

A-4400 Series Refrigerated Air Dryers for Pneumatic Control Systems

The A-4400 Series Refrigerated Air Dryers are designed for continuous operation to supply dry air to pneumatic control systems. All components are selected and assembled to provide dependable service over a long period of time with a minimum amount of maintenance. The air dryer uses R-134a refrigerant, an environmentally friendly HFC, minimizing the risks and/or costs associated with use and disposal of refrigerants.



Figure 1: A-4400 Series Refrigerated Air Dryer with Optional Factory Mounted Air Purification System



Figure 2: A-4400 Series Refrigerated Air Dryer without Optional Factory Mounted Air Purification System

Features and Benefits	
<p><input type="checkbox"/> Superior Part Load Performance</p>	<p>Dew point remains steady as air consumption and cooling loads decrease, ensuring consistent water removal performance at all conditions including critical low-load operating points (without threat of unit freeze-up).</p> <p>Evaporator design eliminates the need for, and maintenance of, a hot gas bypass valve.</p>
<p>Continued on next page . . .</p>	

Features and Benefits (Cont.)	
<input type="checkbox"/> Available with Optional Factory Mounted Air Purification System	<p>Particle filter (standard)/coalescing filter/activated carbon filter/service bypass valve/pressure reducing valve combination provides precise, clean, dry, oil-free air, enabling the control system to operate at peak performance.</p> <p>Full instrumentation including coalescing filter pressure drop indicator, refrigerant and air pressure gauges, and power on/fail lamp simplifies operation and maintenance with quick and easy visual identification of unit performance.</p> <p>Minimizes installation time via factory mounting and piping of all components, including service bypass valve.</p>
<input type="checkbox"/> Available in Three Flow Capacity Sizes Utilizing One Universal Cabinet; UL Listed for US and Canada	<p>Allows application flexibility to minimize cost.</p> <p>Standardized design with common footprint.</p>
<input type="checkbox"/> Uses R-134a Refrigerant	<p>Environmentally friendly HFC, minimizes risks/costs associated with use and disposal of refrigerants.</p>

Product Overview

Six variations of A-4400 Series Refrigerated Air Dryers are available with flow capacities of 12, 17, and 23 scfm (5.7, 8.0, and 10.9 L/s). Models can be ordered with an optional factory mounted Air Purification System consisting of a coalescing oil removal filter with integral pressure drop indicator, packed column type activated carbon oil vapor removal filter, service bypass valve, pressure reducing valve, safety relief valve, and power on/fail lamp. On models featuring an Air Purification System, a low pressure gauge is furnished on the reducing valve to provide output pressure indication. Refer to Table 1 for a comprehensive listing of refrigerated air dryers available.

As outlined in *Product Data A-4000* and the *Installation and Service Manual for PureFlow™ Air Compressors (Publication No. 2629)*, clean, dry, oil-free air is essential to any pneumatic control system. Existence of water, oil, and/or particulate in air lines and instruments can cause instrument calibration to drift, often

leading to equipment failure. For A-4400 Series Refrigerated Air Dryers not equipped with an optional factory mounted Air Purification System, a properly configured air supply system must include a coalescing oil removal filter as well as an activated carbon oil vapor removal filter.

All A-4400 Series Refrigerated Air Dryers feature a hermetically sealed compressor, heat exchanger, and automatic condensate drain trap. An insulating sleeve, that easily slips on and off, covers the automatic condensate drain trap to eliminate external condensation. An evaporator pressure gauge and the automatic condensate drain trap with particle filter are internally mounted and are easily accessible through the end of the unit. All refrigerated air dryers also include a standard cord and plug for 115 volt 60 Hz, single-phase electrical service. Where permanent wiring is required, the cord is easily removed and conduit may be used.

Table 1: Ordering Data

Code Number	Flow Capacity at Rated Condition* scfm (L/s)	Air Purification System	Shipping Weight lb**
A-4412-1	12 (5.7)	Yes	72
A-4412-2	12 (5.7)	No	67
A-4417-1	17 (8.0)	Yes	78
A-4417-2	17 (8.0)	No	73
A-4423-1	23 (10.9)	Yes	78
A-4423-2	23 (10.9)	No	72

* The rated condition is 20 psig (140 kPa) supply pressure, 100°F (38°C) saturated inlet air temperature, 100°F ambient temperature, and 80 psig inlet pressure.

