50 W @ 43 K	45 W @ 50 K	30 W @ 65 K	40 W @ 45 K	—
2nd Stage Capacity	50 Hz	0.1 W @ 4.2 K	0.4 W @ 4.2 K	0.5 W @ 4.2 K	1.0 W @ 4.2 K	1.5 W @ 4.2 K	0.5 W @ 4.2 K	1.0 W @ 4.2 K	2.5 W @ 10 K
	60 Hz	0.1 W @ 4.2 K	0.4 W @ 4.2 K	0.5 W @ 4.2 K	1.0 W @ 4.2 K	1.5 W @ 4.2 K	0.5 W @ 4.2 K	1.0 W @ 4.2 K	3.0 W @ 10 K
Minimum Temperature ¹		<3.0 K	<3.5 K	<3.5 K	<3.5 K	<3.5 K	<3.0 K	<3.0 K	6.5 K
Cooldown Time ¹	50 Hz	<150	<120	<90	<60	<60	<100	<80	40
	60 Hz	<150	<120	<90	<60	<60	<90	<80	35
Weight		7.2 kg (15.9 lbs.) ²	16.0 kg (35.3 lbs.)	14.0 kg (30.9 lbs.)	18.0 kg (39.7 lbs.)	18.5 kg (40.8 lbs.)	23.2 kg (51.2 lbs.)	26.0 kg (57.3 lbs.)	7.8 kg (17.2 lbs.)
Bakeable Option									●
HC-4E1									●
CKW-21A				●					
HC-8E4									●
F-50L/H					●	●	●		
F-70LP/L/H					●	●		●	3
CNA-11B/C		●							
Zephyr [®]									●
CNA-31C/D			●						
CSA-71A					●	●			
CNA-61C/D					●	●			

Note: "RDK" and "RP" prefixes denote individual cryocoolers, while "SRDK" and "SRP" prefixes denote complete systems. For example, SRDK-415D-A71A is the complete model number for a RDK-415D Cold Head with a CSA-71A Compressor.

¹ For reference only. Refer to individual performance specifications.

² Cold head weight only. Refer to individual performance specifications for weights of additional parts.

³ Up to two (2) cold heads can be operated with F-70 Compressor

⁴ Reduced capacities when operated with Zephyr[®], HC-4E1 or HC-8E4 Compressors

RDK-408S2	CH-202	CH-204	CH-208R	CH-208L	CH-210	RDK-400B	CH-104	CH-110
35 W @ 45 K	7.3 W @ 77 K	13.5 W @ 80 K	65 W @ 77 K	28 W @ 77 K	110 W @ 77 K	54 W @ 40 K	34 W @ 77 K	175 W @ 77 K
40 W @ 45 K	8.8 W @ 77 K	16.2 W @ 80 K	80 W @ 77 K	35 W @ 77 K	120 W @ 77 K	70 W @ 40 K	42 W @ 77 K	200 W @ 77 K
5.4 W @ 10 K	1.8 W @ 20 K	6.7 W @ 20 K	6.0 W @ 20 K	8.0 W @ 20 K	6.0 W @ 20 K	N/A	N/A	N/A
6.3 W @ 10 K	2.2 W @ 20 K	7.1 W @ 20 K	7.5 W @ 20 K	10.0 W @ 20 K	7.0 W @ 20 K	N/A	N/A	N/A
<7 K	10 K	10 K	10 K	10 K	10 K	<25 K	<25 K	<25 K
<60	75	35	55	50	35	<30	<40	35
<60	65	30	45	40	30	<30	<30	30
17.2 kg (37.9 lbs.)	6.8 kg (15.0 lbs.)	7.8 kg (17.2 lbs.)	11.6 kg (25.6 lbs.)	11.8 kg (26.0 lbs.)	13.8 kg (30.4 lbs.)	16.0 kg (35.3 lbs.)	7.9 kg (17.5 lbs.)	13.7 kg (30.2 lbs.)
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COMPRESSOR OPTIONS

All SHI Cryocoolers and Pulse Tubes are driven by highly-efficient and reliable helium compressors. These compressors boast industry-leading 20,000 or 30,000 hour maintenance intervals, and are available in single-phase and three-phase, low and high voltage, and water and air-cooled versions.



