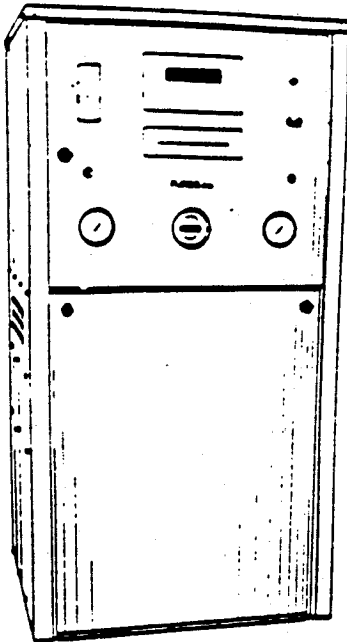




**PUREGAS INSTRUCTION MANUAL  
MODEL P-3100/4200DCO-3  
AIR DRYER**



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CANADIAN PUREGAS EQUIPMENT, LTD.

Dunnville, Ontario, Canada

783 Hwy 3 West, Dunnville, Ontario N1A 2X5 Canada, (905) 774-8600

## PREFACE

*This instruction manual is produced for the benefit of our customers. It is intended to provide basic information that will enable our customers to install, maintain and service PUREGAS Air Dryers economically, capably and with minimum delay. Careful observation of these instructions and maintenance procedures will ensure maximum life and efficiency of the unit.*

*This manual should be read thoroughly before installing, operating or servicing the air dryer to familiarize the technician with the unit and the proper operating and repair procedures. This will minimize the possibility of damage to the unit due to improper operation, handling or disassembly.*

*Please direct all inquiries to:*  
**PUREGAS**  
**P.O. BOX 666**  
**WESTMINSTER, COLORADO 80030**  
**1-800-521-5351 or (303) 427-3700**

**NO PART OF THIS TECHNICAL MANUAL MAY BE REPRODUCED  
WITHOUT THE EXPRESS WRITTEN CONSENT  
OF PUREGAS.**



## LIMITED WARRANTY AGREEMENT

*Puregas Air Dryers carry a two-year warranty against defective workmanship and material. This period starts at date of shipment. Not included are components subject to normal replacement during a year's operating time. These parts include, but are not limited to, electrical components, pressure switches, pressure regulators and air compressors, which carry a one-year warranty.*

*On refrigeration-type dryers, the basic refrigeration circuit carries a five-year warranty. This warranty covers the refrigeration compressor, refrigeration tubing and coils but NOT the thermostat, thermometer or fan motor.*

*Liquid ring compressors, heatless dryers and circuit boards carry a two-year warranty.*

*No claims for labor in replacing defective parts or for consequential damages will be allowed. Replacement parts will be invoiced in the regular way, with invoices subject to adjustment after the parts claimed defective are examined at our factory. In addition, no material or parts will be accepted at our factory for in-warranty repairs or credit without previous authorization from Puregas.*

*Responsibility for damages incurred in transit will be borne by the user and the user in turn should file any damage claim against the carrier. All warranty items are F.O.B. our plant. Freight charges are the responsibility of the user.*

*This warranty shall not apply to any air dryer which shall have been repaired or altered in any way by anyone other than Puregas so as to affect, in our judgment, its proper functioning or reliability, neither will it apply to a dryer which as been subject to misuse, negligence or accident.*

**THE INSTALLING OF PARTS PURCHASED FROM OTHER THAN  
PUREGAS WILL VOID THE WARRANTY ON OUR AIR DRYERS**

**PUREGAS INSTRUCTION MANUAL**  
**MODEL P-3100/4200DCO-3**  
**AIR DRYER**

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# DESCRIPTION, OPERATION AND MAINTENANCE PUREGAS MODEL P-3100/4200DCO-3 AIR DRYER

## SECTION 1. GENERAL

### 1.1 Scope of Manual

This instruction manual covers the description, operating principles, installation and start up, test procedures, maintenance and troubleshooting techniques for the Model P-3100/4200DCO-3 Air Dryers. The Model P-3100/4200DCO-3 is designed for indoor use.

### 1.2 Initial Inspection

Carefully inspect both the exterior and interior of the air dryer for any shipping damage.

