MSD SERIES

Modular Membrane Air Dryers

WILKERSON®

INNOVATIVE

Compact Membrane Air Dryer

The Wilkerson MSD Series membrane air dryers employ an advanced molecular membrane design that can provide atmospheric dewpoints as low as -40°F (-40°C). The MSD Series membrane dryer is available in 12 different models that can deliver compressed air at flow rates up to 21 SCFM with a -4°F (-20°C) atmospheric dewpoint. Wilkerson's membrane dryers are designed for easy installation, operation and long-term reliability.

Our compact, space saving membrane dryer design is compatible with our modular 18 and 28 Series coalescing filters, using our patented modular joiner set. A clean, dry air system is readily available by simply quick connecting our high efficiency coalescing filter to the membrane air dryer. Our innovative modular design eliminates the need for extra piping, adapters and fittings. The net result is an effective, quality, clean, dry air system that will provide low cost operation and minimal maintenance.

ADVANTAGES

- Available in 3/8, 1/2 NPT or BSPP-G port sizes
- Dried compressed air is immediate
- Compact modular design
- Simple and space-saving installation
- Low pressure drop

- No CFC's/FC's
- Suitable for hazardous areas
- No moving parts
- No electrical connection necessary
- No user purge adjustment
- Compatible with 18/28 Series modular product line

