

High quality vacuum for your applications.

From ULVAC CRYOGENICS INC., CRYOPUMP specialist.



High quality, high performance, and exceptional reliability proven in various fields.

Prompt and appropriate customer support. Wide range of models for your applications.

ULVAC CRYOGENICS CRYO-U® series are reliable for any production line throughout the world.

ULVAC Inc., Japan's leading company in vacuum technology and *CTI., the U.S. global leading company in cryogenic technology formed a joint company ULVAC CRYOGENICS INC. in 1981. Since then, ULVAC CRYOGENICS has been working to develop and improve CRYO-U® series by its own unique technology combined with both ULVAC's vacuum technology and CTI'S cryogenic technology to meet the requirements for diverse applications.

CRYO-U® series have been used in many fields such as electronics, optical technology, solar power generation, nuclear fusion or space development and we have accumulated years of experience and knowledge. In recent years, based on these vacuum and cryogenic technology, we have newly developed 4K CRYO-COOLER for the fields of superconductivity, medical equipments, measuring equipments and refrigerating equipments and entered into cryogenic refrigerator business.

We established ULVAC CRYOGENICS KOREA in 2004 and ULVAC CRYOGENICS (NINGBO) in 2005 as overseas production base, and now they manufacture and sell our products.

We provide more than 10 standard models of cryopumps from 4 to 30 inches and super traps as well as the specialized cryopumps ideal for various purposes.

- For energy saving...multiple operation type
- For sputtering systems...high pumping capacity type
- For smaller system footprint...L shaped type
- For ultra high vacuum applications...bakeable type
- For experimental and analytical equipment...vibration proof type
- For pumping corrosive gas...corrosion resistant type
- Specifically for pumping water vapor...super trap

We also provide a wide variety of optional equipments; band heaters for faster regeneration, noise resistant cryometers, automatic regeneration devices and more.

We are aware that our cryopumps are used in our customers' important production lines. Ulvac Group has developed advanced global services structure in Japan, South Korea, China, North America and Europe to offer maintenance services or to deal with unexpected troubles in a prompt and precise manner. We provide best solutions for our customers.

* At present BROOKS AUTONATION, INC.

Creating new technology through ULTRA -

HIGH VACUUM & EXTREME LOW TEMPERATURE

Cryopump working principle

WHAT ARE CRYOPUMPS ?

How cryopumps work

In a cryopump, most gas molecules (N_2 , Ar, etc.) move randomly and hit the cryogenically cooled (10 to 15K) surfaces (cryopanel) where they are trapped and condensed. Gas molecules whose equilibrium vapor pressure is significantly high such as hydrogen and helium (see equilibrium vapor pressure curve below) are removed by adsorption using adsorbent on cryopanel. The baffle which is cooled to cryogenic 80K condenses gases (mostly water vapor) whose equilibrium vapor pressure is low and improves pumping capacity of cryopanel surfaces.

Cryopanel (10 to 15K), baffles and shields (75 to 80K) are cooled by helium refrigeration systems that consist of cryocoolers and compressors.

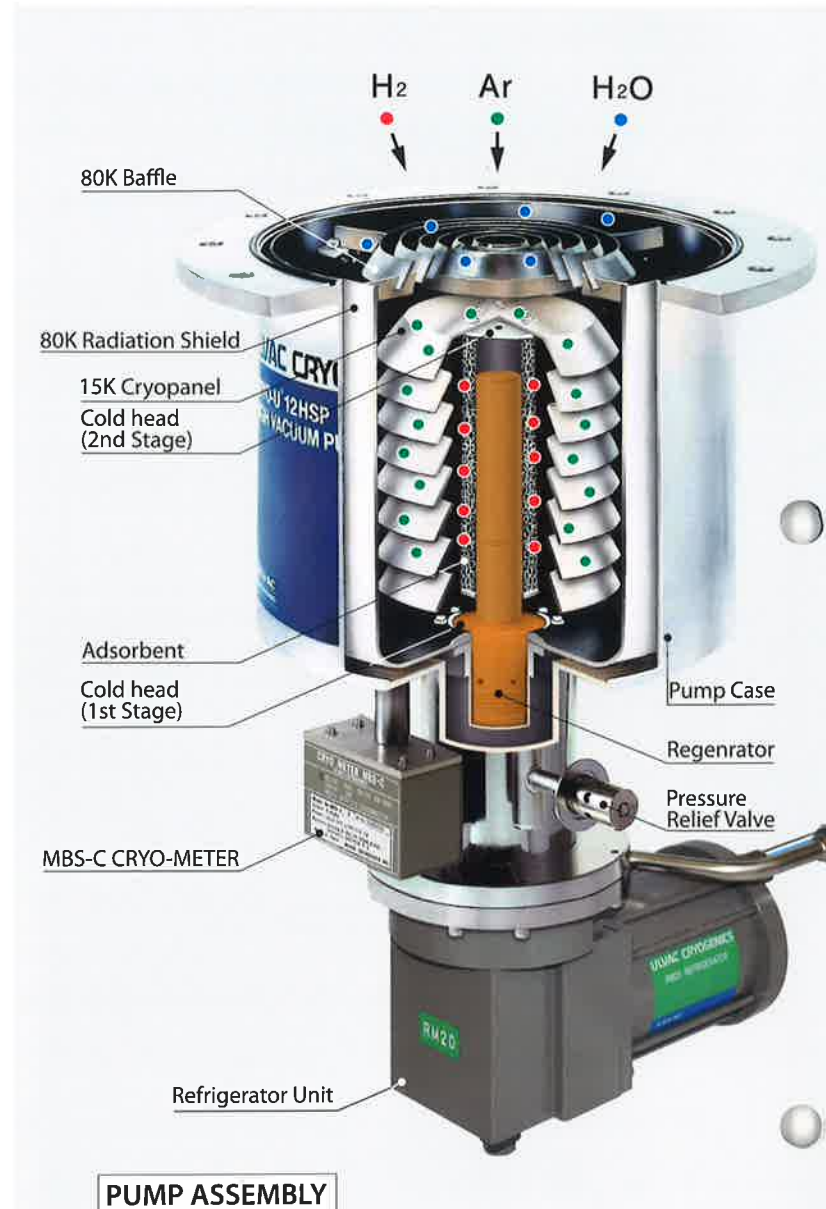
In this way, cryopumps are able to make clean vacuum under 10^{-7} to 10^{-9} Pa (10^{-9} to 10^{-11} Torr) with high pumping speed in the 10^{-1} to 10^{-8} (10^{-3} to 10^{-10} Torr) pressure range.

Features

- Provide Ultra clean vacuum which is exclusive to our cryopumps.
- Vacuum any kind of gas
- No liquid helium needed means low running cost.
- Can be installed in any orientation.
- Easy operation.
- Higher pumping speed compared to ion pumps or turbo molecule pumps.