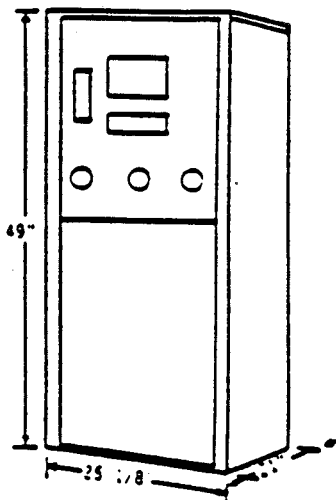
***IMPORTANT!*** Any shipping damage must be brought to the immediate attention of the carrier. Manufacturer is not responsible for shipping damage.

### 1.3 Warranty

Before starting dryer, read manual thoroughly to become acquainted with the principles of operation. Follow installation, start-up and test procedures in proper sequence so as not to void the warranty.

**CAUTION**

***FAILURE TO FOLLOW PROPER SEQUENCE FOR INSTALLATION,  
START-UP AND TEST WILL VOID THE WARRANTY***



***Figure 1***  
***Puregas P-3100/4200DCO-3 Outline Dimensions***

## SECTION 2. DESCRIPTION

The Model P-3100/4200DCO-3 Air Dryers employ the principles of compression and physical adsorption. The operation is fully automatic and relatively maintenance-free. The unit essentially consists of an oilless air compressor and a heatless desiccant dryer. It also incorporates the necessary gauges, controls and automatic alarms to ensure the delivery of dry air at the proper pressure and relative humidity. The air dryer will automatically shut down in the event of a high humidity alarm. Outline Dimensions are shown in Figure 1, Page 1. Specific characteristics are shown in Chart 1, below.

|   |   |
|---|---|
| <b>PART NUMBER</b>  | P-3100/4200DCO-3  |
| <b>NORMAL OUTPUT CAPACITY</b>   | 1,800/2,600 SCFD*   |
| <b>EMERGENCY OUTPUT CAPACITY</b>  | 3,100/4,200 SCFD*   |
| <b>DEWPOINT</b>   | -40 <sup>o</sup>  |
| <b>OUTPUT PRESSURE</b>  | Adjustable 0-20 PSIG  |
| <b>AIR COMPRESSOR</b>   | Oilless Piston  |
| <b>SIZE</b>   | Height: 49", Width: 25 1/8"<br>Depth: 21"   |
| <b>POWER REQUIREMENTS: DCO3</b>   | 115 VAC, 1 PHASE, 60 Hz   |
| <b>STANDARD ALARMS AND INSTRUMENTATION</b>  | Standard alarms with remote monitoring capability. Individual alarm indication display. |
| <b>NOISE LEVEL WITH COMPRESSOR RUNNING</b><br>(Under normal conditions, compressor will only operate 50%) | 56 dbA AT 3'<br>53 dbA at 10'   |
| <b>WEIGHT</b>   | 280 Lbs.  |
| <b>DEHYDRATOR</b>   | Solid State Timer/D.C. Valves   |
| <b>HEAT DISSIPATION</b>   | 4000 BTU/HR, Maximum  |
| <b>DRY AIR OUTLET CONNECTIONS</b>   | Low 1/2" FPT/High 1/2" FPT  |

\*Standard Cubic Feet Per Day

**Chart 1**

***Puregas P-3100/4200DCO-3 Air Dryer Characteristics***



## **SECTION 3. PRINCIPLES OF OPERATION**

This unit has successfully completed a three day operational test at the factory. Each component was individually calibrated and tested over its full range of operation. The operation and existing settings are explained as follows:

### **3.1 Air System**

The air flow is shown schematically in the Air Flow Diagram (Figure 2, Page 4).

### **3.2 Air Compressor**

Ambient air is drawn through the intake filter on the air compressor and compressed to approximately 50 PSIG.