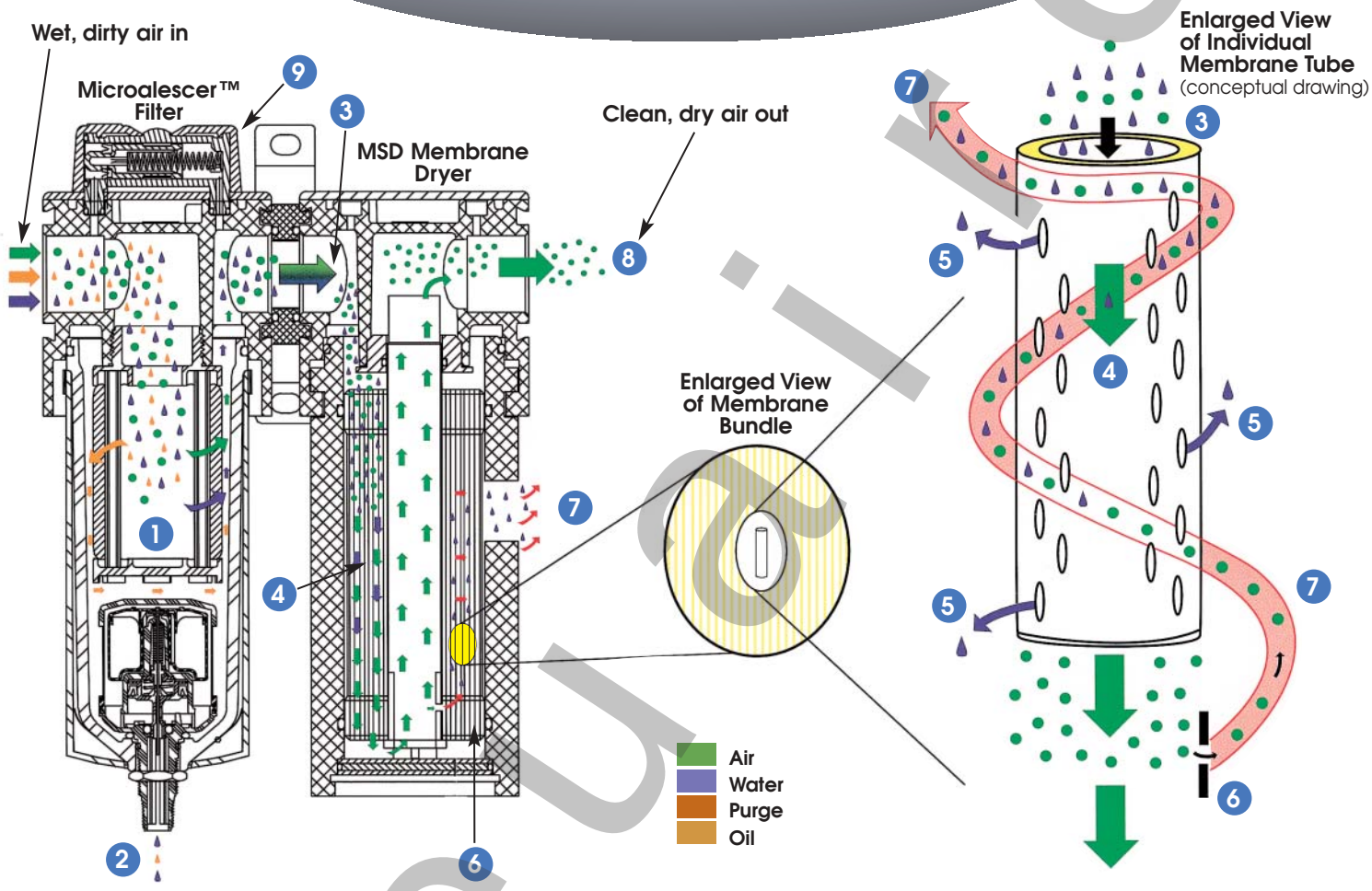
Wilkerson MSD Series

VERSATILE

Typical "Point of Use" Applications

RELIABLE

How the Wilkerson MSD Membrane Dryer Functions



To achieve optimum performance and high quality compressed air for your application, it is imperative to install a Wilkerson Microalescer™ filter with automatic drain. The coalescing-filter prevents dirt particles and oil and water aerosols from contaminating the membrane. This drawing illustrates a typical clean, dry air system.

HOW IT WORKS:

Dirty saturated air enters the Wilkerson coalescing micro-filter (1) where solid particles, liquids and aerosol contaminants are efficiently trapped. The coalesced oil and water is then discharged through the float-type automatic drain. (2)

The clean, saturated compressed air now enters the dryer (3) and goes into the module (4) that consists of a densely packed bundle of hollow fiber membranes. As the compressed air flows through the membranes, the water vapor diffuses through the walls of the membrane. (5) A portion of the dried air from the outlet of the cartridge (6) is diverted and expanded to atmospheric pressure for use as purge air. The purge air can be piped away using the optional exhaust pipe-away kit.

The counter flow purge air then sweeps over the outer surface of the hollow membrane fibers, removing the water molecules, where they are vented to atmosphere. (7) Clean, dry air is now supplied to the application. (8)

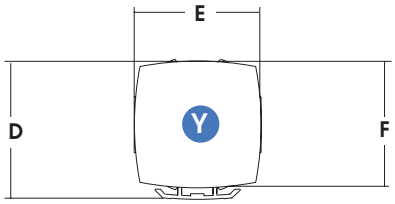
The principle of membrane dryer operation is very elementary. Saturated air has a higher partial vapor pressure than dry air. As a result, there is a constant migration of water molecules through the membrane (5) walls from inside the hollow fiber membrane, where you have wet compressed air, to outside, into the lower partial vapor pressure of the purge air stream.

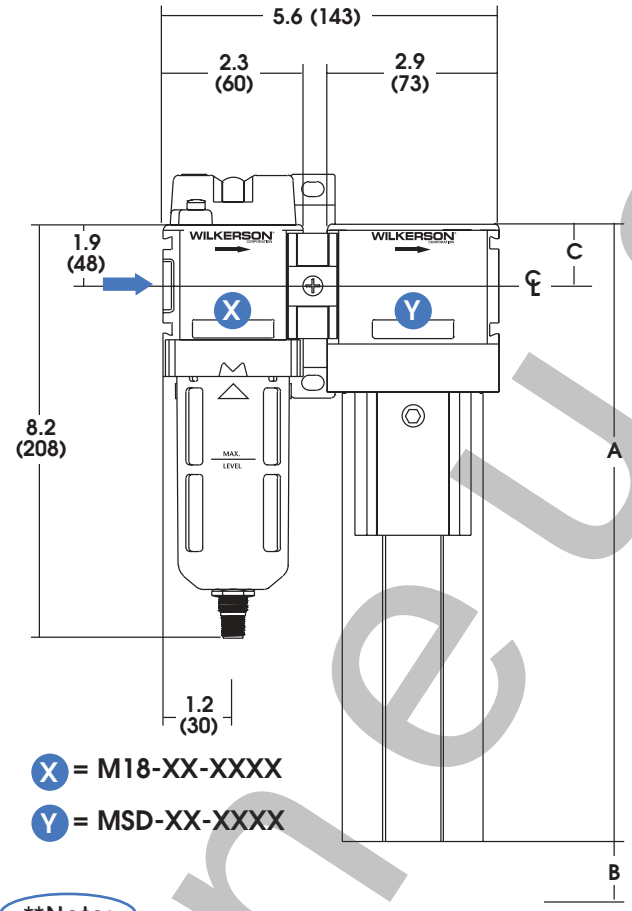
The MSD membrane air dryer is designed to operate continuously—24 hours per day, 7 days per week. The only maintenance required is changing the coalescing filter element when the standard pressure differential indicator (9) shows red. Due to our innovative quick disconnect bowl design, element change out is less than five minutes.

