

# CMD Series

MEMBRANE AIR DRYERS  
1 - 200 SCFM

- ▶ Lightweight Modules
- ▶ Self-Sufficient Design
- ▶ "T" Type Connection
- ▶ Durable
- ▶ Replaceable Membrane Bundle



**CHAMPION**<sup>®</sup>

# Membrane Air Treatment and Technology

## Membrane Air Treatment

The carefully engineered Champion Membrane Dryer design provides a reliable method to remove moisture as a water vapor while coalescing filters remove solid particles, liquid water droplets, liquid oil and oil vapors from the compressed air system.

## CMD Series Membrane Dryers

Offer Flexible Pressure Dew Points Between +40° F and -40° F (+4° C to -40° C)

Moisture (water vapor) is present in ambient air as a gas and cannot be filtered. Membrane fibers present in the CMD Series remove water vapor to prevent it from condensing into harmful liquid water droplets inside compressed air systems. Powder painting, laboratory instruments and food packaging machines with pneumatic components are examples of applications which cannot tolerate the presence of any moisture.

## CFF Series Grade E and Grade F Coalescing Filters

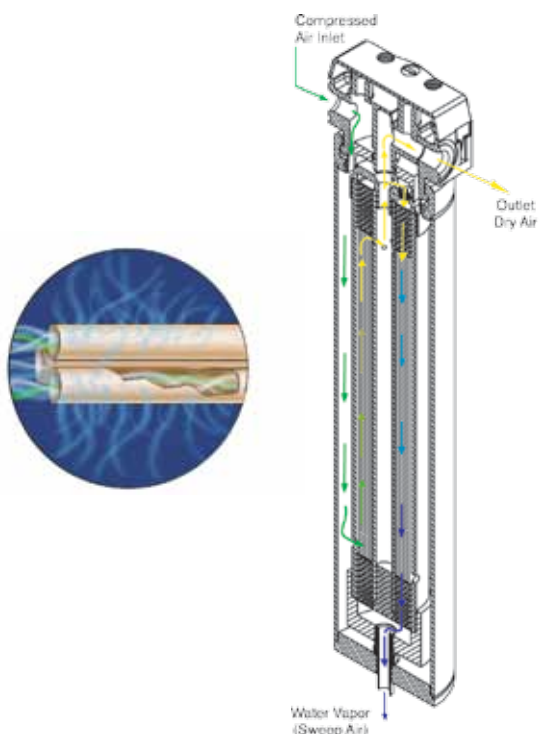
Remove Water Droplets and Solid Particles to 0.01 Micron

Water droplets are formed by the condensed water vapor present in ambient air. Solid particles come from ambient air contaminants like dust and from rusted, oxidized pipework. They can cause pneumatic equipment to malfunction and trigger instrument and control failures.

## CFF Series Grade G Filters

Remove Oil and Oil Vapors for Oil-Free Air

Liquid oil and oil vapors are introduced by compressor coolants and by hydrocarbon vapors present in ambient air. Oil-free compressed air is particularly important in food and pharmaceutical processes where direct and indirect contact with compressed air occurs. Oil contamination of food and drug products can generate significant liability issues and manufacturing spoilage costs.



## Membrane Technology

Membrane Fibers Dry Compressed Air With No Oxygen Loss

- The CMD Series Membrane Dryer utilizes a spiral wrapped bundle of tube-shaped membrane fibers to remove water vapor from the compressed air stream. These fibers are engineered to separate moisture without reducing the oxygen content in the compressed air stream.
- Compressed air should be prefiltered prior to the membrane dryer. We recommend Champion CFF Series Grade C prefiltration (1 micron solid particles) and then an CFF Series Grade F oil removal filter (oil removal to 0.0008 ppm). In situations where the maximum inlet liquid load is less than 1,000 ppm, a CFF Series Grade E oil removal filter may be used as a stand-alone prefilter (0.01 micron particles and 0.008 ppm oil removal).
- After prefiltration of liquid oil and water, the saturated air now begins passing through the outer walls of the membrane tubes. The air is dried as it traverses the length of the membrane bundle by the process of permeation and exits the dryer for use downstream having achieved its' design dew point.
- Permeation is the name of the process by which water vapor moves from the outside of the tubes (area of high vapor pressure), to the inside of the tubes (area of low vapor pressure). A fraction of the compressed air will sweep the water vapors through the membrane walls and exit the dryer through the sweep air ports on the dryer.

