

**ARID-X10B FLOOR  
MOUNT DRYER  
OPERATING MANUAL**

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## DRYER DESCRIPTION



The ARID-X10B dryer is a fully portable dryer designed to dry hygroscopic resins quickly and efficiently. It is ideal for insert molders and laboratory applications, or where production rates are 10 lbs./hr or less.

The ARID-X10B dryer is available in 110 volt and 230 volt models. The power requirements for the 110 volt model are a voltage range of 105-130v AC at 50/60 Hz., single phase with a 20 amp current rating and the 230 volt model requires a range 220-250v AC at 50/60 Hz., single phase with a 10 amp current rating.

### Regeneration Cycle

The **ARID-X10** utilizes our HP4-X dual desiccant bed design that provides a constant supply of dry air to the material hopper. While one bed is removing moisture from the process air stream, the other bed is being regenerated. The entire process is controlled by the PLC which is programmed with the tower heat-up and cool down times required to regenerate the desiccant. When the regenerated bed completes this cycle, the zone valve switches the air stream and the newly regenerated bed is now used for drying the process air. The saturated bed is then regenerated, repeating the cycle. Please see the Regeneration Cycle Diagram on page 8.

The airflow design of the ARID-X/HP4-X dryers makes the regeneration cycle more efficient because we utilize a small amount of the desiccated process air, rather than ambient air, to regenerate the desiccant bed. This reduces the impact of the high moisture content of the ambient air, which would contaminate the desiccant bed, and allows the dryer to attain a lower dew point. This cycle is depicted in the schematic on page 8.

### HP4-X Design

Our patented HP4-X design incorporates 4 desiccant beds where two are stacked, one over the other in each tower. This nearly doubles the

## **DRYER DESCRIPTION**

(Cont'd)

amount of desiccant available for drying the process air stream, and because of the tower design, the dryer is able to regenerate the desiccant in the same time as our ARID-X series. This allows the dryer to operate in very high humidity conditions without affecting the process air dew point. In fact, this design produces dew point levels of  $-40^{\circ}$  to  $-80^{\circ}$  C for faster more complete drying of your material. Please see Airflow diagram on page 7.

### **Material Hopper Requirements**

The Arid-X10 dryer can be used with any material hopper that is designed to allow proper air flow. Hoppers that are equipped with a material spreader cone and diffuser basket will provide the best performance. To obtain optimal drying performance, we recommend that you utilize our uniquely designed material hoppers.

Dri-Air's "all stainless" hopper design utilizes a stainless steel inner shell surrounded by a stainless steel jacketed insulation layer. The easily removable stainless steel spreader cone/diffuser basket assembly promotes proper material flow to ensure that the material is dried efficiently and no undried material is left at the hopper bottom that needs to be fed out prior to operating. You must ensure that your hopper is kept filled, to ensure that you have sufficient time to dry the material.

### **Dryer Controls**

The Arid-X10 dryer is supplied with our standard PLC Control Module that includes a PLC Control Board, Display Control Board with Display/Touch Pad, and a Digital Temperature Controller.

#### **PLC Control Board**

The PLC Control Board controls the regeneration cycle described in the previous section. It has been factory programmed and does not require

## **DRYER DESCRIPTION**

(Cont'd)

any additional input by the operator. The board will automatically monitor and control the dryer's operating parameters by timing the regeneration cycle as well as monitoring and controlling the regeneration heaters and dryer alarms.

### Display Board with Control Panel Display/touch Pad

The Display Control Board works in conjunction with the PLC Control Board to control the dryer's regeneration heaters by actuating solid state relays. The Touch Pad and Control Panel indicate the machine status and allow the operator to start or stop the dryer.

