TELEMARK

Water Vapor Cryotraps

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 TVP series provides the latest advancements in cryotrap technology:

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

• Eliminate Costly LN_2 Usage for Fast Payback

TVP Water Vapor Cryotraps:

- **Decrease Pumpdown Times by 25% - 90%**
- **Attain Deeper Vacuum**
- **Improve Deposition Quality**
- **Single or Dual Circuit Models**

Model TVP3500/TVP2000/TVP1000

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 TVP water vapor cryotraps delivers performance and reliability.

TVP Water Vapor Cryotraps are fully compatible with your existing vacuum system installation. Careful attention has been paid to the interface between the user and the cryotrap and the way in which the TVP is connected to the vacuum system.

An advanced digital control system allows all aspects of the process to be monitored. The on-board system enables simple and seamless integration of the TVP into your existing process control.

CE mark units are available. The TVP has differing refrigerant blends to meet all applicable national/regional environmental requirements. Greater electrical efficiency lowers the overall Total Global Warming Equivalent Index (TWEI) rating.

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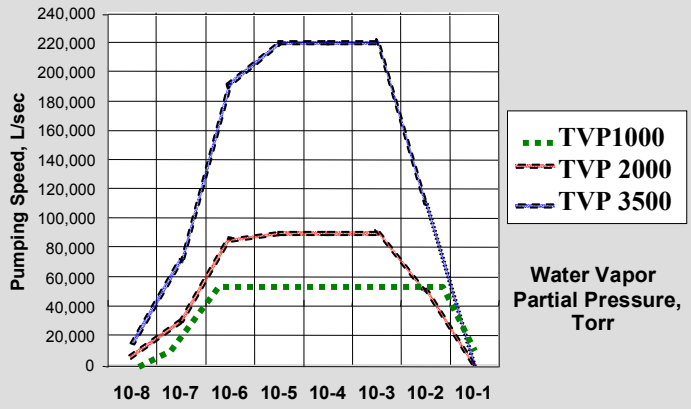
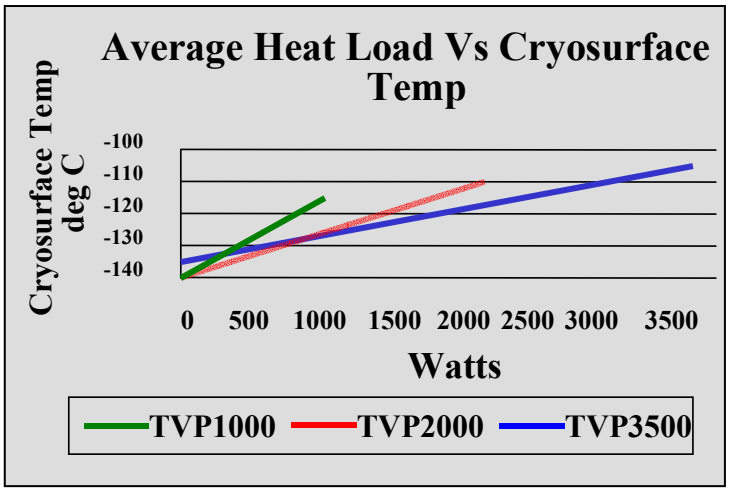
Cryosurface Temperature vs. Cryotrapping Efficiency at Water Vapor Partial Pressure

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





Selection of the correct model of the Telemark TVP 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 TVP1000 deals with heat loads up to 1000 watts and can trap up to 50,000 l/sec of water vapor at a variety of vacuum depths. The TVP2000 handles up to 2000 watts and can trap up to 90,000 l/sec. The TVP3500 can manage a combined heat load of 3500 Watts and can trap up to 220,000 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.

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

CRYOCOILS

Working from chamber drawings or specifications, 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.

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DIGITAL CONTROL

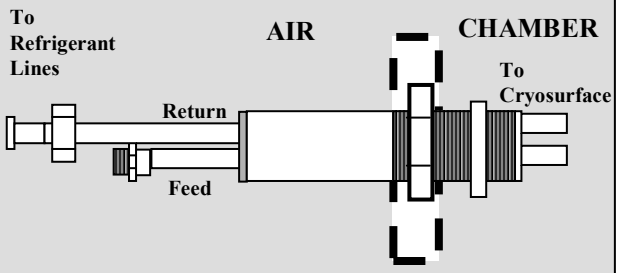
The advanced digital control package operates at 24V, has battery back-up, and is fully CE compliant. Two 20 character 1/2" high backlit read-outs allow for easy reading and rapid scrolling through all available monitor points.

Convenient interface capability for RS-232 or RS-485 allow 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.

FEEDTHROUGHS

(Available separately or as part of the cryocoil)

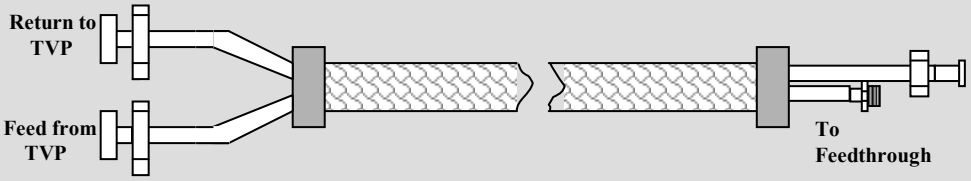
The dual pass feedthrough gives access to the chamber while maintaining the thermal isolation between the feed and return tubing. On the external side, couplings mate directly with the refrigerant line. On the chamber side, the feedthrough is braised to the cryosurface lines.

