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1. INTRODUCTION

Many years of trouble-free service can be expected from your ULTRA AIR REGENERATIVE DESICCANT DRYER. Superior dew point depression will be obtained and operating problem will be avoided by careful installation and proper preventative maintenance procedures.

2. LOCATION

The dryer should be located on a level floor free from vibrations. Although the dryer is a free standing package, it may be secured by bolting the dryer base plate to the floor. Allow approximately three (3) feet on all sides of the dryer to make connections and to permit future servicing.

The ambient temperature of the dryer should fall in the plus 35 F to plus 120 F range. The dryer will function in warmer surroundings, but the degree of dew point depression obtained will decrease.

Operation of the dryer in ambient approaching freezing could cause freezing of separated liquids in the pre-filter sump or in the dryer itself. If it is necessary to operate the dryer at temperature below freezing, it is recommended that the pre-filter sump and drain trap, as well as the inlet manifold, be heat-traced with either electric resistance heat tape or steam.

All **ULTRA AIR DRYERS** are designed for indoor use only. If the dryer has to be located outside, you must order a Low-Ambient Package, a protective roof is absolutely needed so that the dryer will not be directly exposed to rain and snow.

Before operating the dryer, check to see that no pipe connection or tubing connection have become loosened in transit. Make the necessary control power electrical connection and **be certain the dryer is grounded.**

IMPORTANT : Dryer must be installed according to our recommendation to assure -40F pressure dew point.

3. RECOMMENDED INSTALLATION

Make the following connection

- * Inlet piping (including a shut-off valve)
- * Outlet piping (including a shut-off valve)
- * Pre-filter(s) and after-filter(s)
- * Bypass piping if desired (use a bubble-tight valve for bypass)
- * Electrical connection to control box
- * An access connection should be made upstream and downstream of the dryer for dew point and temperature checks.

4. PRE-FILTRATION---REQUIRED

All Regenerative Desiccant Dryers are designed to remove only water vapor, the possibility of liquid water carrying over to the desiccant dryer must be avoided. Coalescing pre-filtration will eliminate the carrying over of droplets and aerosol-sized mists of both liquid water and compressor lubricant.

ULTRA coalescing Filters will not only enhance the dew point depression capability of the dryer, but will also add years to the life of the desiccant by preventing the desiccant from being folded by compressor lubricant. Although the pre-filter sump can be manually drained of separated liquids, it is highly recommended that a suitable automatic drain trap **ULTRA ED-1** be installed to eliminate any possibility of failure to drain the pre-filter sump.

5. AFTER-FILTRATION---REQUIRED

All Regenerative Desiccant Dryers gradually produce hard and abrasive desiccant fines. These contaminants should be removed with an **ULTRA Particulate-After filter** to keep downstream air line from clogging.

6. BLOCK AND BYPASS---OPTIONAL

Suitable manual block and bypass valves should be installed to facilitate servicing of the dryer and filter without interruption of compressed air flow.

Valves must be “bubble-tight” to prevent water vapor migration around the system from the region of high relative humidity to low relative humidity. For a typical installation, block and bypass valves should be installed around the entire dehydration system--pre-filter, dryer, after-filter.

In more critical application and in order to provide the maximum flexibility, dual parallel pre-filters and dual parallel after-filters should be installed. This permits filter element replacement without interrupting the dry air flow. **By-passing of a single pre-filter is not recommend for the safety of the dryer, and by-passing of a single after-filter is not recommended for the safety of your pneumatic system.**

7. FILL IN AND DRAIN OUT DESICCANTS

FOR LFA-800 and above dryers, desiccants will be shipped separately with the dryer. The fill in port is usually located on the top of each tank, or you may use the man hole instead. The drain out port is usually located on the bottom of each tank. Those ports need to be opened only if you want to change desiccants. The regular timing for changing desiccants is two to three years depending on the working condition of the dryer. You can tell the desiccant is fully saturated and can not be regenerated by taking a sample from the drain port, if the color of desiccant has changed from original white to pink or yellow, that means it need to be replaced.

8. PURGE EXHAUST PIPING

To eliminate noise pollution created by frequent tower depressurization or purge exhaust noise, the dryer purge exhaust may be piped outdoor under roof, or to a remote area. This may also eliminate any problem caused by indoor accumulation of condensed moisture from the purge exhaust. If the purge exhaust piping extended more than 15 feet, contact the factory for recommendation.

9. OPERATION

LFA dryer is equipped with external heater and blower. The operation sequence of the dryer is fully automated and is controlled by a programmable controller (AB micrologix 1000). A typical LFA dryer has an 8 hour cycle; 1/2 cycle is 4 hour drying (3 hour tower heating and 1 hour tower cooling).

Wet and dirty compressed air leaving the compressor after-cooler and mechanical separator is free of all entrained liquids and aerosols, as well as solid contamination by accessory pre-filter. Separated liquid contaminates are discharged from the pre-filter sump through an automatic drain trap.

