



INNOVATIVE
WATER VAPOR
CRYOPUMP
TECHNOLOGIES

PRODUCT CATALOG



INNOVATIVE HV/UHV CRYO PUMPING TECHNOLOGIES

NO MORE SPACE AND POWER HUNGRY
COMPRESSORS!

Ricor's new, more compact, single stage water vapor cryopumps are based on the 1.5 to 18W Stirling cryocoolers at 120 K. Paired in-line with the more compact turbo and mechanical pumps with pumping speeds in the 70 to 12,000 L/s range, they provide up to 50% faster pump down times not achievable with turbo and mechanical pumps alone to achieve HV / UHV vacuum levels. Our Cryo-Water Pump can also be applied in an in-situ configuration as well.

In regeneration mode, the Cryo-Water Pump is controlled via PC interface and can be turned off or idled during regeneration and/ or assisted with a built-in heating element.



EXCEPTIONAL, HIGH SPEED, WATER VAPOR PUMPING

- Unique, fast & safe built-in regeneration
- Air and water - cooled configurations
- Ultra low vibration versions (<5N all directions)

NANOSTAR

MICROSTAR

MODEL	NVCP 25	NVCP 40	NVCP 63	NVCP 100	MVCP 100	MVCP 160	MVCP 200	MVCP 250	MVCP 320
Pumping Speed	70 liter/sec	150 liter/sec	400 liter/sec	1000 liter/sec	1000 liter/sec	2500 liter/sec	5000 liter/sec	7500 liter/sec	12000 liter/sec
Interface	All Standard DN25 Flanges	All Standard DN40 Flanges	All Standard DN63 Flanges	All Standard DN100 Flanges	All Standard DN100 Flanges	All Standard DN160 Flanges	All Standard DN250 Flanges	All Standard DN250 Flanges	All Standard DN320 Flanges
Cooling Time	20 Minutes	20 Minutes	23 Minutes [both K543] 30 Minutes [both K548]	40 Minutes	15 Minutes	30 Minutes	80 Minutes	130 Minutes	40 Minutes
Cooling Power 1.5W @ 120K @ 23°C ambient	1.5W	1.5W	2.0W (K543) 1.5W (K548)	2.0W	18 W	18W	18W	18W	36W
Regeneration Time	15 Minutes	15 Minutes	23 Minutes	30 Minutes	15 Minutes	45 Minutes	110 Minutes	130 minutes	60 Minutes
Input Power	40W	40W	45W (K543) 40W (K548)	45W	200W	200W	200W	200W	400W
Weight	1.5 Kg	1.5 Kg	2 Kg	4 Kg	17 Kg	19 Kg	21 Kg	25 Kg	48 Kg
MTTF (Hours)	12,000	12,000	12,000	12,000	30,000	30,000	30,000	30,000	25,000
Ambient Temp Range	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C	-10°C to 40°C
Input Voltage	28V	28V	28V	28V	52V	52V	52V	52V	52V

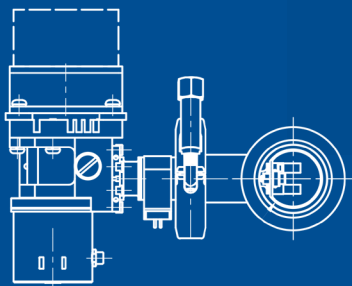
SPECIFICATION

NANOSTAR 25

Water vapor cryopump 25

DN / ISO 25 STIRLING 1.5W SINGLE STAGE
WATER VAPOR CRYOPUMP

NANOSTAR



The Cryo-Water Pump25 is the midrange pumping speed member of the NanoStar* line of cryopumps, based on the K548 1.5W midrange cryopump. It is specifically designed for tabletop or small vacuum deposition tools and portable analysis systems.

Its small size can support GC/MS cryofocusing in portable Gas Chromatograph and Mass Spectrometer systems. Pumping speeds support up to a 5 liter vacuum chamber.