COMPACT

Example: Membrane Dryer, with M18 Coalescing Filter

Top View



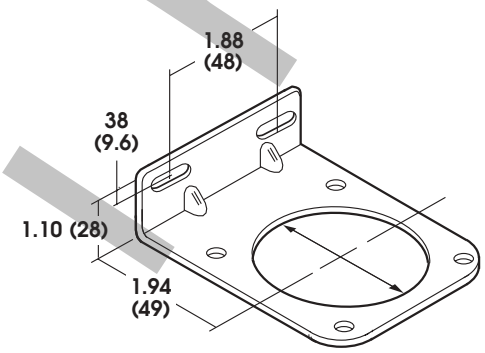


X = M18-XX-XXXX

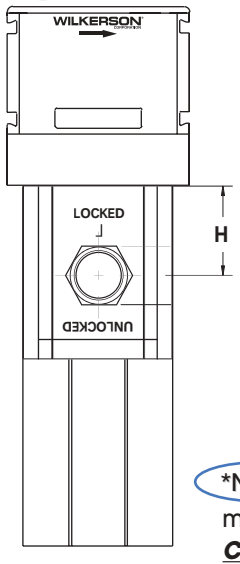
Y = MSD-XX-XXXX

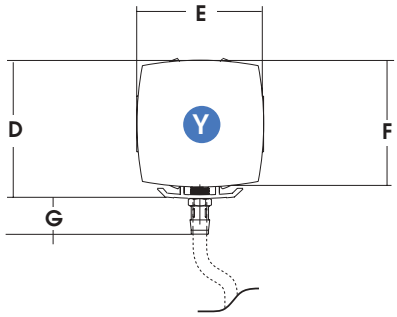
**Note: For optimum system design and maximum element life, Wilkerson suggests using an F18 Series 5 micron particulate prefilter in front of the M18 Coalescer.

MOUNTING BRACKET
GRP-96-638



OPTIONAL PURGE PIPE-AWAY FITTING KIT, INCLUDES LOCKING SILENCER





*Note: There is a 50 ft. (15.2 m) maximum tube length.
Caution: Do not restrict purge flow by kinking tubing.

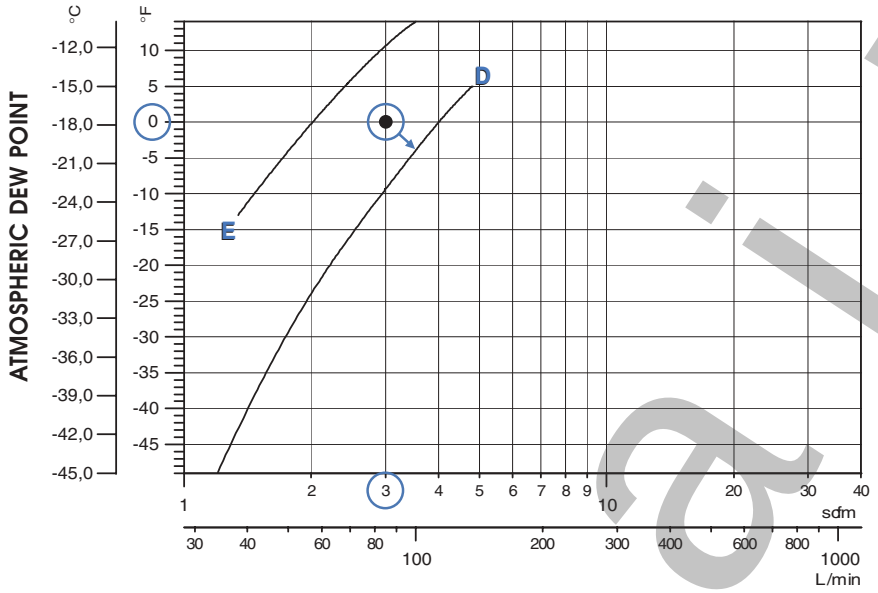
Dimensions

Model	Inches / mm	A	B*	C	D	E	F	G	H
MSD-XX-KA1X		7.6 193	1.7 42	1.0 26	— —	2.9 74	2.9 74	1.8 46	1.18 30
MSD-XX-KA2X		10.4 264	1.7 42	1.0 26	— —	2.9 74	2.9 74	1.8 46	1.18 30
MSD-XX-KB1X		11.9 302	2.3 57	1.0 26	3.1 79	2.9 74	2.9 74	1.8 46	2.79 71
MSD-XX-KB2X		14.7 373	2.3 57	1.0 26	3.1 79	2.9 74	2.9 74	1.8 46	2.79 71

