

ARID-X10D FLOOR MOUNT DRYER OPERATING MANUAL



DRI-AIR INDUSTRIES, INC.
16 THOMPSON ROAD
P.O. BOX 1020
EAST WINDSOR, CT 06088-1020

Tel. (860) 627-5110
FAX (860) 623-4477
Internet <http://www.dri-air.com>
e-mail: sales@dri-air.com

CONTENTS

DRYER DESCRIPTION	Pg. 4
AIR FLOW SCHEMATIC	Pg. 9
DRYER CYCLE DIAGRAM	Pg.10
INSTALLATION PROCEDURES	
FACILITY REQUIREMENTS	Pg. 11
HOPPER CONNECTION	Pg. 11
ELECTRICAL CONNECTION	Pg. 12
POST-INSTALLATION INSPECTION	Pg. 13
DRYER OPERATION	
START-UP PROCEDURES	Pg. 14
ALARMS	Pg. 15
ROUTINE OPERATION	Pg. 16
TROUBLESHOOTING	
BASIC TROUBLESHOOTING	Pg.18
DETAILED TROUBLESHOOTING	Pg.19
ZONE VALVE TROUBLESHOOTING	Pg.21
CONTROLS TROUBLESHOOTING	Pg.21
PARTS LIST	Pg. 26

DRYER
DESCRIPTION

The ARID-X10D 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-X10D 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.

Dryer process operating temperatures are 140 degrees F (minimum) to 350 degrees F (maximum) with an accuracy of +/- 3 degrees. When the drying temperature is 275 degrees F or higher, it is necessary to install a water cooled heat exchanger on the return hose of the dryer to ensure maximum dryer efficiency. If you do not have a heat exchanger and will be operating 275 degrees F or higher, please contact the factory for heat exchanger pricing.

Regeneration Cycle

The **ARID-X10D** 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 either an ELC factory programmed or our advanced dry-control microprocessor. When a 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 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 to -80 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 DESCRIPTION

(Cont'd)

Dryer Controls

The Arid-X10 dryer is supplied with a factory programmed ELC Control Module and a Digital Temperature Controller or our advanced dryer controls (ADC) microprocessor.

ELC Control Module

The ELC Control Module controls the regeneration cycle described in the previous section. It has been factory programmed and does not require any additional input by the operator. The module 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.

Digital Temperature Controller

The Digital Controller works in tandem with the ELC Control module 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.

DRYER DESCRIPTION

(Cont'd)

ADC ADVANCED DRYER CONTROL

The new ADC (Advanced Dryer Control) was introduced for optimum operation of the dryer and is as user friendly as possible. The easy-to-see alphanumeric display indicates all operating parameters and leads the operator through a menu driven program for all settings and information. All fault conditions are shown on the display in a format that is easy to understand. As with earlier designs, the ADC is driven by thermocouples strategically located in the towers, hoses to the hoppers, and other locations to properly control the operation of the dryer. Other inputs monitor the Performance of the dryer for safe and efficient operation.

FEATURES:

- Easy setting of process temperature *
- Blower rotation detection
- Monitoring of heater current to check heater and relay conditions
- Automatic learn mode for heater currents at local voltage
- Day and time indication
- Set start and stop times daily
- Adjustable high temperature alarm *
- Adjustable dew point alarm
- Battery back-up for time retention
- Selection of °F or °C
- Display can be remotely mounted