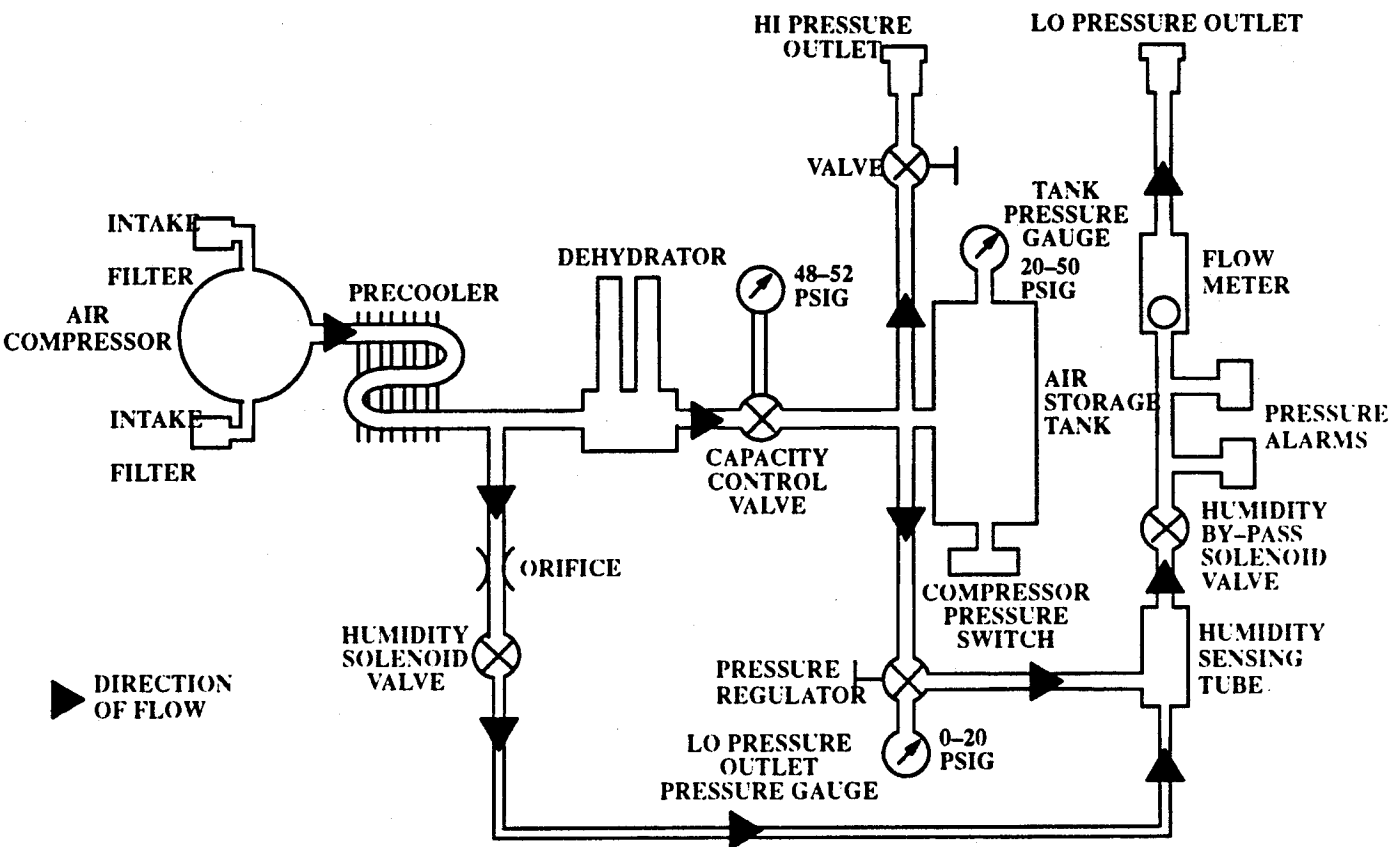
It then passes to the precooler where hot compressed air is cooled before entering the heatless dryer.

