TELEMARK

Water Vapor Cryochiller

Fast pump down, with the efficient trapping of water vapor in the chamber, is a key requirement for maximum efficiency in thin film coating. Telemark cryotraps provide the best available technology:

- **Fast "Cool Down" for shorter cycle times**
- **More Efficient Water Vapor Pumping**
- **Small Footprint**
- **Fast Defrost**
- **Comprehensive Digital Control Package with Digital Communication Connectivity**

Water Vapor Cryotraps:

- **Decrease Pump down Times by 25% to 90%**
- **Attain Deeper Vacuum**
- **Improve Deposition Quality**
- **Eliminate Costly LN_2 Usage For Fast Payback**

Model 1200/1800/2400/2700/3600

Water Vapor Cryochiller

Drawing on our leadership in the field of vacuum PVD coating, Telemark has developed improved cryogenic water vapor chillers, which deliver enhanced performance and reliability.

These models are fully compatible with your existing vacuum system installation. Careful attention has been paid to support a wide variety of interfaces between the system's process controller and the cryochiller. These include Ethernet (TCP/IP), RS-232, RS-485, and an analog remote.

An advanced digital control system allows the cryochiller system operation to be monitored. The on-board system enables several user adjustable conditions to optimize process control. All models are available with a Dual Independent Circuit option.

Our cryochillers offer differing refrigerant blends to meet all applicable national/regional environmental requirements (including US EPA, CE, and the Kyoto Accords International Agreement).

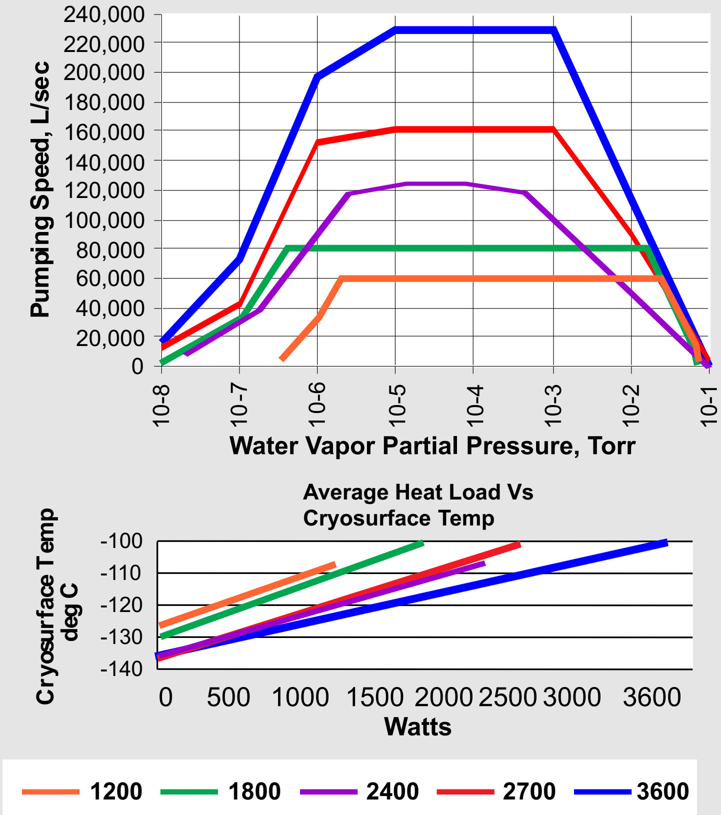
1801 SE Commerce Avenue
Battle Ground, WA 98604, USA

Tel 360-723-5360
Fax 360-723-5368

sales@telemark.com
telemark.com
MADE IN USA

Cryosurface Temperature vs. Cryopumping Efficiency and Water Vapor Partial Pressure

Efficiency % Water Vapor Partial Pressure, Torr	**98**	**95** Cryosurface Temperature Needed (Degrees C)
5×10^{-3}	-89.6	-84.3
2×10^{-3}	-94.6	-89.6
1×10^{-3}	-98.2	-93.4
5×10^{-4}	-101.6	-97.0
2×10^{-4}	-106.0	-101.6
1×10^{-4}	-109.1	-104.9
5×10^{-5}	-112.2	-108.1
2×10^{-5}	-116.0	-112.2
1×10^{-5}	-118.8	-115.1
5×10^{-6}	-121.5	-117.9
2×10^{-6}	-125.0	-121.5
1×10^{-6}	-127.5	-124.1
5×10^{-7}	-129.9	-126.7
2×10^{-7}	-132.9	-129.9
1×10^{-7}	-135.2	-132.2
5×10^{-8}	-137.3	-134.5
2×10^{-8}	-140.1	-137.3
1×10^{-8}	-142.1	-139.5



Selection of Appropriate Model

The model 1200 deals with heat loads up to 1200 watts and can typically trap up to 55,000 l/sec of water vapor, at a variety of vacuum depths. The 1800 deals with heat loads up to 1800 watts and typically traps up to 80,000 l/sec of water vapor at a variety of vacuum depths. The model 2400 handles up to 2400 watts and traps up to 125,000 l/sec, in a typical installation. The 2700 handles heat loads to 2700 watts, and typically traps up to165,00 l/sec of water vapor. The 3600 can manage a combined heat load of 3600 Watts and typically traps up to 200,000 l/sec.