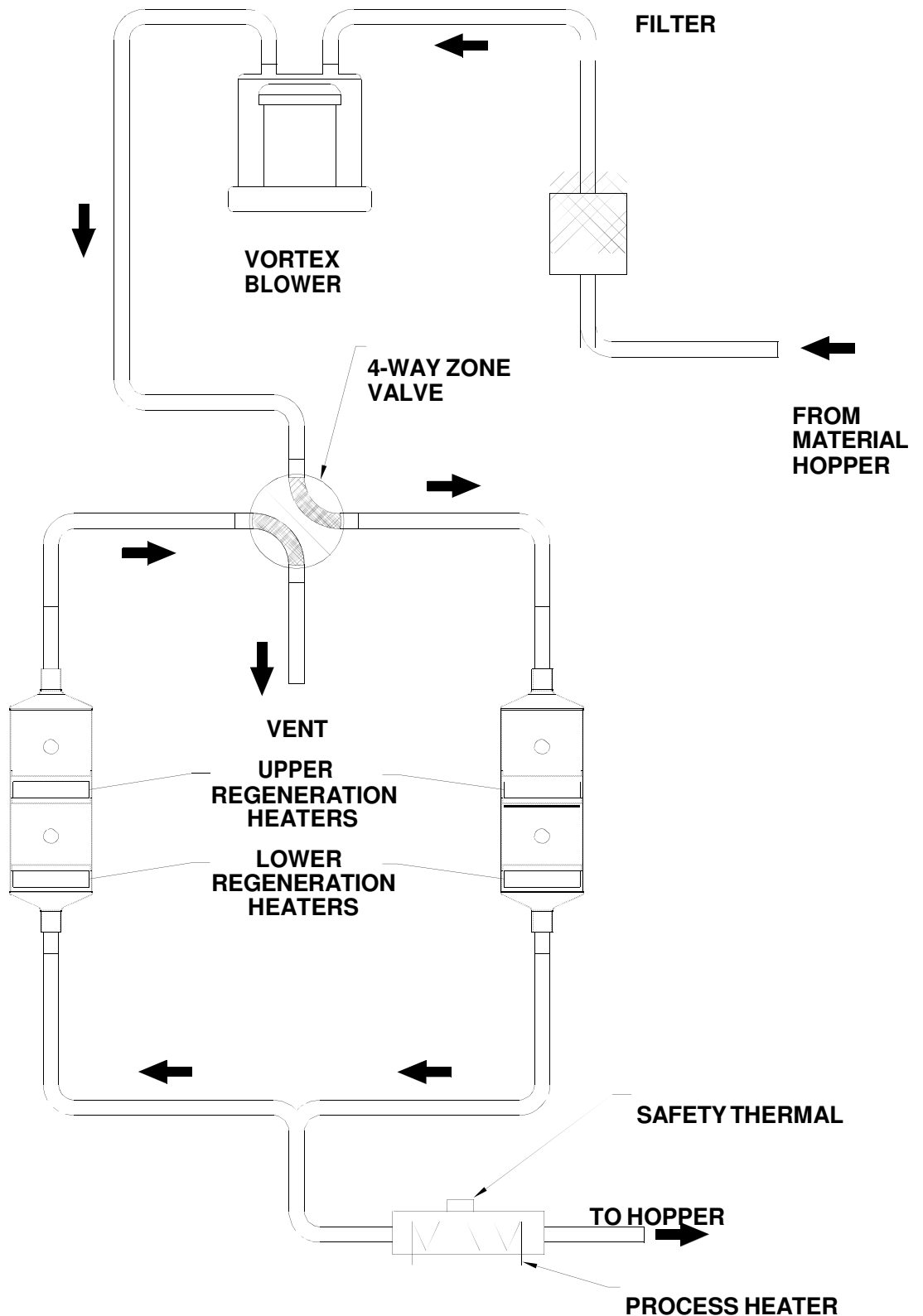
Open thermocouple detection
Process temperature setback to prevent over drying
Closed loop control of valve position
Actual fault indication- no codes to look up
Dew point readout down to -45 degrees C
Temperature calibration for ISO 9000
RS 232 or RS 485 ports for remote readout or control
Optional Ethernet output
Library of resins automatically sets process temperature
Event history for easy trouble shooting
Internal temperature's display
Auto restart with power interruption

