



CACTUS® PC dryers
membrane air dehydration . . .
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Cactus dryer overview



Air Products' CACTUS PC dryers are compact and efficient dehydrators for industrial air supplies. These robust dryers remove water vapor from gas 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.

Every Cactus PC dryer is hand assembled and tested in our AS9100 certified facility. You can be confident that each CACTUS PC dryer will perform as promised.



CACTUS PC dryer advantages

Durable

Each CACTUS PC dryer is manufactured from high-performance ABS with aluminum caps which withstand some of the most grueling environments. Special order versions of the PC3020, PC3030, and PC4030 are available in 316L stainless steel for corrosive environments.

Cost-effective

The simple design makes CACTUS PC dryers less expensive to purchase and maintain than desiccant or refrigerant dryers. The CACTUS PC dryer modules have no moving parts and require no expendable media.

Proven technology

The selective permeation technology has been employed by Air Products for decades. This simple system is a passive device with no moving parts that can be deployed in a wide range of environments, including mobile systems. CACTUS PC dryers are found in critical applications where bulky desiccants and refrigerated dryers are not practical.

Flexible application

CACTUS PC dryers can be mounted vertically or horizontally to meet your design requirements. Deploy at point-of-use or after the storage tank.

Simple start-up

CACTUS PC 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. The fixed purge eliminates the need for adjustments.

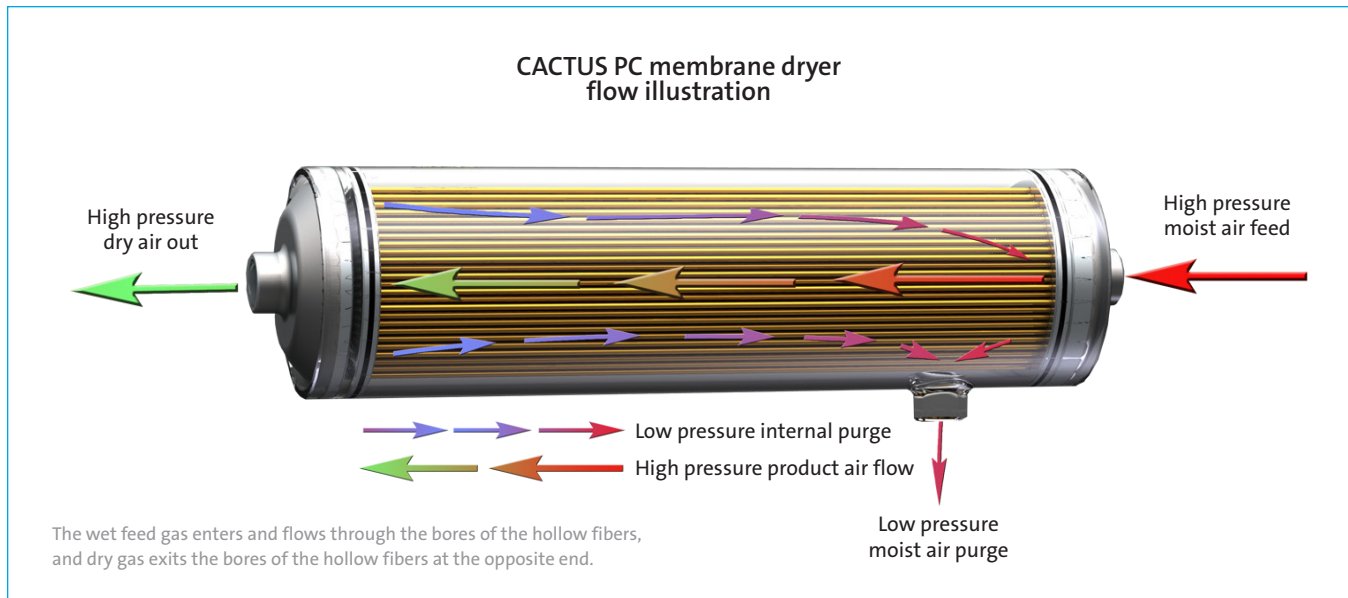
Industrial grade

CACTUS PC dryers are designed to handle industrial production loads. The solid construction is perfect for remote and severe-duty installations like oil platforms and mining operations. Operating pressure up to 300 PSIG meets industrial loads with ease.

Quality assured

Every membrane separator is hand assembled and has to pass our rigorous testing requirements before it will be released into service. You can be confident that every separator 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.

How CACTUS membrane dryers work



The CACTUS PC air dryer is a membrane dryer. Membrane dryers passively produce dry air with no moving parts or electrical components, consumable media, 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 permea-

tion coefficient. As wet feed gas flows along the high-pressure side (the “feed” side) of a membrane dryer, water permeates across the membrane to the low-pressure side (the “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 flows in a counter-current direction 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 is called the dry sweep or inlet purge. Cactus dryers utilize an internal purge which eliminates the need for a secondary stream of dry air to be fed into the membrane separator.

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 module houses the membrane element and provides connection ports for the inlet feed air and outlet dry product air. 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.