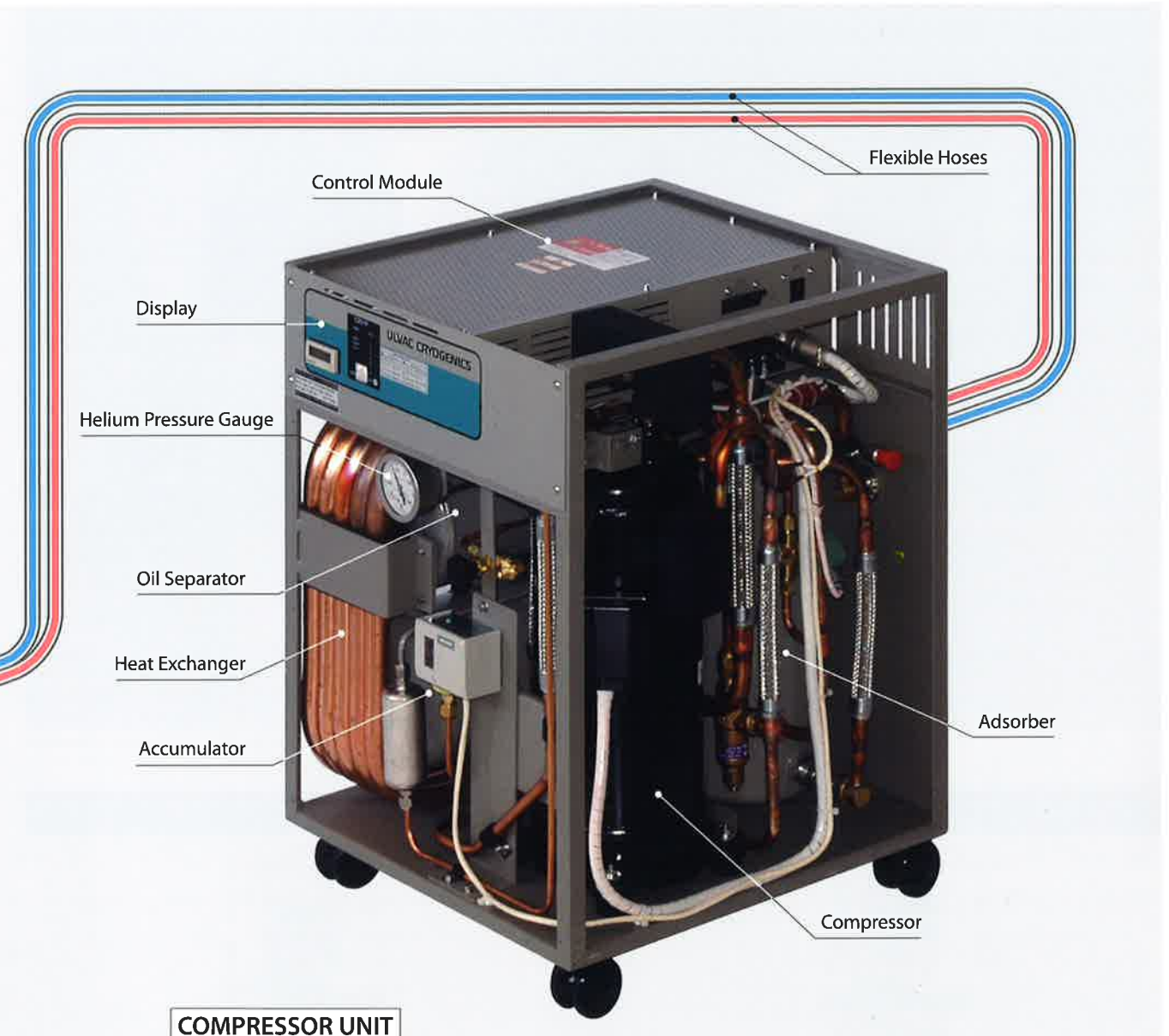
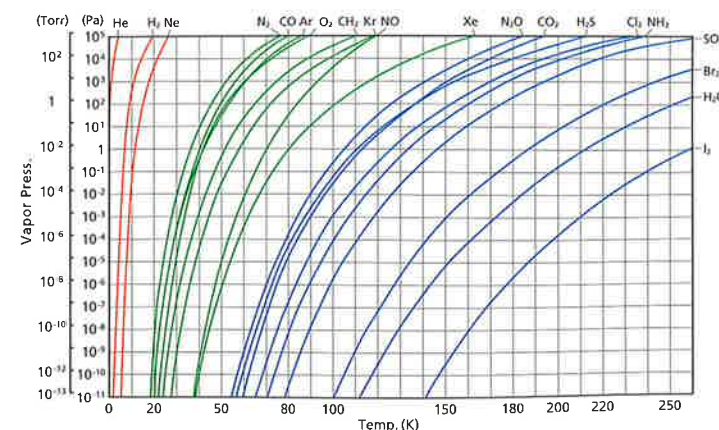
Applications

- Vacuum deposition equipment
- Sputtering equipment
- Ion implanter
- Semiconductor process equipment
- Accelerating device
- Nuclear fusion device
- Surface analysis device
- Space simulation chamber
- Other equipments that require clean high vacuum or ultra high vacuum



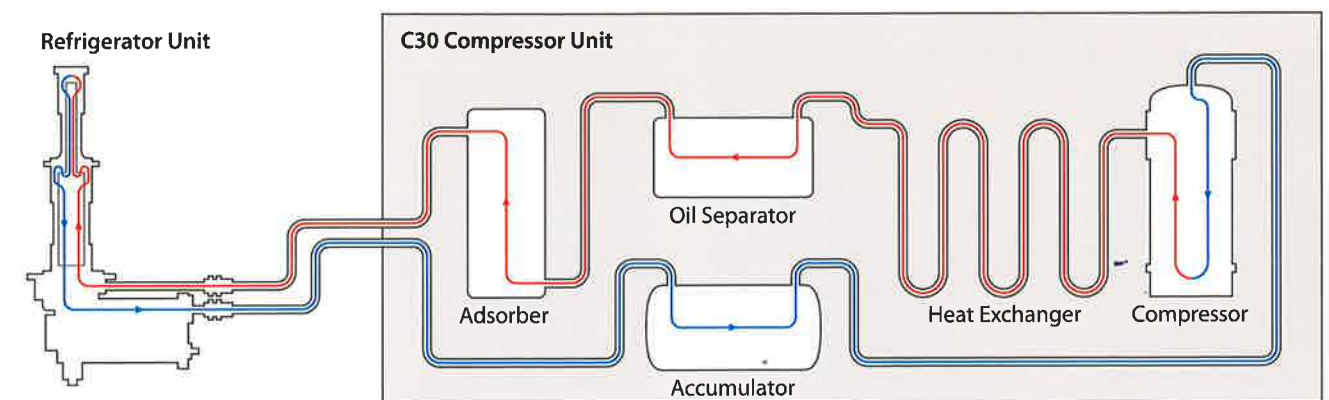
PUMP ASSEMBLY

Equilibrium vapor pressure



COMPRESSOR UNIT

Helium gas flow in a cryopump system

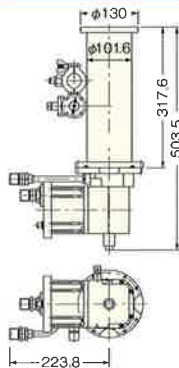


Cryopump models and standard specifications

CRYO-U® CRYOPUMPS



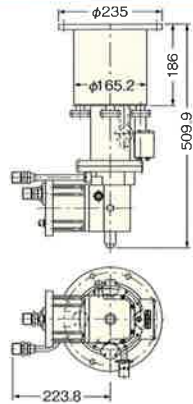
CRYO-U4H



SPECIFICATIONS			
Pumping speed (20°C)	Nitrogen	L/s	450
	Hydrogen		500
	Argon		370
	Water		1,100
Ultimate pressure	Pa(Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon Pa·L/s (Torr·L/s)		1.3×10 ³ (9.8)
Pumping capacity	Argon Pa·L (Torr·L)		1.0×10 ⁷ (7.5×10 ⁴)
	Hydrogen Pa·L (Torr·L)		1.5×10 ⁵ (11.3)
Cooldown time	min(Hz)		45/40 (50/60)
Mounting flange	ISO-K DN100		
Compressor unit	C10		
Weight	Kg		14.5

*Maintenance interval : every 16,000 hours

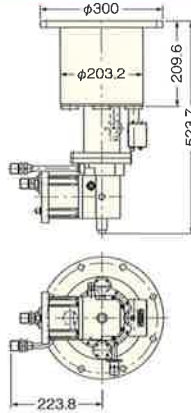
CRYO-U6H



SPECIFICATIONS			
Pumping speed (20°C)	Nitrogen	L/s	750
	Hydrogen		1,100
	Argon		620
	Water		2,100
Ultimate pressure	Pa(Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon Pa·L/s (Torr·L/s)		1.1×10 ³ (7.9)
Pumping capacity	Argon Pa·L (Torr·L)		5.6×10 ⁷ (4.2×10 ⁵)
	Hydrogen Pa·L (Torr·L)		3.1×10 ⁵ (2.3×10 ³)
Cooldown time	min(Hz)		80/70 (50/60)
Mounting flange	UVG-150, UFC-203		
Compressor unit	C10		
Weight	Kg		19

*Maintenance interval : every 16,000 hours

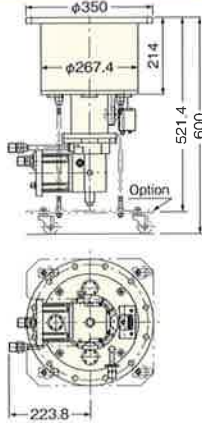
CRYO-U8H



SPECIFICATIONS			
Pumping speed (20°C)	Nitrogen	L/s	1,700
	Hydrogen		2,700
	Argon		1,400
	Water		4,000
Ultimate pressure	Pa(Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon Pa·L/s (Torr·L/s)		1.2×10 ³ (8.9)
Pumping capacity	Argon Pa·L (Torr·L)		1.0×10 ⁸ (7.6×10 ⁵)
	Hydrogen Pa·L (Torr·L)		1.0×10 ⁶ (7.6×10 ³)
Cooldown time	min(Hz)		100/90 (50/60)
Mounting flange	UVG-200, 6 ^B ANSI, UFC-253		
Compressor unit	C10		
Weight	Kg		25

*Maintenance interval : every 16,000 hours

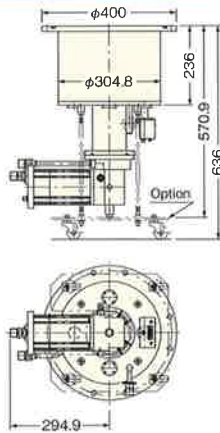
CRYO-U10H



SPECIFICATIONS			
Pumping speed (20°C)	Nitrogen	L/s	2,400
	Hydrogen		3,600
	Argon		2,000
	Water		6,900
Ultimate pressure	Pa(Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon Pa·L/s (Torr·L/s)		1.3×10 ³ (9.8)
Pumping capacity	Argon Pa·L (Torr·L)		1.0×10 ⁸ (7.8×10 ⁵)
	Hydrogen Pa·L (Torr·L)		1.2×10 ⁶ (9.0×10 ³)
Cooldown time	min(Hz)		110/100 (50/60)
Mounting flange	UVG-250		
Compressor unit	C15R		
Weight	Kg		29

