

301 Series Cycling Refrigerated Air Dryer

Models UA301-100 through UA301-2000

Installation, Operating, & Maintenance Manual

A Division of Numatics

Introduction

This manual contains information and recommendations for installing, operating, and servicing the Ultra Air Refrigerated Dryer. Ultra Air Refrigerated Dryers are the highest quality dryers available. We back this claim with one of the longest warranties available in the industry. All units are totally self-contained and have been fully tested and inspected by Ultra Air before shipment from the factory.

The information, specifications, and illustrations in this manual are in accordance with the information in effect at the time of printing. Ultra Air reserves the right to change design and specifications without notice and without incurring obligation.

Please read this manual carefully before locating and installing your dryer. Any questions or problems not covered herein may be directed to your Ultra-Air distributor or to Numatics Air Preparation Group, 3309 John Conley Drive, Lapeer, MI 48446, or by phone at (810) 667-6800 or fax at (810) 667-3902. Before calling, be sure to have the model and serial numbers available. The manufacturer will not be responsible for parts returned without proper authorization.

Warnings

Only persons experienced and licensed to work on electrical, refrigeration, and compressed air systems should install or operate this equipment.

This entire manual should be read and understood before starting installation or operation of this dryer. Before starting, installing, or performing maintenance procedures, the main power must be turned off and the dryer must be depressurized to 0 PSIG.

Do not remove, repair, or replace any item on this dryer while it is under pressure and/or the power is turned on. This dryer contains refrigerant R134A or R22. Service personnel must be certified to handle R134A and R22 and comply with all local, state, and federal regulations concerning refrigerant when performing maintenance or service on this dryer. Never operate this dryer above the maximum rated operating conditions. Operating above specified conditions will result in inferior performance and could damage the unit and/or cause personal injury.

Ultra Air Products, Inc. will not be held responsible for removal, reinstallation, down time costs, or consequential damages caused by the refrigerated air dryer even if the possibility of such incidental or consequential damages has been made known to Ultra Air Products, Inc.

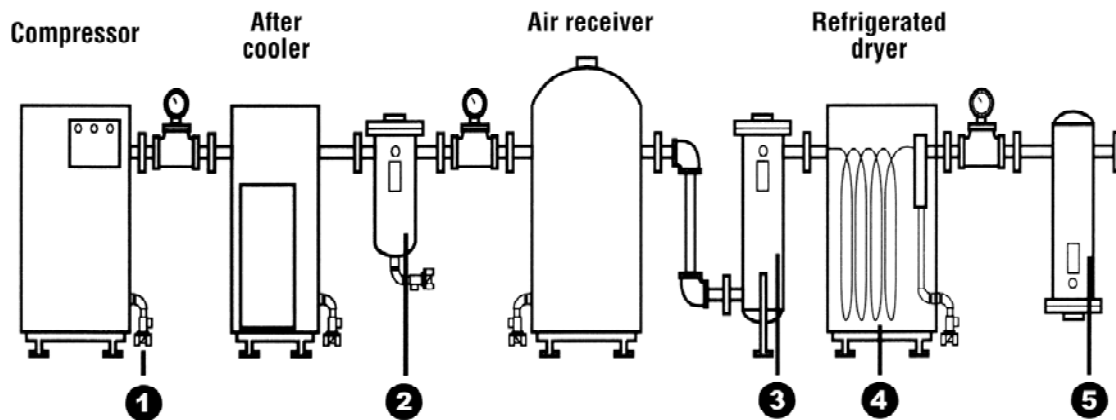
Receiving and Inspection

Upon arrival, remove all packaging materials and inspect dryer carefully. Inspect cabinets for dents, inlet and outlet connections for damage, and skid for any oil due to refrigerant leaks. Inspect refrigerant gauges; they should read at least 40 PSIG and not be damaged. If they do not read at least 40 PSIG, do not start the dryer, instead, contact the factory immediately. If any damage is found, report it to the freight company immediately.

Installation

Allow three (3) feet on all sides of the dryer for service and proper airflow. The dryer should be installed in ambients where temperatures do not drop below 40°F or rise above 110°F. Dryers are normally installed downstream of the receiver tank to prevent undue surging. Unit should be sitting level. Always select an installation site where ample with ventilation, particularly for air-cooled condenser units. An adequate supply of outside air may be made available by using an exhaust system to avoid re-circulation of room air. An area with a high ambient temperature will affect the efficiency of an air-cooled (continued) Ultra Air condenser with a resulting increase in workload on the refrigeration compressor. This can conceivably reduce the life of the equipment and hinder its operation. Dryers operating in ambients lower than 40°F ambient must be ordered with a low ambient control option.

Recommended Installation



1) Drain valve: automatically expels water on timed sequence, eliminating the potential of water buildup.