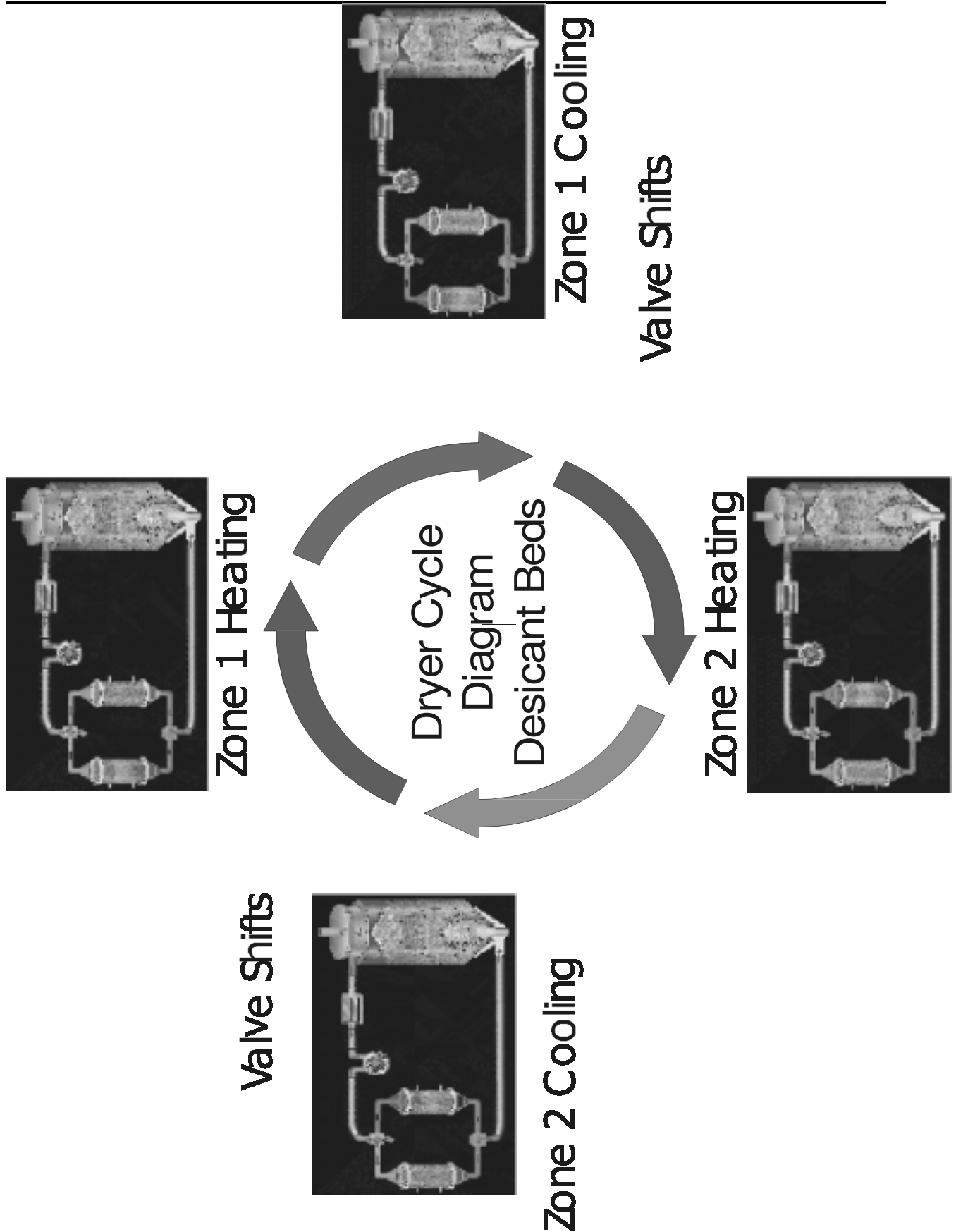
Dri-Air Electric Rotary Zone Valve

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





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).

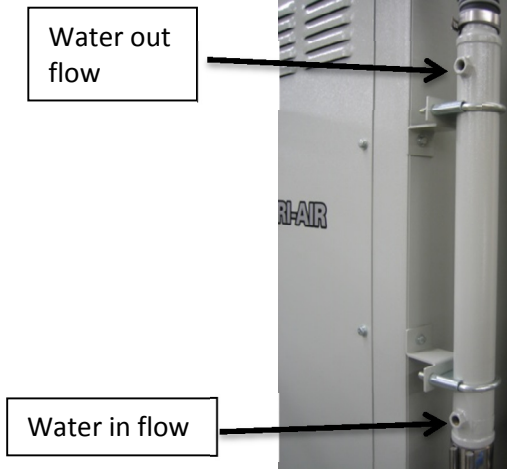
Hopper Connection

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



**INSTALLATION
PROCEDURE**

(Cont'd)



clamps provided with the dryer. Plug the 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.