When determining the optimum vapor trapping capability to significantly improve pump-down times, a preliminary goal should be to achieve at least four times the current water vapor trapping capability of your high vacuum pump.

Selection of the correct model cryotrap depends upon two primary factors: the amount of water vapor that needs to be trapped, and the total heat load the system needs to manage.

Total heat load is a combination of: 35 watts/square ft. of cryosurface, 8 Watts per linear ft. of insulated refrigerant line, “latent” heat loads which are extensive at shallow vacuum depth but can be ignored at 10^{-4} or below, and in-chamber heating of:

deg C	black body load in W/sq ft	shielded load in W/sq ft
50	55	42
100	100	75
150	167	125
200	262	197

The overall heat load on the TVP system is the combination of all of the above.

1801 SE Commerce Avenue
Battle Ground, WA 98604, USA
Tel 360-723-5360
Fax 360-723-5368
sales@telemark.com
telemark.com

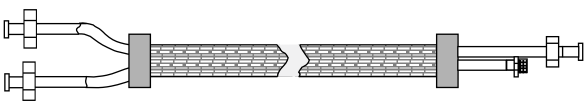
Digital Control

The advanced digital control package operates at 24V, has battery back-up, and is fully CE compliant. Two 20 character 1/2" high backlit read-outs allow for easy reading and rapid scrolling through all available monitor points.

Convenient interface capability for RS-232, RS-485 or Ethernet (TCP/IP) allows for easily adapted system controls or external data-logging. This advanced control package is placed inside the main unit housing creating a smaller overall system footprint. The flexible capabilities of the controller remove the need for additional and costly system control options or specialized interface modules. A 37 pin remote connector is included for those wishing remote manual or analog system control.

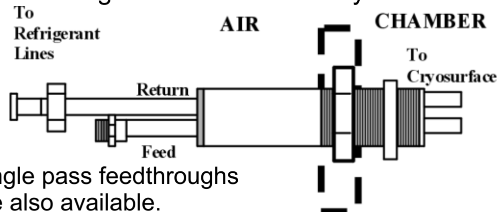
Refrigerant Line

The "refrigerant line" contains both a feed line and a return line of copper tubing with stainless steel couplings to mate with the cryochiller and with the feedthrough. The refrigerant line is protected with foam type thermal insulation to minimize heat loss and protect against exposure to open air.



Feedthroughs

(Available separately or as part of the cryocoil) The dual pass feedthrough gives access to the chamber while maintaining the thermal isolation between the feed and return tubing. On the external side, couplings mate directly with the refrigerant line. On the chamber side, the feedthrough is braised to the cryosurface lines.



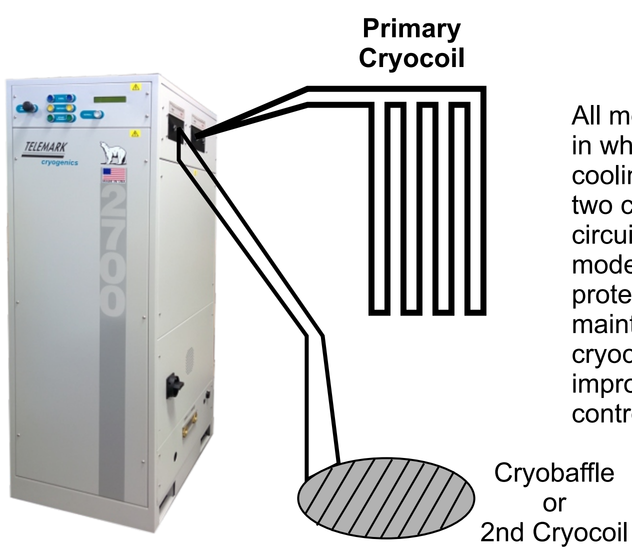
Single pass feedthroughs are also available.

Cryocoils

Working from Chamber drawings or specification, a custom designed cryocoil can be fabricated to perfectly fit your chamber and deliver optimal vapor trapping and heat removal performance

Cryocoils are made from copper tubing (stainless steel is also available) and constructed with a stainless steel feedthrough.

Many different coil shapes and configurations allow for optimum efficiency of your cryosurface.