### **3.3 Heatless Dryer**

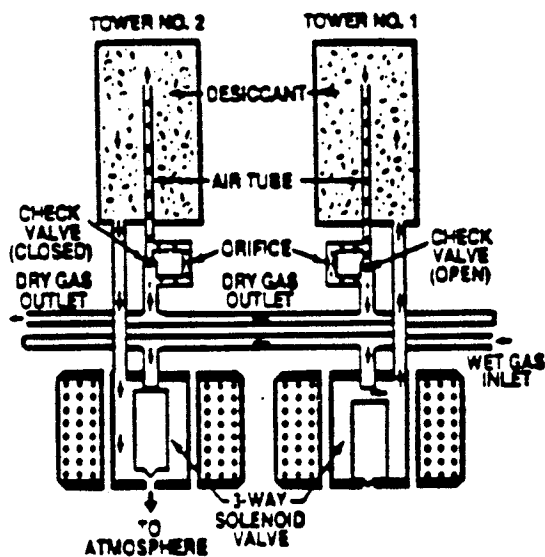
The PUREGAS heatless dryer, which is located downstream from the air compressor, consists of two desiccant-filled towers, a manifold, a solid state timer and two solenoid valves. It is arranged and cycled so one tower delivers dry air while the desiccant in the other tower is purged and dried by a small quantity of the dry air supplied by the first tower. Refer to The Theory of Heatless Drying Diagram (Figure 3, Pg. 4). The tower functions reverse at 30-second intervals. The towers operate as follows:

**3.3.1 Tower #1** – Air from the compressor enters the solenoid valve, which is controlled by an electrical timer and is forced upward through the desiccant in the tower. Moisture is removed from the air as it passes over the desiccant. The dried air is then forced down through the air tube in the center of the desiccant tower, out through an open ball check valve and is finally delivered through the capacity control valve to the air storage tank.

**3.3.2 Tower #2** – Simultaneously with the operation of Tower 1, as described above, the solenoid valve of Tower 2 is opened to the atmosphere. The main dry air supply from Tower 1 is prevented from entering Tower 2 by automatic closure of the ball check valve. However, a small quantity of the dry air is forced through an orifice into the air tube, then down through the desiccant bed absorbing the moisture previously collected while Tower 2 was furnishing dry air (as Tower 1 is doing at this time), and finally expelled to the atmosphere through the solenoid valve. The desiccant in Tower 2 is thus dried and made ready for the cycle reversal. Tower 1 and Tower 2 reverse functions; Tower 2 takes over the air drying operation while the desiccant in Tower 1 is being dried.



*Figure 2*  
Air Flow Diagram



*Figure 3*  
Theory of Heatless Drying Diagram

## SECTION 2. DESCRIPTION

The Model P-3100/4200DCO-3 Air Dryers employ the principles of compression and physical adsorption. The operation is fully automatic and relatively maintenance-free. The unit essentially consists of an oilless air compressor and a heatless desiccant dryer. It also incorporates the necessary gauges, controls and automatic alarms to ensure the delivery of dry air at the proper pressure and relative humidity. The air dryer will automatically shut down in the event of a high humidity alarm. Outline Dimensions are shown in Figure 1, Page 1. Specific characteristics are shown in Chart 1, below.

|   |   |
|---|---|
| <b>PART NUMBER</b>  | P-3100/4200DCO-3  |
| <b>NORMAL OUTPUT CAPACITY</b>                               | 1,800/2,600 SCFD*   |
| <b>EMERGENCY OUTPUT CAPACITY</b>                            | 3,100/4,200 SCFD*   |
| <b>DEWPOINT</b>   | -40 <sup>o</sup>  |
| <b>OUTPUT PRESSURE</b>                                      | Adjustable 0-20 PSIG  |
| <b>AIR COMPRESSOR</b>                                       | Oilless Piston  |
| <b>SIZE</b>   | Height: 49", Width: 25 1/8"<br>Depth: 21"   |
| <b>POWER REQUIREMENTS: DCO3</b>                             | 115 VAC, 1 PHASE, 60 Hz   |
| <b>STANDARD ALARMS AND INSTRUMENTATION</b>                  | Standard alarms with remote monitoring capability. Individual alarm indication display. |
| <b>NOISE LEVEL WITH COMPRESSOR RUNNING</b>                  | 56 dbA AT 3'  |
| (Under normal conditions, compressor will only operate 50%) | 53 dbA at 10'   |
| <b>WEIGHT</b>   | 280 Lbs.  |
| <b>DEHYDRATOR</b>   | Solid State Timer/D.C. Valves   |
| <b>HEAT DISSIPATION</b>                                     | 4000 BTU/HR, Maximum  |
| <b>DRY AIR OUTLET CONNECTIONS</b>                           | Low 1/2" FPT/High 1/2" FPT  |

*\*Standard Cubic Feet Per Day*

Chart 1

*Puregas P-3100/4200DCO-3 Air Dryer Characteristics*

### 3.4 Humidity Sensing Tube

Air is then channeled to the humidity sensing tube and flows over the humidity sensor. The humidity sensor (not shown) will signal the alarm systems if the relative humidity rises above 10%.