*Bowl removal clearance

EFFICIENT

DEWPOINT AT VARIOUS FLOW RATES



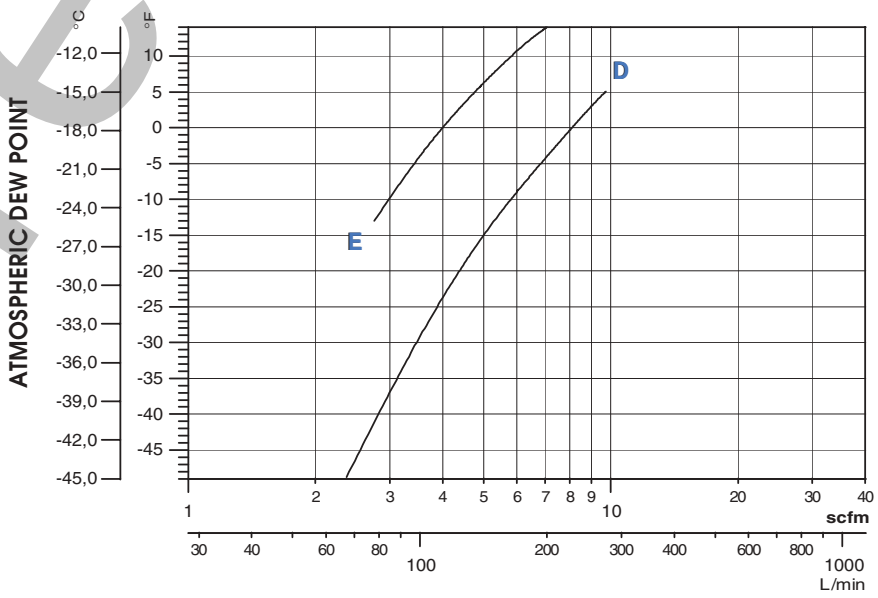
MSD-03-KA1D
MSD-03-KA1E

To read this graph:

Plot actual application point (dewpoint and adjusted flow rate) on chart.
Closest curve **DOWN and RIGHT** of point is correct model for application.

Example: 3 scfm @ 0°F ADP, Model MSD-03-KA1D is correct. (Refer to dryer selection instructions on inside back cover.)

MSD-03-KA2D
MSD-03-KA2E

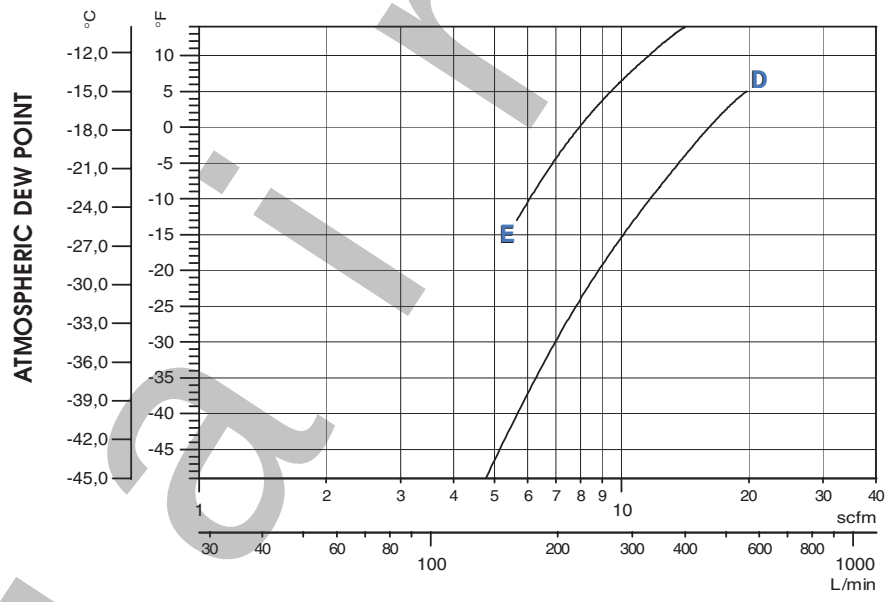


Tested according to ANSI/CAGI Standard ADF 700, ~ Membrane Compressed Air Dryers—Methods for Testing and Rating

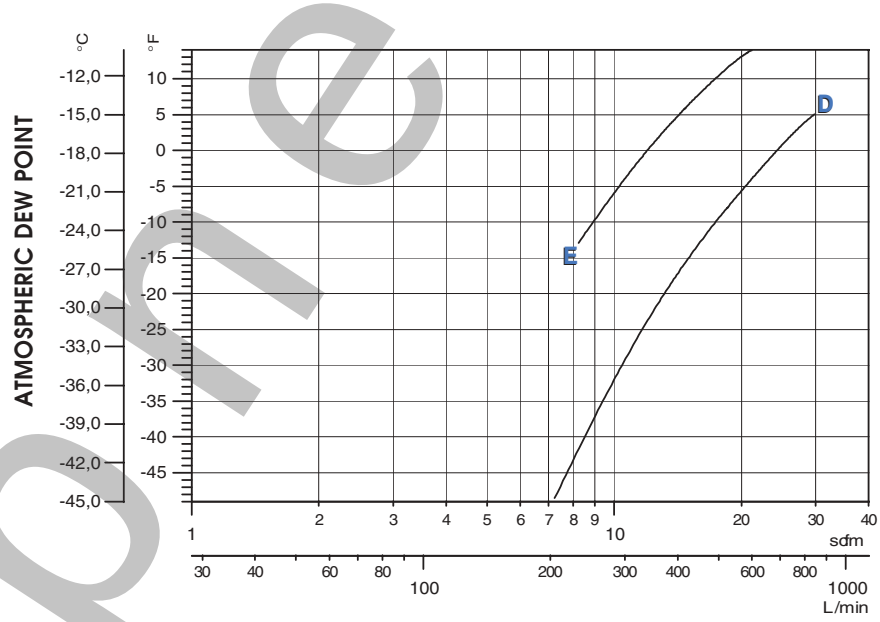
EFFICIENT

DEWPOINT AT VARIOUS FLOW RATES

MSD-03-KB1D
MSD-03-KB1E



MSD-03-KB2D
MSD-03-KB2E



EFFICIENT

MEMBRANE DRYER SPECIFICATIONS

ALL MODELS:

Min./Max. Inlet Air Temp.	40ºF (5ºC) to 125ºF (51ºC)
Ambient Temp. Range	40ºF (5ºC) to 125ºF (51ºC)
Min/Max. Inlet Pressure	60 psig (4,1 bar) - 150 psig (10,3 bar)
Compressed Air Requirement (@ dryer inlet)	ISO Class 1, — , 1* (0.01 micron coalescing)
Inlet/Outlet Size (NPT, BSPP-G)	3/8, 1/2
Materials of Construction	Body - Zinc Bowl - Aluminum Seals - Nitrile

PRODUCT SPECIFIC:

Model Number	MSD-XX-KA1E	MSD-XX-KA2E	MSD-XX-KB1E	MSD-XX-KB2E
Max. Pressure Drop**	1.45 psi	1.45 psi	3.9 psi	4.35 psi
	(0,099 bar)	(0,099 bar)	(0,269 bar)	(0,299 bar)
Shipping Weight lbs. (kg)	3.1 (1,4)	3.5 (1,6)	4.2 (1,9)	5.3 (2,4)
MSD Purge Pipe-Away Kit	MSD-97-103	MSD-97-103	MSD-97-104	MSD-97-104
MSD Replacement Barbed Fitting Kit	← MSD-97-105 →			

*ISO Standard 8573-1: 1991 (E), pertaining to maximum particle size and concentration of solid contaminants, and maximum oil content.

**Note: Refer to catalog 9EM-TK-190 for performance curves of the M-Series Filters.

HOW TO SELECT YOUR MEMBRANE DRYER KIT

MODEL NUMBER

M S D — 0 3 — K A 1 E

MODEL NUMBER
MSD — MEMBRANE SUPER DRYER

THREAD TYPE
Ø = NPT
C = BSPP-G

PORT SIZE
3 = 3/8
4 = 1/2

OPTIONS
K = No Prefilter
C = With Prefilter Plastic Bowl/Bowl Guard, Auto Drain

Refer to Table A for Dew Point and Flow Capacity Selection. Last three positions of Model numbers are determined by selection of dryer in table A

(see next page)

INSTRUCTIONS

DRYER SELECTION

Table A: MEMBRANE DRYER FLOW CAPACITIES

Model Number	ADP1 °F (°C)	Outlet Air Flow2 scfm (L/min)	Purge Flow scfm (L/min)	Required Inlet Flow3 scfm (L/min)
MSD-03-KA1E	-4 (-20)	1.8 (50)	0.3 (8)	2.1 (58)
MSD-03-KA2E	-4 (-20)	3.5 (100)	0.5 (14)	4.0 (114)
MSD-03-KB1E	-4 (-20)	7.1 (200)	1.1 (30)	8.8 (230)
MSD-03-KB2E	-4 (-20)	10.6 (300)	1.6 (44)	12.2 (344)
MSD-03-KA1D	-4 (-20)	3.5 (100)	0.9 (25)	4.4 (125)
MSD-03-KA2D	-4 (-20)	7.1 (200)	1.8 (50)	8.9 (250)
MSD-03-KB1D	-4 (-20)	14.1 (400)	3.5 (100)	17.6 (500)
MSD-03-KB2D	-4 (-20)	21.2 (600)	5.3 (150)	26.5 (750)
MSD-03-KA1D	-40 (-40)	1.4 (40)	0.9 (25)	2.3 (65)
MSD-03-KA2D	-40 (-40)	2.8 (80)	1.8 (50)	4.6 (130)
MSD-03-KB1D	-40 (-40)	5.7 (160)	3.5 (100)	9.2 (260)
MSD-03-KB2D	-40 (-40)	8.5 (240)	5.3 (150)	13.8 (390)

[1] Atmospheric Dew Point

[2] Flow rates based on: 100 psig (6,9 bar) inlet, 77°F (25° C) inlet air temperature, and 77° F (25° C) ambient temperature. Tested according to ANSI/CAGI Standard ADF 700

