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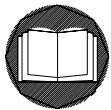
**GEH SERIES  
EXTERNALLY HEATED REGENERATIVE DESICCANT DRYER  
OWNER / OPERATOR MANUAL**

<b>Section</b>	<b>Page #</b>
Safety	2
Introduction & Proper Use	3
Receiving	3
Location	3-4
Inlet Air Temperature	4
Pre-Filtration	4
Condensate Drains	5
Post / After-Filtration	5
Activated Carbon Absorber	5
Optional Backpressure Regulator	5
Block & Bypass	6
Purge Exhaust Piping	6
Electrical Connection	6
Desiccant Loading Procedure	7
Operation	7
Dewpoint Demand Controller	8
Start Up	8
Sequence Controller	9
Heater Controls	10
Prefilter Maintenance	11
Afterfilter Maintenance	11
Control Filter Maintenance	11
Purge Muffler Maintenance	11
Purge Rate Maintenance	11
Cycle Times	12
Desiccant Replacement	12
Dewpoint Probe Maintenance	12
Troubleshooting Guide	13-17

**MODEL #** \_\_\_\_\_

**SERIAL #** \_\_\_\_\_

## DEFINITION OF THE SIGNS USED IN THIS MANUAL



Before attempting any installation or maintenance on the dryer, read carefully the instructions reported in this manual.



General warning sign. Risk of danger or possibility of damage to the machine. Read carefully the text related to this sign.



Electrical hazard. The relevant text outlines conditions, which could result fatal. The related instructions must be strictly respected.



Danger hazard. Part or system under pressure.



Danger hazard. Its absolutely forbidden breathing the air treated with this apparatus.

## GENERAL SAFETY WARNINGS



Compressed air is a highly hazardous energy source. Never work on the dryer with parts under pressure. Never point the compressed air or the condensate drain jet towards anybody. The user is responsible for the installation of the dryer, which must be executed on the basis of this manual. Otherwise, the warranty will be voided and dangerous situations for the personnel and/or damages to the machine could occur.



Only qualified personnel can use and service electrically powered devices. Before attempting any maintenance action, the following conditions must be satisfied:

- Be sure that the voltage is disconnected before any work is performed.
- Be sure that any part of the dryer under pressure cannot be connected to the compressed air system.



Any change to the machine or to the relevant operating parameters not previously authorized by the manufacture, creates the possibility of dangerous conditions, and will void the warranty.

## INTRODUCTION

This manual contains information and recommendations for installing, and operating, standard heatless regenerative dryers. Superior dew point depression will be obtained by careful installation and proper preventative maintenance procedures.

Replacement and maintenance parts along with any questions related to systems or installations should be directed to your local Great Lakes Air distributor. If local distributor is unknown, contact the Great Lakes Air @ 734-326-7080 for your local distributor.

Prior to performing any warranty service on Great Lakes Compressed Air Dryers, an authorization number must be obtained from the service department. Have **model number, serial number, and brief description of warranty issue** available for your service representative. Failure to obtain service authorization number will void equipment warranty.

The information, specifications in this manual are in accord with the information in effect at the time of printing. The manufacturer reserves the right to make changes without notice or incurring obligation.

## PROPER USE OF THE DRYER

This dryer has been designed, manufactured and tested to separate the humidity normally contained in compressed air **only**. Any other use has to be considered improper. The manufacturer will void the warranty and not be held responsible for any problem arising from improper use. The correct use requires adherence to installation conditions specified in this manual.

This dryer is supplied tested and fully assembled. The only operation left to the user is the connection to the plant in compliance with the instructions given in the following chapters.



The purpose of the machine is the separation of water and eventual oil particles present in compressed air. The dried air cannot be used for respiration purposes or for operations leading to direct contact with foodstuff.

## RECEIVING EQUIPMENT

Immediately upon receipt of equipment, remove all crating and packaging around equipment. Examine machinery for any damages either external or internal that may have occurred in transit.

If there is any physical damage please note all damages on bill of lading during delivery or file a claim immediately with shipper if damage is detected after delivery. Ask for a local terminal phone number to report all damages to the Transportation Company. The carrier is legally responsible for any damages, since the unit is shipped F.O.B.

## LOCATION

The Great Lakes Air Heatless Regenerative Dryer should be located on a level floor, free from vibrations. Although your dryer package is a freestanding unit, it may be secured by bolting the dryer base plate to the floor. Allow approximately three feet on all sides to make connections and permit future servicing.

The ambient temperature for Regenerative Dryers ranges from 35°F to 100°F. A dryer will function in warmer surroundings up to 120°F but dew point suppression will suffer.

Operation of Regenerative Dryers in ambient temperatures below 35°F can cause freezing of separated liquids in the pre-filter sump or the dryer itself. If operation in this range is necessary, it is recommended that the Prefilter sump/drain trap, inlet valves, and the bottom 30% of each desiccant tower be heat traced and insulated.

When you have located your unit in its permanent placement, check all pipe and tubing for loose connections. Make power connections and be certain the unit is grounded.



Particular care is required in selecting the installation site, as an improper location could jeopardize the proper operation of the dryer. This unit is not suitable to be used in an explosive atmosphere, or where the risk of fire could be present.

The unit should be installed in an area that is clean and dry, allowing sufficient space on all sides for routine maintenance and service. It should be located on a level floor or shelf free from vibrations and sufficient to support the total weight of the machinery. Although the dryer package is a freestanding unit, it may be secured by bolting the base to the floor but is not required. **This standard dryer is designed for indoor installation.** Contact distributor if installing unit outdoors.

Installations at altitudes above 750 feet may require adjustments. The unit has been factory adjusted to operate at or near sea level, if installation is above this altitude, contact the factory service department for corrected purge settings.

### INLET AIR TEMPERATURE

The Great Lakes Air Heatless Regenerative Dryers are designed to operate at rated flow with a maximum inlet temperature of 100°F. Units can be oversized to accommodate higher inlet temperatures up to 120°F. Inlet temperatures above that require custom designed dryer equipment. In most cases temperatures can be kept below maximum operating by correctly sizing or servicing the compressor Aftercooler.

As compressed air inlet temperatures rise above the design 100°F to the dryer, the moisture holding capacity of the air rises dramatically. The following table represents additional load to a dryer at elevated inlet temperatures.