# Features

## Convenient Installation

- Lightweight modules can be installed on machinery or in instrumentation control rooms without the need for additional support
- Does not require electric power to run, eliminating the need for a power source
- Great for portable applications due to the self-sufficient design
- In-line "T" type connection to prefilters make it easy to incorporate it into an existing OEM package design
- Durable under many environmental conditions: high and low temperatures, corrosive and explosive atmospheres, indoors or out
- Replaceable membrane bundle

## Housings

- Rugged, welded aluminum housing is epoxy coated for durability
- Space-saving modular connection to prefilters

## No Operator or Input Power Required

- Simply hook the membrane dryer up to the compressed air system and walk away
- No adjustments necessary, no instruments required
- No maintenance as there are no moving parts which will wear out
- Long-life membranes with proper liquid oil and water prefiltration

**TABLE 1 - TYPICAL APPLICATIONS**

Packaging Machines	Converting Machines	General Applications
Air/Gas Flushing	Blow Molding	Painting
Bagging	Cup Making	Instrument Air
Capping/Lidding	Bag Making	Air Logic
Labeling	Laminating	Train Doors
Imprinting	Pouch Making	Air Transport
Shrink Wrapping		Fluid Agitation
Traying		Dental



## Modular Prefiltration Packages with Mounting Systems

- Utilize one Champion CFF Series Grade E High Efficiency Oil Removal Filter for normal conditions with less than a 1,000 ppm inlet liquid load. This single prefilter package is very common with OEM applications.
- Utilize two CFF Series filters, the CFF Series Grade C General Purpose Filter and the CFF Series Grade F Maximum Oil Removal Filter, for extreme conditions with greater than a 1,000 ppm inlet liquid load. The dual prefilter package is very common with painting applications.
- A CFF Series Grade G Oil Vapor Removal Filter should be utilized as the final filter for food and pharmaceutical applications where compressed air comes into direct/indirect contact with these end products.
- Convenient mounting systems for all filter combinations are available consisting of a wall-mounting bracket, modular connection kit from filter(s) to dryer, and a modular filter connection kit should there be two prefilters. The filters include automatic drains and a differential pressure indicator to signal the need for element replacement.