[3] Required inlet flow is combined outlet flow plus purge flow

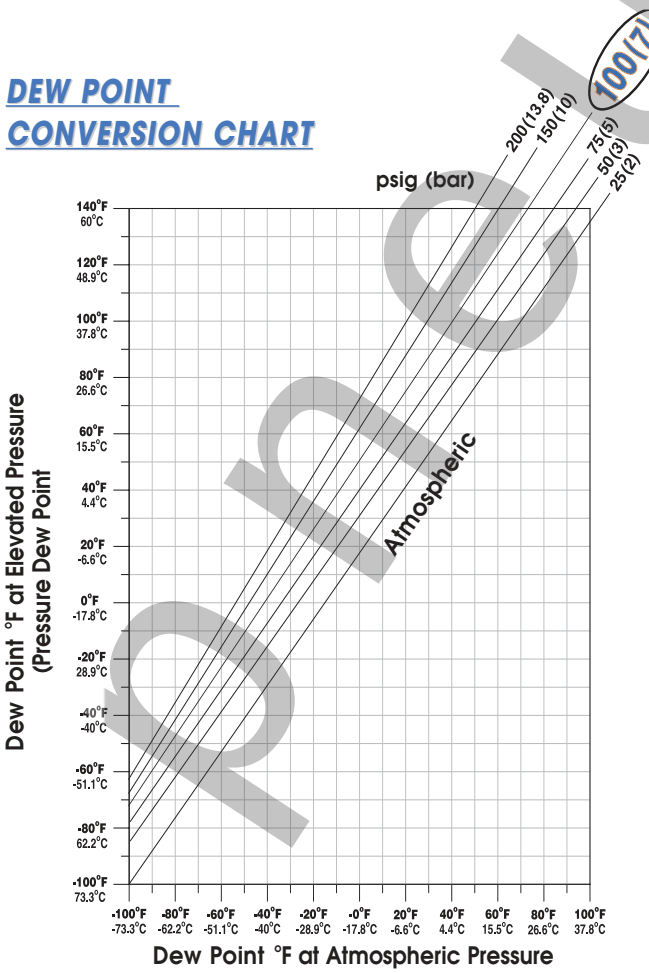
Table B: Pressure Correction Factors (all models)

Inlet Pressure psig (bar)	Multiply outlet flow by:
60 (4,1)	1.82
80 (5,5)	1.30
100 (6,9)	1.00
120 (8,3)	0.83
140 (9,6)	0.74
1.35 (10,3)	0.67

Table C: Inlet Air Temperature Correction Factors

Inlet Temp °F (°C)	-40°F (-40°C) ADP	-4°F (-20°C) ADP
	Multiply outlet flow by:	
41 (5)	0.78	0.78
59 (15)	0.89	0.89
77 (25)	1.00	1.00
95 (35)	1.11	1.11
113 (45)	1.23	1.23
122 (50)	1.30	1.30