** lb x 0.454 = kg

Table 2: Cross-Reference Guide

Refrigerated Air Dryer Configuration	12 scfm (5.7 L/s) Flow Capacity with Air Purification System	12 scfm (5.7 L/s) Flow Capacity without Air Purification System	17 scfm (8.0 L/s) Flow Capacity with Air Purification System	17 scfm (8.0 L/s) Flow Capacity without Air Purification System	23 scfm (10.9 L/s) Flow Capacity with Air Purification System	23 scfm (10.9 L/s) Flow Capacity without Air Purification System
Johnson Controls	A-4412-1	A-4412-2	A-4417-1	A-4417-2	A-4423-1	A-4423-2
Hankison	8010	8010	8015	8015	8025	8025
Robertshaw	2815-201	2815-001	--	2815-003	--	2815-004
Honeywell	HKN8010B HKN8210B WLKA00AHC6 6	AK3480H HKN8010A KNE10 WLKA00AHA6 6	--	AK3481 AK3479 HKNE-15 HKN8015A	--	HKN8025A
Wilkerson	A00-AH-P00 A01-AH-P00 T01-AH-P0L	4302-5 A00-AH-000 A01-AH-000 H01-AH-000 T01-AH-P0K	A02-AH-P00	4302-10 A02-AH-000 H02-AH-000	--	4302-15 H03-AH-000
SpeedAire	--	3Z528	--	3Z529	--	3Z530
Norgren	--	60-010-996 D10-100-0005 D10-100-0010 D11-010-1DA3	--	D10-100-0015 D11-015-1DA3	--	D10-100-0020
Curtis-Toledo	--	CDP10	--	CDP18	--	CDP25
Ingersoll-Rand	--	HG10	--	HG15	--	HG25
Discontinued Johnson Controls	A-4110-1 A-4312-1	A-4110-3 A-4110-6 A-4312-2	A-4317-1	A-4317-2	A-4210-1 A-4210-5 A-4323-1	A-420-1 A-421-1 A-4210-3 A-4210-6 A-4323-2

Service Bypass Valve

A service bypass valve is furnished on all A-4400 Series Refrigerated Air Dryers equipped with an optional factory mounted Air Purification System, in order to make it possible to service the oil removal filters or the heat exchanger section of the air dryer without interrupting the control system air supply. Depressing the bypass valve plunger causes the

air supply to bypass the oil removal filters and evaporator, and flow directly through the pressure reducing valve. An automatic pressure bleed is incorporated in the bypass position to relieve the pressure for safe removal and service of the oil removal filters and the components housed within the dryer cabinet (as illustrated in Figures 3 and 4).

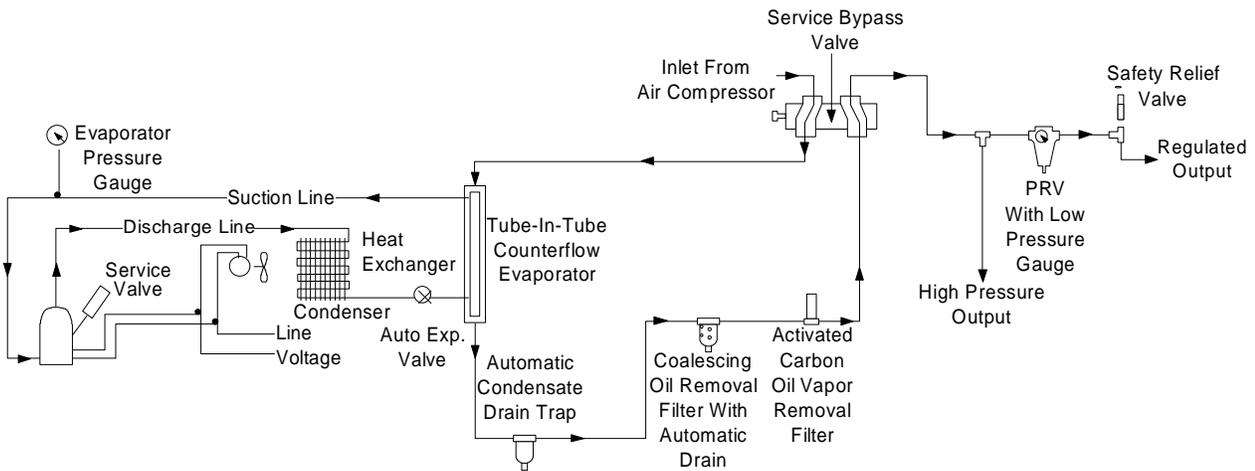


Figure 3: Schematic of A-4400 Series Refrigerated Air Dryer with Service Bypass Valve Positioned for Normal Operation (Shown with Optional Factory Mounted Air Purification System)