# SIZING INFORMATION

Projected Inlet and Outlet flow capacities (scfm) @ 100 psig

	Inlet <sup>(1)</sup> Temperature	Outlet Pressure Dew Point					
		50° F (10° C)	40° F (4.4° C)	20° F (-6.7° C)	0° F (-17.8° C)	-20° F (-29° C)	-40° F (-40° C)
CMD1	40° F Inlet	-	-	3.14	1.24	0.86	0.63
	(4.4° C) Outlet	-	-	2.92	1.02	0.64	0.41
	60° F Inlet	4.98	3.7	1.39	0.95	0.7	0.53
	(16° C) Outlet	4.77	3.49	1.17	0.73	0.49	0.31
	80° F Inlet	2.89	1.52	1.06	0.78	0.59	0.45
	(27° C) Outlet	2.67	1.31	0.84	0.57	0.38	0.23
	100° F Inlet	1.35	1.15	0.87	0.67	0.51	0.38
	(38° C) Outlet	1.13	0.94	0.65	0.45	0.3	0.16
	120° F Inlet	1.07	0.94	0.74	0.58	0.45	0.34
	(49° C) Outlet	0.85	0.73	0.53	0.37	0.24	0.12
150° F Inlet	0.84	0.76	0.62	0.49	0.39	-	
(66° C) Outlet	0.63	0.55	0.41	0.29	0.18	-	
CMD2	40° F Inlet	-	-	8.25	3.78	2.77	2.16
	(4.4° C) Outlet	-	-	7.68	3.21	2.20	1.59
	60° F Inlet	13.09	9.73	4.16	3.03	2.36	1.89
	(16° C) Outlet	12.52	9.16	3.59	2.45	1.79	1.31
	80° F Inlet	7.59	4.52	3.30	2.57	2.07	1.68
	(27° C) Outlet	7.02	3.95	2.73	2.00	1.50	1.11
	100° F Inlet	4.07	3.56	2.80	2.26	1.85	1.51
	(38° C) Outlet	3.50	2.99	2.23	1.69	1.28	0.94
	120° F Inlet	3.32	2.99	2.45	2.03	1.68	1.38
	(49° C) Outlet	2.76	2.43	1.89	1.46	1.12	0.82
150° F Inlet	2.69	2.48	2.10	1.77	1.49	-	
(66° C) Outlet	2.14	1.93	1.55	1.22	0.94	-	
CMD3	40° F Inlet	-	-	20.3	8.34	6.05	4.67
	(4.4° C) Outlet	-	-	18.9	6.94	4.64	3.27
	60° F Inlet	32.3	24.0	9.24	6.62	5.12	4.07
	(16° C) Outlet	30.8	22.6	7.83	5.21	3.71	2.67
	80° F Inlet	18.7	10.1	7.25	5.60	4.47	3.62
	(27° C) Outlet	17.3	8.70	5.84	4.19	3.07	2.22
	100° F Inlet	9.02	7.84	6.11	4.90	3.99	3.27
	(38° C) Outlet	7.61	6.43	4.71	3.49	2.59	1.86
	120° F Inlet	7.29	6.54	5.32	4.38	3.63	3.00
	(49° C) Outlet	5.91	5.16	3.94	2.99	2.24	1.62
150° F Inlet	5.85	5.38	4.53	3.82	3.22	-	
(66° C) Outlet	4.50	4.03	3.19	2.47	1.87	-	
CMD4	40° F Inlet	-	-	26.7	11.2	8.3	6.5
	(4.4° C) Outlet	-	-	24.9	9.3	6.5	4.7
	60° F Inlet	42.4	31.5	12.3	9.0	7.1	5.7
	(16° C) Outlet	40.6	29.7	10.4	7.2	5.3	3.9
	80° F Inlet	24.6	13.3	9.8	7.7	6.3	5.1
	(27° C) Outlet	22.7	11.4	8.0	5.9	4.4	3.3
	100° F Inlet	12.0	10.5	8.4	6.8	5.6	4.7
	(38° C) Outlet	10.1	8.7	6.5	5.0	3.8	2.8
	120° F Inlet	9.8	8.9	7.4	6.1	5.1	4.3
	(49° C) Outlet	8.0	7.1	5.5	4.3	3.3	2.5
150° F Inlet	8.0	7.4	6.3	5.4	4.6	-	
(66° C) Outlet	6.2	5.6	4.6	3.6	2.8	-	
CMD5	40° F Inlet	-	-	47.6	20.6	15.1	11.8
	(4.4° C) Outlet	-	-	44.3	17.3	11.8	8.5
	60° F Inlet	75.5	56.1	22.7	16.5	12.9	10.3
	(16° C) Outlet	72.2	52.8	19.4	13.2	9.6	7.0
	80° F Inlet	43.7	24.7	18.0	14.0	11.3	9.2
	(27° C) Outlet	40.5	21.4	14.7	10.7	8.0	5.9
	100° F Inlet	22.2	19.4	15.3	12.3	10.1	8.3
	(38° C) Outlet	18.9	16.1	12.0	9.0	6.8	5.0
	120° F Inlet	18.1	16.3	13.3	11.0	9.2	7.6
	(49° C) Outlet	14.8	13.1	10.1	7.8	6.0	4.4
150° F Inlet	14.6	13.5	11.4	9.7	8.2	-	
(66° C) Outlet	11.5	10.3	8.3	6.5	5.0	-	
CMD6	40° F Inlet	-	-	77.6	32.3	23.9	18.8
	(4.4° C) Outlet	-	-	72.2	26.9	18.6	13.4
	60° F Inlet	123	91.5	35.5	26.0	20.5	16.5
	(16° C) Outlet	118	86.1	30.1	20.6	15.1	11.2
	80° F Inlet	71.3	38.4	28.3	22.3	18.1	14.8
	(27° C) Outlet	66.0	33.1	23.0	16.9	12.7	9.4
	100° F Inlet	34.7	30.4	24.2	19.7	16.2	13.4
	(38° C) Outlet	29.3	25.1	18.8	14.3	10.9	8.0
	120° F Inlet	28.4	25.7	21.2	17.7	14.8	12.3
	(49° C) Outlet	23.1	20.4	15.9	12.4	9.5	7.0
150° F Inlet	23.1	21.3	18.2	15.5	13.2	-	
(66° C) Outlet	17.9	16.2	13.1	10.3	8.0	-	