(A relative humidity rise would indicate a malfunction)

### **NOTE:**

*To test the humidity systems, wet air from the precooler can be channeled directly to the humidity sensing tube by using the humidity test switch.*

### 3.5 Capacity Control Valve

This valve has two functions. First, it maintains proper purge pressure through the heatless dryer, which will insure dry air delivery under maximum flow condition. It also acts as a check valve preventing air in the air storage tank from bleeding back through the heatless dryer when the air compressor is not operating.

### 3.6 Pressure Switch and Storage Tank

Once the air passes through the capacity control valve, it is directed to the air storage tank. The on/off pressure switch then signals the compressor to shut down at 50 PSIG. The air compressor will remain off until the tank pressure drops below 20 PSIG. Now the on/off pressure switch starts the air compressor and the cycle continues. The tank pressure gauge indicates actual air storage tank pressure. For adjustment refer to Section 6.5, Page 18 and Air Compressor Pressure Switch Diagram, Figure 8, Page 18.

### 3.7 Humidity Bypass Solenoid Valve

The air flows through the humidity bypass valve which allows dry air to pass or releases wet air into the atmosphere. The bypass solenoid valve will release wet air for a preset period of time to allow the air dryer to correct the wet air problem. If the dryer does not correct the wet air problem, it will shut down after this preset time period. The humidity bypass solenoid valve is activated by the humidity alarm circuit.

### **NOTE:**

*When energized, the humidity bypass valve directs dry air out of the unit. When de-energized, the valve bypasses air to the atmosphere.*

- 3.8 Pressure Regulator and Shut-Off Valve**  
From the air storage tank, the air is channeled to the high pressure outlet valve and the low pressure outlet which is regulated by the pressure regulator (0–20 PSIG).
- 3.9 High/Low Pressure Switch**  
Dry air will flow to the high/low pressure switch which signals an alarm if the pressure drops below or rises above a preset value. For adjustments of the pressure switch, refer to Section 6.6, pg. 19 and High/Low Pressure Switch Diagram, Figure 9, pg. 19.
- 3.10 Alarm Summary**  
The following alarms and conditions can be shown on the digital alarm display:
- 3.10.1 High Pressure Alarm – HIGH PRESSURE**  
This alarm results when the outlet pressure (as read on the outlet pressure gauge) exceeds the set point of the high pressure switch following a 30–second delay. The switch can be adjusted; however, it is factory set to alarm when the outlet pressure exceeds 12 PSIG. Refer to Section 6.6 and High/Low Pressure Alarm Switch Diagram, Figure 9, Page 19 for adjustment procedure.
- 3.10.2 Low Pressure Alarm – LOW PRESSURE**  
This alarm results when the outlet pressure drops below the set point of the low pressure switch. The switch is adjustable; however, it is factory set to alarm when the outlet pressure drops below 6.5 PSIG following a 30–second delay. Refer to Section 6.5 and Figure 9, Page 19 for adjustment procedure.
- 3.10.3 Air Compressor Maintenance Alarm – COMP. RUN TIME ALARM**  
This alarm occurs when the air compressor and heatless dryer run time (between 20 PSIG and 50 PSIG) exceeds the set point of the solid state compressor performance time delay switch. The switch is adjustable; however, it is factory set at approximately two minutes. Refer to Rear View of Front Door, Figure 14, Page 31.
- 3.10.4 Humidity Condition – HUMIDITY, –COND.–**  
During the time when **HUMIDITY, –COND.–** is being displayed the following sequence occurs:  
(A.) The humidity bypass solenoid valve de–energizes and releases air from the storage tank into the atmosphere.  
(B.) The solid state humidity time delay switch starts counting down from its adjustable set point. The factory setting is two minutes.  
(C.) **HUMIDITY, –COND.–** is shown in the alarm display.