### Digital Temperature Controller

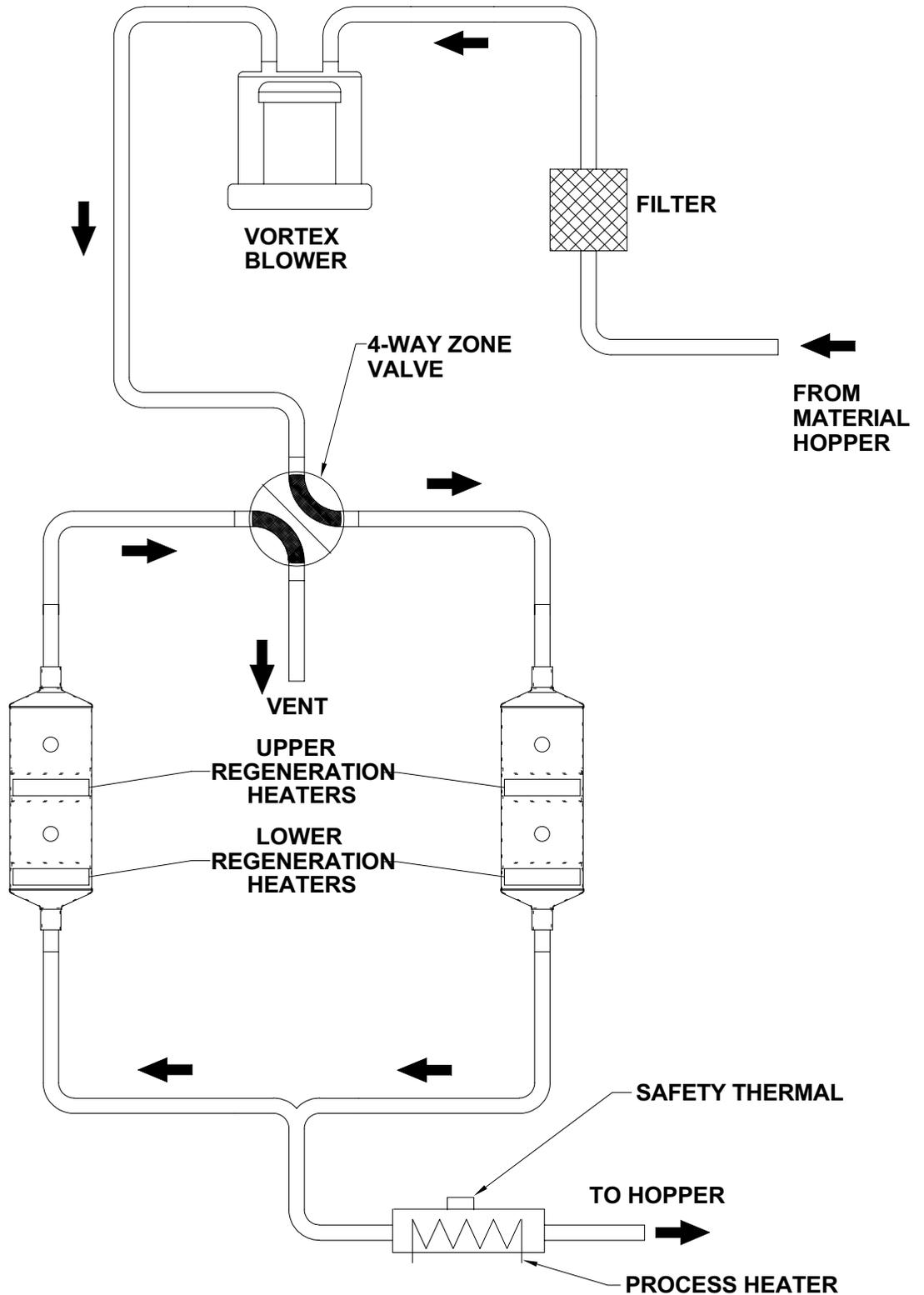
The Digital Controller works in tandem with the PLC Control Board to monitor and control the process air temperature. The controller's touch pad allows the operator to input the dryer's process air temperature settings and alarm points. These are explained in more detail later in this manual.

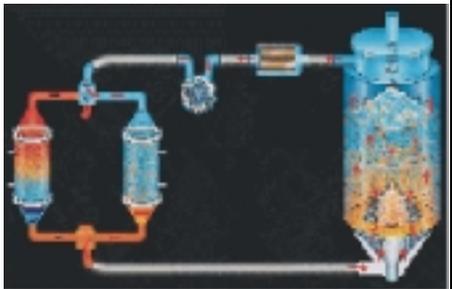
### **Dri-Air Electric Rotary Zone Valve**

The Arid-X10 utilizes our exclusive electric rotary valve technology, which helps make this dryer truly portable and low maintenance. As the valve does not need compressed air to operate, it is far more reliable than valves that depend on clean compressed air at a constant pressure.

The valve is designed to be practically maintenance free, as the seals are self seating and are designed to provide years of trouble free service. The electric controls are easily accessible for trouble-shooting, and are equipped with lights to indicate the zone position of the valve.