Temperature	100°F	105°F	110°F	115°F	120°F
Additional Load	0%	15%	32%	51%	75%

### PREFILTRATION

As all regenerative desiccant dryers are designed to remove only water vapor, any possibility of liquid water carryover to the desiccant dryer must be avoided. Coalescing pre-filtration will eliminate the carryover of droplets, aerosols, and compressor lubricant liquids. This pre-filtration is required under the Great Lakes Air Factory Warranty.

Good pre-filtration will not only enhance the dew point suppression capability of the dryer, but will also add years of life to the desiccant by preventing fouling of the desiccant caused by compressor lubricants.

A coalescing filter equipped with a differential pressure gauge is the best way to determine contaminant loading, or available life of the filter element. The element is designed to be saturated with oil and moisture. The saturated moisture and oil is drained from the element as new contaminants enter the element. Differential pressure is created by contaminants the element can not drain. The elements can stand differential pressures of 100 PSIG. The recommended maximum is 10 PSIG. The pressure at which you should change your elements should be determined by comparing the operational efficiency of your system (Cost of pressure drop vs. cost of the elements). The standard recommended element replacement schedule is twice a year. (4th of July and Christmas)

## **CONDENSATE DRAINS**

A typical compressed air system has multiple points that require condensate removal. The compressor usually has intercooler drain points, the Aftercooler has a drain point, and the receiver tank usually has a drain and the coalescing filter before the dryer has a drain. **It is urgent that each of these drains is not piped to a common header** that will allow condensate to be pumped from a high-pressure location to a low-pressure location. Some facilities have tried to install check valves to prevent backflow in a common header system. This concept looks good on paper but is a system failure just waiting to happen.

The health of your compressed air dehydration system is contingent on a clean and properly designed condensate removal system.

## **AFTERFILTRATION**

All regenerative desiccant dryers gradually produce hard and abrasive desiccant fines. These contaminants should be removed with a high quality Particulate After-Filter. The Great Lakes Air Particulate Filter is specifically designed to remove the desiccant dust generated by regenerative air dryers.

Particulate filters located downstream of Regenerative Air Dryers do not have automated drain systems. The material collected should be held in the bottom of the housing; no draining is necessary. Simply clean out the sump area as an element is replaced.

As with the coalescing elements, the particulate elements can stand differential pressures of 100 PSIG. The recommended maximum is 10 PSIG. The pressure at which you should change your elements should be determined by comparing the operational efficiency of your system (Cost of pressure drop vs. cost of the elements). The standard recommended element replacement schedule is twice a year. (4th of July and Christmas)

## **OPTIONAL ACTIVATED CARBON ABSORBER**

An activated carbon absorber may be installed downstream of the dryer if it is desired to remove the last trace of compressor lubricant vapors as well as trace organic contaminant vapors found in compressed air. With a properly sized activated carbon absorber, the quality of the outlet compressed air will be better than that of a non-lube compressor.

Typically, absorber filters are used in a wide variety of applications. The most common and also the most necessary are that of paint and breathing air applications. Activated carbon filtration is absolutely necessary for optimum compressed air performance when applying paints whether it is powders, liquids, or high solids or to remove breathing air odors.

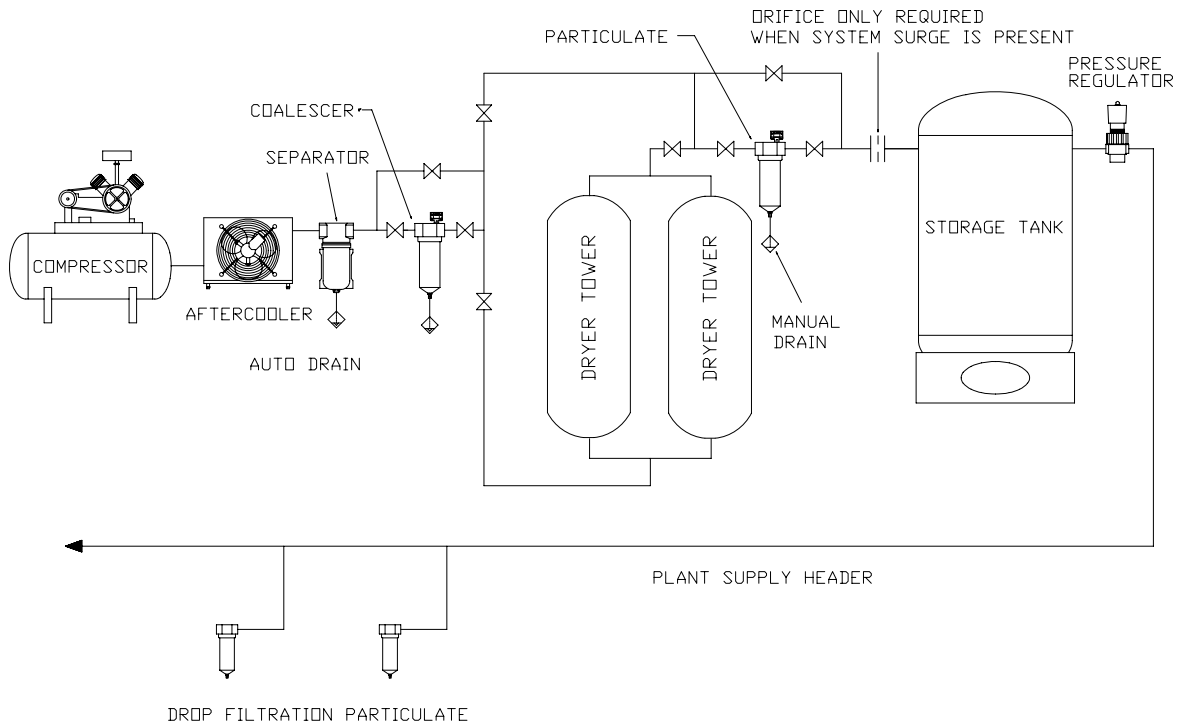
## **OPTIONAL BACK PRESSURE REGULATOR**

For Regenerative Dryer applications, where sudden downstream demand for dry air frequently occurs in such a manner to cause rapid pressure loss in the compressed air system, it is recommended that a back pressure regulator be installed downstream of the dryer. The backpressure regulator will maintain a constant pressure within the dryer. It will eliminate any chance of fluidizing the desiccant bed by sudden flow surges, which accompany rapid pressure loss. By eliminating fluidization and desiccant bed "bumping", the life of the desiccant charge will increase and after-filter elements will not become prematurely clogged with desiccant fines.