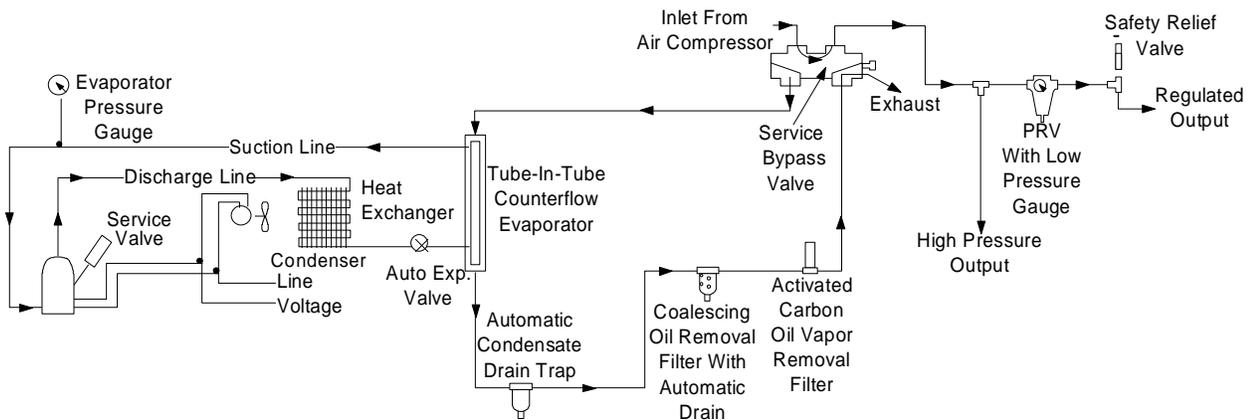
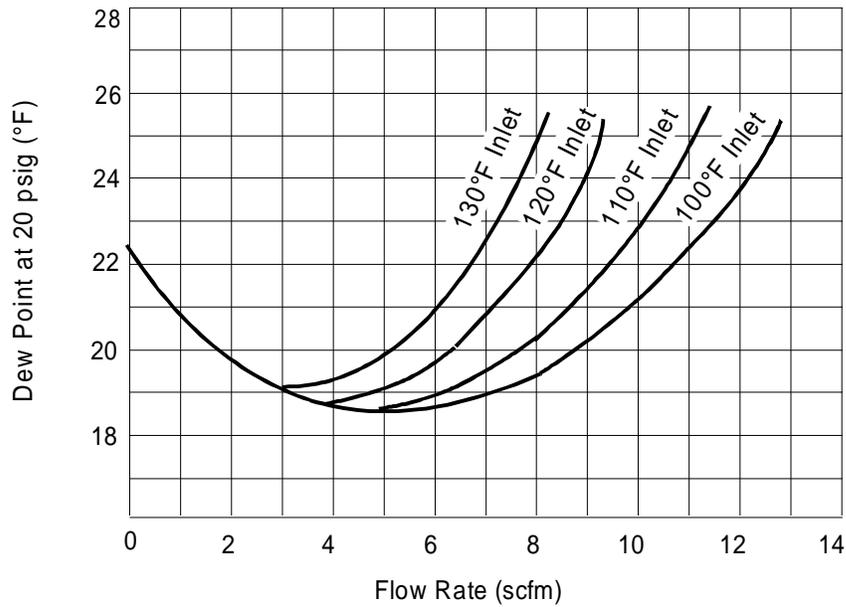


Figure 4: Schematic of A-4400 Series Refrigerated Air Dryer with Service Bypass Valve in Bypass Position (Shown with Optional Factory Mounted Air Purification System)