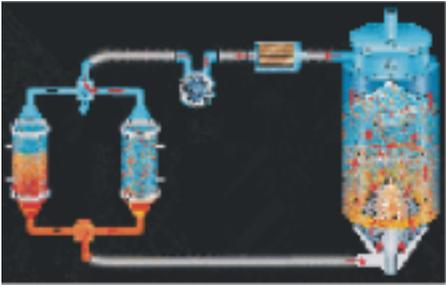
# AIR FLOW SCHEMATIC FOR ARID-X 10 DRYER



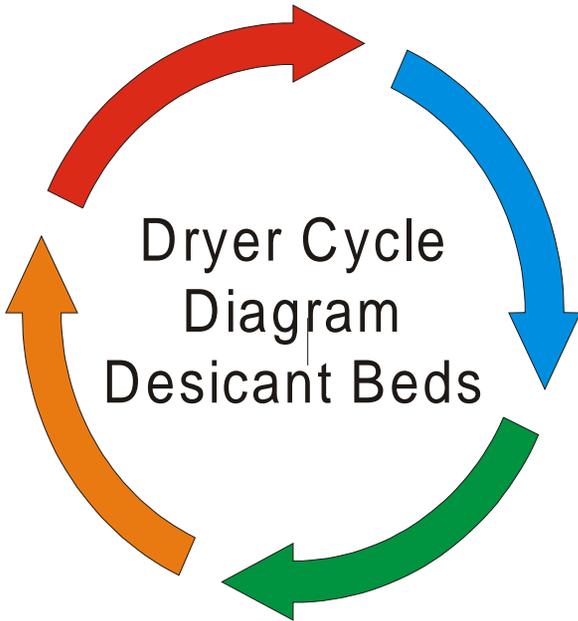


Zone 1 Cooling

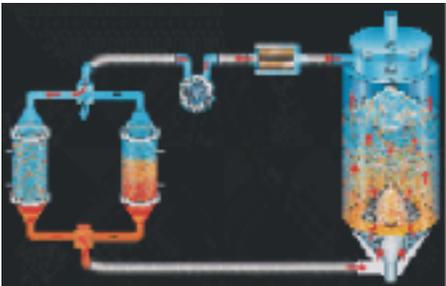
Valve Shifts



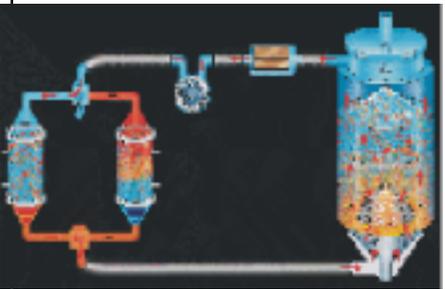
Zone 1 Heating



Zone 2 Heating



Valve Shifts



Zone 2 Cooling

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## **INSTALLATION PROCEDURE**

**CAUTION:** Prior to installing the dryer a qualified electrician should ensure that the facility power supply is compatible with the unit. Any wiring required for installation must be performed by a qualified electrician.

### **Installation Requirements**

#### **Electrical**

The power requirements for the unit are detailed on page 4 of this manual. The unit is supplied with power connector cord and should be installed as directed below. *All 230 volt models require a minimum operating voltage of 220v AC to operate properly.*

#### **Facility Location**

The unit is suitable for use in industrial and laboratory environments. The location should be adequately ventilated, with no flammable vapors or gasses present. The unit must be positioned to allow the operator to view the control panel and access the controls. Do not locate the dryer in an enclosed area. Allow at least 3 feet (1 meter) of clearance around each side for proper ventilation and heat dissipation. If the unit is to be installed on a bench or stand, be sure they are adequately sized to accommodate the dryer's weight (72 lbs/32Kg).

### **Hopper Connection**

Each Arid-X10 dryer is supplied with a 6 foot Process Air Hose/Thermocouple Assembly and a 6 foot Return Air Hose. To install the dryer, connect the Process Air Hose/Thermocouple Assembly to the material hopper by placing the end of the hose with the thermocouple probe over the material hopper inlet port (usually on the bottom of the hopper) and the end of the hose with the thermocouple plug over the dryer's Process Air Outlet Port located on the top of the dryer. Connect the Return Air Hose to the outlet port on the material hopper (usually on top/cover of hopper) and to the dryer's Process Inlet Port on top of the Filter Canister. Clamp each hose tightly with the hose clamps provided with the dryer. Plug the

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## **INSTALLATION PROCEDURE**

(Cont'd)

thermocouple connector on the Process Air Hose assembly into the receptacle located on the side of the dryer. See Dryer Configuration drawing (84430) in Appendix.