### **NOTE:**

*If the humidity condition does not clear and humidity time delay “times out”, the air compressor/heatless dryer will shut down and **HIGH, HUMIDITY ALARM** will appear on the alarm display. If the humidity condition does clear, the bypass solenoid will energize and prevent air in the storage tank from being released into the atmosphere. The **HUMIDITY –COND.–** will disappear from the alarm display and the humidity time delay count will reset to zero.*

## 3.10 Alarm Summary (continued)

### 3.10.5 Humidity Alarm – HUMIDITY ALARM

This alarm will only be displayed after the **HUMIDITY –COND.–** (humidity condition) time delay has timed out. When a **HUMIDITY ALARM** is displayed, the air compressor and heatless dryer will not operate until the reset switch is toggled.

### 3.11 Humidistat

The humidity level is represented by the seven LED's (three red and four green) located just below the alarm display. When all LED's are energized, the humidity level is well below 2% relative humidity, indicating the system is operating correctly.

### 3.12 Dessicant

During shipment, the desiccant in the heatless dryer towers may have absorbed some moisture. If this is the case, one or more LED's may be off during initial start-up; however, they will come on as the desiccant "dries out" during operation. All LED's on the humidistat should be energized after 15 minutes of operation.

### 3.13 Logic Scan LED

The logic scan LED will pulse on and off whenever the dryer is turned on. This indicates the display board is scanning for alarms.

### 3.14 Alarm LED

The alarm LED is normally off. It will only energize when an alarm condition is present on the digital alarm display.

***Example:*** The alarm LED will energize during the following alarm conditions: **HUMIDITY ALARM. HIGH PRESSURE, LOW PRESSURE** and **COMP. RUN TIME ALARM.** The alarm LED will not energize when **HUMIDITY –COND.–** is displayed or when the digital alarm display is blank.

## **CAUTION**

*It is extremely important to perform the installation, start-up and test procedures in Sections 4 and 5 in the following sequence or damage to components may result and warranty voided.*

### **4.1 Inspection**

Remove the lower front door and open the upper instrument panel. Carefully inspect both the exterior and interior of the air dryer for any shipping damage.

***IMPORTANT!*** Any damage must be brought to the immediate attention of the carrier. Manufacturer is not responsible for shipping damage.

### **4.2 Accessories**

The following items will be secured in the air compressor compartment accessory bag:

|        |              |                               |
|--------|--------------|-------------------------------|
| 1 each | P-B-104      | Allen Wrench 3/16" – Long Arm |
| 2 each | P-3986       | Filter Felt                   |
| 1 each | P-5000-3-19  | Bag, Cloth 5" x 8"            |
| 1 each | P-5000-8-38  | Plug Alarm                    |
| 1 each | P-5000-8-39A | Boot Alarm Socket             |

### **4.3 Installation Procedure**

**4.3.1** Close the upper instrument panel and install the lower panel before moving unit to the permanent location.

**4.3.2** Remove shipping blocks. This permits the assembly to "float" freely on the rubber vibration pads.

## **NOTE:**

*Failure to remove the shipping blocks may damage the mounting assembly.*

**4.3.3** Leveling feet are located under each corner of the air dryer. The air dryer must be properly leveled to prevent excessive vibration and to insure proper alignment of the access panels.

#### 4.4 Location

- 4.4.1 The unit should be installed in an environment that is free from abrasive dust and chemicals.
- 4.4.2 The optimum temperature range is between 40<sup>o</sup> and 85<sup>o</sup> F. Although the unit will operate at temperatures up to 120<sup>o</sup> F., the operating life of the components decreases dramatically at temperatures above 85<sup>o</sup> F.

#### 4.5 Electrical Hook-up

- 4.5.1 The air dryer operates on 115 VAC, 1 phase, 60 hertz power.

***Important!*** A 15 amp minimum service must be provided. The incoming power to the dryer should have 20 amp SLO-BLO fuses. A minimum of 14 AWG wire must be used to connect to dryer.

- 4.5.2 Before plugging the air dryer into the electrical outlet, make sure the main power switch is in the OFF position.

- 4.5.3 Connect the air dryer to the proper electrical source.

#### 4.6 Start Up

- 4.6.1 A plastic plug with a small hole (orifice plug) is located in the low pressure outlet port at the rear of the air dryer. This plug will permit the unit to operate in a simulated "on-line" condition.

- 4.6.2 Place the main power switch to the "ON" position.

(A.) The logic scan LED will start flashing.

(B.) The air compressor, heatless dryer and ventilating fan will start running and air will flow through the orifice in the low pressure outlet.