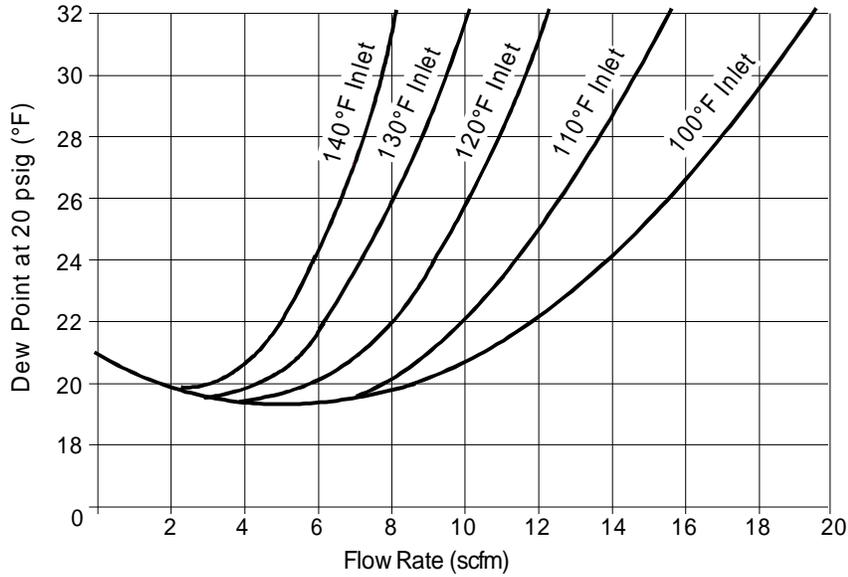
Table 3: Inlet Pressure Correction Factors for Dew Point (See Figures 5, 6, and 7.)

Inlet Pressure psig (kPa)	Change In Dew Point F° (C°)	Inlet Pressure psig (kPa)	Change In Dew Point F° (C°)
70 (490)	+2.5 (+1.4)	110 (770)	-6.5 (-3.6)
80 (560)	0 (0)	120 (840)	-8.5 (-4.7)
90 (630)	-2.5 (-1.4)	130 (875)	-11.0 (-6.1)
100 (700)	-4.5 (-2.5)	--	--



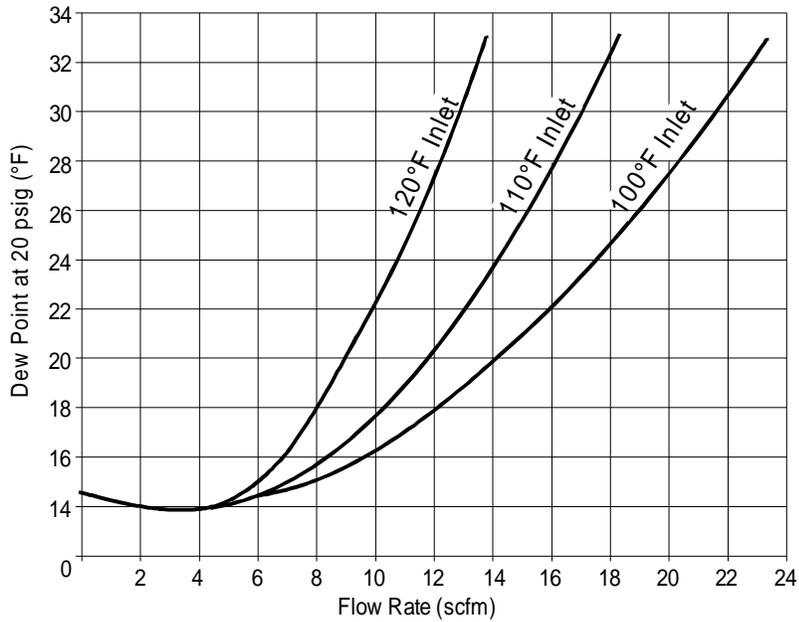
**Figure 5: A-4412-1 and A-4412-2
Dew Point vs. Flow Rate**

(At 20 psig supply pressure, 100°F ambient temperature, and 80 psig inlet pressure; for ambient temperatures above 100°F, consult a Johnson Controls representative.)