### **Electrical Connection**

The Arid-X10 dryer is available in 110 or 220 volt, single-phase models. The 110 volt model is supplied with a pre-assembled power cord with a grounded three prong male plug already attached, while the 220 volt model requires the user to have a qualified electrician attach an appropriately grounded male plug, suitably configured to the facility's power supply outlet.

#### 220 volt Connection - USA/Canada

Connect WHITE and BLACK wires to power leads on plug and the GREEN wire to the ground lead.

#### 220 volt Connection - Europe

Connect BROWN and BLUE wires to the power leads on plug and the GREEN/YELLOW wire to the ground lead.

To connect the dryer to electrical power, plug in the cord to any grounded power source. With all units being single phase, blower rotation will be correct.

**CAUTION: Do not operate this dryer using an ungrounded power receptacle.**

### **Post-Installation Inspection**

Prior to starting the dryer, inspect the unit to ensure the following:

1. All hose couplings are tight and secure.
2. Hoses are not crushed or obstructed.
3. Process Air Thermocouple is connected.
4. Hopper is clean and ports are clear.

## DRYER OPERATION    STARTUP PROCEDURE

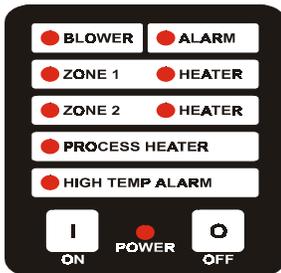
**CAUTION:** Only personnel qualified to operate this dryer should start and run this dryer.

### Dryer Controls

Main Power - The rocker switch located on the left side of the dryer face panel controls all power to the dryer. It functions as the main circuit breaker for the dryer and in emergencies, will cut all power to the unit.

Control Panel Power - Located on the Control Panel are the ON and OFF buttons that initiate the operation of the dryer. Pressing the ON button will start the dryer operating at the previous operational settings. The OFF button will interrupt dryer operation, but will not cut power to the unit.

### Dryer Start-up



**CONTROL PANEL**



**TEMP CONTROLLER**

To initiate dryer start-up, press the rocker switch on the unit's face panel. The POWER light on the Control Panel (shown on left) should illuminate; indicating power is supplied to the unit. To continue the start-up procedure, follow the instructions below.

1. POWER light indicates there is power to the controls.
2. Press ON to start dryer. BLOWER light will illuminate; indicating system ready and operating.
3. Flashing ZONE light means designated bed is in heating portion of regeneration cycle.
4. Steady ZONE light means designated bed is in cooling portion of regeneration cycle.
5. Illuminated HEATER lights indicate designated heater is on.
6. The dryer is now ready for setting the Process Air temperature. Follow instructions in next section.
7. The TEMPERATURE ALARM light will illuminate if an alarm condition arises. Further diagnostics required. See sections on Alarms and Trouble-shooting.
8. To stop dryer press OFF.

**To Set Process Air Temperature:**

Using the Digital Temperature Controller:



**DIGITAL CONTROLLER**

1. Press **SET** button on the controller and the red Temperature Set display (labeled SV) will flash.
2. Press the < key to move the cursor to each digit you wish to change. Using the ↑ key to increase the flashing digit or the ↓ key to decrease the digit. Set each digit to the desired temperature setting.
3. Press the **SET** key again to enter the new temperature setting.

If the upper Process Air Temperature display (Labeled PV) flashes, the controller is indicating that the process air temperature is below the preset lower control limit. The display will continue to flash until the temperature rises above the lower control limit.

**CAUTION:** Do not operate this dryer below 140 degrees F (60 deg. C) or above 350 degrees F (177 deg. C).

## **ALARMS**

All of the alarm conditions discussed below initiate a “Dryer Shutdown” that cuts power to the blower, digital controller and PLC output relays. To determine which alarm condition caused the shutdown, press the OFF button on the Control Panel and then press and hold down the ON button until the dryer restarts and the displays are actuated. See Trouble-Shooting section of this manual.

### **Process Air Temperature Alarms**

The PLC/Digital Control system is preprogrammed with alarm set points that will shut the dryer down and activate the TEMPERATURE ALARM light on the dryer control panel and the ALM1 light on the digital

controller.