*Maintenance interval : every 16,000 hours

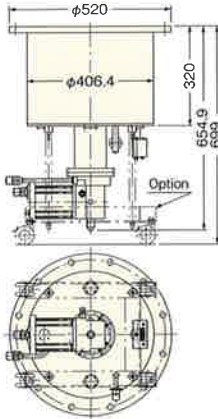
CRYO-U12H



SPECIFICATIONS			
Pumping speed (20°C)	Nitrogen	L/s	4,000
	Hydrogen		6,000
	Argon		3,300
	Water		9,500
Ultimate pressure	Pa(Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon Pa·L/s (Torr·L/s)		2.0×10 ³ (15)
Pumping capacity	Argon Pa·L (Torr·L)		2.1×10 ⁸ (1.6×10 ⁶)
	Hydrogen Pa·L (Torr·L)		9.8×10 ⁵ (7.4×10 ³)
Cooldown time	min(Hz)		85/75 (50/60)
Mounting flange	UVG-300, 10 ^B ANSI		
Compressor unit	C30VR		
Weight	Kg		40

*Maintenance interval : every 16,000 hours *Travelling base is optional.

CRYO-U16 / U16P



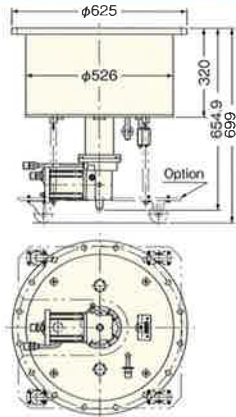
SPECIFICATIONS			
Pumping speed (20°C)	Model	CRYO-U16	CRYO-U16P
	Nitrogen	5,000	5,000
	Hydrogen	10,000	10,000
	Argon	4,200	4,200
Pumping capacity	Water	16,000	16,000
	Ultimate pressure	Pa(Torr)	10 ⁻⁷ (10 ⁻⁹)
	Maximum throughput	Argon Pa·L/s (Torr·L/s)	1.4×10 ³ (11)
		Hydrogen Pa·L (Torr·L)	4.1×10 ² (3.1)
Pumping capacity	Argon Pa·L (Torr·L)		4.3×10 ⁸ (3.3×10 ⁶)
	Hydrogen Pa·L (Torr·L)		2.4×10 ⁶ (1.8×10 ⁴)
Cooldown time	min(Hz)		110/100 (50/60)
Mounting flange	UVG-400		
Compressor unit	C30VR		
Weight	Kg		61

*Maintenance interval : every 16,000 hours *Travelling base is optional.

Cryopump models and standard specifications

CRYO-U® CRYOPUMPS

CRYO-U20P

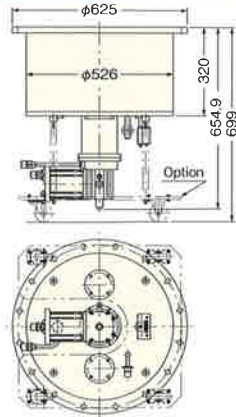


SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	10,000
	Hydrogen		18,000
	Argon		8,400
	Water		29,000
Ultimate pressure	Pa (Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	1.1×10 ³ (8.3)
	Hydrogen		5.0×10 ² (3.7)
Pumping capacity	Argon	Pa·L (Torr·L)	5.8×10 ⁸ (4.4×10 ⁶)
	Hydrogen		4.6×10 ⁶ (3.4×10 ⁴)
Cooldown time	min (Hz)		180/160 (50/60)
Mounting flange			UVG-500
Compressor unit			C30VR
Weight	Kg		69

*Maintenance interval : every 16,000 hours *Travelling base is optional.

CRYO-U20H

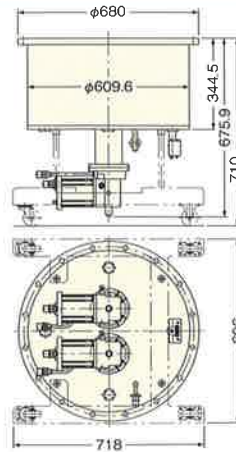


SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	10,000
	Hydrogen		18,000
	Argon		8,400
	Water		29,000
Ultimate pressure	Pa (Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	1.7×10 ³ (12.8)
	Hydrogen		5.0×10 ² (3.7)
Pumping capacity	Argon	Pa·L (Torr·L)	5.8×10 ⁸ (4.4×10 ⁶)
	Hydrogen		4.6×10 ⁶ (3.4×10 ⁴)
Cooldown time	min (Hz)		160/140 (50/60)
Mounting flange			UVG-500, 20 ^B ANSI, ISO-500
Compressor unit			C30PVRT
Weight	Kg		72

*Maintenance interval : every 16,000 hours *Travelling base is optional.

CRYO-U22H

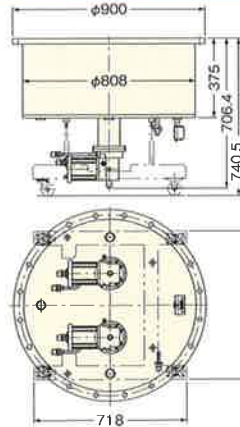


SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	17,000
	Hydrogen		25,000
	Argon		14,000
	Water		39,000
Ultimate pressure	Pa (Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	4.1×10 ³ (31)
	Hydrogen		1.3×10 ³ (9.6)
Pumping capacity	Argon	Pa·L (Torr·L)	8.1×10 ⁸ (6.1×10 ⁶)
	Hydrogen		8.5×10 ⁶ (6.4×10 ⁴)
Cooldown time	min (Hz)		150/135 (50/60)
Mounting flange			UVG-550
Compressor unit			C30VR×2
Weight	Kg		125

*Maintenance interval : every 16,000 hours

CRYO-U30H

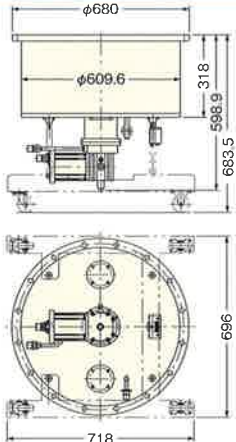


SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	28,000
	Hydrogen		43,000
	Argon		23,000
	Water		70,000
Ultimate pressure	Pa (Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	2.7×10 ³ (20)
	Hydrogen		7.4×10 ² (5.6)
Pumping capacity	Argon	Pa·L (Torr·L)	7.8×10 ⁸ (5.9×10 ⁶)
	Hydrogen		1.5×10 ⁷ (1.1×10 ⁵)
Cooldown time	min (Hz)		240/200 (50/60)
Mounting flange			VG-750
Compressor unit			C30VR×2
Weight	Kg		175

*Maintenance interval : every 16,000 hours

CRYO-U22P

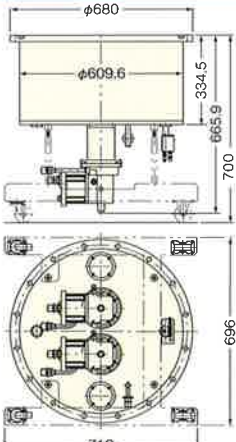


SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	11,500
	Hydrogen		14,000
	Argon		9,700
	Water		39,000
Ultimate pressure	Pa (Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	1.7×10 ³ (12.8)
	Hydrogen		5.0×10 ² (3.7)
Pumping capacity	Argon	Pa·L (Torr·L)	5.8×10 ⁸ (4.4×10 ⁶)
	Hydrogen		6.0×10 ⁶ (4.5×10 ⁴)
Cooldown time	min (Hz)		180/170 (50/60)
Mounting flange			UVG-550
Compressor unit			C30PVRT
Weight	Kg		115

*Maintenance interval : every 16,000 hours

CRYO-U22WB



SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	13,000
	Hydrogen		16,500
	Argon		11,000
	Water		39,000
Ultimate pressure	Pa (Torr)		10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	3.5×10 ³ (26)
	Hydrogen		1.3×10 ³ (9.6)
Pumping capacity	Argon	Pa·L (Torr·L)	8.1×10 ⁸ (6.1×10 ⁶)
	Hydrogen		8.5×10 ⁶ (6.4×10 ⁴)
Cooldown time	min (Hz)		165/150 (50/60)
Mounting flange			UVG-550
Compressor unit			C30PMVRT×1
Weight	Kg		125

*Maintenance interval : every 16,000 hours

Export control policy

Vacuum pumps that pump nitrogen gas at pumping speed of 15000L/S or more fall under row 2(35) of appended table 1 of Japan's Export Trade Control Order, which is based on international export control regimes. Also, when applying our refrigerator system to a cryocooler for optical sensors, the cryocooler falls under row 10(2) of appended table 1 of Japan's Export Trade Control Order as well. Customers must follow all related rules and regulations such as Foreign Exchange and Foreign Trade Act and take appropriate procedures when exporting or re-exporting those products. CRYO-U22H and CRYO-U30H are included within the scope of the above policy.