The compressed air laden with water vapor enters either the right or left tower via the inlet valves located on the top of the dryer. Assume that the compressed air enters through the right inlet valve(1) and then through the right tower. So, for the first 4 hours the compressed air flow through the right tower where its moisture is adsorbed by the desiccant bed and then dry air comes out of the air outlet at the bottom of the dryer.

While the right tower is drying the compressed air, the blower(2) supplies purge air to the left tower for the regeneration of the left tower desiccant bed. So purge air from the blower flows through the heater (3) and then to the left tower desiccant bed. As the purge air flows through the heater (3), the purge air becomes hot increasing it's capacity to absorb moisture from the left desiccant bed. The air then discharged to the atmosphere through the purge exhaust valve (4) and through the purge muffler (5). After 3 hours the heater (3) is turned off while purge air keeps flowing over the left desiccant bed to cool the desiccant. After 3 hours and 47 minutes the blower (2) is turned off, and repressurization (polishing) valve (6) is opened for polishing

cycle , 13 minutes latter the left purge valve (4) is closed to repressurize the left tower. Equalization of pressure assures smooth switching of the inlet valves and minimize bumping of the desiccant bed. After 4 hours, the inlet valves switch, the compressed air now enters the left tower to be dried, and the right tower desiccant bed is regenerated. Cycle keeps repeating.

The heater is controlled by a temperature controller preset at 350F, with 25F dead band, which means during the heating period, the heater will shut off whenever the purging air temperature is above 350F; and turn back on again whenever the temperature is below 325F to keep the optimum heating temperature range. Also, a heater overtemp limit switch is preset at 800F. In some situations, such as loss of purge air , the limit switch may turn off the heater while the heater overtemp light comes on.

An LFA dryer purge flow is equipped with a water column pressure switch, and a water column pressure gauge to insure that there is enough air passing through the heater. The pressure switch is preset at the factory. If at any time during the heating period the pressure is dropped below the preset value, the heater will shut off.

NOTES: Normal reactivating temperature is 300F to 350F.

10. START-UP

WARNING: Never operate the dryer without air flow or proper purge flow. These conditions will damage the heater and will void warranty.

The block valves upstream and downstream of the dryer should be closed and the bypass valve should be open. Before turning the dryer control power switch on, **S-L-O-W-L-Y** pressurize the dryer by gradually opening the block valve upstream of the dryer. When both tower pressure gauges indicate line pressure, the dehydration system outlet block valve can be opened and the dehydration system bypass valve closed. Compressed air now flows through the pre-filter, the dryer and after-filter.

The dryer operation should never be initiated by **SUDDENLY** pressurizing the dryer towers from the dryer inlet. The sudden inrush of high velocity air into the desiccant bed will cause desiccant breakdown and hasten the need for after-filter element replacement and desiccant bed replacement.

The dryer control power switch should now be turned on. Dryer will go through the sequence mentioned before, which is stored in the PLC controller.

NOTES: * Every time the operator turns the power on, he needs to push the reset button to rest the heater overtemp light.

11. MAINTENANCE

A. Pre-filter

The filter element must be replaced whenever the pressure drop over the pre-filter exceed 5 psid or the gauge pointer is in change zone. It is important to check the operation of the automatic drain trap or valve at frequent intervals to ensure that no liquid carry-over into the dryer occurs. **ULTRA AIR** recommends pre-filter elements be change every (3) three months to ensure proper filtration. This will prolong your desiccant bed life and ensure clean dry air down stream.

B. After-filter

The filter element must be replaced whenever the pressure drop exceeds 5 psid or the gauge pointer is in the change zone. Whenever the pre-filter is changed always change the after-filter.

C. Control Air Filter

Frequent inspection of the control air filter will ensure that sufficient control air is available for pneumatic actuation of dryer valves. The control air filter should always be changed when the pre-filter and after-filter elements are changed.

D. Purge Rate

An adequate supply of purge air is essential for proper regeneration of the desiccant and dew point depression. Increasing the purge pressure setting always gives you a better dew point. However, the down stream line air supply will be reduced. Never shut off the purge air pressure. This will cause moisture down stream and damage to your desiccant bed.

E. Programmable Logic Controller (PLC)

A dryer sequence control program has been accurately set in the factory. The PLC is set on "run" mode, that means whenever the operator turns the power on, the PLC will automatically start the dryer sequence.

F. Solenoids

Failure of a solenoid to function properly may be caused by:

- * Faulty control circuit. Check the electrical system, including the timer.
- * A burnt out coil. Replace coil.
- * Improper voltage. Input voltage should be within +/-10% of the name plate voltage. A low voltage condition may cause solenoid chattering.
- * Leakage. Take the valve apart, clean, and replace worn or damaged parts.