Coalescing filters are also effected by dramatic flow swings or pressure changes. This problem is identified by oil carryover through the element or even the destruction of the element.

## BLOCK & BYPASS

All compressed air dryer systems should have a bypass system to facilitate servicing the dryer and filters without interrupting compressed air flow. Valves should be bubble-tight to prevent water vapor migration around the system from the regions of high relative humidity to low relative humidity. The bypass system should be capable of bypassing each filter or the dryer and any combination thereof. Operation in this condition for extended periods of time is not recommended because of possible system contamination (I.E. desiccant dust downstream, moisture downstream, or oil in the desiccant).



## PURGE EXHAUST PIPING

To eliminate noise pollution created by frequent tower depressurization or purge exhaust noise, the purge exhaust may be piped outdoors or to a more remote area. This may also eliminate any problem caused by indoor accumulation of condensed moisture from the purge exhaust. Extended purge exhaust piping must not restrict the passage of purge air near atmospheric pressure.

If the equivalent length of extended purge exhaust piping does not exceed 15 feet, use pipe one size larger than dryer purge exhaust connection. If the equivalent length of extended purge exhaust piping does not exceed 30 feet, use pipe two sizes larger than dryer purge exhaust connection. For remote purge piping in excess of 30 feet contact the factory for recommendations.

## ELECTRICAL CONNECTION

The Nameplate/Data Plate located on each unit identifies the power supply requirements.



Units supplied with electrical junctions, require a suitable fused disconnect in compliance with the National and Local Electrical Code requirements. Maximum fuse specification can be located on the Nameplate/Data Plate.

Check unit voltage supply as specified on the equipment data plate. The power feed should meet the national electric code standard for amperage capacity of that unit. The (FLA) Full Load Amps of any dryer can also be found on the data plate directly below the specified voltage. Control Voltage 120-1-60 is transformed from the main power feed and no separate control power feed is required.

## DESICCANT LOADING PROCEDURES

Models GEH-350 and larger require field loading of the desiccant material. Desiccant is not shipped in the dryer vessels to avoid damage to the desiccant support screens and premature desiccant breakdown. The screens are designed to support the load of the desiccant under operating conditions; however, shipping conditions require the desiccant to be loaded on site.

THE PROCEDURE TO LOAD THE DESICCANT IS AS FOLLOWS:

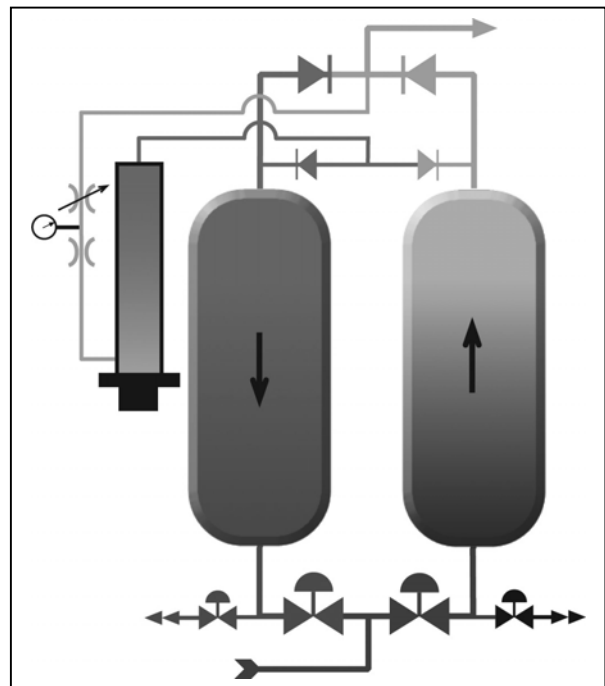
1. Remove the pressure relief valves from the top of each of dryer vessels.
2. Load 50% of the shipped desiccant quantity into each of the dryer vessels. The final level of the desiccant will vary from unit to unit. If all of the desiccant will not fit in one or the other vessels, a slight tapping or vibration will settle freshly loaded desiccant.
3. Replace the pressure relief valves on top of the dryer vessels to a pressure seal condition.

## OPERATION

The operation of a GEH dryer is fully automated with all sequencing and function controlled by an automatic timing module or a programmable controller.

Wet and dirty compressed air discharged from the compressor enters the Aftercooler where the compressed air temperature is reduced to near ambient. The entrained liquids are released, and then removed by a separator. The coalescing Prefilter then removes any liquid moisture carryover present after the separator. The compressed air still saturated at the reduced temperature but not containing any gross liquids enters the GEH Regenerative Dryer.

The saturated compressed air enters either the right or left tower of GEH Dryer depending on the position of the control sequence. For ease of description assumes the saturated compressed air is entering the right tower. The compressed air passing through the right desiccant tower gives up all of its water vapor to the Activated Alumina desiccant. This cycle will continue for 4 Hours on a standard model, or until the vessel is saturated to design capacity with the optional Demand Cycle Controller. For more information on the operation of the Demand Cycle Controller refer to that section in this manual.



While one tower is drying the process air the other tower is in the regeneration mode. The regeneration is accomplished by utilizing a regulated portion of dry compressed air called the purge stream. The stream is expanded to near atmospheric pressure by passing through an orifice. This expanded volume of dry air is then passed over the saturated desiccant bed to absorb and carry away moisture. The now saturated purge stream exits to atmosphere through the left tower purge exhaust valve and muffler. This process is maintained for 3 Hours and 55 Minutes. At the end of this time period the purge valve closes and allows the purge stream to repressurize the regenerated tower preparing it for the next cycle of adsorption.

## DEWPOINT DEMAND CONTROLLER

The Dewpoint Demand Controller is an option designed to limit energy consumption to the minimum required for optimum dryer performance. The option works off the premise that not all compressed air conditions are stable and continuous. Each desiccant tower is designed to adsorb the moisture load of full rated flow and rated conditions for 5 minutes. If at the end of 5 minutes your flow has fluctuated i.e. from 20 to 100% of rated load the desiccant bed has unused adsorption capacity of roughly 40%. At the end of the 5 minutes the demand cycle control holds the freshly regenerated tower in a pressurized standby mode so the on-line tower can continue to adsorb moisture to the design limit. While the dryer is in this standby mode no energy is being expended and the overall average energy consumption is reduced. As the Dewpoint meter (The heart of the Dewpoint demand control) signals that the proper moisture loading of the on-line tower is approaching, the towers invert bringing the standby tower on-line and beginning the regeneration of the previously saturated tower.