The Cryo-Water Pump25 facilitates the elimination or the control of water vapor in small research vacuum chambers. Combined with UV desorption / getter technology, NanoStar cryopumps provide an effective means of water vapor reduction and control at UHV levels.

The Cryo-Water Pump25 mounts directly to a turbo pump or in situ in its own port. It can reduce pump down time by >50% during atmosphere to HV / UHV vent - pump cycles.

Compact and completely self-contained, with the Cryo-Water Pump25 there is no need for big, power hungry compressors or gas lines. The onboard microcontroller contains a temperature controller which offers stand-by remote shutdown and overcurrent protection.



APPLICATIONS

RICOR'S NEW, MORE COMPACT, SINGLE STAGE WATER VAPOR CRYOPUMPS ADDRESS THE NEED FOR:

- Load Locks
- Microscope Specimen Prep
- Laboratory Research
- Portable Analysis Systems
- GC / MS cryofocusing

SPECIFICATIONS

Pumping Speed: 70 liter /sec	Input Power: 40W
Interface: All Standard DN25 Flanges	Weight: 1.5 Kg
Cooling Time: 20 Minutes	MTTF: 12,000 Hours
Cooling Power: 1.5W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 15 Minutes	Input Voltage: 28V

The NanoStar operational temperature range of 1110K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Bromine (Br₂), and Iodine (I₂).

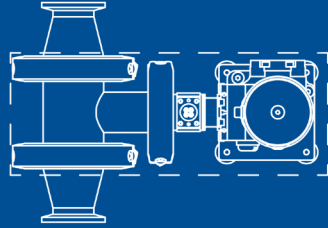
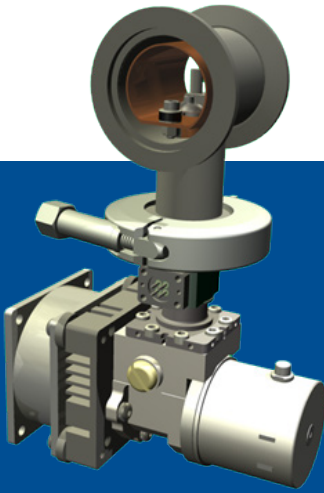
* NanoStar is a new addition to RICOR's flagship MicroStar™ single stage, water vapor cryopump product line designed for large vacuum chamber applications.

NANOSTAR 40

Water vapor cryopump 40

DN / ISO 40 STIRLING 1.5W SINGLE STAGE
WATER VAPOR CRYOPUMP

NANOSTAR



Fast pump down is an effective way to reduce production costs and improve product quality. The Cryo-Water Pump40, based on the K548 1.5W cryocooler, is the midrange pumping speed member of the NanoStar* line of cryopumps. It mounts directly to a turbo pump or in situ in its own port and can reduce pump down time by >50% during atmosphere to HV / UHV vent - pump cycles.

The Cryo-Water Pump40 Single Stage Cryopump is designed specifically for tabletop and small vacuum chamber deposition tools, analysis systems, and load locks. Pumping speeds support up to a 15 liter vacuum chamber and a user powered and controlled built- in heater supports regeneration cycles.

Emerging packaging technologies utilizing FOWLP (eWLB), WLCSP, 3D TSV ICs, Flip Chips, SiP, OLEDs and MEMS are all susceptible to water vapor absorption with subsequent failure mechanisms. Combined with UV desorption / getter technology, NanoStar cryopumps provide a means of water vapor reduction and control up to UHV levels.

Compact and completely self-contained, with the Cryo-Water Pump40 there is no need for big, power hungry compressors or gas lines. The onboard microcontroller contains a temperature controller which offers stand-by remote shutdown and over current protection.



APPLICATIONS

RICOR'S NEW, MORE COMPACT, SINGLE STAGE WATER VAPOR CRYOPUMPS ADDRESS THE NEED FOR:

- Load Locks
- Tabletop Deposition Tools
- Semiconductor Packaging
- Microscope Specimen Prep
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 150 liter /sec	Input Power: 40W
Interface: All Standard DN40 Flanges	Weight: 1.5Kg
Cooling Time: 20 Minutes	MTTF: 12,000 Hours
Cooling Power: 1.5W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 15 Minutes	Input Voltage: 28V

The NanoStar operational temperature range of 1110K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Bromine (Br₂), and Iodine (I₂).