**Figure 6: A-4417-1 and A-4417-2
Dew Point vs. Flow Rate**

(At 20 psig supply pressure, 100°F ambient temperature, and 80 psig inlet pressure; for ambient temperatures above 100°F, consult a Johnson Controls representative.)



**Figure 7: A-4423-1 and A-4423-2
Dew Point vs. Flow Rate**

(At 20 psig supply pressure, 100°F ambient temperature, and 80 psig inlet pressure; for ambient temperatures above 100°F, consult a Johnson Controls representative.)

/ Installation

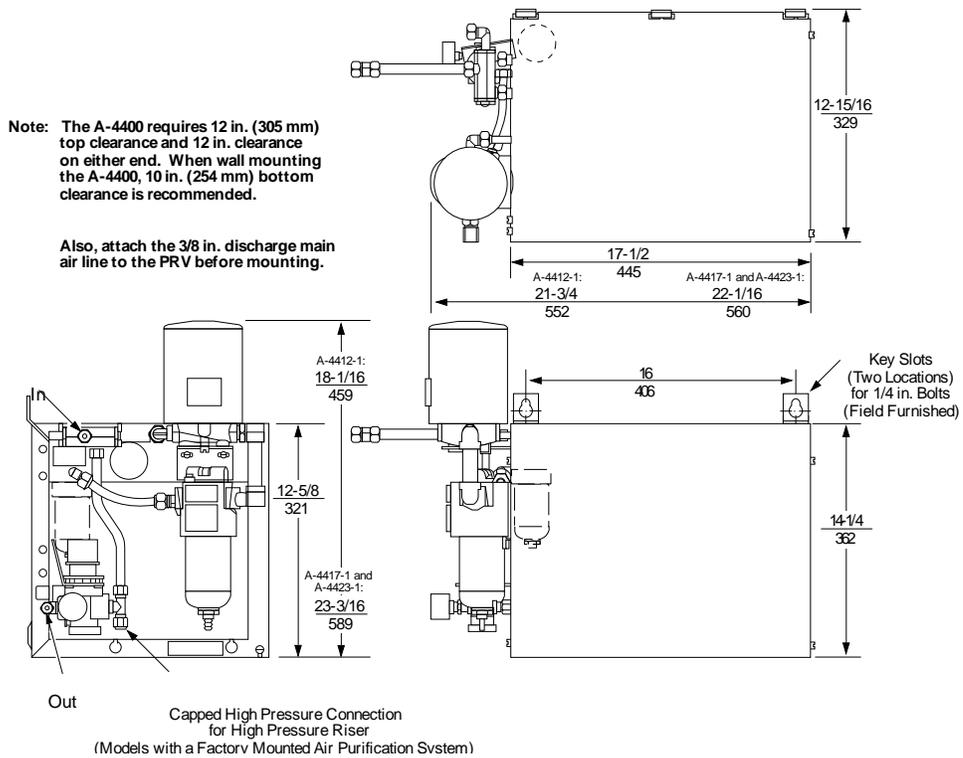
The A-4400 Series Refrigerated Air Dryer must be located in an open area that will permit free circulation of air through the ends of the unit. The A-4400 requires 12 in. (305 mm) top clearance (as measured from the top of the cabinet) and 12 in. clearance at either end. When the unit is wall mounted, it is recommended that there also be 10 in. (254 mm) bottom clearance.

Two key slots are provided at the rear of the A-4400 for wall mounting the unit. These key slots can be hand adjusted approximately 1/2 in. (13 mm) if needed when hanging the unit on the appropriate mounting bolts (field furnished). Refer to Figure 8 for space requirements and additional mounting details.

After the A-4400 has been mounted in place, connect a suitable drain line to both the automatic condensate drain trap and the coalescing oil removal filter. Tighten the drain line fitting at both locations to secure the drain line in place. Refer to Figure 9 for location of the drain trap and the coalescing oil removal filter.

Note: Since condensate may contain entrained oil, be certain to dispose of this waste properly, in accordance with local, state, and federal regulations.

Refer to the *A-4400 Series Technical Bulletin* in the *Pneumatic Air Supply Manual (FAN 718)* for additional installation and maintenance procedures including comprehensive wiring instructions.