Heat Exchanger Connections

This option should be used when drying materials over the 250°F (120°C) or under 150°F (65°C) level on a continuous basis. If the return temperature is too hot coming back into the desiccant bed, the desiccant will not be as effective in removing moisture. The water after-cooler is located on the dryer return airline and utilizes water from a chiller or tap water. Two ¼" n.p.t. taps are required for installation.

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.

ECC Dryer Start-up

To initiate dryer start-up, press the rocker switch on the unit's face panel. The Rocker Switch should illuminate; indicating power is supplied to the unit. The dryer is now operating; follow the instructions below to set the process air temperature or to shut the dryer off.

1. Rocker Switch POWER ON light indicates there is power to the controls, heaters, valve and blower.
2. The dryer is now ready for setting the Process Air temperature. Follow instructions in next section.
3. The AMBER TEMPERATURE ALARM light will illuminate if an alarm condition arises. Further diagnostics required. See sections on Alarms and Trouble-shooting.
4. To stop dryer press the Rocker Switch to the OFF position.

To Set Process Air Temperature:

Using the Digital Temperature Controller:



1. Press **SEL** button on the controller to enable the red Temperature Set display (labeled SV) to be altered.



**TEMP
CONTROLLER**



DIGITAL CONTROLLER

2. Press the up arrow  key to increase the set point or the down arrow  key to decrease the setting until the desired process air temperature set point is displayed.

3. Press the **SEL** key again to enter the new temperature setting.

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

The High Temp Alarm condition discussed below will initiate a “Dryer Shutdown” that cuts power to the blower, digital controller and ELC output relays. See Trouble-Shooting section of this manual

ALARMS

Process Air High Temperature Alarm

The ELC/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.

The high temperature alarm will be activated if the actual process air temperature exceeds the set temperature by 50 degrees (default). When this condition occurs, the dryer will shutdown and the HIGH TEMP ALARM light will illuminate. The high temperature limit (50 degrees) can be changed through the temperature controller if needed. Please refer to the Omron temperature control manual.

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 ambient 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 allows 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.

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.

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

Filter maintenance

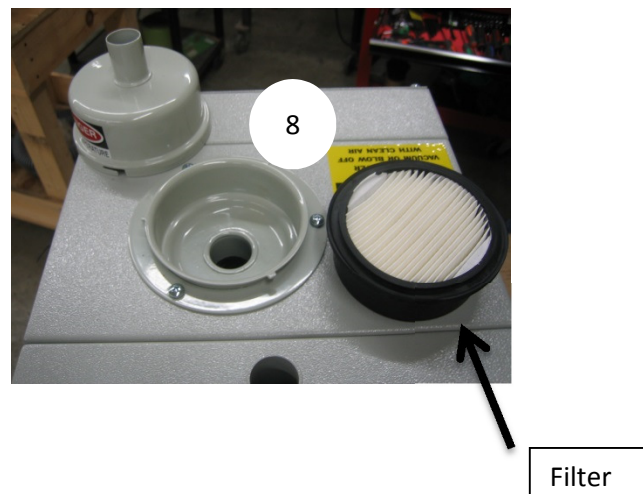
1. Open filter canister and clean filter element on a daily basis using compressed air.
2. Change filter cartridge every 6 months (Sooner if process materials are dusty.).

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**

BASIC TROUBLE- **SHOOTING**

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.

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 (F1 & F2).
- b. Dryer fuse (F3). It has a blown fuse indicator that lights up if the fuse is defective.
- c. Is POWER light in Rocker Switch illuminated?
- d. Check heater's continuity using a volt ohmmeter.