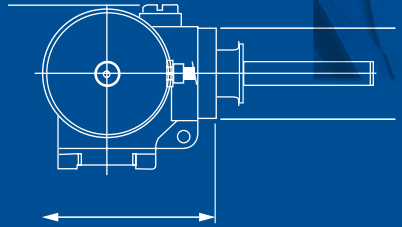
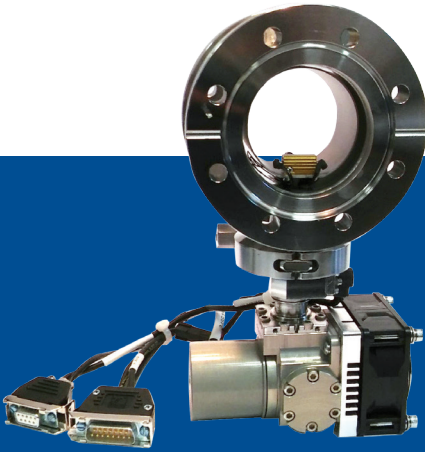
* NanoStar is a new addition to RICOR's flagship MicroStar™ single stage, water vapor cryopump product line designed for large vacuum chamber applications.

NANOSTAR 63

Water vapor cryopump 63

DN / ISO 63 STIRLING 1.5W - 2.0W SINGLE
STAGE WATER VAPOR CRYOPUMP

NANOSTAR

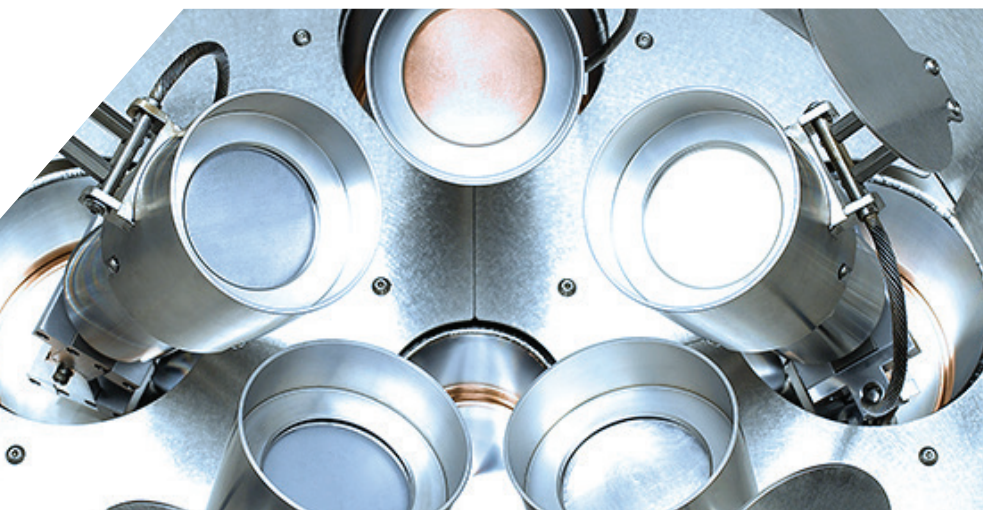


The Cryo-Water Pump63 is based on the K548 1.5W midrange cryopump or K543 2.0W cryopump - the midrange pumping speed member of the NanoStar* line of cryopumps designed specifically for tabletop or small vacuum deposition tools, PVD / PEVD / CVD / ALD chambers, and load locks.

A user powered and controlled built-in heater supports regeneration cycles and pumping speeds support a vacuum chamber of up to 20-25 liters. The Cryo-Water Pump63 mounts directly to a turbo pump or in situ in its own port. It can reduce pump down time by >50% during atmosphere to HV / UHV vent - pump cycles.