Terminology

Maximum throughput

Upper limit of the gas throughput at which the temperature of the 15K cryopanel reaches 20K when the cryopump is in continuous pumping.

Pumping capacity

Argon: The argon quantity pumped by condensation on the 15K cryopanel until the condensed layer makes contact to the 80K shield or 80K baffle and cryopump cannot pump any more argon.

Hydrogen: The hydrogen quantity pumped by adsorption on the adsorbent until the pumping speed for hydrogen is reduced to 80% of its initial speed.

Cooldown time

The time required for a cryopump to be cooled from room temperature to 20K.

Cryopump models and standard specifications

CRYO-U® CRYOPUMPS

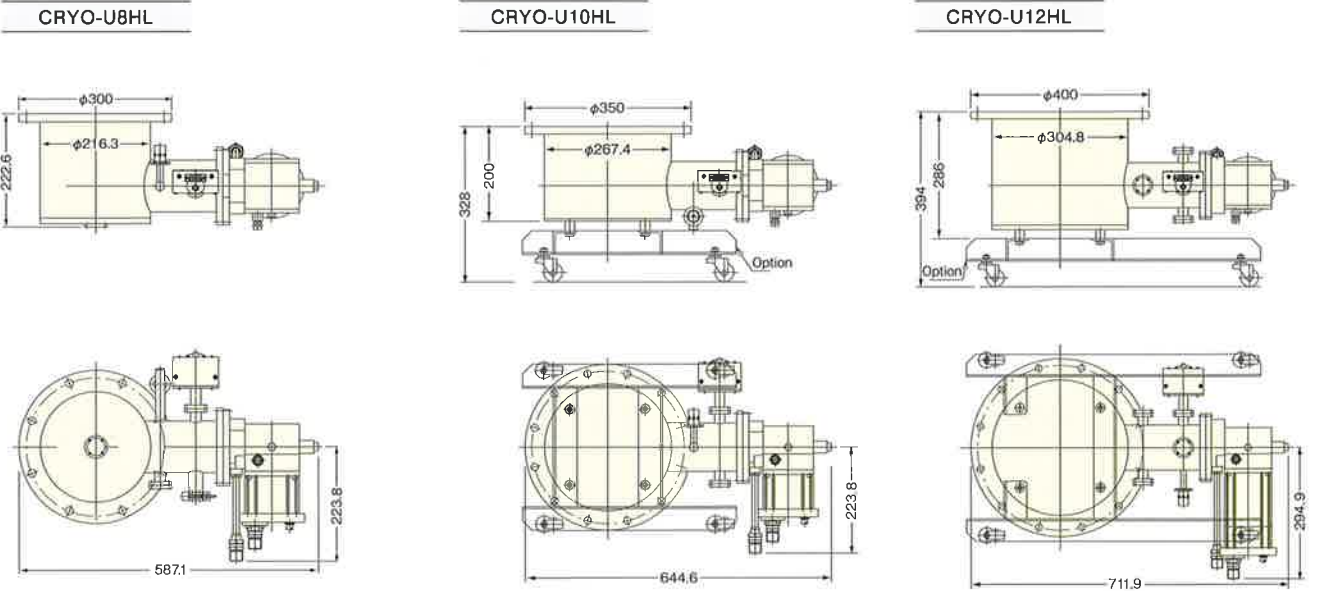
L type

Reduces overall footprint of the system

The overall height is minimized by installing refrigerator unit in a horizontal position.
(Any models can be designed as L type except for CTI products)



Dimensions



SPECIFICATIONS

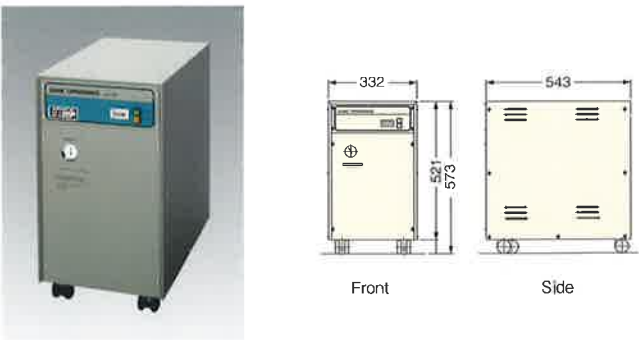
Model		CRYO-U8HL	CRYO-U10HL	CRYO-U12HL
Pumping speed (20°C)	Nitrogen	1,500	2,400	4,000
	Hydrogen	2,200	3,600	6,800
	Argon	1,200	2,000	3,300
	Water	4,000	6,900	9,500
Ultimate pressure	Pa(Torr)	10 ⁻⁷ (10 ⁻⁹)	10 ⁻⁷ (10 ⁻⁹)	10 ⁻⁷ (10 ⁻⁹)
Maximum throughput	Argon Pa·L/s (Torr·L/s)	1.2×10 ³ (8.9)	1.3×10 ³ (9.8)	2.0×10 ³ (15.0)
	Hydrogen	1.6×10 ² (1.2)	1.5×10 ² (1.1)	4.1×10 ² (3.1)
Pumping capacity	Argon Pa·L (Torr·L)	1.6×10 ⁸ (1.8×10 ⁶)	1.0×10 ⁸ (7.6×10 ⁵)	3.1×10 ⁸ (2.3×10 ⁶)
	Hydrogen	1.2×10 ⁶ (9.0×10 ³)	1.2×10 ⁶ (9.0×10 ³)	9.8×10 ⁵ (7.4×10 ³)
Cooldown time	min(Hz)	90/80 (50/60)	135/120 (50/60)	90/80 (50/60)
Mounting flange		UVG-200, 6 ^B ANSI, UFC-253	UVG-250, UFC-306, UFC-305	UVG-300, 10 ^B ANSI
Compressor unit		C10	C15R	C30VR
Weight	Kg	20	29	40

*Maintenance interval : every 16,000 hours *Travelling base is optional.

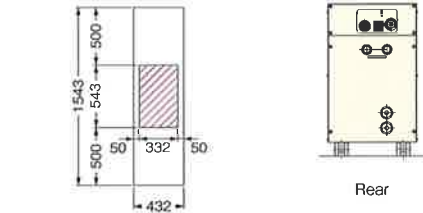
COMPRESSOR UNIT

COMPRESSOR UNIT

C10



Maintenance space

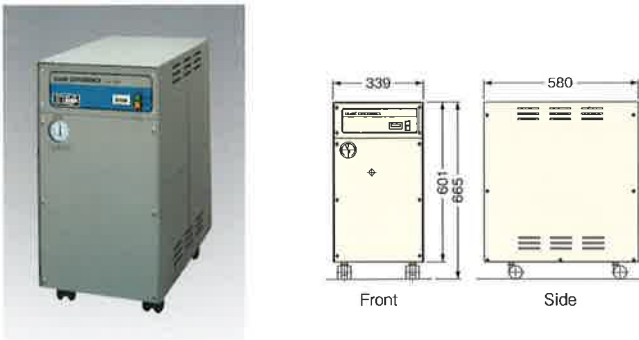


SPECIFICATIONS

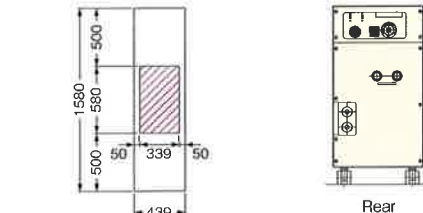
Electrical requirements (ACV×φ×Hz)	200×3×50 220×3×60
Power (kW) (50/60Hz)	1.5 / 1.7
Cooling method Water flow rate(L/min) (20°C)	2.0
Weight (Kg)	75
Adsorber replacement cycle (Time)	24,000

*Cooling water inlet/outlet Rc 3/8

C15R



Maintenance space

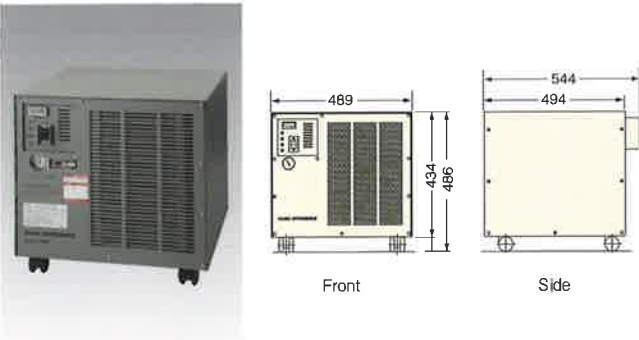


SPECIFICATIONS

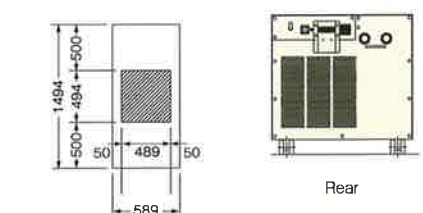
Electrical requirements (ACV×φ×Hz)	200×3×50 220×3×60
Power (kW) (50/60Hz)	3.3 / 4.1
Cooling method Water flow rate(L/min) (20°C)	3.5
Weight (Kg)	100
Adsorber replacement cycle (Time)	30,000