DEW POINT CONVERSION CHART

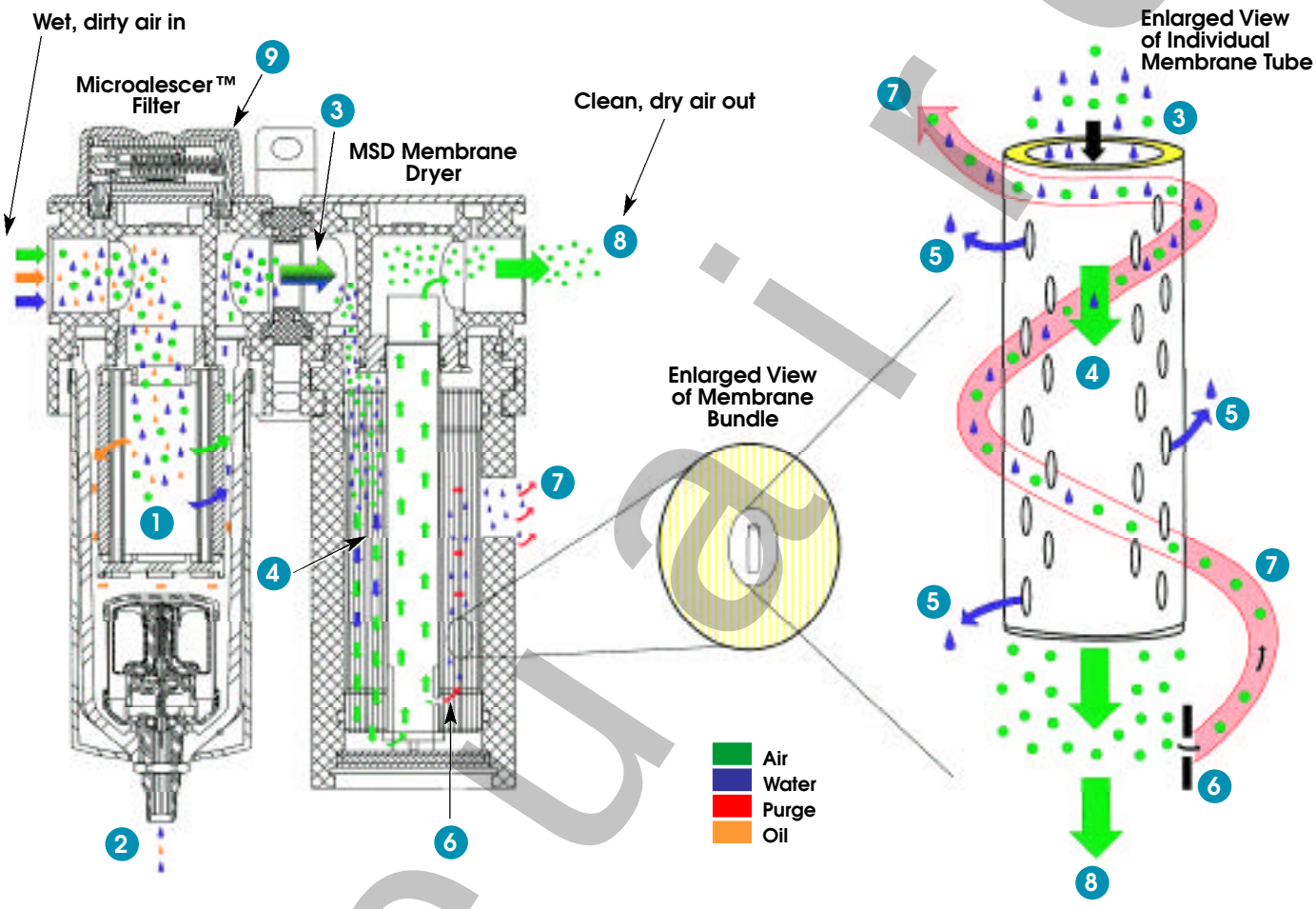


TO SELECT A DRYER FOR YOUR APPLICATION:

The outlet flows in Table A are based on 100 psig (6,9 bar) inlet pressure, and 77°F (25°C) inlet air temperature. For proper model selection in your specific application, you must adjust the outlet air flow requirement for the actual inlet air temperature and pressure where the dryer will be installed. This is accomplished by using the correction factors found in Tables B and C (above). ***FOR EXAMPLE:*** I have an application which requires a -4°F atmospheric dew point, 8 scfm (226L/min) of air (this would be dryer outlet flow), system pressure (dryer inlet pressure) at 140 psig (9,6 bar), and inlet air temperature of 95°F (35°C) ***TO ADJUST FOR PRESSURE:*** Take the 8 scfm (226L/min) air flow, and from Table B, ***MULTIPLY*** by 1.35, which equals 10.8 scfm (306L/min). ***THEN, TO ADJUST FOR TEMPERATURE:*** Take the 10.8 scfm (306L/min) and from Table C, ***MULTIPLY*** by 0.9, which equals 9.72 scfm (275L/min), ***which is the ADJUSTED OUTLET AIR FLOW REQUIREMENT FOR THE APPLICATION.*** **From Table A, the model which would be best suited for this application is the MSD-03-KB2E, which has an outlet air flow of 10.6 scfm (300L/min). On the same line, you will see the purge at rated flow is 1.6 scfm (44L/min)., and the TOTAL INLET FLOW REQUIRED (outlet + purge) is 12.2 scfm (344L/min) for this model.** Please contact Applications Engineering if your application cannot be adjusted using these tables.

MSD Membrane Dryers

How the Wilkerson MSD membrane dryer functions



To achieve optimum performance and high quality compressed air for your application, it is imperative to install a Wilkerson Microalescer™ filter with automatic drain. The coalescing-filter prevents dirt particles and oil and water aerosols from contaminating the membrane. This drawing illustrates a typical clean, dry air system.

How it Works:

Dirty saturated air enters the Wilkerson coalescing micro-filter (1) where solid particles, liquids and aerosol contaminants are efficiently trapped. The coalesced oil and water is then discharged through the float-type automatic drain. (2)

The clean, saturated compressed air now enters the dryer (3) and goes into the module (4) that consists of a densely packed bundle of hollow fiber membranes. As the compressed air flows through the membranes, the water vapor diffuses through the walls of the membrane. (5) A portion of the dried air from the outlet of the cartridge (6) is diverted and expanded to atmospheric pressure for use as purge air.

The counter flow purge air then sweeps over the outer surface of the hollow membrane fibers, removing the water molecules, where they are vented to atmosphere (7) .Clean,dry air is now supplied to the application. (8)

The principle of membrane dryer operation is very elementary. Saturated air has a higher partial vapor pressure than dry air. As a result, there is a constant migration of water molecules through the membrane (5) walls from inside the hollow fiber membrane, where you have wet compressed air, to outside, into the lower partial vapor pressure of the purge air stream.

The MSD membrane air dryer is designed to operate continuously—24 hours per day, 7 days per week. The only maintenance required is changing the coalescing filter element when the standard pressure differential indicator (9) shows red. Due to our innovative quick disconnect bowl design, element change out is less than five minutes.