Combined with UV desorption / getter technology, NanoStar cryopumps provide a means of water vapor reduction and control at UHV levels.

Compact and completely self-contained, with the Cryo-Water Pump63 there is no need for big, power hungry compressors or gas lines. The onboard microcontroller contains a temperature controller which offers stand-by remote shutdown and over current protection.



APPLICATIONS

RICOR'S NEW, MORE COMPACT, SINGLE STAGE WATER VAPOR CRYOPUMPS ADDRESS THE NEED FOR:

- Load Locks
- Tabletop Deposition Tools
- Semiconductor Packaging
- Microscope Specimen Prep
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 400 liter/sec	Input Power: 45W (K-543)
Interface: All Standart DN63 Flanges	40W (K-548)
Cooling Time: 23 Minutes 30 Minutes [28V input] [both K548]	Weight: 2 Kg
Cooling Power: 45W (543) 40W (548)	MTTF: 12,000 Hours
Regeneration Time: 23 Minutes	Ambient Temp Range: -10°C to 40°C
	Input Voltage: 28V

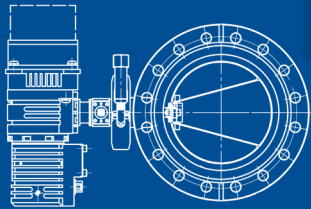
The NanoStar operational temperature range of 1110K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Bromine (Br₂), and Iodine (I₂).

* NanoStar is a new addition to RICOR's flagship MicroStar™ single stage, water vapor cryopump product line designed for large vacuum chamber applications.

NANOSTAR 100

Water vapor cryopump 100

DN / ISO 100 STIRLING 2.0W SINGLE STAGE
WATER VAPOR CRYOPUMP



NANOSTAR

The Cryo-Water Pump100, Single Stage Cryopump, based on the K543 cryocooler, is the highest pumping speed member of the NanoStar* line of cryopumps designed specifically for tabletop or small vacuum deposition tools, PVD / PEVD / CVD / ALD chambers, and load locks.

A user powered and controlled built-in heater supports regeneration cycles and pumping speeds support a vacuum chamber of up to 25 liters. The DN/ISO 100 Cryopump mounts directly to a turbo pump or in situ in its own port. It can reduce pump down time by >50% during atmosphere to HV / UHV vent - pump cycles.

Combined with UV desorption / getter technology, NanoStar cryopumps provide a means of water vapor reduction and control at UHV levels.

Compact and completely self-contained, with the Cryo-Water Pump100 there is no need for big, power hungry compressors or gas lines. The onboard microcontroller contains a temperature controller which offers stand-by remote shutdown and over current protection.



APPLICATIONS

RICOR'S NEW, MORE COMPACT, SINGLE STAGE WATER VAPOR CRYOPUMPS ADDRESS THE NEED FOR:

- Load Locks
- Tabletop Deposition Tools
- Semiconductor Packaging
- Microscope Specimen Prep
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 1,000 liter/sec	Input Power: 45W
Interface: All Standard DN100 Flanges	Weight: 4Kg
Cooling Time: 40 Minutes [28V input]	MTTF: 12,000 Hours
Cooling Power: 2.0W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 30 Minutes	Input Voltage: 28V

The NanoStar operational temperature range of 1110K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Bromine (Br₂), and Iodine (I₂).

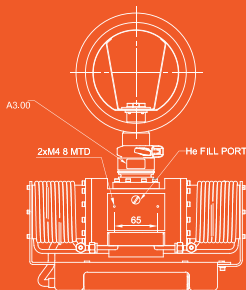
* NanoStar is a new addition to RICOR's flagship MicroStar™ single stage, water vapor cryopump product line designed for large vacuum chamber applications.