*Cooling water inlet/outlet Rc 3/8

C10AT



Maintenance space



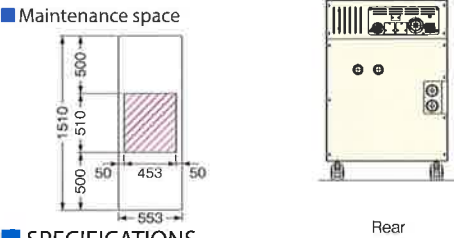
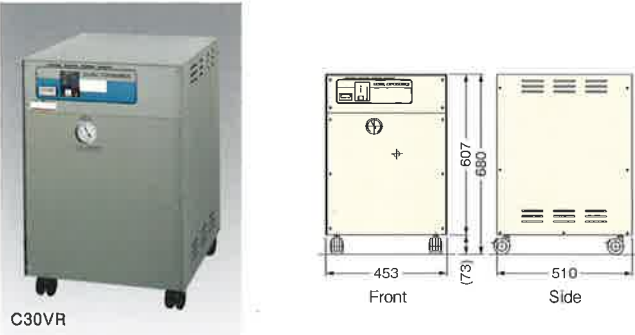
SPECIFICATIONS

Electrical requirements (ACV×φ×Hz)	190to220×3×50 190to230×3×60
Power (kW) (50/60Hz)	1.5 / 1.7
Cooling method	air-cooled
Weight (Kg)	77
Adsorber replacement cycle (Time)	24,000

COMPRESSOR UNITS

COMPRESSOR UNITS

C30VR/C30MVR

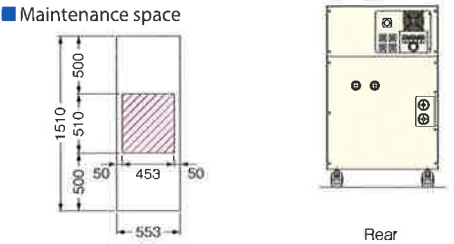
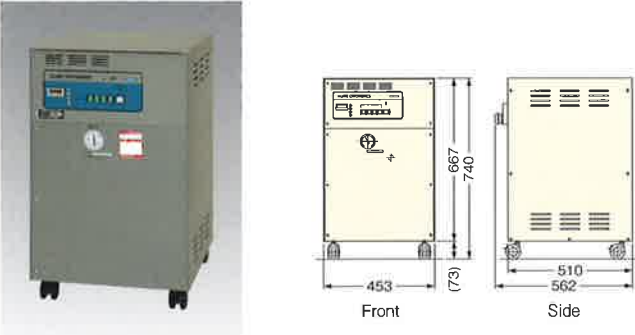


SPECIFICATIONS

Model	C30VR	C30MVR
Electrical requirements(ACV×φ×Hz)	200×3×50	220×3×60
Power (kW) (50/60Hz)	5.0 / 6.0	
Cooling method Water flow rate(L/min) (20℃)	5.5	
Weight (Kg)	127	131
Adsorber replacement cycle(Time)	24,000	

*Cooling water inlet/outlet Rc 3/8 *C30MVR run multiple cryopumps.

C40R

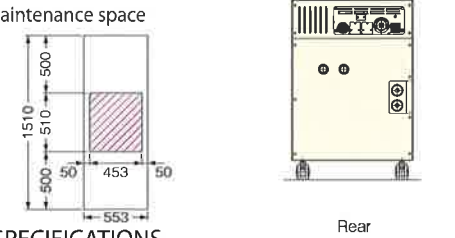
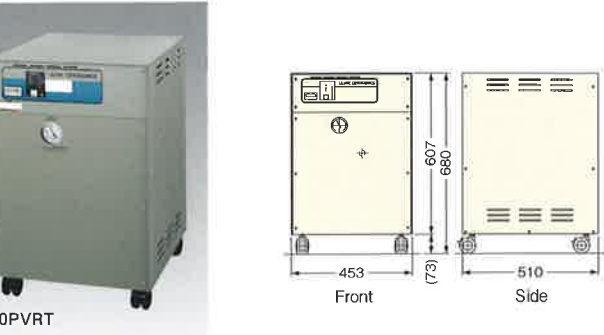


SPECIFICATIONS

Model	C40R
Electrical requirements(ACV×φ×Hz)	200×3×50 220×3×60
Power (kW) (50/60Hz)	6.5 / 8.0
Cooling method Water flow rate(L/min) (20℃)	5.5
Weight (Kg)	130
Adsorber replacement cycle(Time)	24,000

*Cooling water inlet/outlet Rc 3/8

C30PVRT/C30PMVRT



SPECIFICATIONS

Model	C30PVRT	C30PMVRT
Electrical requirements(ACV×φ×Hz)	200×3×50	220×3×60
Power (kW) (50/60Hz)	5.7 / 7.5	5.2 / 6.5
Cooling method Water flow rate(L/min) (20℃)	5.5	
Weight (Kg)	121	
Adsorber replacement cycle(Time)	24,000	

*Cooling water inlet/outlet Rc 3/8 *C30PMVRT run multiple cryopumps.

MULTIPLE PUMPS WITH A SINGLE COMPRESSOR

MULTIPLE PUMPS WITH A SINGLE COMPRESSOR

Multiple cryopumps can be running on a single compressor.



Please consult with our sales representative for different types of multiple operation.

Combination of cryopumps and compressor units

Cryopump \ Compressor	C10/C10AT	C15R	C30VR	C30MVR	C30PVRT	C40R
U4H	1			3		4
U6H	1			3		4
U8H / U8H-U / U8HSP	1			3		4
U10H / U10HSP		1		2		(3)
U12H / U12HSP			1	(2)		
U16 / U16P			1			
U20P			1			
U20H					1	
U22P					1	
U22H / U30H			Use 2 Compressors			

The numbers show how many cryopumps can be running on one compressor. The numbers in the brackets show optional combinations.

*Please consult with our sales representatives for more details.

SPECIALITY CRYOPUMPS FOR SPUTTERING PROCESS

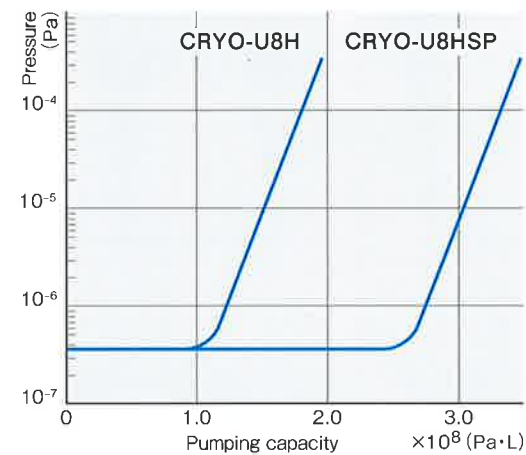
SPECIALITY CRYOPUMPS FOR SPUTTERING PROCESS

Highest capacity of the same size class cryopumps

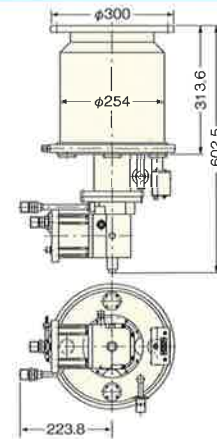
Increased pumping capacity extends interval between regenerations and improves cryopump performance.

Comparison of pumping capacities (example)

The pressure at 5 minutes after continuously introducing argon gas at $2.5 \times 10^2 \text{ Pa} \cdot \text{L}$ and stopped



CRYO-U8HSP

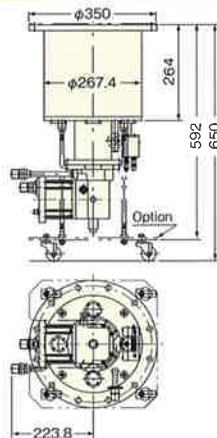


SPECIFICATIONS

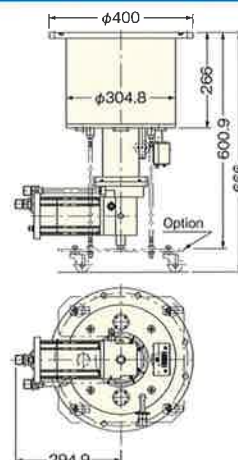
Pumping speed (20°C)	Nitrogen	L/s	1,700
	Hydrogen		3,200
	Argon		1,400
	Water		4,000
Ultimate pressure		Pa (Torr)	$10^{-7} (10^{-9})$
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	$1.2 \times 10^3 (8.9)$
	Hydrogen		$2.4 \times 10^2 (1.8)$
Pumping capacity	Argon	Pa·L (Torr·L)	$2.5 \times 10^5 (1.9 \times 10^6)$
	Hydrogen		$1.0 \times 10^6 (7.8 \times 10^3)$
Cooldown time		min (Hz)	110/100 (50/60)
Mounting flange			UVG-200, 6" ANSI, UFC-253
Compressor unit			C10
Weight		Kg	34

*Maintenance interval : every 16,000 hours *Travelling base is optional.