The alarm will be activated if either the process air temperature fails to reach the set point within the allotted time period or the temperature exceeds the high limit. The TEMPERATURE ALARM light will flash and the red ALM1 light on the Digital Controller will illuminate for both conditions.

### **Thermocouple Failure Alarm**

If a failure is detected with the Process Air Thermocouple, the upper Process Air Temperature display (labeled PV) on the Digital Controller will flash and display 0000. This alarm will be displayed if the thermocouple is not connected or is faulty.

## **ROUTINE OPERATION & MAINTENANCE PROCEDURES**

When operating this dryer please follow the procedures detailed below:

### **Routine Operation**

The dryer should be operated in a dry environment at temperatures between 50 and 110 degrees F (10-44 deg. C). The unit should be situated so that the air hoses are not crimped or restricted after connection with the material hopper and the controls are easily accessible to the operator.

When moving the dryer allow the dryer to cool completely before handling. Recheck the hose and thermocouple connections to ensure that they are tight.

To shut the dryer down, press the OFF button on the Control Panel and press the rocker switch to the off position. Always unplug the unit when not in operation.

**ROUTINE OPERATION &  
MAINTENANCE  
PROCEDURES**  
**Cont'd**

**Emergency Shutdown**

In the event that a condition should arise that requires the operator to immediately halt the dryer's operation, the operator can press the rocker switch to the off position and the unit will shut down completely. Remove the power plug from the facility outlet to cut all power from the dryer.

**Hopper Maintenance**

1. Always clean hopper interior, air inlet port and diffuser basket prior to adding or changing materials.
2. Never over-fill the hopper. Material should not obstruct the exhaust port at the top of the hopper.

**Filter maintenance**

1. Open filter canister and clean filter element on a daily basis using compressed air.
2. Change filter cartridge every 6 months (Sooner if process materials are dusty.).

**Never operate dryer without filter element installed.**

**Dryer Cleaning**

**Always unplug the dryer before cleaning.**

The dryer is supplied with a surface coating that is easily cleaned and maintained by simply wiping the dryer with a moistened cloth or rag. Never clean the dryer with solvents or corrosive liquids. Always allow the dryer to cool completely before cleaning.

## **TROUBLE- SHOOTING GUIDE**

All maintenance and trouble-shooting should be performed by a qualified electrician and a trained operator.

Nearly all diagnostic procedures can be performed with a volt ohmmeter and an AC/DC Ammeter.

### **BASIC TROUBLE- SHOOTING**

In the event that the dryer will not start or shuts down in an alarm condition please take the following steps prior to other diagnostic steps.

#### **1. Check the Power Circuit:**

- a. Incoming power fuses or circuit breaker.
- b. Dryer fuse. It has a blown fuse indicator that lights up if the fuse is defective.
- c. Is POWER light illuminated?
- d. Check heater continuity using a volt ohmmeter.

#### **2. Air Flow Circuit:**

- a. Ensure Zone Valve position corresponds to the regeneration cycle by comparing the ZONE position lights on the Zone Valve to the ZONE indicator lights on the control panel
- b. Make sure that all hoses are connected, not crushed, and free from obstructions.
- c. Inspect filter and make sure cover is tight.

#### **3. Control Circuit:**

- a. Using the Control Panel ZONE indicator lights as a guide for the status of the dryer regeneration cycle, check that all inputs are proper for the part of the regeneration cycle that the unit is in.
- b. Monitor the PLC output lights to ensure the corresponding LED on the power board is illuminated and there is output voltage to the heater.

#### **4. Operating Conditions:**

- a. Check the process air temperature. It should not be set below 140 °F (60 °C) because the unit will go into high temp alarm.

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**POWER light is not on. Unit will not start:****DETAILED**  
**TROUBLESHOOTING**

1. Check Rocker Switch circuit breaker to see if it is tripped using multi-meter. Reset the Rocker Switch breaker by turning it off and then on.
2. Check small fuse next to contactor. The LED will be lit if it is blown. Replace if necessary by opening the fuse holder and put new fuse into holder.
3. Check that incoming power to the unit is proper.
4. Check safety snap disc with multi-meter. (Should be normally closed)

**ALARM light is flashing. Unit will not run.**

1. Check for Main Contactor failure by pressing OFF button on Control Panel and then press and hold down the ON Button. If the unit does not start, the Main Contactor is not pulling in.

**TEMPERATURE ALARM light is flashing. Unit will not run:**

This indicates that the process air temperature has; exceeded the high limit programmed into the temperature controller, failed to reach the process air temperature set point, or there has been a thermocouple failure. To determine which of the aforementioned conditions caused the alarm, perform the procedure below.