MICROSTAR 100

Water vapor cryopump 100

ISO & CF 100 STIRLING 18W TWIN PISTON
LINEAR WATER VAPOR PUMP

MICROSTAR



The ISO & CF 100 is a state-of-the-art completely self-contained compact cryogenic water vapor pump. Based on the Ricor K535 cryocooler it does not require a separate helium compressor and gas lines. This enables fast, simple and painless pump to tool integration at the lowest possible cost. It significantly reduces power and footprint space making a clean cluster tool integration.

Water vapor in a vacuum system affects the pumpdown time and contamination levels in almost all deposition process systems. It is one of the leading causes of failure in advanced semiconductor package manufacturing.

The ISO & CF 100 provides exceptional performance for load locks and small vacuum deposition tools with high gas loads including HV or UHV level PVD / PEVD / CVD / ALD chambers. It can be utilized as a process chamber field upgrade to an existing pump system (mechanical or TMP).

This combination provides high water vapor pumping speeds and offers reduced partial pressure of water, giving a total base pressure with up to a 50% decrease in pump down time.

REGENERATION

The ISO & CF 100 is equipped with a built-in reverse Stirling regeneration process that achieves a full regeneration cycle in less than 40 minutes. As only water vapor is captured on the cold panel (at the default temperature of 120K), the regeneration process does not release hazardous gases in dangerous concentrations into the vacuum system.



APPLICATIONS

- Load Locks
- Sputtering Processes
- ALD Processing
- Cluster Tools
- Advanced Semiconductor Packaging
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 1,000 liter/sec	Input Power: 200W
Interface: All Standard DN100 Flanges	Weight: 17Kg
Cooling Time: 15 Minutes	MTTF: 30,000 Hours
Cooling Power: 18W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 30 Minutes	Input Voltage: 52V

The Microstar operational temperature range of 45K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Ammonia (NH₃), Chlorine (Cl₂), Carbon Dioxide (CO₂), Nitrous Oxide (N₂O), Hydrogen Sulfide (H₂S), Bromine (Br₂), and Iodine (I₂).

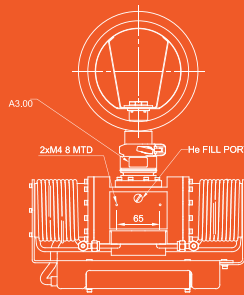
The sublimation phase curves of these chemicals fall in the same operational temperature range of the K535. This can be a useful application in chemical processing.

MICROSTAR 160

Water vapor cryopump 160

ISO & CF 160 STIRLING 18W TWIN PISTON
LINEAR INTEGRAL WATER VAPOR PUMP

MICROSTAR



Based on the K535 cooler, the Cryo-Water Pump160 is an upgrade to an existing pump (mechanical or TMP) on load lock, transfer and/or process chambers. This combination provides high water vapor pumping speed, offering reduced partial pressure of water and total base pressure - together saving up to 50% of the pump down time.

The Cryo-Water Pump160 does not require a separate helium compressor and gas lines. This enables fast, simple and painless pump to tool integration at the lowest possible cost. It is equipped with a regeneration process that achieves a full regeneration cycle in less than 40 minutes.

REGENERATION

The ISO & CF 160 is equipped with a reverse Stirling regeneration process that achieves a full regeneration cycle in less than 40 minutes. As only water vapor is captured on the cold panel (at the default temperature 120K) the regeneration process does not release hazardous gases in dangerous concentrations into the vacuum system.



APPLICATIONS

- Load Locks
- Sputtering Processes
- PVD Processing
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 2,500 liter/sec	Input Power: 200W
Interface: All Standard DN160 Flanges	Weight: 19Kg
Cooling Time: 30 Minutes	MTTF: 30,000 Hours
Cooling Power: 18W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 45 Minutes	Input Voltage: 52V

The Microstar operational temperature range of 45K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Ammonia (NH₃), Chlorine (Cl₂), Carbon Dioxide (CO₂), Nitrous Oxide (N₂O), Hydrogen Sulfide (H₂S), Bromine (Br₂), and Iodine (I₂).

