

**PRISM<sup>®</sup> PE dryers**  
**membrane air dehydration . . .**  
**tell me more**

# Membrane dryer overview

Air Products' PRISM PE dryers are compact and efficient dehydrators for industrial air supplies. These robust dryers remove water vapor from compressed air streams by the selective permeation of water molecules through polymers. They are “molecular filters” in which water travels across the membrane faster than other gas molecules. Advantages include lower maintenance time and expense compared to desiccant or refrigerant dryers. Membrane dryers are superior for operation at remote sites and for point-of-use applications.

# PRISM PE dryer advantages

## Durable

Each module is manufactured from high-performance ABS with aluminum caps which will withstand some of the most grueling environments. Some models are available in 316L stainless steel for corrosive environments.

## Cost-effective

The simple design makes PRISM PE dryers less expensive to purchase and maintain than desiccant or refrigerant dryers. No moving parts or expensive media required.

## Proven technology

The selective permeation technology has been in use by Air Products for decades. This simple system is passive, with no moving parts, resulting in more reliable products that can be deployed in a wide range of environments, including mobile systems. PRISM PE dryer modules are found in critical applications, like the oil and gas industry and onboard aircraft carriers in the U.S. naval fleet.

## Flexible application

PRISM PE dryers can be mounted vertically or horizontally to meet your design requirements. The purge inlet port is designed with a swivel fitting to allow for various installation positioning. A user-installed orifice or adjustable valve optimizes the purge rates and dew points for each application.

## Simple start-up

PRISM PE dryers are easily commissioned. Simply apply clean compressed air, and production begins. No break-in period, expensive media, or complex equipment to manage and maintain.

## Industrial grade

PRISM PE dryers are designed to handle industrial production loads. The solid construction is perfect for remote and severe duty installations like oil and gas and mining operations.

## Quality assured

Every PRISM PE dryer has to pass our rigorous testing requirements before it will be released into service. You can be confident that every dryer will be a solid performer. The PRISM Membranes business unit is proud of its AS9100 certification for quality management systems, which meets the exacting requirements of the global aerospace industry.

## Efficient

PRISM PE membrane dryers are the most efficient units available. Compared to other brands, the PRISM PE dryers operate with lower purge rates.

# Alternative technology comparison

## 100 cfm dryers

	Dessiccant <sup>1</sup>	Deliquescent <sup>2</sup>	PE4030 Membrane
Size inches (mm)	49 x 17 x 13 (1245 x 432 x 330)	13 x 51 (330 x 1295)	5.6 x 41 (141 x 1045)
Weight	172 lbs. (78 kg)	260 lbs. (118 kg)	14.9 lbs. (6.76 kg)
Maintenance	Intensive PM schedule	Recharging and monitoring	None
Consumable items	Desiccant and filters (\$1020 US), valves + solenoids (\$1039 US)	Deliquescent tablets (\$1.25/lb) 130 lbs (59kg)	None
Expandable	No	No	Yes
Power required	Yes	No	No
Management system	PLC controlled + sensors	Manual drain valve + visual ports	None
Dew point attainable	Variable -4°F to -100°F	20° below inlet dew point	Variable +40°F to -70°F

<sup>1</sup> Nano NDL-110-F Heatless Desiccant Air Dryer.

<sup>2</sup> Van Air D-12 Freedom Single Tower Deliquescent Air Dryer.