**Figure 8: A-4400 Series Refrigerated Air Dryer
Shown with Optional Factory Mounted Air Purification System**

Dimensions $\frac{\text{in.}}{\text{mm}}$

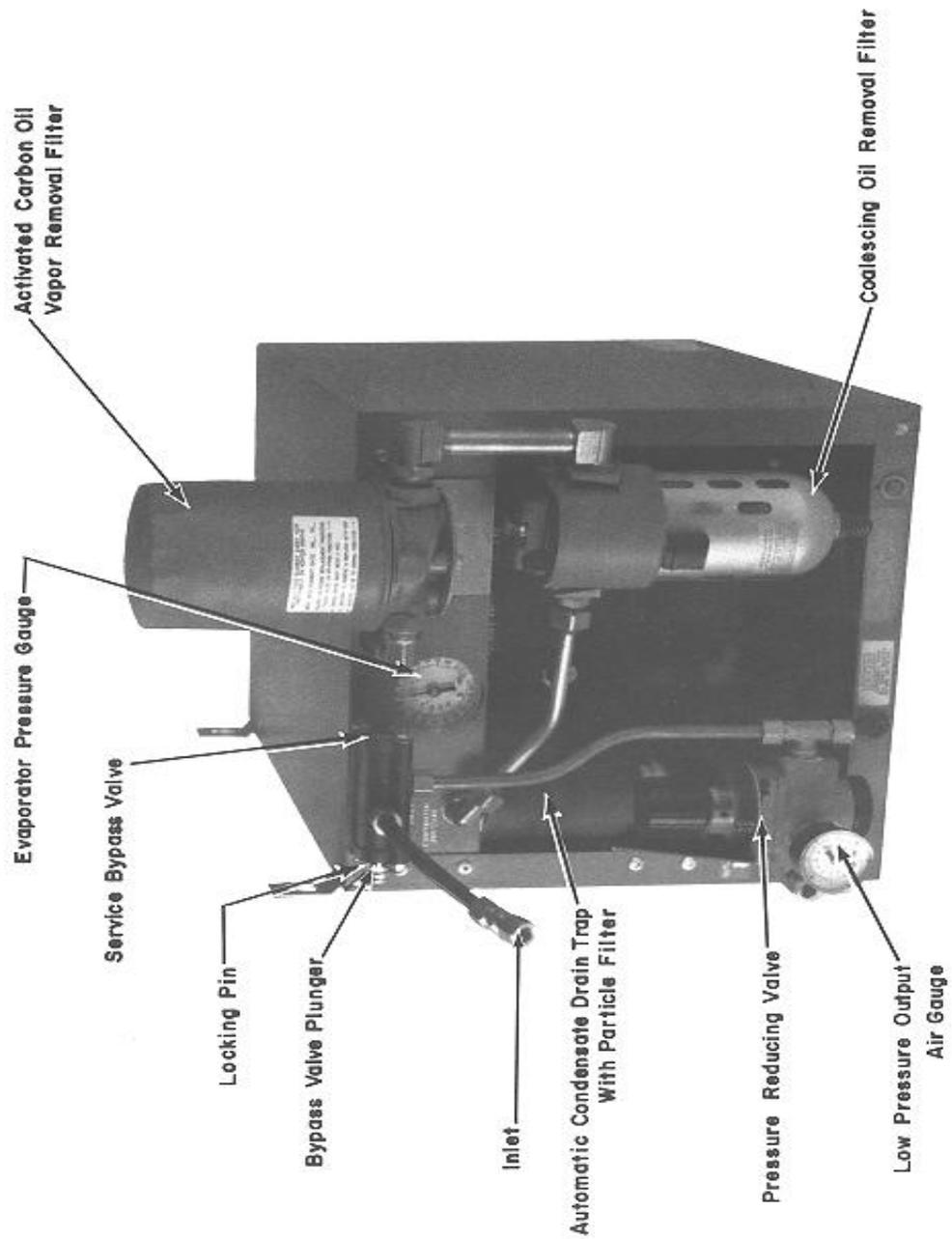


Figure 9: Front View of A-4400 Series Refrigerated Air Dryer

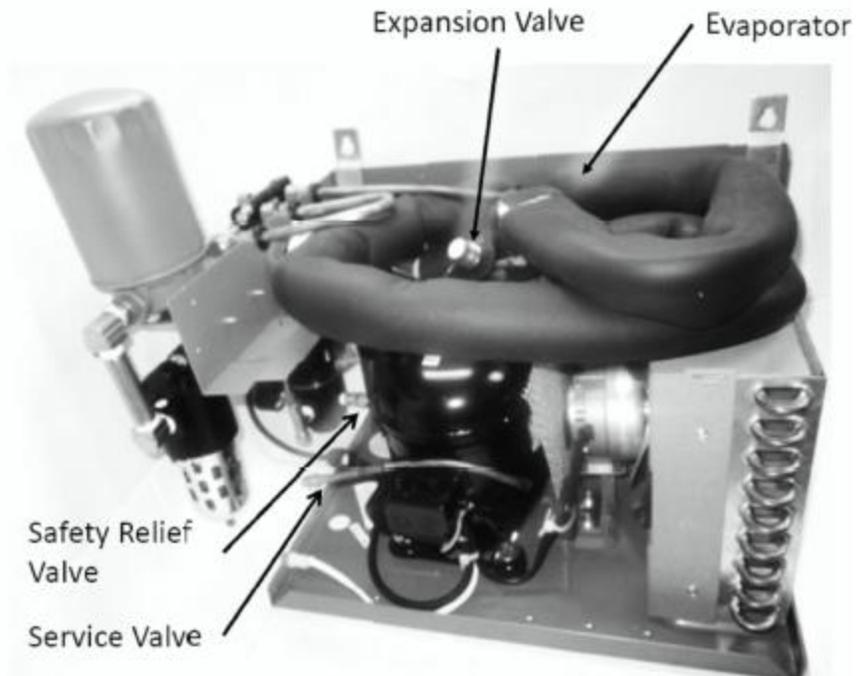


Figure 10: A-4400 Series Refrigerated Air Dryers with Cover Removed

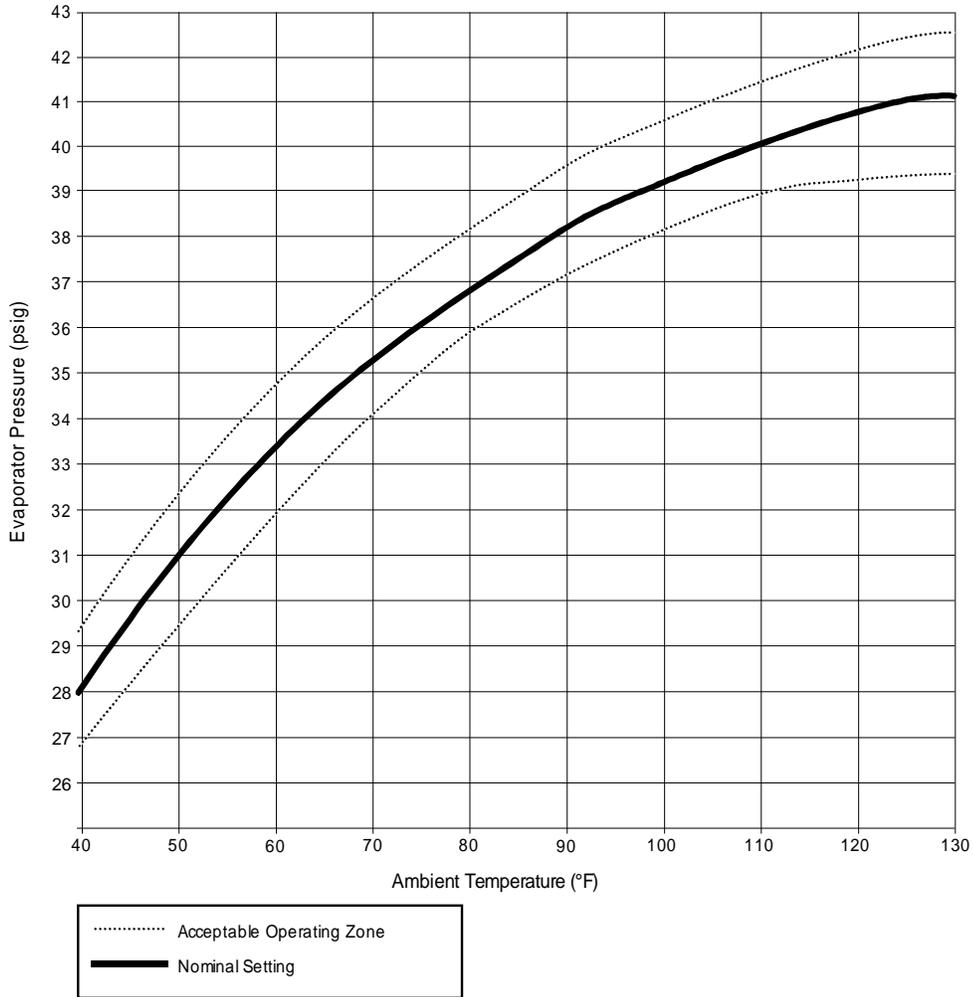


Figure 11: Evaporator Pressure vs. Ambient Temperature (Sea Level--No Load Condition)

Evaporator Pressure Correction

Variations in the evaporator absolute pressure due to altitude will not show up on the evaporator pressure gauge, making it necessary to readjust the expansion valve using an adjusted gauge pressure.

For altitudes from 1500 to 5000 ft, increase the expansion valve setting by 2.5 psig (17.5 kPa), and for altitudes over 5000 ft, increase the expansion valve setting by 4.0 psig (28 kPa). This increase in evaporator pressure must be added to the value determined in Figure 11 to account for altitude effects. Refer to the *A-4400 Series Technical Bulletin* in the *Pneumatic Air Supply Manual (FAN 718)* for additional information.

Example:

If:

Altitude = 4,000 ft above sea level