## STARTUP

Pressurize the system with the dryer bypass open and the dryer inlet and outlet closed. Then open the dryer outlet valve allowing it to pressurize the dryer from the outlet. By pressurizing the dryer backwards through the outlet it allows the control air system to be energized first and properly seat control and process valves.

S-L-O-W-L-Y pressurizes the rest of the dryer by gradually opening the Inlet valve upstream of the dryer. This will allow compressed air to enter and completely pressurize the dryer. When the tower pressure gauges indicate line pressure, close the bypass valve and allow compressed air to flow through the entire dryer package.

Pressurization of the dryer should never be initiated by suddenly pressurizing the dryer towers from the dryer inlet. The sudden rush of high velocity air in the desiccant bed would cause the desiccant bed to fluidize. Desiccant fluidization will create desiccant breakdown and or excessive desiccant fines.

### ***This section refers to systems with the optional Dewpoint Demand Systems only***

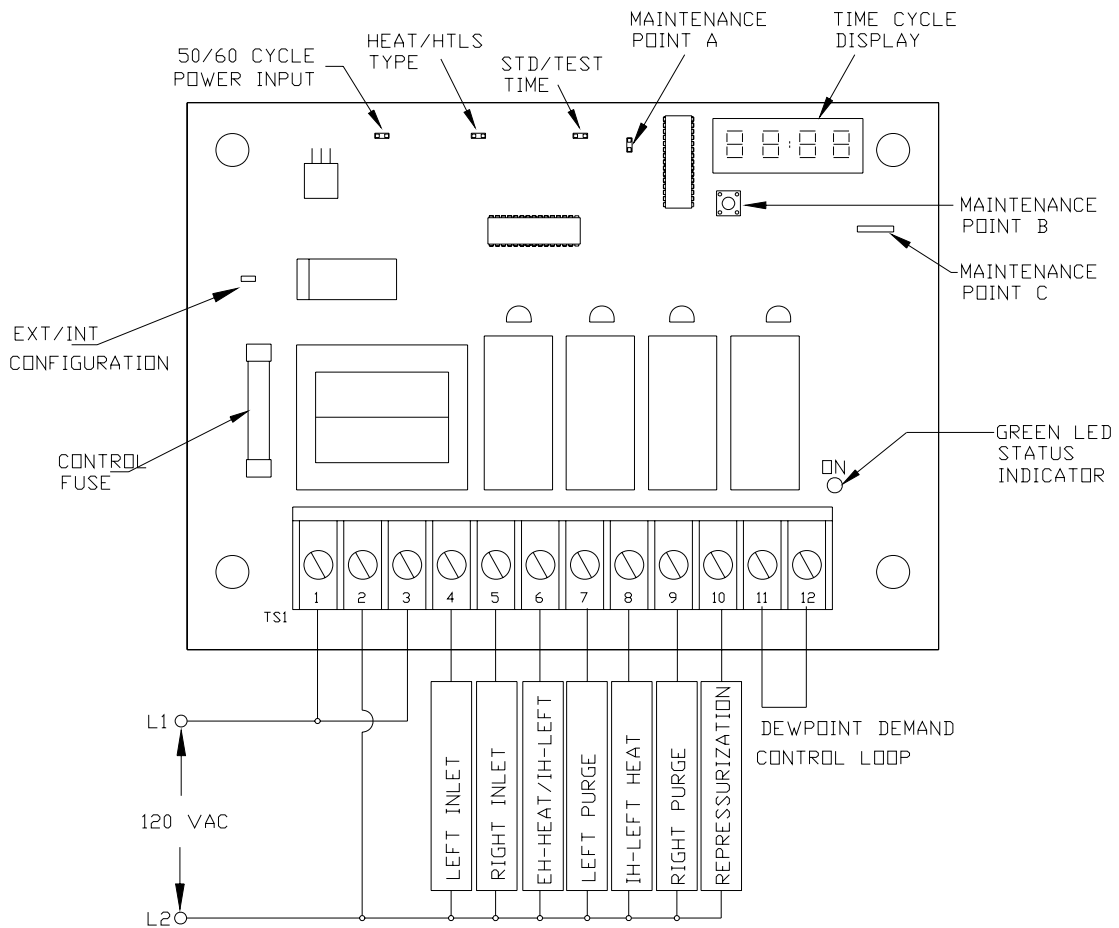
*The final step prior to initiation of the dryer is to verify flow to the Dewpoint probe in the sample flow cell. Open the isolation valve upstream of the sample cell filter. The sample cell is now pressurized. An orifice in the sample cell outlet lets a small flow of air over the probe. The flow should be strong enough to be felt but not strong enough to be heard. After the orifice there is a check valve that prevents atmospheric air from migrating into the sample cell when the compressed air system is depressurized. The coil of tubing on the outlet of the sample cell is to prevent atmospheric moisture from migrating into the sample cell during sampling.*

The desiccant loading procedure can cause a large amount of desiccant dust to accumulate prior to equipment startup. Most of this accumulation is blown out the purge exhaust valve during the first hours of operation. The high volume of desiccant fines from startup limit the life of the initial purge muffler element. It is recommended that the muffler element be replaced after the first 100 hours of operation.

Initiate the "power on" selector switch or push button. Almost immediately one tower will depressurize to atmospheric pressure through the purge exhaust valve and muffler. At this time verify that the purge flow indicator (pressure gauge in the purge loop piping) is reading the pressure indicated by the factory tag located on the piping behind the gauge, (The pressure setting for the flow indicator should be between 45 & 55 PSIG). If the indicator does not match the tag, adjust the globe valve directly above the indicator until the setting matches. This Pressure/Flow can be set only during a purge cycle (air exiting the muffler). The setting will change during repressurization then return to the setting in the next purge cycle. From this point the system should cycle as outlined in the operation section of this manual. Once the purge flow is set it will fluctuate slightly during the day if the system operating pressure fluctuates. It is best to set the purge flow during a time when the system pressure is at a low point so the dryer purge requirements are not starved during lower pressure operating periods.