*Press OFF button and restart machine by holding in the ON button. View what is displayed on the digital controller Process Air Temperature display. If it exceeds the set point an overtemp condition has occurred. If it is below the set point, the dryer cannot reach the set point. If 0000 is displayed, a thermocouple failure has occurred. Perform the following procedures for the indicated failure.*

Depending on when the operator discovered the alarm, the dryer may restart if it had sufficient time to cool down. If this happens simply allow the dryer to operate until the alarm occurs and then perform the above procedure.

**Machine will not reach temperature:**

1. If the PROCESS HEATER light is *not* lit.
  - A. Check output from temperature controller and input to PLC.
  - B. Check position of the Process Air Thermocouple. The probe tip should be in the middle of the hose.
2. If the PROCESS HEATER light is lit.
  - A. Check solid-state relays on power board.
  - B. Check airflow through process air hose.

Check the alarm limit first, by pressing and holding the **SET** button on the temperature controller until **AL** is displayed. The setting displayed indicates the number of degrees over the set point that the alarm will be actuated. It is factory set to 50°F (30°C) and should not be set below 30°F (16°C) or it will actuate too quickly.

**If the temp exceeds the set point, check the following:**

1. Remove the hose from the top of the hopper to check airflow. There should be airflow out of the hopper exhaust port and a vacuum on the hose. If there is little or no flow, check the inlet hose.
2. Inspect the filter to make sure that it is clean and not affecting the airflow.
3. Check the to see if one of the power board solid state relays has failed on by using a multi-meter on the output to the heater. The relay has failed if there is power to the heater when the Solid-state relay's LED is not lit.

**If thermocouple has failed, check following:**

1. Ensure thermocouple plug is securely inserted into dryer outlet.
2. Check thermocouple continuity with multi-meter.

## **TROUBLE-SHOOTING DRI-AIR ROTARY ZONE VALVE**

The Dri-Air Electric Rotary Valve is designed to provide very little process air flow restriction and no leakage between zones. It incorporates high temperature, self adjusting seals for years of trouble free service. The electrical controls are built into the end of the valve and include zone position lights.

Trouble-shooting is easy. The valve is not working properly if there are no lights illuminated, or the lights indicating the valve's zone position do not match the ZONE light displayed on the dryer's control panel.

Check all electrical connections to valve to ensure they are tight.

Do not attempt to adjust valve, contact factory service department with serial number of dryer to obtain replacement valve (Part # 83707).

### **DO NOT PUT FINGERS INTO VALVE WITH POWER ON**

## **TROUBLE-SHOOTING CONTROLS - PLC & DISPLAY BOARD**

### **PLC Mother Board**

The dryer control package includes a PLC controller that is programmed for the drying cycle discussed previously. Each input/output terminal on the Mother Board has a corresponding LED that can be used for trouble-shooting. A lit LED indicates the input or output is actuated. All PLC inputs are 12 volts AC and the outputs to the valve and main contactor are 110 volts AC. (See drawings 84428 or 84429 for more detail.)

### **Display Panel & Display Board**

The Control Panel displays the dryer status, including heater operation and alarms. The Display Board associated with the Display Panel actuates the heaters with 15 volt DC outputs to the heater relays.

**PARTS LIST: Arid X-10**

	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
<b>General</b>	84231	FILTER CARTRIDGE
	83707	ZONE VALVE
	82125	BLOWER
	84054	THERMOCOUPLE
	84016	TEMP. CONTROLLER (CB-100)
	80082	DESICCANT 4 lb./MACHINE
	80221	THERMAL SWITCH (500°)
	84101	PLC CONTROL
	84102	PLC w/7 DAY TIMER
	83401	DISPLAY BOARD
	81789	3 POLE RELAY
	83794	OUTPUT BOARD
	83443	.5A FUSE
84183	ROCKER SWITCH	
81942	7 DAY TIMER	
<b>110v Dryer</b>	84414	UPPER REGEN HEATER 110 v
	84412	LOWER REGEN HEATER 110v
	84409	PROCESS HEATER 110v
	83625	TRANSFORMER – 110v
<b>220v Dryer</b>	83437	TRANSFORMER – 220v
	84413	UPPER REGEN HEATER 220v
	84411	LOWER REGEN HEATER 220v
	84410	PROCESS HEATER 220v