VALVE TROUBLE **SHOOTING**

To determine proper ZONE POSITION for valve, follow procedures detailed below:

1. Open front panel of dryer to view ELC's LCD.
2. Open Right Side Panel to view Valve Control Board.
3. Note if enunciator under #4 on ELC LCD is on, indicating dryer is in Zone 2. If no enunciator is visible, the dryer is in Zone 1.
4. Note which Zone Light is illuminated on Valve Control Board. Light should correspond to ELC LCD.

2. Air Flow Circuit:

- a. Ensure Zone Valve is operating correctly and is in proper zone position. See VALVE TROUBLE SHOOTING.
- 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 ELC LCD Output/Input Enunciators 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. See page 18.

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.

Rocker Switch light is not on. Unit will not start:

DETAILED
TROUBLESHOOTING

1. Check small fuse. The LED will be lit if it is blown. Replace if necessary by opening the fuse holder and put new fuse into holder.
2. Check that incoming power to the unit is proper.
3. Check safety snap disc with multi-meter. (Should be normally closed)

HIGH TEMP ALARM light is illuminated. 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 Rocker Switch to OFF position and restart machine by moving switch to ON position. 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 Output Light (C1) on Digital Controller is not lit.
 - A. Check position of the Process Air Thermocouple. The probe tip should be in the middle of the hose.
 - B. Check Digital Controller - may be faulty.

If the Output Light (C1) on Digital Controller is lit.

- C. Check the solid-state relay on panel.
- D. Check airflow through process air hose.

Check the alarm limit first, by pressing and holding the **SEL** button on the temperature controller until **STBY** is displayed. Then press the **DOWN** arrow key until **AL1** is displayed in the upper (PV) display. The setting displayed in the lower (SV) display 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 to see if the solid state relay 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 input power is not activated.

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 LCD Enunciator on the ELC.

TROUBLE-SHOOTING CONTROLS - ELC

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

REFERENCE GUIDE LCD ENUNCIATORS

The following list details the corresponding inputs & outputs to the numbered enunciators displayed on the ELC's LCD.

UPPER ENUNCIATOR ROW

<u>NO.</u>	<u>INPUT#</u>	<u>DESC.</u>
1	I0	Main Power
2	I1	High Temp Alm
3-6	Spare	

LOWER ENUNCIATOR ROW

<u>NO.</u>	<u>OUTPUT#</u>	<u>DESC.</u>
1	Q0	Z1 Heaters
2	Q1	Z2 Heaters
3	Q2	Main Contactor
4	Q3	Zone Valve