CRYO-U10HSP



CRYO-U12HSP



SPECIFICATIONS

Pumping speed (20°C)	Nitrogen	L/s	2,400
	Hydrogen		3,600
	Argon		2,000
	Water		6,900
Ultimate pressure		Pa (Torr)	$10^{-7} (10^{-9})$
Maximum throughput	Argon	Pa·L/s (Torr·L/s)	$1.3 \times 10^3 (9.8)$
	Hydrogen		$2.1 \times 10^2 (1.6)$
Pumping capacity	Argon	Pa·L (Torr·L)	$2.0 \times 10^5 (1.5 \times 10^6)$
	Hydrogen		$1.2 \times 10^6 (9.0 \times 10^3)$
Cooldown time		min (Hz)	120/110 (50/60)
Mounting flange			UVG-250, 10" ANSI
Compressor unit			C15R
Weight		Kg	36

*Maintenance interval : every 16,000 hours *Travelling base is optional.

CFC-free CRYOGENIC COLD TRAPS

CFC-free CRYOGENIC COLD TRAPS

Super Trap Series

Super Trap CRYO-T series are specialized to trap water vapor. No need of LN₂.

A cryogenic cold trap with a single stage cryocooler. LN₂ is not needed to run Super traps means low running cost and less maintenance.

Super trap is available from 4 inch to 30 inch.

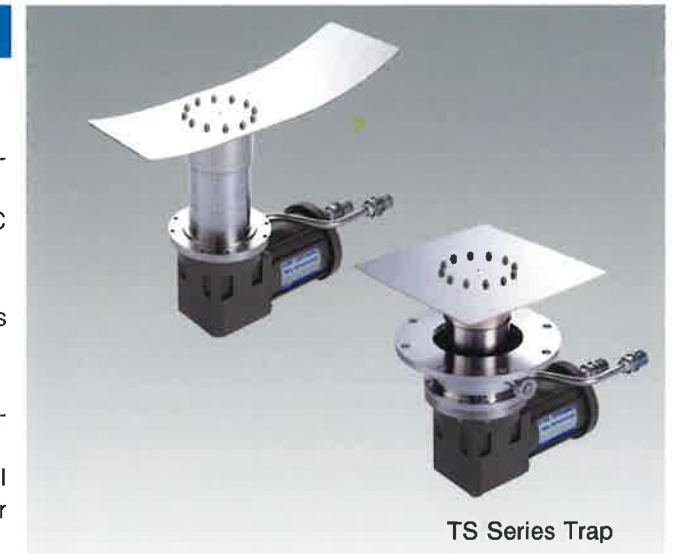
Model	Pumping speed for water (L/s)
CRYO-T4	1,100
CRYO-T6	2,100
CRYO-T8	4,000
CRYO-T10	6,900
CRYO-T12	9,500



Speed TS Series

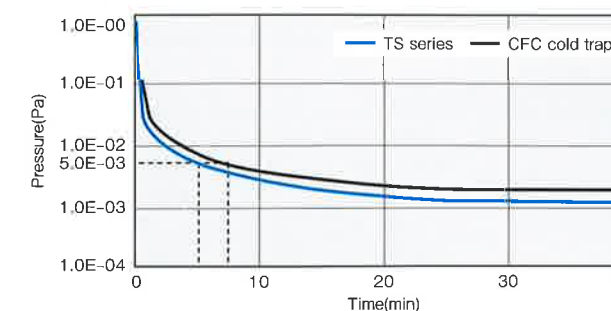
Alternative to CFC cold traps

- Significantly reduced pumping time and improved performance.
- No global warming potential by using helium gas. (HCFC has high global warming potential of 1600 to 3800)
- Same or higher performance compared to CFC cold traps.
- Both cooldown and warm-up completed in 10 minutes respectively.
- Effective pumping speed: 10,000~100,000L/s.
- Light weight and compact size make an easy installation. (Footprint is 1/3 of a CFC type)
- Optimal for batch type deposition equipment and optical coating equipment that outgas large amount of water vapor. (Applicable to all kinds of vacuum systems)

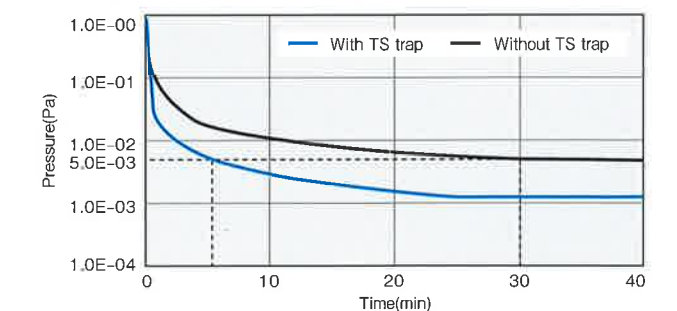


Actual measurement examples of pumping capacity

- Comparison of TS traps and CFC traps



- Comparison of pumping capacity with and without TS series trap



SPECIFICATIONS

Model		TS10	TS14	TS22
Heat source maximum temperature	°C	400	400	350
Applicable chambers	mm	φ600~800	φ600~1,000	φ1,100~1,300
Defrost	min	5~10	5~10	5~10
Cooldown time	min	10	10	10
Cryopanel size	mm	200 x 200	250 x 250	400 x 400
Electric power	kW, 50/60Hz	5.7 / 7.5	5.7 / 7.5	5.7 / 7.5
Cooling water	L/min	5.5	5.5	5.5
Refrigerator unit maintenance interval	h	20,000	20,000	20,000
Compressor maintenance interval	h	24,000	24,000	24,000

4K CRYOCOOLERS GM CRYOCOOLERS

CRYOCOOLERS

4K CRYOCOOLERS



ULVAC CRYOGENIC'S leading-edge technology

A GM refrigerator that provides closed-cycle helium circulation does not require liquid helium. (UR4K03 and UR4K10T have been developed using ULVAC technology.)

SPECIFICATIONS

Refrigerator		UR4K03	UR4K10T
Refrigeration capacity	1st stage	5.0W / 60K	20W / 40K
	2nd stage	0.3W / 4.2K	1.0W / 4.2K
Ultimate temperature	2nd stage	2.8K	3.0K
Cooldown time	4.2K	within 100 min	60 min
Weight		11.0kg	13.0kg
Dimensions(mm)		170W×297D×490H	181W×300D×565H
Maintenance Interval		10,000 hours	
Compressor		C10	C30HVRT
Cooling method		Water cooling	
Power supply rating		AC200V×3φ×50Hz, AC220V×3φ×60Hz	
Power consumption(50/60Hz)		1.5kW / 1.7kW	5.7kW / 7.5kW
Cooling water		2 L/min (20°C)	9 L/min (20°C)

* Values are for 50Hz with no load.

* Performance depends on the installation environment of the refrigerator and the object to be cooled.

* The maintenance intervals are the recommendation, not guaranteed values.

GM CRYOCOOLERS

Proven performance and many different models

Cryogenic refrigerator for cryopump applications. We offer both single-stage and two-stage cold heads, from compact to large size for a broad range of applications.



SPECIFICATIONS

R Series(two-stage type)		RM10	RM20	RM50	RM80T
Refrigerator system		CR10	CR20	CR50	CR80RT
Refrigeration capacity	1st stage	13W / 77K	35W / 77K	65W / 77K	80W / 77K
	2nd stage	3.5W / 20K	12W / 20K	7W / 20K	8W / 20K
Ultimate temperature		12K	12K	12K	12K
Cooldown time		40 min	30 min	40 min	30 min
Weight (Refrigerator unit)		10.0kg	13.5kg	13.5kg	15.6kg
Maintenance Interval		16,000 hours			
R Series(single-stage)		RMS10	RMS50	RMS80T	RS150T
Refrigerator system		CRS10	CRS50	CRS80T	CRS150T
Refrigeration capacity	1st stage	35W / 77K	85W / 77K	135W / 77K	165W / 77K
Ultimate temperature		30K	30K	30K	30K
Cooldown time		20 min	20 min	20 min	20 min
Weight (Refrigerator unit)		9.5kg	13.0kg	15.0kg	20.0kg
Maintenance Interval		16,000 hours	20,000 hours	20,000 hours	10,000 hours

*Cooling capacity, ultimate temperature, cooldown time are at a combination of one refrigerator and one compressor, ambient temperature of 2°C and no load.

*Value at the power supply frequency of 60Hz.