2) Water separator: uses centrifugal action to spin large volumes of liquid out of the system. Use with drain valve is highly recommended.

3) Heavy duty coalescer (1.0 micron): removes bulk amounts of oil aerosols through impingement separation. Should have drain valve to prevent moisture collection. Protects refrigerated dryer from oil coating on interior walls, as oil acts as an insulator and reduces the efficiency of the dryer.

4) UA301 Series refrigerated air dryer: Lowers compressed air dewpoint.

5) Heavy duty coalescer (1.0 micron)

Drain Connections

All separators on the UA301 models are equipped with a zero loss drain to reduce energy consumption. All prefilters on UA301 models are equipped with a timer actuated solenoid valve drain system. The drain line from the dryer should be sloped and emptied into a floor drain or connector that is lower than the bottom of the separator in the dryer so the condensate that is removed by the dryer can be drained by gravity.

Electrical Requirements

The nameplate on the instrument panel on each unit identifies the power supply requirements. A suitable wall-mounted disconnect switch in accordance with national and local code requirements is recommended.

General Information

The Ultra Air 301 Series Refrigerated Air Dryer is a cycling type dryer with a hermetic refrigeration compressor and is available with a water cooled or air cooled condenser.

Air Side

Phase 1 - Precooling

Warm, saturated air enters the air-to-air heat exchanger, where it is cooled by outgoing cooled air flowing in the opposite direction.

Phase 2 – Pre-separation

As the air is pre-cooled, some of the moisture condenses. During this phase, all condensed moisture and oil is separated from the compressed air.

Phase 3 - Chiller

The air then enters and is further cooled in the refrigeration chiller. The air stream is cooled to 35-39°F (1.6-3.8°C), reducing its dewpoint to the same temperature.

Phase 4 - Separation

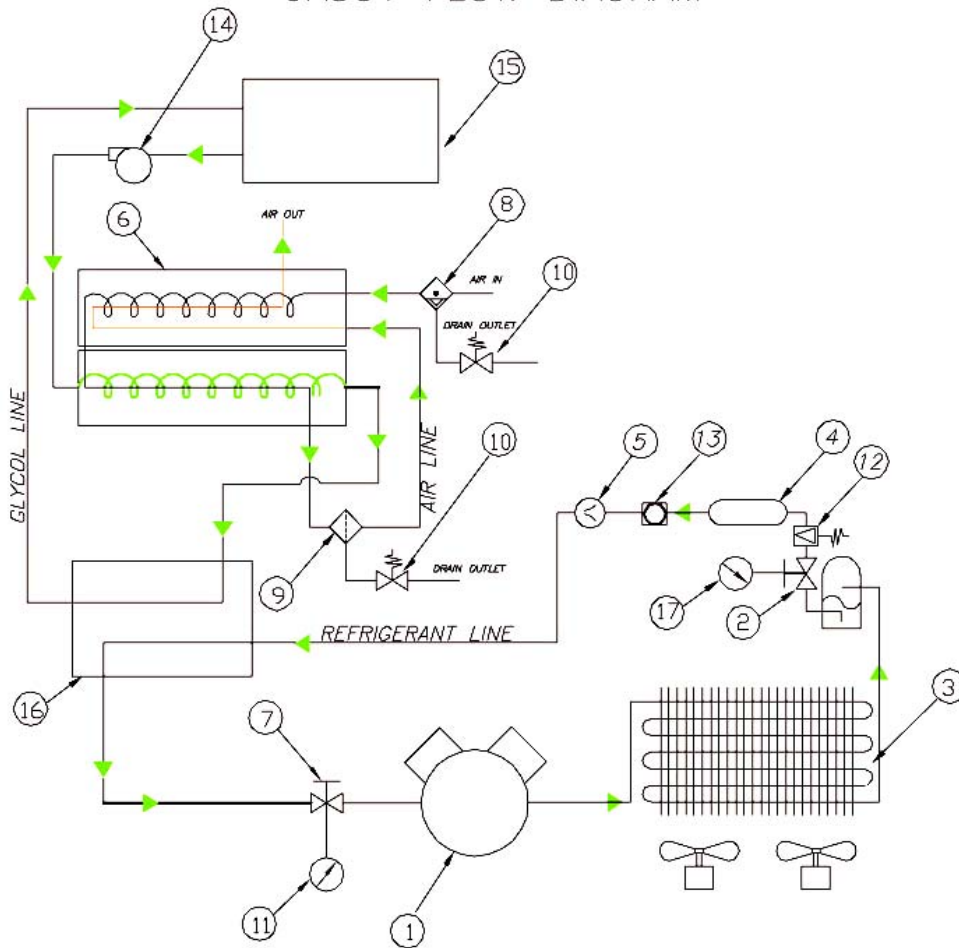
As the air is cooled in the chiller, the moisture condenses into a liquid. At this point, all liquid, via the separator is removed from the air stream and drained away with an electronic draining device.