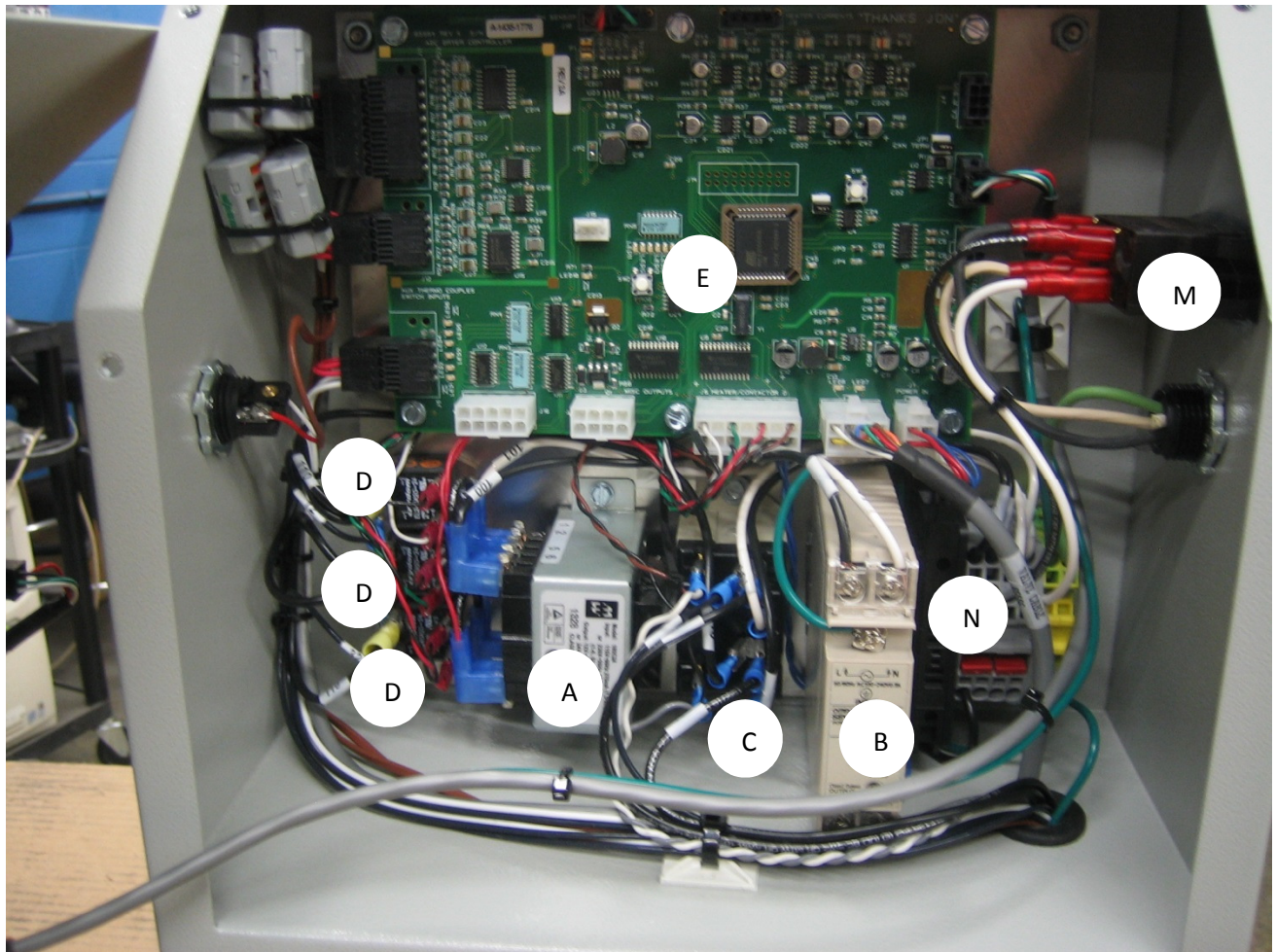
ELC Control Module

The dryer control package includes an ELC controller that is programmed for the drying cycle discussed previously. Each input/output terminal on the Module has a corresponding enunciator displayed on the Module's LCD display that can be used for trouble-shooting. In normal operation the LCD displays numbers 1 to 6 with a row of enunciators above the numbers for the inputs and a row of enunciators below for the outputs. (See Reference Guide to the left.) When the enunciator is displayed the input or output is actuated. All ELC inputs/outputs are 120 volts AC.