WILKERSON

How to Select Your Membrane Dryer

MODEL NUMBER

M	S	D	—	0	3	—	K	A	1	E

- **MODEL NUMBER**: MSD — MEMBRANE SUPER DRYER
- **THREAD TYPE**: Ø = NPT; C = BSPP-G
- **PORT SIZE**: 3 = 3/8; 4 = 1/2
- **OPTIONS**: K = No Prefilter; C = With Prefilter Plastic Bowl/Bowl Guard, Auto Drain

Refer to Table A for Dew Point and Flow Capacity Selection. Last three positions of Model numbers are determined by selection of dryer in table A

Table A:
MEMBRANE DRYER FLOW CAPACITIES

Model Number	ADP[1] °F (°C)	Outlet Air Flow[2] scfm (L/min)	Purge flow scfm (L/min)	Required Inlet Flow[3] scfm (L/min)
MSD-03-KA1E	-4 (-20)	1.8 (50)	0.3 (8)	2.1 (58)
MSD-03-KA2E	-4 (-20)	3.5 (100)	0.5 (14)	4.0 (114)
MSD-03-KB1E	-4 (-20)	7.1 (200)	1.1 (30)	8.2 (230)
MSD-03-KB2E	-4 (-20)	10.6 (300)	1.6 (44)	12.2 (344)
MSD-03-KA1D	-4 (-20)	3.5 (100)	0.9 (25)	4.4 (125)
MSD-03-KA2D	-4 (-20)	7.1 (200)	1.8 (50)	8.9 (250)
MSD-03-KB1D	-4 (-20)	14.1 (400)	3.5 (100)	17.6 (500)
MSD-03-KB2D	-4 (-20)	21.2 (600)	5.3 (150)	26.5 (750)
MSD-03-KA1D	-40 (-40)	1.4 (40)	0.9 (25)	2.3 (65)
MSD-03-KA2D	-40 (-40)	2.8 (80)	1.8 (50)	4.6 (130)
MSD-03-KB1D	-40 (-40)	5.7 (160)	3.5 (100)	9.2 (260)
MSD-03-KB2D	-40 (-40)	8.5 (240)	5.3 (150)	13.8 (390)

[1] Atmospheric Dew Point

[2] Flow rates based on: 100 psig (6,9 bar) inlet, 77° F (25° C) inlet air temperature, and 77° F (25° C) ambient temperature. Tested according to ANSI/CAGI Standard ADF 700

[3] Required inlet flow is combined outlet flow plus purge flow

Table B:
Pressure Correction Factors (all models)

Inlet Pressure psig (bar)	Multiply outlet flow by:
60 (4,1)	1.82
80 (5,5)	1.33
100 (6,9)	1.00
120 (8,3)	0.83
140 (9,6)	0.74
150 (10,3)	0.67

Table C:
Inlet Air Temperature Correction Factors

Inlet Temp °F (°C)	-40°F(-40°C) ADP	-4°F(-20°C) ADP
	Multiply outlet flow by:	
41 (5)	0.78	0.77
59 (15)	0.89	0.80
77 (25)	1.00	1.00
95 (35)	1.11	1.18
113 (45)	1.23	1.33
122 (50)	1.30	1.43

TO SELECT A DRYER FOR YOUR APPLICATION:

The outlet flows in Table A are based on 100 psig (6,9 bar) inlet pressure,and 77°F (25°C) inlet air temperature.For proper model selection in your specific application, you must adjust the outlet air flow requirement for the actual inlet air temperature and pressure where the dryer will be installed. This is accomplished by using the correction factors found in Tables B and C (above). ***FOR EXAMPLE:*** I have an application which requires a -40°F (-40°C) atmospheric dew point, 6 scfm(170 L/min) of air (this would be application consumption), system pressure (dryer inlet pressure) at 140 psig (9,6 bar),and an inlet air temperature of 95°F (35° C). ***TO ADJUST FOR PRESSURE:*** Take the 6 scfm (170 L/min) application air flow, and from Table B, ***MULTIPLY*** by 0.74, which equals 4.44 scfm (126 L/min). ***TO ADJUST FOR TEMPERATURE:*** Take the resulting 4.44 scfm (126 L/min) pressure-adjusted air flow from the above calculation,and from Table C, ***MULTIPLY*** by 1.11,giving 4.93 scfm (140 L/min). **This is the NORMALIZED AIR FLOW RATE for the application.The Outlet Air Flow Capacity from Table A for the selected membrane dryer must meet or exceed the Normalized Air Flow Rate so calculated for the prescribed atmospheric dew point to be attained.**

From Table A, the model which would be best suited for this application is the MSD-03-KB1D, which has an outlet air flow of 5.7 scfm (160 L/min).

On the same line, you will see the purge at 100 psig is 3.5 scfm (100L/min) and the TOTAL INLET FLOW REQUIRED (outlet + purge) is 9.2 scfm (260 L/min) for this model. Please contact Applications Engineering if your application cannot be adjusted using these tables.

9CW-YG-244 8/99