Phase 5 - Reheating

The cold, dry air is reheated by incoming warm air as it passes back through the air to air heat exchanger.

SYS	QTY	DESCRIPTION
1	1	COMPRESSOR
2	1	DISCHARGE ROTO LOCK VALVE
3	1	AIR COOLED CONDENSOR
4	1	LIQUID LINE FILTER
5	1	FIXED ORFICE
6	1	AIR/AIR, AIR/GLYCO HEAT EXCHANGER
7	1	SUCTION LINE ROTO LOCK VALVE
8	1	COALESCING PRE-FILTER
9	1	SEPARATOR
10	2	ELECTRONIC DRAIN VALVE
11	1	SUCTION LINE PRESSURE GAUGE
12	1	LIQUID LINE SOLENOID
13	1	LIQUID SIGHT GLASS
14	1	PUMP
15	1	GLYCOL COOLANT TANK
16	1	EVAPORATOR
17	1	DISCHARGE PRESSURE GAUGE

UA301 FLOW DIAGRAM



Refrigerant Side

There are two (2) basic sections, commonly referred to as the high and low-pressure sections, in a refrigeration circuit. The high side begins at the refrigerant compressor discharge port and ends at the expansion device. The circuit leaving the expansion device through the air to refrigerant heat exchanger and up to the compressor suction port is known as the low pressure circuit. The compressor takes in low pressure refrigerant gas and compresses it to a high pressure and high temperature gas. The high temperature gas passes into the refrigerant condenser where it is cooled and liquefied. The refrigerant then passes through the filter dryer where moisture and any foreign particles are removed. The refrigerant then passes through an expansion device where the liquid refrigerant is throttled and a temperature drop will occur as part of the liquid turns into gas. The cold refrigerant gas and liquid then enters the refrigerant-to-glycol heat exchanger where it absorbs the heat from the glycol as it evaporates. The low-pressure refrigerant gas returns to the compressor for repetition of the process.

Glycol Side

The thermal mass is an environmentally friendly polypropylene glycol solution. It is pumped continuously through the heat exchangers to eliminate any dew point fluctuations commonly found in other cycling dryers. The glycol is stored in an insulated tank with spun weld connections. The glycol flows through the pump to the Air-to-Glycol heat exchanger where it cools the compressed air. From there, it travels to the evaporator where heat is extracted out by the refrigerant. The cold glycol then returns to the storage tank. A temperature probe in the tank monitors the temperature and turns off the compressor when the glycol reaches its set point. A float switch in the tank shuts off the unit if the glycol level drops below the minimum height.

Controls

A. High-low refrigerant cut-out switch

Cut out switch senses high and low refrigerant pressure at refrigerant compressor inlet and outlet ports.

B. Liquid line dryer/filter

Filters refrigerant of moisture and any foreign particles. Must be replaced if refrigerant system has maintenance performed on it.

C. Sight glass

Located in the liquid line, indicating liquid refrigerant levels and moisture content.

D. Expansion device

Meters refrigerant flow in the evaporator.

E. Electronic drain valve

An electric drain valve on the separator is designed to open and close automatically. The timer drain on the prefilter is programmed to automatically drain away condensate.

F. Crank case heater

A safety device which prevents refrigerant migration back to the compressor during shutdown.

Air cooled models

Cooling air flows from the front to the back of the dryer. Air must be drawn from a clean source in order to reduce dust and dirt accumulation on the condenser coils. Air temperature should not exceed 110°F(43°C).

Fan motor rotation check (this check applies only to air cooled models)

Locate the rotation decals. These may be on each motor or on the condenser. Observe the refrigerant compressor cooling fans. Rotation should be in accordance with the fan rotation shown on the decals. Cooling air should exhaust through the condenser coils away from the fan motors.

WARNING

Disconnect electrical services from the unit whenever it is necessary to make adjustments on timers or when servicing drain valves.

Initial Startup Procedures

The following procedure must be followed. Failure to do so could damage your dryer and invalidate the warranty. Before starting.