G. Desiccant Replacement

Spent desiccant should be drained through the desiccant drain port. New desiccant should be charged through the desiccant fill port. Always leave adequate plenum above the desiccant bed to permit the bed

motion and expansion during dryer operation. Change desiccant periodically for best results.

Be certain to use only ULTRA activated alumina which your ULTRA representative can provide. It excels with respect to dew point depression capability and attrition resistance.

12. ECONO-PURGE CONTROL---OPTIONAL

Most air dryers are sized for the maximum air usage or compressor capacity in a plant; therefore in a standard dryer, purge air flow is factory set to regenerate the desiccant bed for maximum air flow or the capacity of the dryer. additionally, it is assumed that the inlet air will be 100% saturated.

The ultra Econo-purge Control reduces the purge air loss, heater “on” time, and blower “on” time in proportion to the average air flow and its moisture content. A dew point sensor senses the dew point of the dried process air and controls the purge exhaust. Here is how the Econo-purge Control works:

After (5) minutes repressurization which is the end of the (4) hour half cycle, the controller will be given (20) twenty seconds to check the outlet air dew point from the hygrometer sensor. If the dew point is higher than the default dew point alarm setting, the controller will continue counting the cycle sequence. After (20) twenty seconds, dryer switch over. If the dew point is lower than the default dew point alarm setting, the controller will stop counting the cycle sequence, that mean wet inlet air will keep drying through the previous tank, with no “purge air loss” , no “heater on”, and no “blower on” until the previous tank is fully saturated which will give a higher dew point than the default alarm value, then the controller resume counting the cycle sequence. After (20) twenty seconds, dryer switch over.

With Econo-Purge Control option, average 50% of purge air and power consumption of heater and blower will be saved,

NOTES:* for -40F Pressure Dew Point (PDP), the dew point alarm setting is -10F

* for -100F PDP, the dew point alarm setting is -40 f

* ECONO/RUN switch has to be “ECONO” position in order to be in “Econo-Purge Control “ mode.

13. TROUBLE SHOOTING

Problem	Cause	Solution
Poor Dew Point	Excessive inlet flow	Reduce flow to rated capacity.
	Excessive inlet temp.(above 120F)	Check up stream after cooler
	Excessive Water	Check up stream

		separator, pre-filter and their drain traps.
	Desiccant fouled by lubricant	Replace desiccant & pre-filter element
	Pre-filter drain	check for clogging. clean, repair or replace.
	Low purge flow	Check correct purge setting
	Low inlet pressure	check for pressure loss over pre-filter check dryer sizing based on flow and pressure.
	Contaminated	Change desiccant
Excessive pressure drop	Excessive inlet flow	Reduce flow to rated capacity or install larger dryer
	Low inlet pressure	Check for pressure loss over pre-filter
	Excessive pressure drop over pre-filter and/or after-filter	Change elements
	Saturated desiccant	Change desiccant
Purge Failure	Purge flow control or orifice clogged	Remove and Clean
	Purge exhaust valve fails/closed	Check solenoid actuator, purge exhaust.
	Purge muffler clogged	Check Muffler and clean.
Pressurization failure	Repressurization valve fails	Check repressurization valve
Failure to switch	No control air	Check control air filter and control air tubing.

	Electric power less	Check power supply fuse, timer micro-switch.
	Switching valve fails	check inlet valve, actuator & solenoid
	dryer plc control fails	Replace
High back pressure in off-stream tower.	Purge muffler	Clean and replace
	Restrictive purge exhaust piping	Replace with large size pipe.
	Check valve leakage	Clean and replace
	Purge control orifice size too small or clogged	Clean or replace
Heater overtemp	Temperature limit switch alarm setting low.	Increase the setting value.
	Not enough purge air	Increase the purge control pressure setting.
	Temperature controller fails	see below
Temperature controller failure	Type J thermocouple wire loose	Check connection of wiring.
	Control function fails	Replace

14. WARRANTY

ULTRA REGENERATIVE DRYERS are warranted to be free from defects in material and workman shop for a period of one year from the date of shipment,

provided the equipment is used according to ULTRA'S recommended usage. ULTRA'S liability is limited to the repair of, refund of purchase price paid for, or replacement in kind of, at ULTRA'S sole option. In no event shall ULTRA be liable or responsible for incidental or consequential damages, even if the possibility of such incidental or consequential damages have been made known to ULTRA AIR PRODUCTS, INC.

Customer responsibility includes the following routine preventive maintenance:

- * Inspection and replacement of all filter(s) element(s) on a need basis.
- * Making sure automatic drain for pre-filter is functioning properly.
- * Replacement of desiccant.
- * Cleaning or replacement of purge exhaust muffler on a need basis.

WARNING: Failure to maintain and change pre-filters on a regular basis could damage desiccant bed, cause dryer failure, AND VOID THE WARRANTY.