## SEQUENCE CONTROLLER

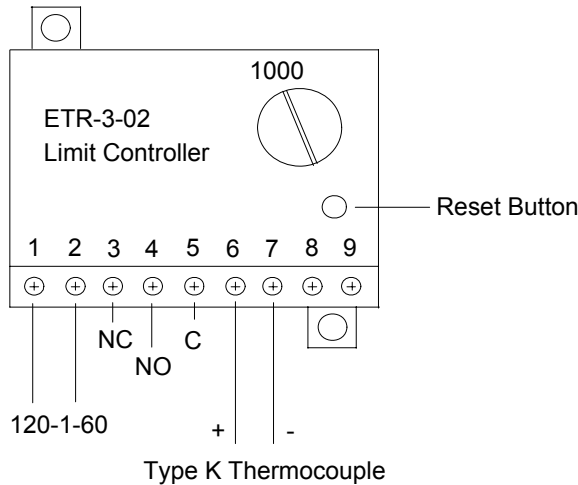
The standard model GEH regenerative air dryer is controlled by an electronic CMOS logic system designed specifically for Great Lakes Air dryers. The controller is preset in its function with minor adjustments available by moving jumper pins. The first adjustment is the power frequency at the dryer input. For the timing to be accurate this must be set properly. The two options are 50HZ or 60HZ most US applications are 60HZ. The second adjustment is the primary dryer type heated or Heatless. The third adjustment is the type of heated dryer internal or external the model GEH is an externally heated and should be set appropriately. If the heat and Heatless pin is in the Heatless position the external / internal is not functional. The fourth adjustment is the standard and test timing cycle. The standard cycle is 4 hours on each tower and 8 hours for a complete cycle. The test cycle was designed into the unit to facilitate troubleshooting. The long 8-hour cycle is prohibitive for service or maintenance to observe the dryer functions. With the jumper in the "TEST" position the unit runs 40 minutes on each tower and 80 minutes complete. **DO NOT OPERATE THE DRYER IN THIS MODE FOR REGULAR OPERATION!**



## HEATER CONTROL

The process temperature controllers supplied with the model GEH come factory set for standard operation. The process temperature controller is a small microprocessor with the capacity to monitor and adapt its ramping functions to best suit the specific dryer application. The process controller is located on the door of the electrical enclosure with a digital readout of the current purge temperature. The required temperature setting of the process controller is identified earlier in this manual as between 275°F and 375°F. To identify the proper setting for your application the following steps are suggested. Set the process controller at 325°F initially. Observe the operation of the unit over the following days. If the unit delivers a highly elevated downstream temperature for more than a couple of minutes after switch over the temperature should be lowered in 15° increments with no more than 1 adjustment per day. If the unit is developing an insufficient dewpoint with no elevated discharge temperature the unit will need to have the process temperature elevated. Elevate the temperature in 10° increments with no more than 1 adjustment per day. Once the temperature is set it should not need readjustments unless a dramatic change in operating conditions such as load or pressure occurs.

The second controller is a high limit controller that senses the temperature of the heating element sheath. In the case of a primary controller failure or the lack of purge flow to carry the heat away from the element the sheath would heat up and trip the high limit controller. The high limit controller is a manual reset type temperature switch, once it is tripped it must be manually be reset by powering the system down and restarting it or by temporarily jumping out terminal 12 & 13 on the top of the controller. The high limit controller is black plastic and located on the sub panel of the electrical enclosure. The setting for the high limit controller is 1000°F.



### **PREFILTER MAINTENANCE**

The Prefilter element should be replaced whenever the pressure drop over the Prefilter becomes excessive. Differential pressure is the best method to gauge the need for element replacement. The elements can stand differential pressures of 100 PSIG but the recommended maximum is 10 PSIG. The pressure at which you should change your elements should be determined by comparing the operational efficiency of your system (Cost of pressure drop vs. cost of the elements). The standard recommended element replacement schedule is twice a year (4th of July and Christmas). Placing a mechanical separator immediately upstream of the coalescing Prefilter can extend Prefilter life. It is important to regularly check the operation of the drain trap device for the Coalescer and any upstream traps.

### **AFTER-FILTER MAINTENANCE**

The after-filter element should be replaced whenever the pressure drop becomes excessive. As with the coalescing elements the particulate elements can stand differential pressures of 100 PSIG. The recommended maximum is 10 PSIG. The pressure at which you should change your elements should be determined by comparing the operational efficiency of your system (Cost of pressure drop vs. cost of the elements). The standard recommended element replacement schedule is twice a year (4th of July and Christmas).

### **CONTROL AIR FILTERS MAINTENANCE**

Frequent inspection of the control air filter is required so Activated Alumina particulate does not restrict the control air required for pneumatic actuation of dryer valves. The standard recommended element replacement schedule is twice a year (4th of July and Christmas).

### **PURGE MUFFLER MAINTENANCE**

Purge mufflers prevent high noise levels from the cyclic depressurization of the desiccant towers. The desiccant fines generated from normal operation will cause the muffler elements to become clogged, which will restrict purge flow and cause insufficient regeneration. If the purge tower shows backpressure during operation replace the muffler element.

The desiccant loading procedure can cause a large amount of desiccant dust to accumulate prior to equipment startup. Most of this accumulation is blown out the purge exhaust valve during the first hours of operation. The high volume of desiccant fines from startup limit the life of the initial purge muffler element. It is recommended that the muffler element be replaced after the first 100 hours of operation. Subsequent element replacements should be every 6 months to a year or as dictated by regeneration tower backpressure.

### **PURGE RATE MAINTENANCE**

An adequate supply of purge air is essential for proper regeneration of desiccant and good Dewpoint suppression. If your system pressure varies throughout the day set the purge pressure at a low period so in low-pressure periods the purge flow is not starved. Always consult the factory prior to changing operating conditions.

The adjustable purge valve should be set to the following values for standard equipment operating at standard conditions.