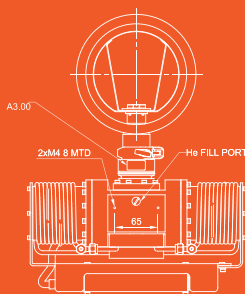
The sublimation phase curves of these chemicals fall in the same operational temperature range of the K535. This can be a useful application in chemical processing.

MICROSTAR 200

Water vapor cryopump 200

ISO & CF 200 STIRLING 18W TWIN PISTON
LINEAR INTEGRAL WATER VAPOR PUMP

MICROSTAR



Based on the K535 cooler, the Cryo-Water Pump 200 is mostly used for medium vacuum deposition tools, PVD / PEVD / CVD/ ALD chambers and load locks.

On process chambers, a set of 8" MicroStar and 4" turbo-pump can often replace the traditional Cryo pump and therefore eliminate regeneration while providing MicroStar's high water vapor pumping speed and the turbo constant permanent gases speed.

As load locks present the greatest risk of introducing water into the chamber system, using a system containing the Cryo-Water Pump 200 can provide favorable and consistent process conditions, reducing the risk of corrosive by-products. The MicroStar combined with turbo pump (TMP- mechanical or magnetic levitated bearings) reduces the pump down time by up to 50%, allowing higher up-time and improved productivity.

REGENERATION

The Cryo-Water Pump 200 is equipped with a regeneration process that achieves a full regeneration cycle in less than 40 minutes. As only water vapor is captured on the cold panel, the regeneration process does not release hazardous gasses in dangerous concentrations into the vacuum system.



APPLICATIONS

- Load Locks
- Sputtering Processes
- PVD Processing
- Deposition Process
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 5,000 liter/sec	Input Power: 200W
Interface: All Standard DN200 Flanges	Weight: 21Kg
Cooling Time: 80 Minutes	MTTF: 30,000 Hours
Cooling Power: 18W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 110 Minutes	Input Voltage: 52V

The Microstar user adjustable operation temperature range of 45K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Ammonia (NH₃), Chlorine (Cl₂), Carbon Dioxide (CO₂), Nitrous Oxide (N₂O), Hydrogen Sulfide (H₂S), Bromine (Br₂), and Iodine (I₂).

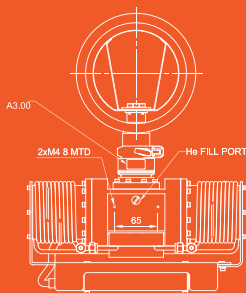
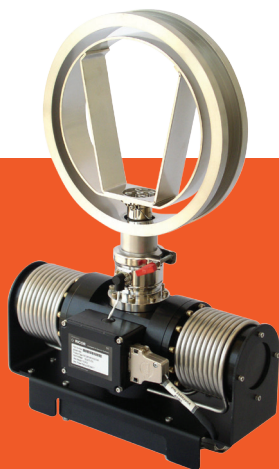
The sublimation phase curves of these chemicals fall in the same operational temperature range of the K535. This can be a useful application in chemical processing.