Compressor Model	HC-4E1	CKW-21A	HC-8E4	F-50		F-70		
				L	H	LP	L	H
Cooling	Water Cooled	Water Cooled	Water Cooled	Water Cooled		Water Cooled		
Electrical Supply	1 Phase 200 V, 230/240 V, 50 Hz 208/230 V, 60 Hz	3 Phase 200 V, 50/60 Hz	3 Phase 220 V, 50 Hz 220/230 V, 60 Hz	3 Phase 200 V, 50/60 Hz	3 Phase 380, 400, 415 V, 50 Hz 480 V, 60 Hz	3 Phase 200 V, 50/60 Hz		3 Phase 380-415 V, 50 Hz 480 V, 60 Hz
Power Consumption*	2.6 kW at 50 Hz 3.0 kW at 60 Hz	2.7-3.3 kW at 50 Hz 3.5-4.0 kW at 60 Hz	3.7 kW at 50 Hz 4.3 kW at 60 Hz	6.5-7.2 kW at 50 Hz 7.5-8.3 kW at 60 Hz		6.7-7.2 kW at 50 Hz 8.0-8.5 kW at 60 Hz	6.6-6.9 kW at 50 Hz 7.5-7.8 kW at 60 Hz	
Ambient Temperature	4-40 °C (40-104 °F)	5-35 °C (41-95 °F)	4-40 °C (40-104 °F)	5-35 °C (41-95 °F)		4-40 °C (40-104 °F)		
Cooling Water (Inlet)	2.7 L/min. (0.7 gal./min.) 4-27 °C (40-80 °F)	3.0-3.5 L/min. (1.8 gal./min.) 28 °C (82 °F)	5.7-9.5 L/min. (1.5-2.5 gal./min.) 4-21 °C (40-70 °F)	7-10 L/min. (1.8 gal./min.) 28 °C (82 °F)		6-9 L/min. (1.6-2.4 gal./min.) 5-25 °C (41-77 °F)		
Cooling Air	N/A	N/A	N/A	N/A		N/A		
Dimensions (HxWxD)	504 x 430 x 485 mm (19.8 x 16.9 x 19.1 in.)	461 x 400 x 450 mm (18.1 x 15.7 x 17.7 in.)	504 x 430 x 485 mm (19.8 x 16.9 x 19.1 in.)	591 x 450 x 588 mm (23.3 x 17.7 x 23.2 in.)		532 x 443 x 493 mm (20.9 x 17.4 x 19.4 in.)		
Weight	75 kg (165 lbs.) 82 kg (180 lbs.) w/ transformer	70 kg (155 lbs.)	75 kg (165 lbs.)	120 kg (264 lbs.)		100 kg (225 lbs.)		
Maintenance	30,000 Hours	20,000 Hours	30,000 Hours	30,000 Hours		30,000 Hours		

* Typical power consumption



For Information in: Asia

Sumitomo Heavy Industries, Ltd.
ThinkPark Tower
Cryogenics Division, Sales Department
1-1, Osaki 2-Chome, Shinagawa-Ku
Tokyo 141-6025, Japan
Phone: +81-3-6737-2550
Fax: +81-3-6866-5114
E-mail: cryo@shi.co.jp

Cryogenics Division, Service Department
2-1-1, Yato-cho, Nishitokyo-city
Tokyo 188-8585, Japan
Phone: +81-42-468-4265
Fax: +81-42-468-4254
E-mail: cryo_service@shi.co.jp

Sumitomo Heavy Industries (Shanghai) Management, Ltd.
10F, SMEG PLAZA
No.1386, Hongqiao Road
Shanghai 200336, P.R. China
Phone: +86-21-3462-7660
Fax: +86-21-3462-7661
Mobile: +86-138-1612-1291
E-mail: ZCryo_ChinaSales@shi.co.jp

Room 107-110, Building 5
No.100, Zixiu Road
Shanghai 201103, P.R. China
Phone: +86-21-6070-5200
Fax: +86-21-6070-5086
E-mail: ZCryo_ChinaService@shi.co.jp

Sumitomo (SHI) Cryogenics Korea Co., Ltd.
Room 619-620, Venture Valley
#958 Goseck-Dong, Kwonsun-Gu
Suwon-City, Gyeonggi-Do, South Korea
Phone: +82-31-278-3050
Fax: +82-31-278-3053
E-mail: Won_Bum_Lee@shi.co.jp

Sumitomo (SHI) Cryogenics Taiwan Co., Ltd.
4th Floor, No. 3
Lane 216, Gongyuan Rd.
Hsinchu City 300, Taiwan ROC
Phone: +886 3 561 2557
Fax: +886 3 562 3400

United States

Sumitomo (SHI) Cryogenics of America, Inc.
1833 Vultee Street
Allentown, PA 18103
Phone: +1 610-791-6700
Fax: +1 610-791-0440
E-mail: sales@shicryogenics.com

Sumitomo (SHI) Cryogenics of America, Inc.
1700 Wyatt Drive
Suite 8
Santa Clara, CA 95054
Phone: +1 408-736-4406
Fax: +1 408-736-7325

Sumitomo (SHI) Cryogenics of America, Inc.
1500-C Higgins Road
Elk Grove Village, IL 60007
Phone: +1 847-290-5801
Fax: +1 847-290-1984

Europe

Sumitomo (SHI) Cryogenics of Europe, Ltd.
3 Hamilton Close, Houndmills Industrial Estate
Basingstoke, Hampshire RG21 6YT
United Kingdom
Phone: +44 (0) 1256 853333
Fax: +44 (0) 1256 471507
E-mail: uksales@shicryogenics.co.uk

Sumitomo (SHI) Cryogenics of Europe, GmbH
Daimlerweg 5a
Darmstadt D-64293, Germany
Phone: +49 (0) 6151 860 610
Fax: +49 (0) 6151 800 252
E-mail: contact@sumitomocryo.de

World Wide Web: www.shicryogenics.com

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