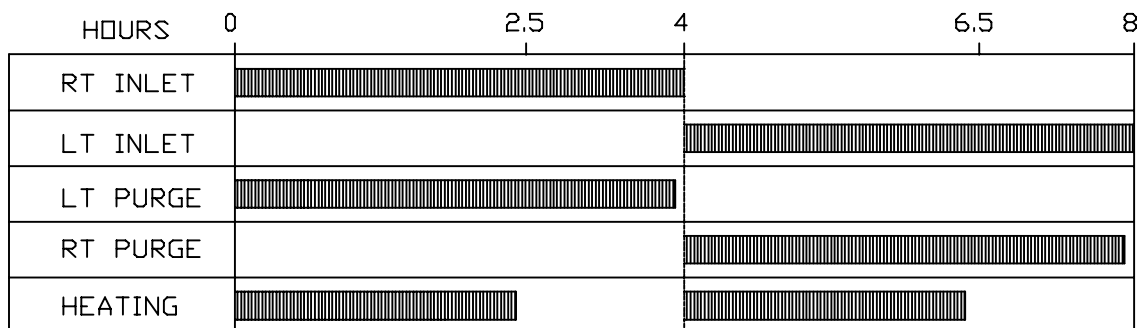
<b>Model</b>	<b>Purge Set Point</b>
GEH-100	40
GEH-125	50
GEH-175	40
GEH-250	50
GEH-350	45
GEH-500	50
GEH-650	50
GEH-800	50
GEH-1000	50
GEH-1250	50

<b>Model</b>	<b>Purge Set Point</b>
GEH-1400	45
GEH-1600	45
GEH-1800	45
GEH-2000	45
GEH-2250	40
GEH-2500	45
GEH-2750	45
GEH-3000	50
GEH-3500	45
GEH-4000	45

**CYCLE TIMES**

Time cycles are part of the equipment design and have been accurately set in the factory and should not be field adjusted. Timing changes are possible for custom applications but always consult the factory prior to changes. The following are the standard time cycles for your equipment.

- Drying Each Tower ..... 4 Hours or indefinite period with the Demand Cycle Controller option.
- Purging Each Tower ..... 3 Hours / 55 Minutes
- Heating Each Tower ..... 2 Hours / 30 Minutes
- Drain Time Sequence ..... Field Adjustable



**DESICCANT MAINTENANCE AND REPLACEMENT**

Desiccant life is estimated at 3 to 5 years, however conditions differ with location. Contamination of desiccant is a leading cause of accelerated failure. Close preventative maintenance of the coalescing pre-filters will extend the life of the desiccant. Spent desiccant should be drained through the desiccant drain port in the bottom of each tank. Desiccant alone is not hazardous and can be disposed of as a general landfill product. Oil contaminated desiccant must be dealt with on the basis of the amount of oil contamination.

Fresh desiccant should be added through the desiccant fill port, which is where the pressure safety relief valves, are located. Always leave adequate room above the desiccant bed to permit some bed motion and expansion during dryer operation.

Be certain to only install the approved Activated Alumina that you're Great Lakes Air representative can provide; it excels with respect to dew point suppression capability and attrition resistance. Various brands can cause excessive attrition, and poor Dewpoint suppression.

**DEWPOINT PROBE MAINTENANCE**

Although neither the Dewpoint meter nor probe requires regular maintenance it is important that the filter upstream of the probes be changed regularly. It is also recommended that the probe be recalibrated periodically. Calibration can last for years due to the low velocity of the sample cell. Contamination and excessive saturation can cause the need for recalibration or replacement.

## TROUBLE SHOOTING GUIDE

Because almost all problems with regenerative dryers will result in bad dewpoints it is assumed that the condition of bad dewpoint applies to the entire table.

PROBLEM	POSSIBLE CAUSE	REMEDY
No / Bad regeneration	No / Low purge stream	Verify purge flow indicator setting. (See "STARTUP")
	High pressure in regeneration tanks	More than 2 PSIG in the regeneration tank will inhibit regeneration. Replace muffler elements.
	No regeneration heat	The high limit temperature controllers are manual reset. If purge flow is too low or the primary controller fails the high limit will trip. See "HEATER CONTROL" in this manual to reset.
		Verify main fuse integrity and replace where necessary. If the controls and fuses check out and the heater is receiving voltage and there is still no heat contact the factory for instructions to verify the heater condition.
	Low regeneration temperature	A low process heater setting will inhibit regeneration. A setting to high is also bad. (See "HEATER CONTROL")
	Contaminated desiccant	If compressor lubricants have contaminated the desiccant it will not regenerate properly. Remove sample for verification of quality.
Cycle / Sequence failure	Timing card failure	These cards are very reliable replacing it should be the last resort.
	Low control voltage	Control voltages or spikes below 95V will reset the timer in mid cycle. Isolate and or improve voltage.
	Process valve failure	If you believe that a process valve has failed contact the factory for assistance in identifying the failed valve.
	Solenoid valve failure	By referring to the OPERATION section of this manual you should be able to identify the firing sequence of the solenoids. DO NOT rely on voltage tests verify that the valve is passing control air.
	<i>Dewpoint Demand Only</i> Dewpoint meter not signaling the tower switch.	If the dewpoint meter does not close its contacts to complete the circuit between terminal 11 & 12 on the timer board the unit will not cycle. It will remain in standby mode.
High Outlet temperature	Excessive heat during cycle	The heating cycle is adding more heat than the cooling cycle can remove. To make adjustments refer to, "HEATER CONTROL".
Excessive inlet conditions	Liquid carryover	Regenerative dryers are designed to remove vapor not liquid. Adequate filtration must be employed to remove all liquid before entering the dryer.
	To much flow	Dryer capacities are identified by the model # in SCFM @ 100 PSIG & 100°F. Flowing more than rated capacities can damage desiccant and make complete regeneration impossible.
	Low inlet pressure	By operating at pressures less than design, the actual flow through the dryer is increased and in excess of the maximum rating.
Bad Dewpoint after system startup	Probe is saturated from atmospheric moisture	Isolate probe during system shutdowns. See dewpoint demand controller section for details

An advanced troubleshooting guide is available contact your distributor for more information.

## TROUBLESHOOTING FILTRATION & DRAINS

Identify the pre-filtration for the unit. It should be a high quality coalescing filter. Check that the drain system is working properly; and is not hard piped into other system drains. Hard piped drain systems will inevitably pump liquid from one point of the system to the other because of operating differential pressures. Check valves are utilized to overcome this problem in many facilities but are prone to being left open from the usual debris in drain lines. If a system has common piped drain system water down stream of the filters and dryer is almost impossible to identify.

If the dryer Prefilter has a differential pressure gauge check to see that it reads at least 1 PSID. No visible pressure drop is usually an indication of a ruptured filter element. If the coalescing filter is showing large amounts of liquid being drained it might be overloaded and bypassing liquid. Verify upstream drains are functioning properly.