 Ambient temperature = 80°F
 Evaporator pressure gauge reading at no load condition = 35 psig

Then:

Corrected evaporator pressure =
 35 psig + 2.5 psig = 37.5 psig

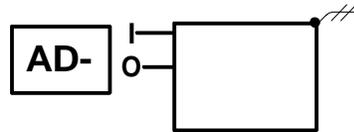
Guide Specification

The air dryer shall be of the refrigeration type, designed for continuous operation and sized to reach a maximum dew point of 30°F (0°C) at 20 psig (140 kPa) at expected air flow rates and ambient temperature conditions (100°F saturated inlet air temperature, 100°F ambient air temperature, and 80 psig inlet pressure). The refrigeration system shall operate on HFC R-134a refrigerant.

For proper removal of water, oil, and particulate, the air dryer shall be furnished with a complete Air Purification System consisting of a service bypass valve, automatic condensate drain trap with integral particle filter, coalescing oil removal filter, activated carbon oil vapor removal filter,

and pressure reducing valve. Visual indication of dryer operation shall be provided by means of a power on/fail lamp, refrigerant and air pressure gauges, and a coalescing filter pressure drop indicator.

Application and Drawing Identification



See Beims 45-2.03-1.

Specifications

Product	A-4400 Series Refrigerated Air Dryers