	Inlet <sup>(1)</sup> Temperature	Outlet Pressure Dew Point					
		50° F (10° C)	40° F (4.4° C)	20° F (-6.7° C)	0° F (-17.8° C)	-20° F (-29° C)	-40° F (-40° C)
CMD7	40° F Inlet	-	-	147	60.8	44.7	34.9
	(4.4° C) Outlet	-	-	137	50.6	34.5	24.7
	60° F Inlet	233	173	67.0	48.7	38.1	30.5
	(16° C) Outlet	223	163	56.8	38.5	27.9	20.4
	80° F Inlet	135	72.8	53.1	41.5	33.4	27.3
	(27° C) Outlet	125	62.6	43.0	31.3	23.3	17.1
	100° F Inlet	65.5	57.2	45.1	36.5	30.0	24.6
	(38° C) Outlet	55.3	47.1	35.0	26.3	19.8	14.5
	120° F Inlet	53.3	48.1	39.5	32.7	27.3	22.7
	(49° C) Outlet	43.3	38.1	29.5	22.7	17.3	12.7
150° F Inlet	43.1	39.8	33.8	28.6	24.2	-	
(66° C) Outlet	33.4	30.1	24.0	18.9	14.5	-	
CMD8	40° F Inlet	-	-	205	90.7	68.9	55.1
	(4.4° C) Outlet	-	-	191	76.5	54.7	40.9
	60° F Inlet	326	242	98.9	74.4	59.6	48.8
	(16° C) Outlet	311	228	84.8	60.2	45.5	34.6
	80° F Inlet	189	107	80.4	64.4	53.0	43.9
	(27° C) Outlet	174	92.4	66.2	50.2	38.9	29.7
	100° F Inlet	96.9	85.9	69.5	57.4	48.0	40.0
	(38° C) Outlet	82.7	71.8	55.3	43.2	33.8	25.8
	120° F Inlet	80.4	73.4	61.5	51.9	43.9	36.9
	(49° C) Outlet	66.5	59.4	47.6	37.9	30.0	23.0
150° F Inlet	66.3	61.7	53.3	45.8	39.3	-	
(66° C) Outlet	52.7	48.1	39.7	32.2	25.7	-	
CMD9	40° F Inlet	-	-	287	118	89.6	71.7
	(4.4° C) Outlet	-	-	267	97.9	69.7	51.8
	60° F Inlet	456	339	129	96.7	77.6	63.5
	(16° C) Outlet	436	319	109	76.8	57.7	43.6
	80° F Inlet	264	138	105	83.8	69	57.2
	(27° C) Outlet	244	119	84.6	63.9	49.1	37.3
	100° F Inlet	126	112	90.4	74.7	62.4	52.0
	(38° C) Outlet	106	91.8	70.5	54.8	42.5	32.2
	120° F Inlet	104	95.3	80.0	67.5	57.1	48.0
	(49° C) Outlet	84.9	75.8	60.4	47.9	37.6	28.5
150° F Inlet	86.1	80.2	69.2	59.5	51.1	-	
(66° C) Outlet	67.1	61.1	50.2	40.5	32.0	-	

**NOTE:**

1. Use inlet air temperature if the air entering the dryer has not been dried upstream (air is saturated). If air has been dried (e.g. in a refrigerated dryer) use the dew point temperature of the inlet air.
2. Flow capacities are at 100 psig (7 kgf/cm<sup>2</sup>). Capacities are established in accordance with CAGI (Compressed Air and Gas Institute) Standard ADF 700; Membrane Compressed Air Dryers - Methods for Testing and Rating. For larger capacities, alternate pressures, and dew points contact your local distributor for assistance.
3. Purge % = (inlet flow - outlet flow)/inlet flow

**3 Year Warranty**

The standard one year warranty is extended to three years when the dryer is installed with an optional pre-filter package. To keep the warranty in effect, bundles must be replaced at six month intervals and the drain mechanism yearly.

Model	Inlet Flow/Outlet Flow <sup>(1)</sup> Capacity scfm		In/Out Connections	Dimensions in (mm)		Weight (lb) (kg)	Replacement Bundles Part No.
	@ +40° F (+4° C) pdp	@ -40° F (-40° C) pdp		L	W		
CMD1	1.15 (0.94)	0.38 (0.16)	3/8"	11 (281)	8 (209)	5 (2.45)	CMDB1
CMD2	3.56 (2.99)	1.51 (0.94)	3/8"	15 (387)	8 (209)	6 (2.77)	CMDB2
CMD3	7.84 (6.43)	3.27 (1.86)	1/2"	19 (486)	8 (209)	7 (3.04)	CMDB3
CMD4	10.5 (8.7)	4.7 (2.8)	1/2"	27 (696)	8 (209)	8 (3.58)	CMDB4
CMD5	19.4 (16.1)	8.3 (5.0)	3/4"	20 (498)	11 (267)	11 (4.90)	CMDB5
CMD6	30.4 (25.1)	13.4 (8.0)	3/4"	27 (696)	11 (267)	14 (6.19)	CMDB6
CMD7	57.2 (47.1)	24.6 (14.5)	1"	29 (747)	12 (310)	17 (7.55)	CMDB7
CMD8	85.9 (71.8)	40.0 (25.8)	1"	35 (885)	14 (346)	35 (15.88)	CMDB8
CMD9	112 (91.8)	52.0 (32.2)	1"	41 (1040)	14 (346)	40 (18.14)	CMDB9

Maximum Operating Pressure: Membrane dryer: 200 psig (14 kgf/cm<sup>2</sup>)

Maximum Inlet Temperature: 150° F (66° C)

Dimensions and weights are for reference only. Request certified drawings for construction purposes.

(1) Flow capacity at 100 psig (7 kgf/cm<sup>2</sup>) and 100° F (38° C) saturated inlet. Flow capacities are established in accordance with CAGI (Compressed Air and Gas Institute) Standard ADF 700: Membrane Compressed Air Dryers - Methods for testing and rating.



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