1. Be sure dryer 'on/off' switch is in the 'off' position and disconnect all power to dryer.
2. If refrigerant gauges read below 40 PSIG (2.75bar), do not start the dryer. Contact your Ultra Air distributor or the factory directly.
3. Make sure the air inlet and outlet piping is piped correctly and piping is supported correctly. Do not use the dryer in and out connections as sup-ports.
4. Make sure condensate lines are run properly and to the correct locations.
5. Set drain 'on' and 'off' times. During periods of high humidity it is recommended that 'off' time is decreased and 'on' time is increased. During periods of low humidity, increase 'off' time and decrease 'on' time.
6. Check that there is adequate ventilation on all air cooled units.
7. For water cooled units, make sure cooling water is being supplied to the unit.
8. Confirm proper inlet air pressure, temperature, and flow to the dryer.
9. Connect power to dryer. This will energize crankcase heater(s). Allow the unit to stand for 24 hours before continuing (3 phase only).
10. Check lights. The 'power on' lights should be lit.
11. Pressurize the unit by opening an air inlet valve with the bypass valve open and the air outlet valve closed (3 valve bypass is option offered by Ultra-Air).
12. Press the switch to "on" position. The 'dryer on' light will illuminate and the compressor will start.
13. Open the optional air outlet valve to pass through dryer and close the bypass valve.

Shutdown Procedures

1. Press the button to the 'off' position.
2. 10-15 minutes after the unit shuts down, cooling water can be shut down (water cooled units only).
3. Turn off main disconnect if necessary.

WARNING

Dryer failure resulting from a dirty condenser is not covered under warranty.

Air Cooled Condenser Maintenance Procedures

Air cooled condensers may be cleaned by blowing clean with a compressed air blow gun or by low pres-sure steam cleaning. Steam cleaning may be necessary for heavy

deposits. Do not use wire brushes as this may bend the fins, causing leaks. Straighten any bent fins and fan blades. Recommended service interval is 1000 hours of operation. More frequent service may be required if dryer is located in a dusty or dirty area. Ambient air filters are required for dryers located in an excessively dusty or dirty environment.

Maintaining the auto drain

1. Turn dryer on/off switch to 'off' position
2. Disconnect power supply to the dryer
3. Lockout and tag power supply in accordance with OSHA regulations
4. If applicable, switch dryer to bypass mode
5. Remove filter strainer and clean
6. Disassemble the solenoid valve, and clean or replace all parts necessary
7. Check electrical continuity across coil
8. Reassemble valve and test, using the test button on the electronic control panel
9. Repressurize system and test drain by using the test button on the control panel

Warranty

All UA301 Series standard refrigerated air dryers manufactured by Ultra Air Products, Inc. are warranted to be free from defective materials and workmanship for a period of two years from date of shipment from Ultra Air's factory. Said warranty covers all parts and labor (this excludes routine preventative maintenance and adjustments). In addition to the standard two year warranty, an extended three years on all original parts will be covered on a prorated basis (excludes labor and prefilter element):

Year	% of Part Covered
3	60%
4	40%
5	20%

The equipment must be properly maintained and used in accordance with instructions or all warranty is void.

Electronic Control Panel

The electronic control panel displays four different temperatures, allows the user to set and monitor the timing of the drain valves, and controls the on/off operation of the compressor. The control panel operates on 10V AC. The displayable temperatures are Coolant Temperature, Dewpoint Temperature, Ambient Air Temperature, and Inlet Air Temp. Pushing the select switch, causing the corresponding indicator light to illuminate, can change the displayed temperature. The temperatures can be displayed in degrees Fahrenheit or degrees Celsius (a Celsius readout is achieved by turning on switch 1, located on the back of the panel; a Fahrenheit readout is achieved by turning it off). The evaporator temperature is only displayed for 18 seconds at a time. The panel also monitors the evaporator temperature and activates an alarm if it exceeds 70°F (21°C) or if the evaporator temperature is not being displayed, at which point the alarm light flashes. When the evaporator temperature is displayed, the indicator light will be on continuously, regardless of whether or not the evaporator alarm temperature is exceeded. When a sensor becomes defective (open or shorted) or a temperature is out

of range, the corresponding display for that temperature will read "Err". Each temperature can be calibrated individually. When switch 2 (located on the back of the board) is turned on, it puts the dryer in calibrate mode, causing the temperature display to flicker. The mode select switch is used to select the temperature to be calibrated, using the up and down arrows to select the designated temperature. After calibration is complete, turn off switch 2. The select switch is then used to select the drain open set time, between .5 and 20 seconds. The drain open select time is displayed for 18 second at a time after the time has been selected or after the up or down switch is released. Use the select switch to select the drain closed set time. The time can be set from 1 minute to 2 hours using the up and down buttons. The drain closed select time can only be displayed for 18 seconds at a time after the time has been selected or after the up and down switch has been released. The compressor on switch is used to turn the compressor on and off. The compressor light turns on and the compressor relay activates when the compressor turns on. When the compressor is turned off, the compressor light turns off and the compressor relay is deactivated. The drain test switch activates the drain relay for the drain open set period. The drain open light turns on when the drain relay is activated..REV.

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