■ Export Control Policy : When applying our refrigerator to a cryocooler for optical sensors, the cryocooler falls under row 6.A.2.d.2 of the control list established by The Wassenaar Arrangement, which is equal to row 10(2) of appended table 1 of Japan's Export Trade Control Order. Customers must follow all related rules and regulations such as Foreign Exchange and Foreign Trade Act and take appropriate procedures when exporting or re-exporting our refrigerators.

ACCESSORIES

ACCESSORIES

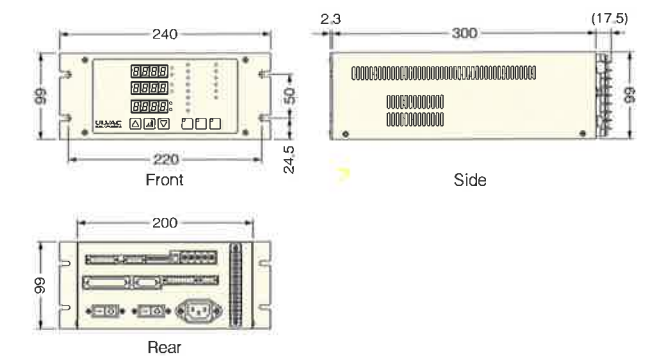
Regeneration control unit ARC



The ARC can be used for regeneration of the cryopump automatically and completely. It is recommended for use with any new cryopump installation, either for a new vacuum system or to replace any oil diffusion pump or turbo molecular pump.

By setting the calendar timer, regeneration will automatically take place and the cryopump will be ready to start pumping as scheduled.

■ Dimensions example (unit:mm)



Components (ARC auto regeneration system)

- Regeneration control unit Model ARC
- Regeneration gas purge unit Model PR (for dry N₂ purge)
- Band heater Model RBH

Regeneration gas purge unit PR

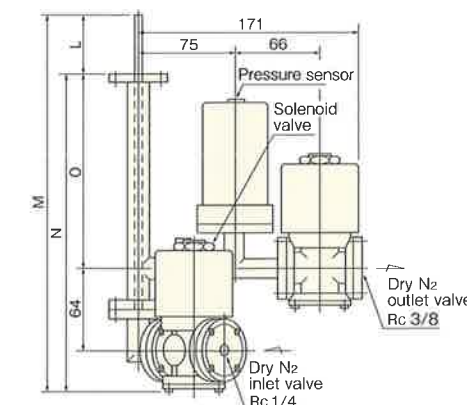
The PR is a dry N₂ purge unit to minimize warm up time.

■ Measurement table

PR	Applicable models	L	O	N	M
1A	U6H, U8H, U8HSP, U10H	35	32	128	163
2A	U12H, U12HSP, U16, U16P, U20P, U20H, U22P, U22H, U22WB, U30H	45	150	246	291
3A	U8H-U	165	150	246	411

*Please consult with our sales representative for L-type pumps.

■ Dimensions example (unit:mm)



ACCESSORIES

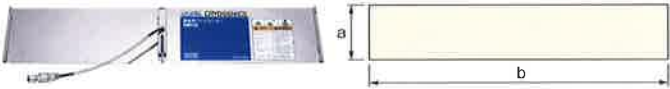
ACCESSORIES

BAND HEATER RBH

Reduces warm-up time with easy installation

The RBH minimizes warm-up time, promotes water evaporation and shortens roughing time. With the RBH band heater, regeneration can be performed effectively and completely. The RBH can be easily installed even on a small space thanks to its thin-plate form.

Dimensions example



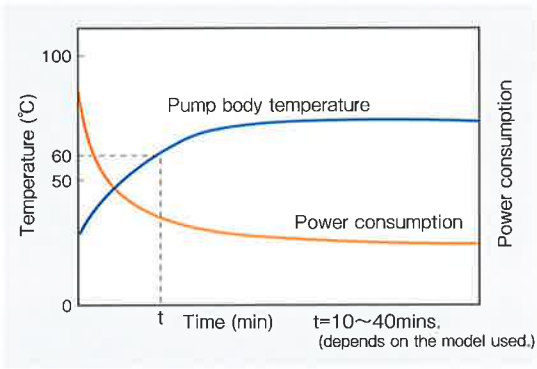
SPECIFICATIONS

Model	Applicable cryopumps	Dimensions (mm)		Current (A)		Recommended fuse (A)
		a	b	Max.	Normal	
RBH-6	U6H	170	495	1.3	0.2	5
RBH-8	U8H, U8H-U	170	650	1.5	0.4	5
RBH-8HSP	U8HSP	170	790	2.7	0.4	5
RBH-10	U10H	170	850	2.7	0.4	5
RBH-12	U12H, U12HSP	190	940	2.9	0.6	5
RBH-16	U16, U16P	260	1,290	5.0	0.9	10
RBH-20	U20P, U20H	260	1,665	7.5	1.5	10
RBH-22P	U22P	260	1,900	8.3	1.7	20
RBH-22	U22H	302	1,900	11.5	2.0	20
RBH-30	U30H	320	2,525	14.6	2.7	30

*Electrical requirements: AC200V, single phase 50/60Hz (usable with AC100V)



Power consumption and temperature characteristics



CRYO-METER MBS-C

The MBS-C measures the second stage temperature of cryopumps

- The MBS-C can measure from cryogenic to room temperature.
- Compact and immune to electric noise thanks to the sheath structure.
- Displays 3 temperature ranges of the 15K cryopanel in 3 different colors.

*MBS compatible cables are available for existing products. (Optional)

SPECIFICATIONS

Temperature range	15K cryopanel 80K shield	Cryogenic thermocouple (Chromel-AuFe) K (CA) thermocouple
Temperature display	Indicator	● Red above 280K ● Orange 20 - 280K ● Green below 20K
Contact output	Cooldown completed	ON at 20K or below
	Warm-up completed	ON at 280K or above
Analog output	Contact capacity	AC48V×0.5A/DC24V×0.5A
	Cryogenic thermocouple (Chromel-AuFe) K(CA) thermocouple	5V (10K) ~ 0V (350K) Electromotive force(mV)
Input power	DC24V±10% 100mA	
Weight	520g	
Dimensions	62(Height)×90(Width)×45(Depth)mm (without thermocouple)	



Applicable models of cryopumps

Model	MBS-C2	MBS-C3
Applicable models of cryopumps	U6H, U8H,U8HSP, U8H-U, U10H U12H,U12HSP	U16,U16P, U20P,U20H, U22P,U22H, U30H
Cryogenic thermocouple (Chromel-AuFe)	500mm	500mm
K(CA) thermocouple	500mm	1000mm

CRYOMETER MBD

The MBD series can display the second stage temperature of cryopumps.

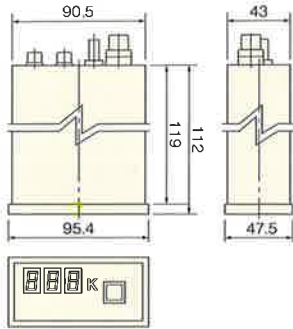
- Connect a cryopump to the MBS-C CRYO-METER so that the accurate temperature can be digitally displayed and observed from a remote location.
- The MBD series can be used as a power source unit of the MBS-C CRYO-METER.

SPECIFICATIONS

Model	MBD-S	MBD-T
Temperature display	Digital	
Temperature range	10K~350K (-263°C~+77°C)	
Accuracy	±2% (of full scale) (±1K between 10K and 30K)	
Input power	100-115 VAC±15%	100-220 VAC±15%
Power supply for MBS-C CRYO-METER	DC24V (built-in)	
Cable length	Input power cable	3m
	Analog input cable	5m
	Power supply cable for MBS	5m
Weight	520g	



Dimensions example (unit:mm)



SPECIALITY CRYOPUMPS

SPECIALITY CRYOPUMPS

Rapid regeneration at room temperature

Significantly reduces regeneration time

- Reduces warm up and roughing time to half or up to 1/3* by using an inner heater (installed in a cryopump).
 - Reduces cooldown time up to 2/3 by inverter control.
- *It may vary depending on the operating condition.

Corrosion-proof type

Specialized for pumping corrosive gases

Corrosion resistance is significantly improved by finishing inner kits with special coating. Corrosion-proof type cryopumps can be used for many different purposes.

Special models can be ordered.

Bakeable type

Ideal for ultra-high vacuum

The bakeable type cryopumps can easily produce ultra-high vacuum on the order of 10-8Pa by baking the pump wall to heat the pump case from 150°C to 200°C. (Any models can be made as bakeable type except for CTI products.)

CRYOPUMP OPERATION AND REGENERATION CYCLE

CRYOPUMP OPERATION AND REGENERATION CYCLE

1. Start up

(1) Roughing the cryopump (for vacuum insulation inside a cryopump)

- Start up a roughing pump (RP) and open the roughing valves (RV1 and RV2).
- When the pressure inside the cryopump reaches 40Pa (0.3Torr), check pressure rise of the cryopump by closing the roughing valve (RV2) to confirm outgassing rate.
- If the pressure rise (ΔP) is greater than 6.6Pa (0.05) per 5 minutes measured by pirani vacuum gauge, repeat steps a) and b).
- When the pressure rise (ΔP) decreases to the proper range, close roughing valves (RV1 and RV2) to stop roughing pump.