Dryer performance – quick reference

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

Model	Flow @ +40°F PDP		Flow @ +20°F PDP		Flow @ 0°F PDP		Flow @ -20°F PDP		Flow @ -40°F PDP	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
PC3010-D2	7.8	6.7	6.5	5.4	5.5	4.3	4.7	3.5	3.9	2.7
PC3020-D2	17.2	14.9	14.7	12.3	12.6	10.2	10.7	8.2	8.9	6.4
PC3030-D2	29.0	25.1	24.8	20.8	21.2	17.1	18.0	13.8	15.0	10.8
PC4030-D2	56.0	48.4	47.5	39.7	40.5	32.5	34.5	26.3	29.0	20.8
Avg. purge %	13.6%		16.5%		19.9%		23.8%		28.6%	

Flow capacity in slpm @ 7 barg, 35°C, 100% RH

Model	Flow @ +3°C PDP		Flow @ -10°C PDP		Flow @ -20°C PDP		Flow @ -30°C PDP		Flow @ -40°C PDP	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
PC3010-D2	217	186	179	146	153	120	131	97	112	78
PC3020-D2	480	413	403	335	350	280	301	230	256	184
PC3030-D2	809	697	681	565	591	473	508	388	431	311
PC4030-D2	1560	1341	1305	1079	1128	898	973	740	830	596
Avg. purge %	14.0%		17.4%		20.5%		24.3%		28.6%	

PDP = Pressure Dew Point

Performance ratings are for single separators at standard conditions. Actual performance will vary with incoming pressure and temperature. Contact our Technical Services department to obtain detailed performance estimates for your specific application.

Operating dryers in parallel will increase the flow volumes

Ordering information

Catalog Number	Descriptor Code	Connector	Thread	Materials
107025	PC3010-D2-3A-20	3/8-inch	NPT	ABS shell with aluminum cap
107027	PC3010-D2-3B-20	3/8-inch	BSPP	ABS shell with aluminum cap
107034	PC3020-D2-00-2E	1/2-inch	NPT	316 Stainless shell & cap
107035	PC3020-D2-00-2F	1/2-inch	BSPP	316 Stainless shell & cap
107036	PC3020-D2-4A-20	1/2-inch	NPT	ABS shell with aluminum cap
107038	PC3020-D2-4B-20	1/2-inch	BSPP	ABS shell with aluminum cap
124086	PC3020-D2-4D-20	1/2-inch	NPT	ABS w/Clear anodized cap
107043	PC3030-D2-00-2E	1/2-inch	NPT	316 Stainless shell & cap
107044	PC3030-D2-00-2F	1/2-inch	BSPP	316 Stainless shell & cap
107045	PC3030-D2-4A-20	1/2-inch	NPT	ABS shell with aluminum cap
107047	PC3030-D2-4B-20	1/2-inch	BSPP	ABS shell with aluminum cap
107053	PC4030-D2-00-2G	3/4-inch	NPT	316 Stainless shell & cap
107054	PC4030-D2-00-2H	3/4-inch	BSPP	316 Stainless shell & cap
107055	PC4030-D2-6A-20	3/4-inch	NPT	ABS shell with aluminum cap
107057	PC4030-D2-6B-20	3/4-inch	BSPP	ABS shell with aluminum cap
130205	PC4030-D2-6D-20	3/4-inch	NPT	ABS w/Clear anodized cap

Dimensions and weights

Model	Length		Diameter		Weight	
	inches	mm	inches	mm	pounds	kg
PC3010-D2	15.3	387	3.9	99.3	4.6	2.1
PC3020-D2	26.9	683	3.9	99.3	6.3	2.2
PC3020-D2 [SS]	26.9	683	3.9	99.3	15.4	7.0
PC3030-D2	41.2	1048	3.9	99	8.3	3.8
PC3030-D2 [SS]	41.2	1048	3.9	99	20.5	9.3
PC4030-D2	41.1	1045	4.9	125	14.6	6.6
PC 4030-D2 [SS]	40.5	1029	5.6	141	39.7	18.0

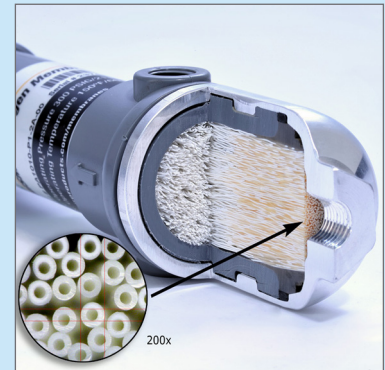
Alternative technology comparison

100 cfm dryers

	Dessiccant ¹	Deliquescent ²	PC4030 Membrane
Size inches (mm)	49 x 17 x 13 (1245 x 432 x 330)	13 x 51 (330 x 1295)	4 x 40 (102 x 1016)
Weight	172 lbs. (78 kg)	260 lbs. (118 kg)	14.6 lbs. (6.6 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 (59 kg) per charge	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 -40°F
Noise	Yes. May require abatement.	No	None

¹ Nano NDL-110-F Heatless Desiccant Air Dryer.

² Van Air D-12 Freedom Single Tower Deliquescent Air Dryer.



A typical membrane separator contains thousands of fibers that are bundled and encased at both ends in epoxy resin. The bundle ends 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.

For more information regarding
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