Dual Circuit Cryochillers

All models are available in a dual circuit configuration, in which the systems provide independent control and cooling of two surfaces. Common configurations are two cryocoils or a cryocoil and a cryobaffle. Each circuit can cool or defrost independently with only a modest effect on the other circuit. For cryobaffles protected by a gate valve, the baffle can be constantly maintained at cryo-temperature while the in-chamber cryocoil is cycled for expected process time improvements. Each circuit is independently controlled and monitored.

1801 SE Commerce Avenue
Battle Ground, WA 98604, USA

Tel 360-723-5360
Fax 360-723-5368

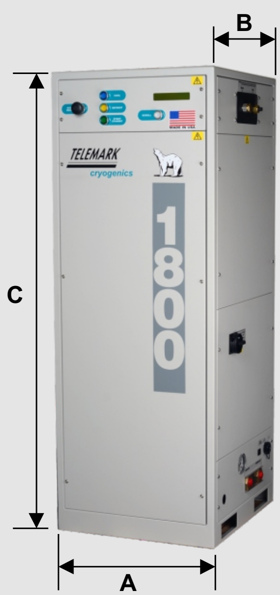
sales@telemark.com
telemark.com

MADE IN USA

Specifications

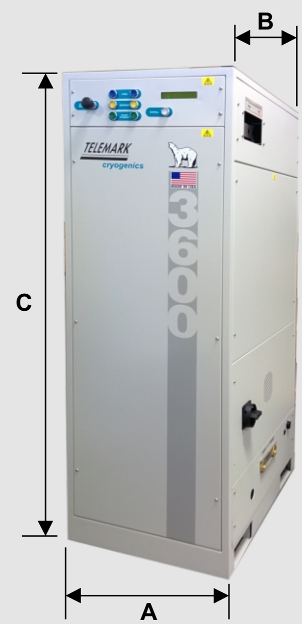
	1200	1800	2400	2700	3600
Maximum Load (Watts)	1,200	1,800	2,400	2,700	3,600
Theoretical Pumping Speed l/sec	80,000	120,000	185,000	245,000	300,000
Typical Pumping Speed l/sec	55,000	80,000	125,000	165,000	200,000
Ultimate Vacuum	2 x 10^{-8} (torr) mbar	2 x 10^{-8} (torr) mbar	2 x 10^{-8} (torr) mbar	2 x 10^{-8} (torr) mbar	2 x 10^{-8} (torr) mbar
Weight	425 lbs. 193 kg	485 lbs. 243 kg	485 lbs. 243 kg	845 lb. 384 kg	930 lb. 412 kg
Power supply	380 - 440VAC 3 ph 50 Hz or 460VAC 3 ph 60 Hz or 200 - 230VAC 3 ph 50/60 Hz	380 - 440VAC 3 ph 50 Hz or 460VAC 3 ph 60 Hz or 200 - 230VAC 3 ph 50/60 Hz	380 - 440VAC 3 ph 50 Hz or 460VAC 3 ph 60 Hz or 200 - 230VAC 3 ph 50/60 Hz	380 - 440VAC 3 ph 50 Hz or 460VAC 3 ph 60 Hz or 200 - 230VAC 3 ph 50/60 Hz	380 - 440VAC 3 ph 50 Hz or 460VAC 3 ph 60 Hz or 200 - 230VAC 3 ph 50/60 Hz
Full load Current Draw @ 60Hz @200-230V @380-440V	20 Amps 10 Amps	30 Amps 15 Amps	40 Amps 20 Amps	50 Amps 25 Amps	60 Amps 30 Amps
Start Up Max Current Draw @ 60Hz @200-230V @380-440V	30 Amps 15 Amps	60 Amps 30 Amps	60 Amps 30 Amps	60 Amps 30 Amps	85 Amps 45 Amps
Water requirement (Maximum)	5 lt/min @ 15°C 10 lt/min @ 25°C 20 lt/min @ 32°C	5 lt/min @ 15°C 10 lt/min @ 25°C 20 lt/min @ 32°C	6 lt/min @ 15°C 12 lt/min @ 25°C 30 lt/min @ 32°C	6 lt/min @ 15°C 12 lt/min @ 25°C 30 lt/min @ 32°C	8 lt/min @ 15°C 16 lt/min @ 25°C 30 lt/min @ 32°C
Water connections	3/4" NPT female	3/4" NPT female	3/4" NPT female	3/4" NPT female	3/4" NPT female
Refrigeration Connections	½" UltraSeal	½" UltraSeal	½" UltraSeal	½" UltraSeal	½" UltraSeal

Dimensions



1200/2400/1800

A	22.0 in 559 mm
B	24.0 in 610 mm
C	59.5 in 1511 mm



2700/3600

A	23.6 in 599 mm
B	35.3 in 897 mm
C	70.25 in 1784 mm

1801 SE Commerce Avenue
Battle Ground, WA 98604, USA

Tel 360-723-5360
Fax 360-723-5368

sales@telemark.com
telemark.com

MADE IN USA