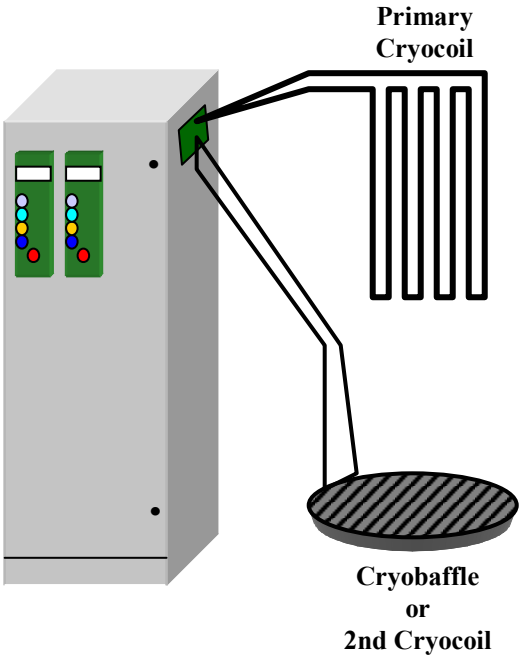


Single pass feedthroughs are also available.

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 Cryotraps

The TVP2000 and TVP3500 are available in dual circuit models 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 minimal 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.

Dual Circuit Models are:
TVP2000D
TVP3500D

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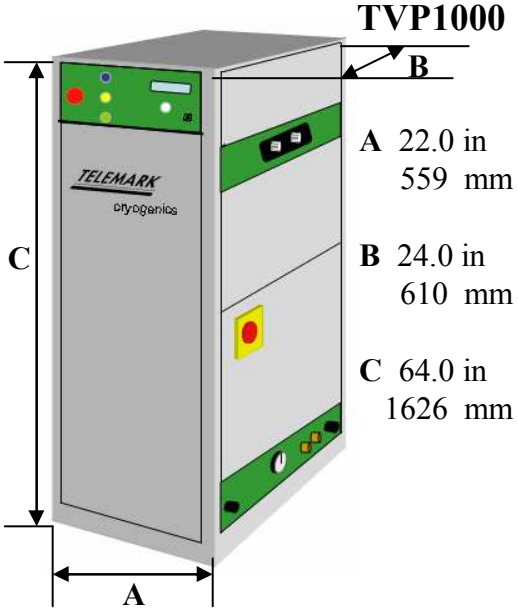
SYSTEM SPECIFICATIONS

		TVP1000	TVP2000	TVP3500
Maximum Load (Watts)		1000	2000	3500
Max Pumping Speed l/sec		50,000	90,000	220,000
Ultimate Vacuum (all models)			2 x 10^{-8} (torr) mbar	
Weight		485 lbs. 243 kg.	845 lbs. 384 kg.	1078 lbs. 490 kg.
Power Supply (all models)			380-440 VAC 3 ph 50/60 Hz or 200-230 VAC 3 ph 50/60 Hz	
Max Current Draw				
@200-230V	Peak/Cooldown	30 Amp	60 Amp	90 Amp
	Run	15 Amp	30 Amp	58 Amp
	Standby	10 Amp	30 Amp	29 Amp
Max Current Draw				
@380-440V	Peak/Cooldown	15 Amp	35 Amp	60 Amp
	Run	7.5 Amp	18 Amp	38 Amp
	Standby	5 Amp	15 Amp	15 Amp
Water Requirement (maximum)				
		5 lt./min @ 15°C	6 lt./min @ 15°C	12 lt./min @ 15°C
		10 lt./min @ 25°C	12 lt./min @ 25°C	24 lt./min @ 25°C
		20 lt./min @ 32°C	30 lt./min @ 32°C	38 lt./min @ 32°C
Water Connections (all models)			3/4" BSP female & hose barbs	
Refrigeration Connections (all models)			1/2" Parker UltraSeal	

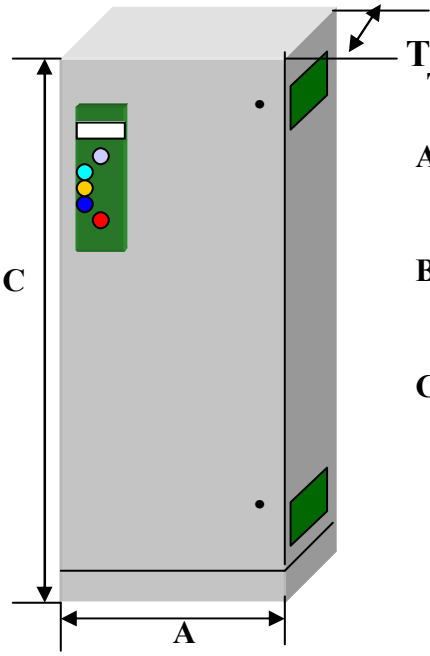
Physical Dimensions



A 22.0 in
559 mm

B 24.0 in
610 mm

C 64.0 in
1626 mm



A 23.6 in
603 mm

B 36.8 in
935 mm

C 68.9 in
1745 mm

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