



## Water Vapor Cryotraps - Value Engineered Models

Fast pump down, with the efficient handling of water vapor in the chamber, is a key requirement for maximum efficiency in thin film coating. The Telemark cryotraps provide the latest advancements in cryotrap technology:

- **Fast “Cool Down” for shorter cycle times**
- **Efficient Water Vapor Pumping (Cooling Power)**
- **Small Footprint**
- **Fast Defrost**
- **Engineered for maximum value**

### Telemark Water Vapor Cryotraps:

- **Decrease Pump down Times by 25% to 90%**
- **Attain Deeper Vacuum**
- **Improve Deposition Quality**
- **Single or Dual Circuit Models**
- **Eliminate Costly LN<sub>2</sub> Usage for Fast Payback**



## Model 1200/2400 Water Vapor Cryotraps

Drawing on our leadership in the field of vacuum PVD coating, Telemark has developed a new line of cryogenic water vapor traps. Improved technology within the Telemark water vapor cryotraps delivers performance and reliability.

Telemark's Value Engineered water vapor cryotraps are designed to provide rugged and reliable process speed and quality enhancements and support 'local' front panel manual control as well as a remote analog control.

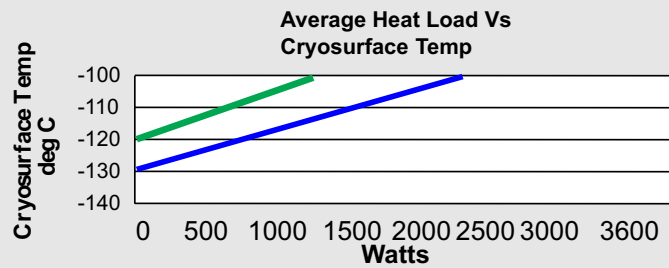
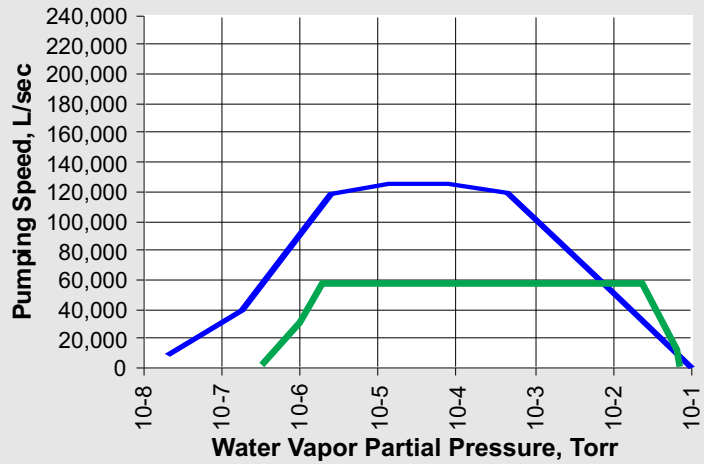
Reliability enhancements have been designed into each model allowing a broad range of cooling water capabilities and user site operating conditions. Both models are available with a Dual Independent Circuit option. Another option available on either is two output/two return connections for simultaneous operation of two cryobaffles. CE Mark units are available.

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

### Cryosurface Temperature vs. Cryopumping Efficiency and Water Vapor Partial Pressure

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

## Value Engineered Models



— 1200

— 2400

### Selection of Appropriate Model

Selection of the correct 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.

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 model 2400 handles up to 2400 watts and traps up to 125,000 l/sec, in a typical installation.

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.

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<sup>-4</sup> 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

### 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.

# Value Engineered Models

## Operational Control

The 'Value Engineered' models offer standard front panel control with manual switches and two digital display meters, as well as a 37-pin analog remote connection supporting many common system control applications. Front panel monitoring of several important TVP refrigerant line temperature readings is a standard feature.