Models	Included in Table 1
Electrical Rating	115 Volt 60 Hz, Single-phase Electrical Service
Current Draw	5.75 Amperes
Refrigerant	R-134a (HFC)
Compressor	Hermetically Sealed
Agency Listings	UL Listed, cUL Listed, Category Code SROT, File SA8490
Ambient Operating Temperature Limits	40 to 115°F (4 to 46°C) with maximum dew point of 86°F (30°C), non-condensing. If operation is outside the ambient temperature limits, refer to the <i>Commissioning</i> section of the <i>A-4400 Technical Bulletin</i> for additional information.
Ambient Storage Temperature Limits	-40 to 140°F (-40 to 60°C)
Maximum Flow Rate	As Illustrated in Figures 5 through 7.
Pressure Drop with 80 psig (560 kPa) Supply and Rated Flow	A-4412-1: 10 psig (70 kPa); A-4412-2: 4 psig (28 kPa) A-4417-1: 17 psig (117 kPa); A-4417-2: 8 psig (55 kPa) A-4423-1: 33 psig (228 kPa); A-4423-2: 15 psig (103 kPa)
Maximum Input Pressure	125 psig (862 kPa)
Connections	3/8 in. Compression Fittings for Poly tubing or Copper Tubing
Finish	Gray Enamel
Accessory (Order Separately)	A-4000-154 Manual Override for Coalescing Oil Filters

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



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