Roughing pressure (For rotary pump users)

Oil vapor do not backstream from the roughing pump at 40Pa (0.3Torr). A fore-line trap should be used below this pressure.

(2) Cryopump start up (Cooldown)

- Start up the compressor and cryopump.
- Cooldown is completed when the temperature of the 15K cryopanel and the 80K shield are reduced to below 20K and 130K, respectively.

2. Normal operation

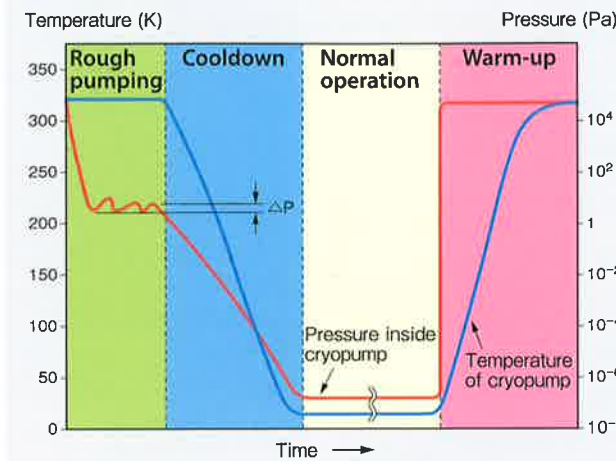
(1) Roughing the vacuum chamber

- Start up the roughing pump (RP) and open the roughing valves (RV1 and RV3). Pump the vacuum chamber to appropriate pressure, e.g. 40Pa (0.3Torr) at pirani vacuum gauge (PiG2).
- Close the roughing valves (RV1 and RV3) to stop the roughing pump (RP).

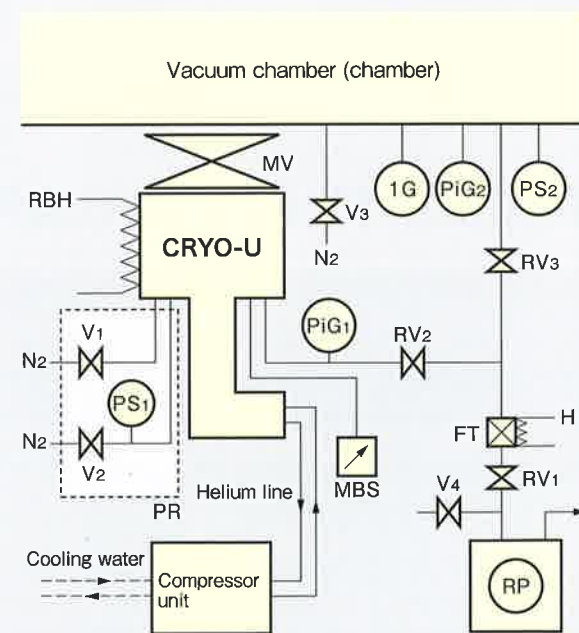
(2) High vacuum pumping of the vacuum chamber

- Open the main valve (MV) and pump the vacuum chamber with a cryopump.
- Proceed with vacuum process such as vacuum deposition or sputtering when the vacuum pressure in the vacuum chamber reaches the required level.

Examples of operation cycle



Examples of cryopump applied system



MV : Main valve
RV1, RV2, RV3 : Roughing valve
V1 : Dry N2 inlet valve
V2 : Dry N2 outlet valve
V3 : Gas inlet valve
V4 : Gas inlet valve
FT : Fore-line trap
H : Heater
PR : Regeneration gas purge unit (optional)

RBH : Regeneration band heater (optional)
PiG : Pirani vacuum gauge
IG : Ionization vacuum gauge
PS : Atmospheric pressure sensor
RP : Roughing pump
MBS : CRYO-METER

3. Regeneration

Regeneration is a process of returning the cryopump to its original pumping capabilities by releasing the gasses condensed or adsorbed inside the cryopump to the outside.

Regenerate the cryopump when any one of the following operating parameters reaches to the following condition:

- Temperature of 15K cryopanel exceeds 20K
- Temperature of 80K shield exceeds 130K
- Pressure in a cryopump exceeds 1.3×10^{-4} Pa (1.0×10^{-6} Torr) 5 minutes after closing the main valve (MV).
- Total amount of pumped gas reaches its pumping capacity.

The regeneration flow chart shows these regeneration procedures.

I. Warm up procedure of cryopumps

- Close the main valve (MV) and shut down cryopump.
- Power the regeneration band heater (RBH) and open the dry N2 introducing valve (V1). When the pressure inside the cryopump reaches atmospheric pressure, open the N2 outlet valve (V2).
- Stop nitrogen gas when the 80K shield temperature reaches 280K to complete warm up.

II. Roughing of the vacuum chamber

Rough pump the cryopump again as specified. When the rate of pressure rise stays within the specified value (1.3Pa/min), the roughing is completed.

III. Start up the cryopump

Start up the cryopump again according to the prescribed process.

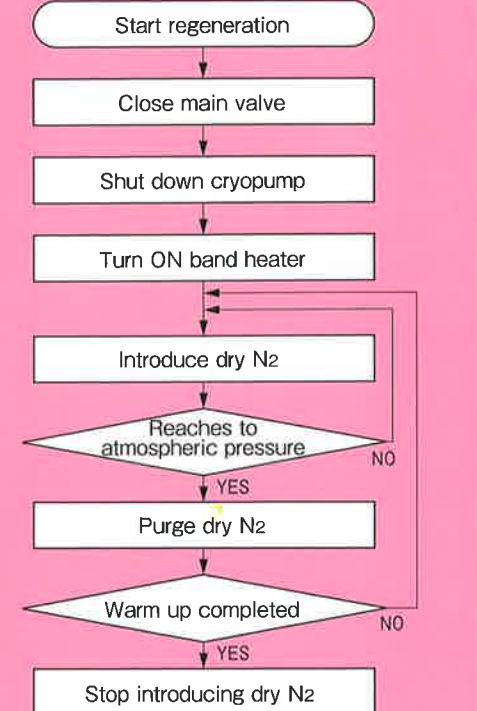
When the temperature of a cryopump reaches to 20K, the regeneration is completed.

These are the basic operation cycle and regeneration procedures.

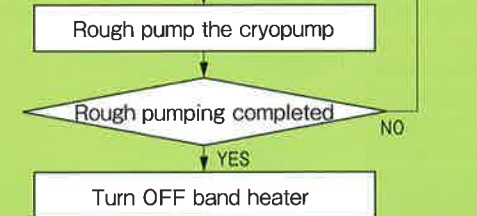
Automatic and rapid regeneration is possible by using an optional automatic regeneration controller and other optional accessories.

Basic regeneration flow chart

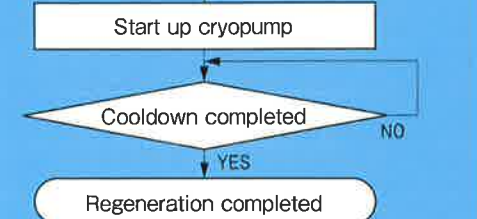
I Warm up



II Rough pumping



III Operation



SERVICE NETWORK

SERVICE NETWORK

We provide support services on a global basis.

ULVAC Group has built the sales and production base as a quadrilateral structure including Japan, North America, Europe and Asia to provide best solutions to our customers.

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ULVAC CRYOGENICS INCORPORATED



ULVAC CRYOGENICS KOREA INCORPORATED

MAINTENANCE AND REPLEACEMENT PARTS

MAINTENANCE AND REPLACEMENT PARTS

Maintenance services and wide variety of parts



● Maintenance seal kit



● Driver assembly, motor bearing



● Adsorber



● Helium charging adapter kit



● Inner kit

User's training program

The training program for beginner users and maintenance personnels are held regularly. Orientation sessions at customers' sites are also available upon request.



ULVAC GROUP (Japan)

ULVAC, Inc.
ULVAC Kyushu Corporation
ULVAC Tohoku, Inc.
Reliance Electric Ltd.
ULVAC COATING CORPORATION
ULVAC-RIKO, Inc.
ULVAC KIKO, Inc.
ULVAC-PHI, INC.
SHOWA SHINKU CO., LTD.
ULVAC TECHNO, Ltd.
ULVAC EQUIPMENT SALES, Inc.
Sanko ULVAC Co., Ltd.
Initium, Inc.
Tigold Corporation
ULVAC ENGINEERING, Inc.

ULVAC CRYOGENICS INC.

Certified to ISO 9001 / ISO 14001

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<http://www.ulvac-cryo.com/english/>

For inquiries

●The content of this catalog is subject to change without notice for improvement of the products.

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ULVAC CRYOGENICS
ISO-9001 / ISO-14001

CRYO[®]-U Series