## TROUBLESHOOTING AMBIENT & AIR INLET QUALITY

Identify the compressed air inlet temperature to the dryer if it is above 100°F and the system was not designed for high inlet temperatures it is most likely overloaded. Be sure to carefully identify the air temperature, 110°F can feel just warm through a steel pipe. Reduce the dryer inlet temperature. As compressed air inlet temperatures rise above the design 100°F to the dryer, the moisture holding capacity of the air rises dramatically. The following table represents additional load to a dryer at elevated inlet temperatures.

Temperature	100°F	105°F	110°F	115°F	120°F
Additional Load	0%	15%	32%	51%	75%

Identify the ambient operating conditions. If the unit is in ambient conditions above, 110°F Dewpoint and operational efficiencies will suffer. Ambient temperatures at 120°F and higher will seriously impair the dryer's adsorption capacity.

## TROUBLESHOOTING PURGE EXHAUST SYSTEM

When the system is purging, check the tower pressure gauge on the purging tank. It should be at 0. Any backpressure in the regeneration purge system will impede purge flow and hinder the regeneration of the desiccant. If the system has mufflers change the elements. This should be done annually. If the system has the purge exhaust piped away locate the cause for the restriction and eliminate it. It is possible that a bad check valve or inlet valve will be allowing process air into the regeneration system overloading the muffler or piping system. The next section helps you identify a valve problem.

## TROUBLESHOOTING VALVE INTEGRITY

Most of the valves on a regenerative dryer act to separate the high-pressure process-drying stream from the low/atmospheric pressure regeneration system. By performing the following diagnosis, it is possible to identify valve bypass and the severity of that bypass without even taking the unit out of service.

Identify which tower/muffler is purging. Turn the purge control valve (Located between the tanks in the purge piping) off completely. Check the muffler to see if the purge flow has stopped. If it has half of the valves on the dryer are in good shape. If a small amount of air can be felt then a valve seat is leaking and needs to be repaired as soon as possible. If large amounts of air are present a valve has failed and immediate attention is required. Return the purge valve to the original operating set points.

At this point, you have checked out half of the valves of the machine. In order to check the other half you will need to wait approximately 5 minutes for the unit to switch towers so the process can be repeated.

If you have a leak, it will be one of three points. They are listed in order of failure probability. The only way to specifically identify which valve is failing requires depressurizing the unit and removing the valves and inspecting them.

1. The smaller front purge check valve above the opposite tank that is purging.
2. The large outlet check valve above the regeneration tank.
3. The inlet valve on the side of the regeneration tank. This valve is rarely the culprit. If it is you will find air leaking out of the valve casting at a vent point indicating the diaphragm has ruptured.

## TROUBLESHOOTING & ADJUSTING OPTIONAL DEWPOINT DEMAND CONTROLLER DISPLAYS

The dewpoint demand system consists of three components. First a probe that reads system dewpoint and transmits that signal back to the second component a dewpoint display that interrupts the 4-20 ma signal to display dewpoint in °F Pressure Dewpoint. The third component is the 24V DC power supply that supplies power to the probe for loop power signal and the probes auto calibration routine. All must be working in concert to get an accurate dewpoint reading.



1. Depress and hold the **E** button then push the **M** button until the “**COND**” display appears then release the buttons.
2. Press the **▶** button to scroll through the group categories, once the desired group is displayed press the **M** to scroll through the indications and factory setup points within the desired group.
3. The **▲** button will scroll the individual set points and available options.
4. Pressing the **E** button will return the meter to the main display.
5. You must exit to the main display and return to step #1 to enter a new group. Modifications can only be made to one category at a time.

Group	Indication	Name	Factory Setup
<b>COND</b>	<b>Condition Data</b>		
	PVH	Peak hold setup	PH
	RANG	Measurement Range setup	2A
	AVG	Number of averaging	1
	NAV	Number of moving averaging setup	OFF
	S.UD	Step wide setup	1
	BLNK	Indication blank setup	OFF
	A.OUT	Analog output setup	4-20
	B.UP	Digital zero backup setup	OFF
	LINE	Linearization setup	CLR
	TR T	Tracking zeroing time setup	0.0
	PON	Power on delay setup	OFF
	PRO	Protect setup	OFF
	U-NO	Unit number indication setup	ON
<b>CON</b>	<b>Comparator Data</b>		
	S-HI	HI side judgment value setup	-0200
	S-LO	LO side judgment value setup	-0400
	H-HI	HI side hysteresis setup	0
	H-LO	LO side hysteresis setup	0
<b>NET</b>	<b>Scaling Data</b>		
	FSC	Full scale indication value setup	068
	FIN	Full scale input value setup	20ma
	OFS	Offset indication value setup	-112
	OIN	Offset input value setup	4ma
	DLHI	Digital limiter HI value setup	9999
	DLLO	Digital limiter LO value setup	-9999
	AOHI	Analog output HI indication setup	068
	AOLO	Analog output LO indication setup	-112
	DEP	Decimal point position setup	000.0
<b>LINE</b>	<b>Linearization Data</b>		
			0