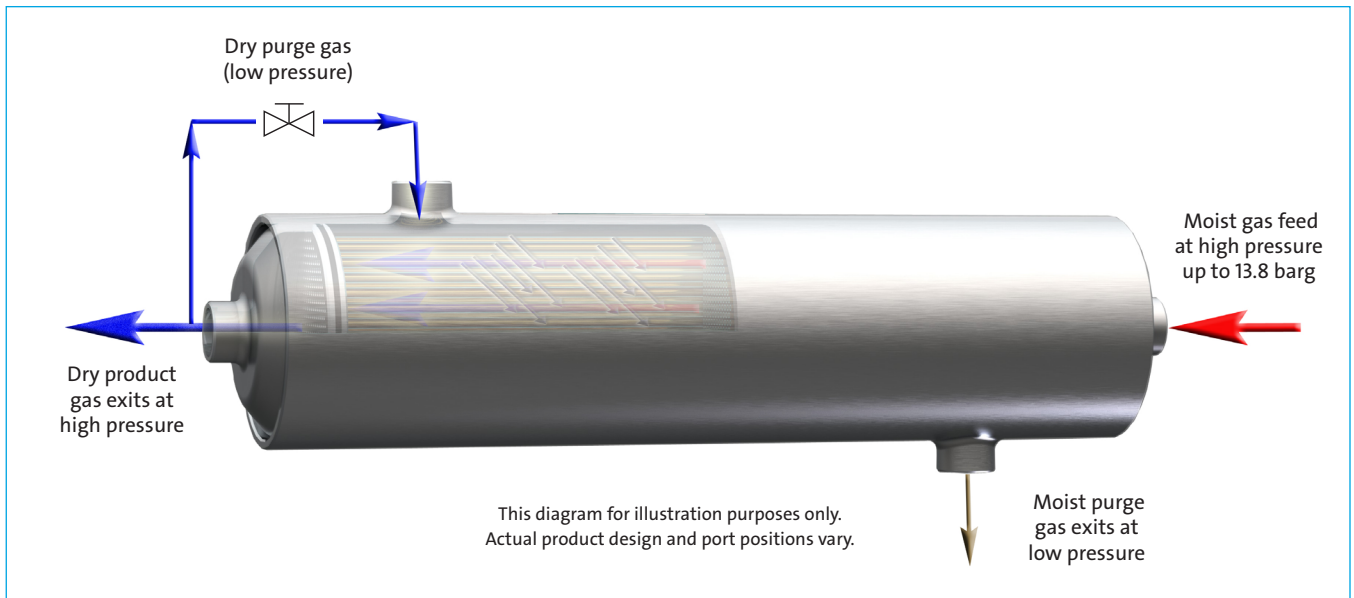
Membrane dryers are passive devices that have lower capital and operational costs. The small size and simple operation make them ideal for applications where bulky units will not fit. Membrane dryers are quiet, require no external power, and do not have expendable media that requires maintenance.



A typical membrane separator contains thousands of fibers that are bundled and encased at both ends in epoxy resin. The ends of the bundle are cut, which leaves the fiber bores open on both ends, allowing the gas to travel from one end to the other. The fiber bundle is enclosed in a suitable casing. The casing protects the fibers and routes the gas properly.

**Air Products' PRISM membranes: experience, performance, and value.**

# How PRISM PE membrane air dryers work



**Membrane dryers passively produce dry air with no moving parts or electrical components, consumable items, or desiccant dust carry-over. They provide silent and uninterrupted operation for a wide range of dew point specifications.**

Membrane dryers remove water vapor from gas streams by the selective permeation of water molecules through polymers. Membrane dryers can be described as “molecular filters” where water travels across the membrane faster than other gas molecules.

The permeation of gases is driven by the difference in partial pressure across a thin polymeric separating layer supported on a spongy porous substrate which makes up the core of the membrane. Gases permeate across the separating layer in either direction at a rate that is proportional to the driving force and the permeation coefficient. As wet feed gas flows along the high-pressure side (or “feed” side) of a membrane dryer, water permeates across the membrane to the low-pressure side (or “permeate” side). The water vapor content of the feed gas becomes

progressively lower as it flows along the length of the membrane dryer, which causes less driving force for permeation.