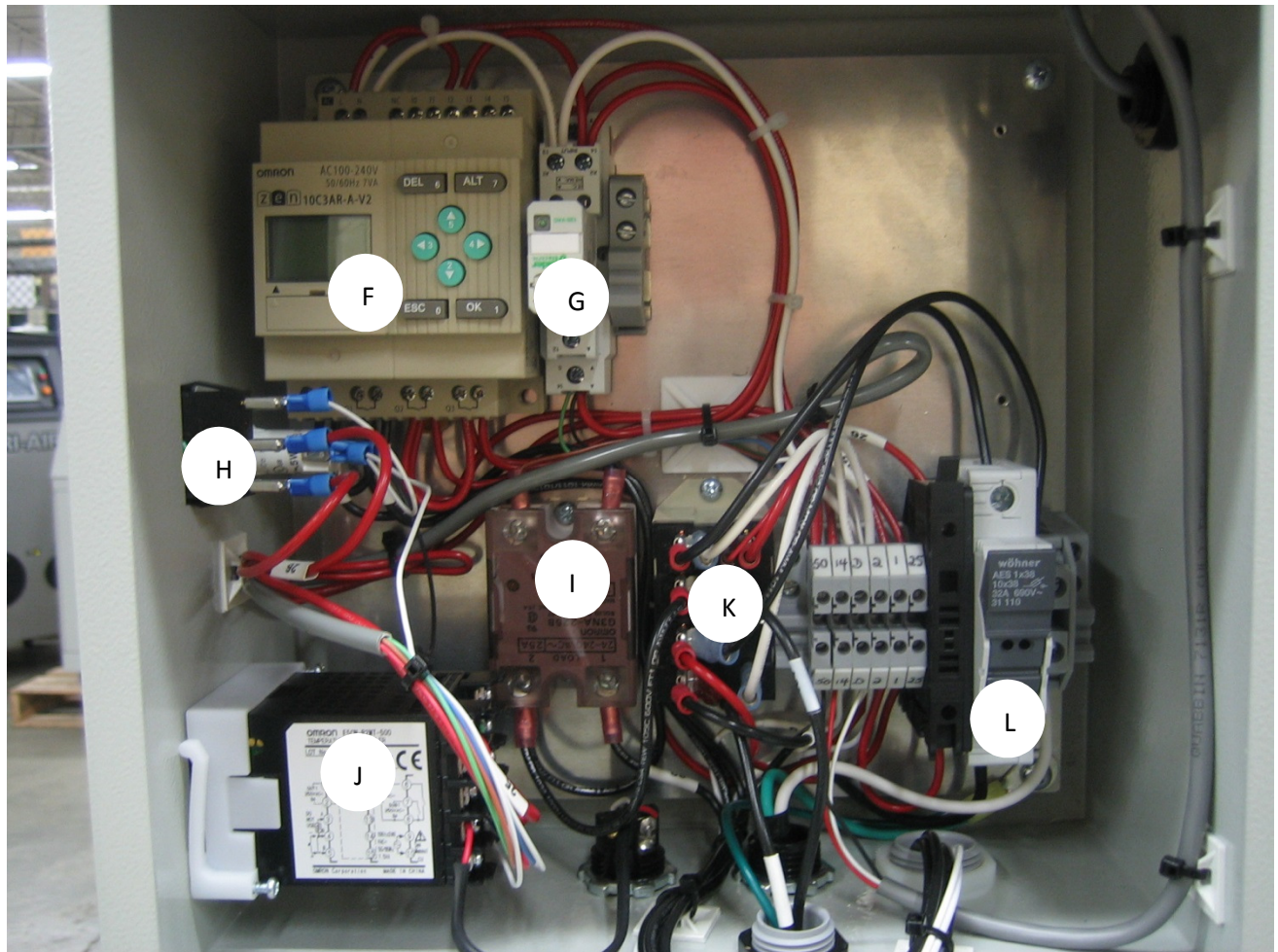
Dryer Control Panel

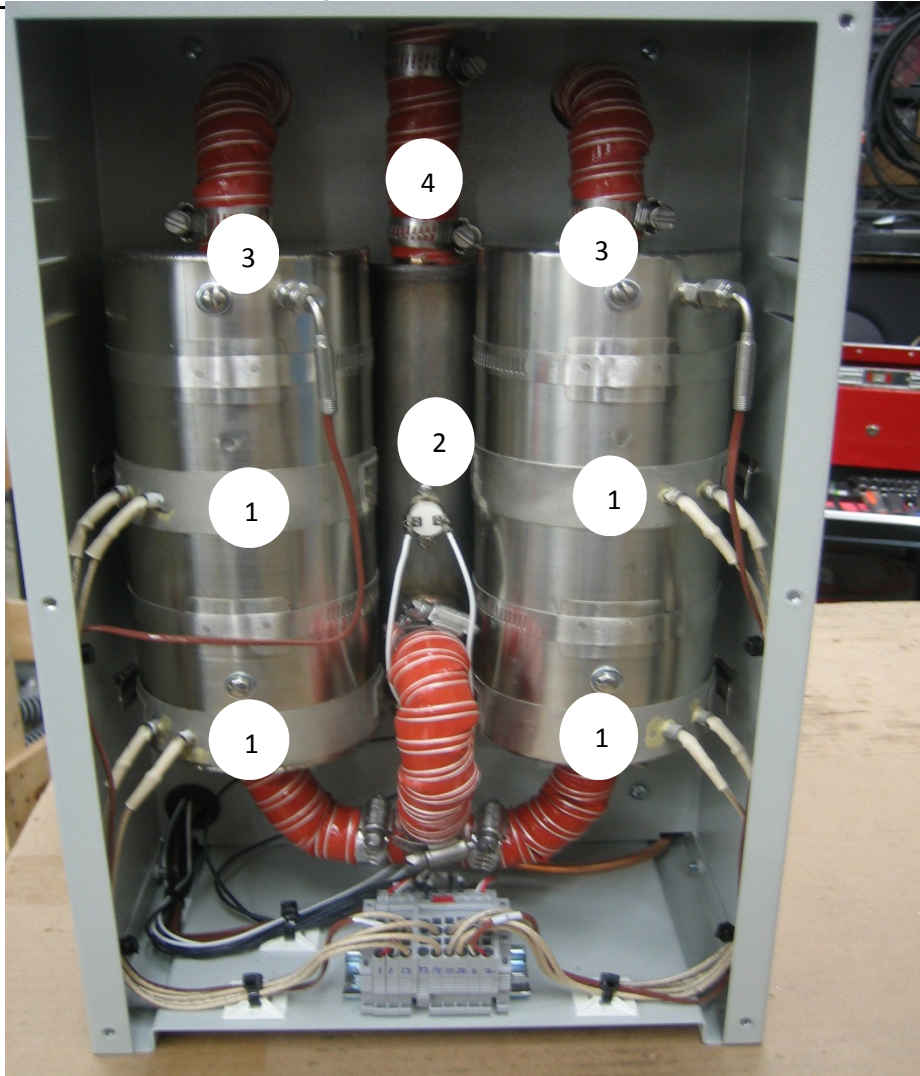
The Control Panel for the dryer includes an ON/OFF Rocker switch that acts as the Main Power Switch and EMERGENCY STOP. When this switch is in the OFF position all power is cut to the Controllers, Blower and Electric Valve.

ADC



ELC







PARTS LIST: Arid X-10



Mechanical

Electrical

Item#	DESCRIPTION	ELC	ADC
1	REGEN HEATER (220V) 250W	86927	86927
2	THERMAL SWITCH 500	80221	80221
3	THERMOCOUPLE	84054	84054
4	PROCESS HEATER (220V) 1250W	84410	84410
4	PROCESS HEATER (110V) 1250W	84409	84409
5	ZONE VALVE	83707	88012
6	BLOWER	82125	82125
7	DEWPOINT SENSOR	N/A	85374
8	FILTER CARTRIDGE	84231	84231
9	1" PROCESS HOSE 6' LONG	82659	82659
9	1" PROCESS HOSE 6' LONG SPECIAL HI TEMP INSULATION	84205	84205
10	RETURN HOSE 1" HI TEMP	87202	87202
A	TRANSFORMER	85959 (230V) only	87184
B	POWER SUPPLY 24VDC	N/A	85351
C	CONTACTOR MAIN	N/A	86704
D	SOLID STATE RELAY 20A	N/A	87165
E	MOTHERBOARD	N/A	85584-6
F	OMRON ELC CONTROL	85232	N/A
G	1 POLE RELAY	82496	N/A
H	ROCKER SWITCH	83079	N/A
I	SOLID STATE RELAY	81649	N/A
J	TEMP. CONTROLLER	85241	N/A
K	CONTACTOR MAIN	82086	N/A
L	LARGE FUSE HOLDER	84691	N/A
M	CIRCUIT BREAKER	84183	84183
N	.5A FUSE HOLDER	82035	82035
	.5A FUSE	83443	83443
	AMBER LIGHT	80907	N/A
	7 DAY TIMER	81942	N/A
	DISPLAY BOARD	N/A	84930-1



This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]