### Adjusting Dewpoint Demand Set point

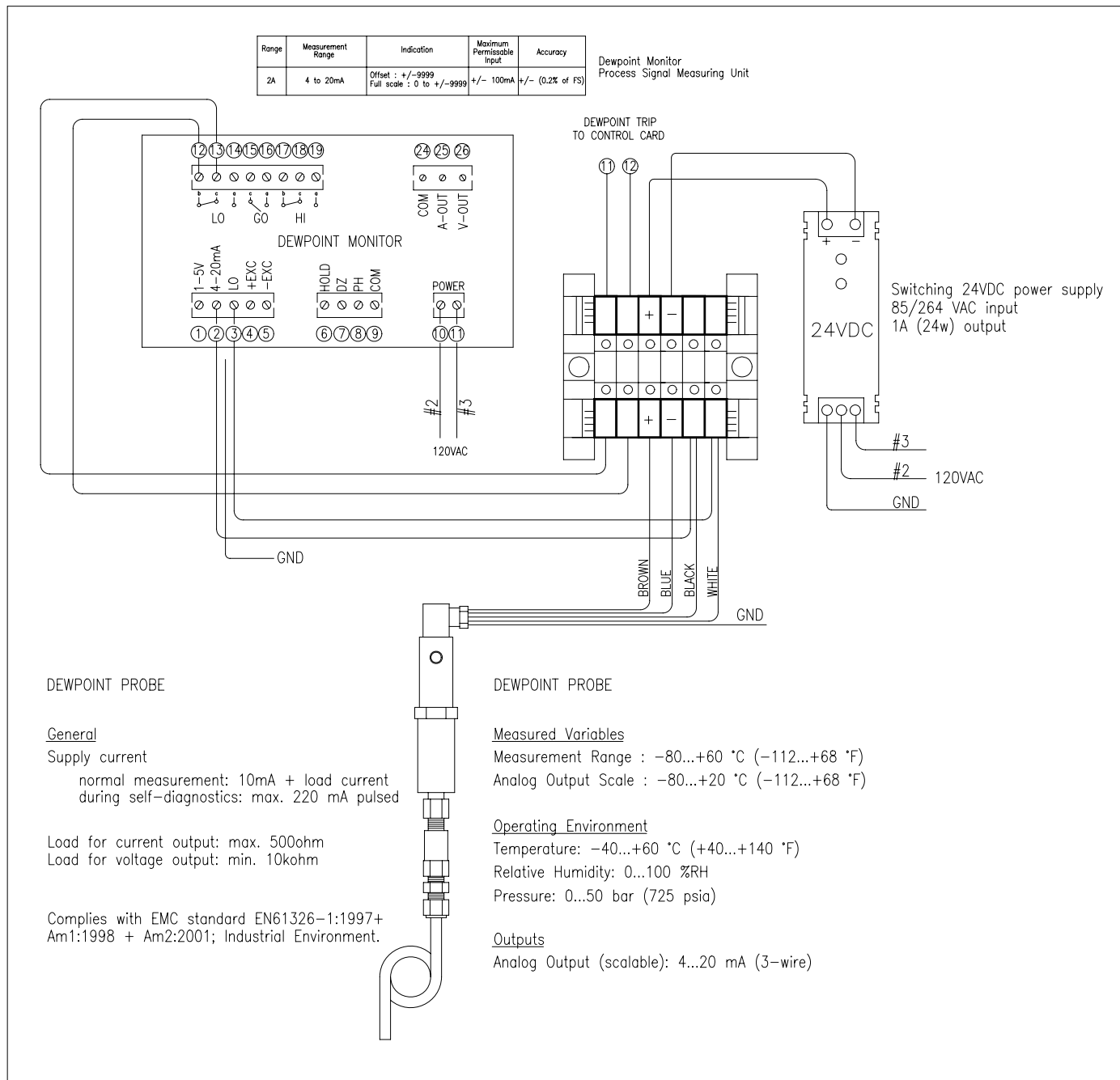
1. Depress and hold the **E** button then push the **M** button until the “**COND**” display appears then release the buttons.
2. Press the **▶** button to scroll through the group categories, once the “**CON**” is displayed press the **M** to scroll through the individual indications. Once you see “**S-LO**” the next push of **M** will be the set point input of “**S-LO**”
3. Press the **▶** button to scroll through the digits and the **▲** button will scroll the individual digits to the desired set points.
4. Pressing the **E** button will return the meter to the main display.

### Adjusting High Dewpoint Alarm Set point

1. Depress and hold the **E** button then push the **M** button until the “**COND**” display appears then release the buttons.
2. Press the **▶** button to scroll through the group categories, once the “**CON**” is displayed press the **M** to scroll through the individual indications. Once you see “**S-HI**” the next push of **M** will be the set point input of “**S-HI**”
3. Press the **▶** button to scroll through the digits and the **▲** button will scroll the individual digits to the desired set points.
4. Pressing the **E** button will return the meter to the main display.

### QUICK TROUBLE SHOOTING TIPS:

1. Verify that there is flow over the sensor in the sample cell. The sample cell should have unrestricted line pressure feeding it. The reduced bleed flow is achieved by the check valve and orifice on the out let of the sample cell prior to the "pigtail" that prevents moisture from backtracking from ambient into the sample cell.
2. Verify that the cable is securely connected to the moisture probe
3. Verify that the 24V DC power supply is supplying the correct voltage.
4. Verify the display meter settings (Previous Page)
5. Verify the probe connection and wiring.



## **TROUBLESHOOTING DESICCANT (TESTING OR REPLACEMENT)**

Desiccant in a regenerative dryer has an average life of 5 years provided the coalescing filter upstream of the dryer is monitored and serviced regularly. Some types of system failures or lack of filtration maintenance can damage desiccant before that period. We recommend that you pull a desiccant sample and have it analyzed after approximately 3 years of service.



To pull a sample, de-energize and completely depressurize the dryer. Remove the lower desiccant drain plug and fill a zip-lock bag full of desiccant. A quart bag with 1 to 2 pounds of desiccant sample is usually sufficient. Label the bag left or right tower with the serial number of the dryer.

Replacing the drain plug after it has been removed can be a messy and aggravating process without a simple little trick. Before removing the plug, have the sample bag and a shop rag or piece of cardboard just slightly larger than the drain opening handy. Once the sample bag is full, cover the hole with your hand and work the rag or cardboard in the drain hole to stop the desiccant flow and replace the plug. The rag or cardboard left in the tower will cause no problem to the dryer operation.

## **TROUBLESHOOTING INTERMITTENT CYCLE PROBLEMS**

There are three probable reasons that a system cycle will fail intermittently. The first possible reason is the timer control card. This fault is very easy to verify with the help of a voltmeter. Use the meter to match the control cycle to electrical outputs associated with the output diaphragm on page 9 of this manual.

The second is a solenoid valve fault. To check this possibility verify that control air is applied to the correct inlet or purge valve, by trying to remove the push-lock tubing on the top of each valve. This is accomplished by pressing the locking ring between the brass fitting and the tubing and gently pulling the tubing. If pressure is present, you will not be able to remove the tubing it will be locked in place by the pressure. If the tube has no control air, it will easily come out. Replace it immediately if it does come out. Control air should be present on the inlet valve that is closest to the purge valve venting purge air.

The other valve should not have control air. Only one purge valve should be vented and it should be the one venting purge air. If the control card is sending the correct electrical signal to the solenoid and the solenoid is not sending air to the correct process valve the solenoid is the fault.

If both the card and the solenoids check out and you have performed a valve check from earlier in this, manual the problem must be check or inlet valve sticking. Replace the check valve cartridges and rebuild the inlet valves with complete rebuild kits.