A dry stream of air is injected at low pressure on the permeate side to increase the driving force for water permeation at the dry end of the membrane dryer. This dry stream (fed to the permeate side through the inlet purge port) is called the external purge, dry sweep, or inlet purge. The gas that permeates across the membrane can be considered internal purge. The external and internal purge gas streams together make up the total purge that exits from the purge outlet port. Some of the dry air exiting the membrane dryer can be used as the external purge or a secondary source can be used.

The purge gas carrying the removed water vapor on the permeate side flows in the direction opposite to the feed stream. This “counter-current” flow enables the highest possible driving force to be created over the length of the membrane dryer. Performance is improved (increased dryer capacity or decreased purge) by operating the permeate side at the lowest feasible pressure.

The shell houses the membrane element and provides connection ports for the inlet feed air, outlet dry product air, inlet external purge, and outlet total purge. The membrane element consists of a bundle of hollow fibers with the ends potted in epoxy or other resin. The wet feed gas enters and flows through the bores of the hollow fibers, and dry gas exits the bores of the hollow fibers at the opposite end.

## Ordering information

Catalog Number	Product Number	Shell Materials	Connection Thread Type	Connection Size	Cap Materials
107059	PE1015-E1-3A-00	High performance ABS	NPT	3/8-inch	6061 Aluminum
107060	PE1015-E1-3B-00	High performance ABS	BSPP	3/8-inch	6061 Aluminum
194204	PE1015-E1-3D-00	High performance ABS	NPT	3/8-inch	Clear anodized cap
107062	PE1020-E1-3A-00	High performance ABS	NPT	3/8-inch	6061 Aluminum
107063	PE1020-E1-3B-00	High performance ABS	BSPP	3/8-inch	6061 Aluminum
107064	PE1020-E1-3B-23	High performance ABS	BSPP	3/8-inch	6061 Aluminum
107065	PE1020-E1-3B-31	High performance ABS	BSPP	3/8-inch	6061 Aluminum
150174	PE1020-E1-3D-00	High performance ABS	NPT	3/8-inch	Clear anodized cap
107067	PE1030-E1-3A-00	High performance ABS	NPT	3/8-inch	6061 Aluminum
107068	PE1030-E1-3B-00	High performance ABS	BSPP	3/8-inch	6061 Aluminum
413880	PE2020-E1-4A-00	High performance ABS	NPT	1/2-inch	6061 Aluminum
413881	PE2020-E1-4B-00	High performance ABS	BSPP	1/2-inch	6061 Aluminum
413882	PE2030-E1-4A-00	High performance ABS	NPT	1/2-inch	6061 Aluminum
413883	PE2030-E1-4B-00	High performance ABS	BSPP	1/2-inch	6061 Aluminum
107072	PE3020-E1-4A-00	High performance ABS	NPT	1/2-inch	6061 Aluminum
107073	PE3020-E1-4B-00	High performance ABS	BSPP	1/2-inch	6061 Aluminum
137430	PE3020-E1-4F-00	316L Stainless Steel Shell	BSPP	1/2-inch	6061 Aluminum
107076	PE3030-E1-4A-00	High performance ABS	NPT	1/2-inch	6061 Aluminum
107077	PE3030-E1-4B-00	High performance ABS	BSPP	1/2-inch	6061 Aluminum
107081	PE4020-E1-6A-00	High performance ABS	NPT	3/4-inch	6061 Aluminum
107082	PE4020-E1-6B-00	High performance ABS	BSPP	3/4-inch	6061 Aluminum
107085	PE4030-E1-6A-00	High performance ABS	NPT	3/4-inch	6061 Aluminum
107086	PE4030-E1-6B-00	High performance ABS	BSPP	3/4-inch	6061 Aluminum
410565	PE4030-E1-6E-00	316L Stainless Steel	NPT	3/4-inch	316L Stainless Steel
410566	PE4030-E1-6F-00	316L Stainless Steel	BSPP	3/4-inch	316L Stainless Steel
411103	PE4030-E1-6P-00	Replaceable cartridge	NPT	3/4-inch	316L Stainless Steel
411104	PE4030-E1-6R-00	Replaceable cartridge	BSPP	3/4-inch	316L Stainless Steel

## ABS product dimensions and weights

For dimensions of stainless steel and other specialty products, please contact Air Products PRISM Membranes.