MICROSTAR 250

Water vapor cryopump 250

ISO & CF 250 STIRLING 18W TWIN PISTON
LINEAR INTEGRAL WATER VAPOR PUMP

MICROSTAR



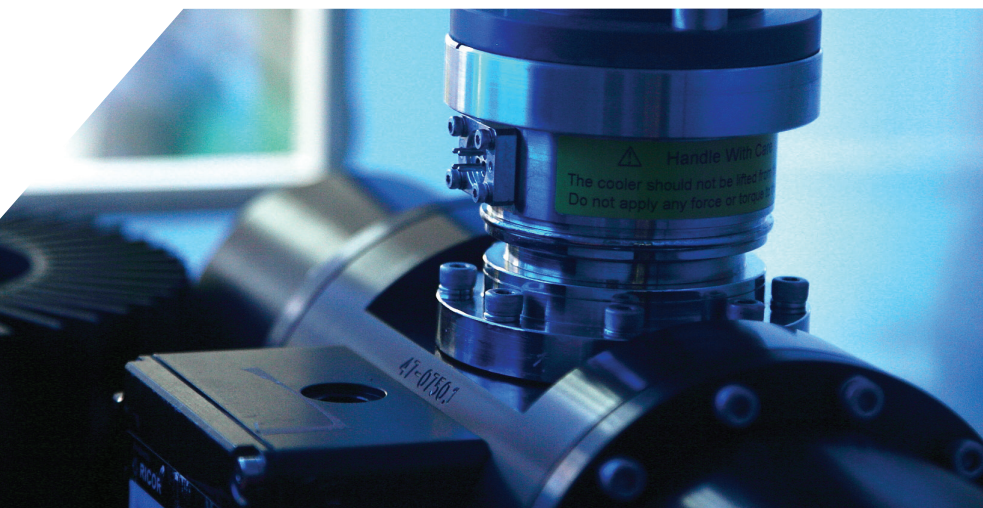
Based on the K535 cooler, the Cryo-Water Pump 250 is mostly used for medium / large vacuum deposition tools, PVD / PEVD / CVD / ALD chambers and load locks.

The MicroStar combined with turbo pump (TMP- mechanical or magnetic levitated bearings) reduces pump down time by up to 50%, allowing higher up-time and improved productivity. With no need for a separate helium compressor and gas lines, the compact Cryo-Water Pump 250 can often replace the traditional cryopumps in the process chambers.

In order to achieve high speed water pumping, the cold panel is kept at 110K to 140K and typical setup is 120K. At this temperature, only water molecules are captured to a partial pressure as low as below 10-10 Torr. The temperature is user defined and can be set to a lower base temp in order to pump other condensable gasses.

REGENERATION

The Cryo-Water Pump 250 is equipped with a regeneration process that achieves a full regeneration cycle in less than 40 minutes. As only water vapor is captured on the cold panel, the regeneration process does not release hazardous gasses in dangerous concentrations into the vacuum system.



APPLICATIONS

- Load Locks
- Sputtering Processes
- PVD Processing
- Deposition Process
- Laboratory Research
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 7,500 liter/sec	Input Power: 200W
Interface: All Standard DN250 Flanges	Weight: 25Kg
Cooling Time: 80 Minutes	MTTF: 30,000 Hours
Cooling Power: 18W	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 130 Minutes	Input Voltage: 52V

The Microstar user adjustable operation temperature range of 45K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Ammonia (NH₃), Chlorine (Cl₂), Carbon Dioxide (CO₂), Nitrous Oxide (N₂O), Hydrogen Sulfide (H₂S), Bromine (Br₂), and Iodine (I₂).

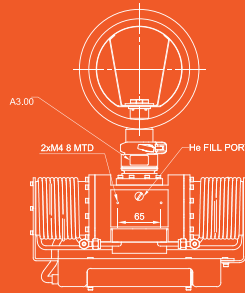
The sublimation phase curves of these chemicals fall in the same operational temperature range of the K535. This can be a useful application in chemical processing.