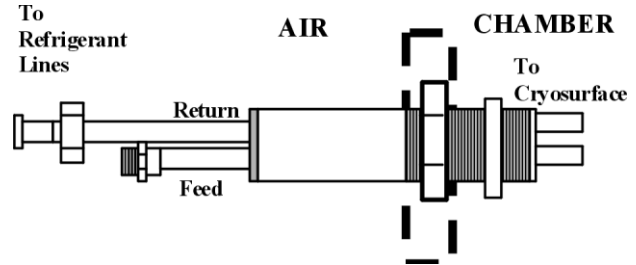
## Optional

A microprocessor based control system with RS232, RS485 or Ethernet interface is available at additional cost.

## Feedthroughs

(Available separately or as part of the cryocoil)

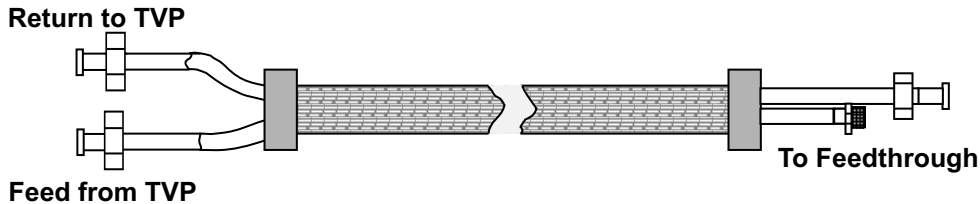
The dual pass feedthrough gives access to the chamber while maintaining the thermal isolation between the feed and return tubing. On the external side, couplings mate directly with the refrigerant line. On the chamber side, the feedthrough is braised to the cryosurface lines.



Single pass feedthroughs are also available.

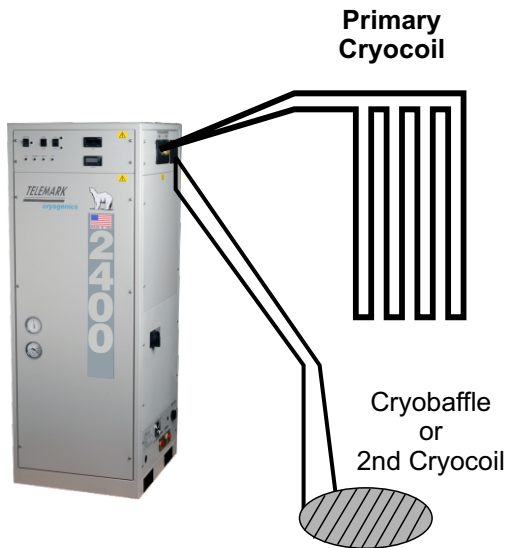
## Refrigerant Line

The "refrigerant line" contains both a feed line and a return line of copper tubing with stainless steel couplings to mate with the TVP system 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.



## Dual Circuit Cryotrap

Both 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, two cryobaffles, or a cryocoil and a cryobaffle. Each circuit can cool or defrost independently with 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.



# Specifications Value Engineered Models

	1200	2400
<b>Maximum Load (Watts)</b>	1,200	2,400
<b>Theoretical Pumping Speed l/sec</b>	80,000	185,000
<b>Typical Pumping Speed l/sec</b>	55,000	125,000
<b>Ultimate Vacuum</b>	2 x 10 <sup>-8</sup> (torr) mbar	2 x 10 <sup>-8</sup> (torr) mbar
<b>Weight</b>	425 lb. 193 kg	485 lb. 243 kg
<b>Power supply</b>	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
<b>Full load Current Draw @ 60Hz @200-230V @380-440V</b>	20 Amps 10 Amps	40 Amps 20 Amps
<b>Start Up Max Current Draw @ 60Hz @200-230V @380-440V</b>	30 Amps 15 Amps	60 Amps 30 Amps
<b>Water requirement (Maximum)</b>	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
<b>Water connections</b>	3/4" NPT female	3/4" NPT female
<b>Refrigeration Connections</b>	1/2" UltraSeal	1/2" UltraSeal

## Dimensions