Model	Length		Diameter		Width		Weight	
	inches	mm	inches	mm	inches	mm	pounds	kg
PE1015-E1	18.8	477	2.2	55	3.6	91	1.4	0.61
PE1020-E1	26	660	2.2	55	3.6	91	1.6	0.71
PE1030-E1	39.5	1003	2.2	55	3.6	91	1.9	0.88
PE2020-E1	26.9	684	3.1	78	4.7	120	3.3	1.49
PE2030-E1	40.4	1026	3.1	78	4.7	120	3.9	1.76
PE3020-E1	26.9	683	3.9	99	5.3	135	6.1	2.76
PE3030-E1	41.2	1048	3.9	99	5.3	135	8.0	3.62
PE4020-E1	26.1	664	4.9	125	6.3	161	10.9	4.94
PE4030-E1	41.1	1045	4.9	125	6.3	161	14.9	6.76

## Dryer performance – quick reference

Flow capacity in scfm – inlet air @ 100 psig, 100°F, 100% RH

Model	Flow @ +40°F PDP		Flow @ +20°F PDP		Flow @ 0°F PDP		Flow @ –20°F PDP	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
PE1015-E1	5.8	5.0	3.9	3.2	–	–	–	–
PE1020-E1	8.8	7.6	6.8	5.7	4.3	3.5	2.8	2.3
PE1030-E1	12.4	10.6	10.3	8.6	7.6	6.2	6.1	4.8
PE2020-E1	19.1	16.4	14.7	12.2	9.2	7.5	6.1	4.9
PE2030-E1	27.5	23.7	23.0	19.1	16.9	13.7	13.5	10.7
PE3020-E1	38.8	33.4	30.2	25.1	19.0	15.4	12.8	10.1
PE3030-E1	50.7	43.6	42.7	35.5	31.4	25.5	25.3	20.1
PE4020-E1	56.4	48.5	44.3	36.8	27.5	22.4	18.5	14.6
PE4030-E1	88.1	75.8	74.4	61.8	54.7	44.5	44.5	35.3
Purge rate (% of inlet flow)	14.0%		16.9%		18.7%		20.7%	

Flow capacity in standard liters per second – inlet air @ 7 barg, 35°C, 100% RH

Model	Flow @ +3°C PDP		Flow @ –10°C PDP		Flow @ –20°C PDP		Flow @ –30°C PDP	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
PE1015-E1	2.4	2.1	1.5	1.2	–	–	–	–
PE1020-E1	3.9	3.4	2.9	2.4	1.9	1.5	1.2	1.0
PE1030-E1	5.6	4.8	4.6	3.8	3.5	2.9	2.8	2.3
PE2020-E1	8.5	7.3	6.3	5.2	4.0	3.3	2.6	2.1
PE2030-E1	12.4	10.8	10.2	8.5	7.8	6.4	6.3	5.0
PE3020-E1	17.1	14.8	12.8	10.7	8.3	6.8	5.3	4.3
PE3030-E1	22.7	19.7	19.9	15.8	14.5	11.8	11.7	9.4
PE4020-E1	24.3	21.1	18.5	15.4	11.8	9.7	7.5	6.0
PE4030-E1	39.3	34.0	32.8	27.4	25.1	20.6	20.4	16.4
Purge rate (% of inlet flow)	13.3%		16.6%		18.2%		19.8%	

PDP = Pressure Dew Point

Performance ratings are for single dryers at typical operating conditions for comparison only. Contact our Technical Services department to receive detailed performance charts or to generate computer simulations for your applications.

Operating dryers in parallel will increase the flow volumes

For more information regarding  
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