MICROSTAR 320

Water vapor cryopump 320

DUAL ISO 320 STIRLING 36W TWIN PISTON
LINEAR INTEGRAL WATER VAPOR PUMP

MICROSTAR

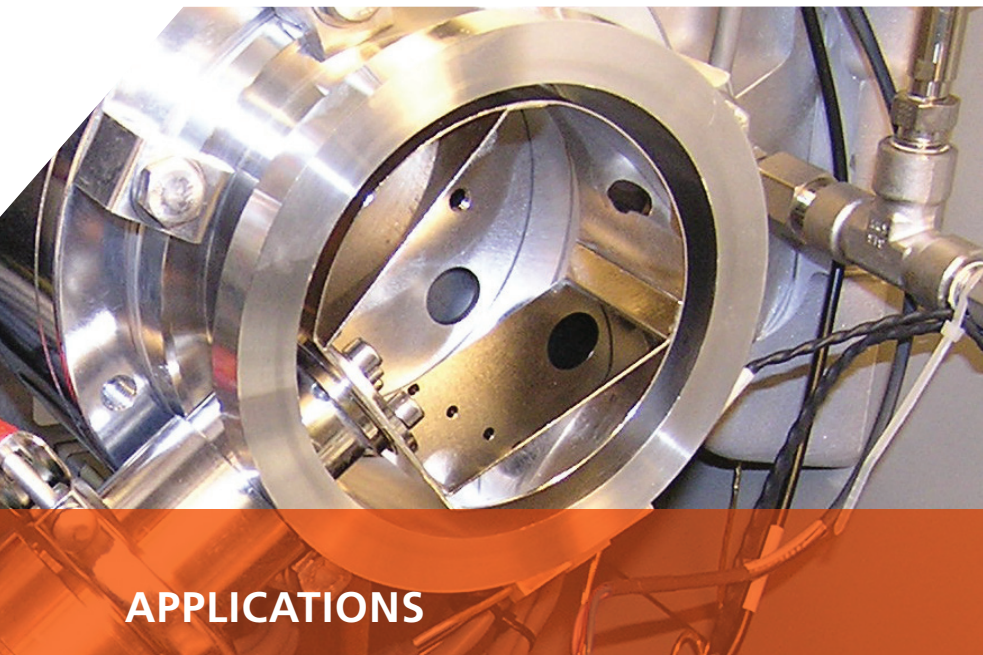


The Cryo-Water Pump 320 is the highest pumping speed member of the MicroStar line of products. It has a unique dual configuration, based on 2 separate K535 coolers that are both integrated into the same ISO 320 interface.

This one of a kind assembly is used as a water vapor pump in the Thin Film Deposition process in the Flat Panels industry. Dual configuration is used to accommodate the large-scale machinery used for such applications.

REGENERATION

The ISO 320 coolers are equipped with a regeneration process for each unit that achieves a full regeneration cycle in under 40 minutes. As only water vapor is captured on the cold panel, the regeneration process does not release hazardous gasses in dangerous concentrations into the vacuum system.



APPLICATIONS

- Sputtering Processes
- Cluster Tools
- Advanced Semiconductor Packaging
- Laboratory Research
- Large Vacuum Conveyor Processes
- Chemical Processing

SPECIFICATIONS

Pumping Speed: 12,000 liter/sec	Input Power: 400W
Interface: All Standart DN320 Flanges	Weight: 48Kg
Cooling Time: 60 Minutes	MTTF: 25,000 Hours
Cooling Power: 36wwwwW	Ambient Temp Range: -10°C to 40°C
Regeneration Time: 60 Minutes	Input Voltage: 52V

The Microstar user adjustable operation temperature range of 45K up to 150K is useful for freezing out other molecular compounds in a gaseous state including Sulphur Dioxide (SO₂), Ammonia (NH₃), Chlorine (Cl₂), Carbon Dioxide (CO₂), Nitrous Oxide (N₂O), Hydrogen Sulfide (H₂S), Bromine (Br₂), and Iodine (I₂).

The sublimation phase curves of these chemicals fall in the same operational temperature range of the K535. This can be a useful application in chemical processing.

OUR VALUES

PEOPLE CENTERED

We strive to take an 'open-minded' approach to each brief. Listening to the current and evolving needs of our customers ensures we deliver the right solution as opposed to the easiest.

VALUE

Working according to the budgetary constraints of our customers, we design products and solutions that balance high performance with high value. Our in-house capacity for mass production of coolers allows us to make our solutions as cost-effective as possible.

INNOVATION

Our innovative culture ensures a continuous stream of technological innovation; we welcome creative and unconventional solutions.

CUSTOMIZATION


We go the extra mile in tailoring solutions that fit our customers' specific needs.

EXCELLENCE

We strive to deliver outstanding quality at 3 levels: Product design, management systems and health & safety.

SUSTAINABILITY

Our commitment to responsible citizenship includes conservation and protection of natural resources and active involvement in the communities where we live and work.





 **RICOR**
CRYOGENIC & VACUUM SYSTEMS



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