(C.) Toggle the reset switch to clear erroneous alarms.

(D.) **LOW PRESSURE** (Pressure Low) will appear on the alarm display until the outlet pressure gauge reads approximately 6 PSIG or more. During the time **LOW PRESSURE** appears on the display, the alarm LED will also be energized.

(E.) **HUMIDITY -COND.-** (Humidity Condition) may appear on the alarm display. If **HUMIDITY -COND.-** does not clear within approximately two minutes, **HUMIDITY ALARM** will appear in the alarm display and the air compressor will shut down. If this happens, simply toggle the reset switch. This will allow the unit to run for approximately two more minutes. The **HUMIDITY -COND.-** should clear within 10-15 minutes.

(F.) The seven humidity level LED's will energize when the desiccant in the heatless dryer is dry. If, however, during initial start-up, **HUMIDITY - COND.-** appears in the alarm display, two or more LED's will be off. The LED's will energize as the desiccant dries out. This should take less than 15 minutes. It may be necessary to increase outlet flow to 2160 SCFD during this "dryout" period.



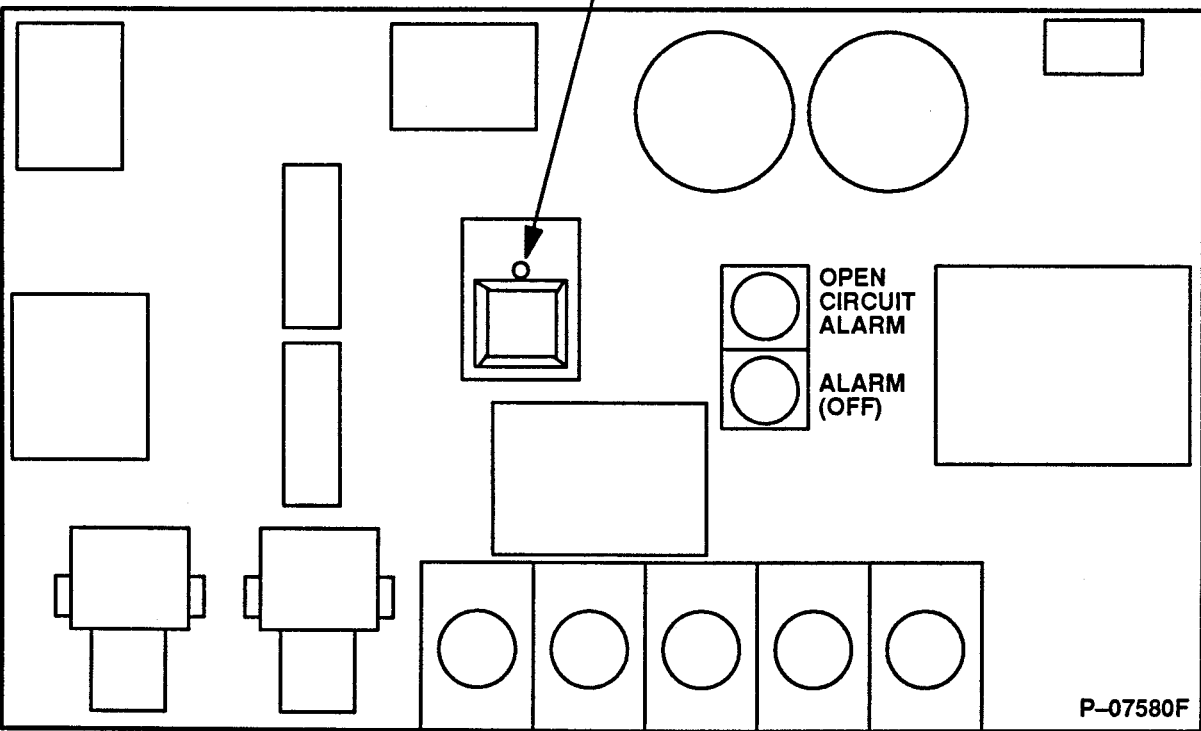
(G.) The outlet pressure gauge will stabilize at approximately 10 PSIG.

(H.) The air pressure in the air storage tank will cycle between 20 and 50 PSIG as noted on the tank pressure gauge.

(I.) The alarm LED will be energized only when the **LOW PRESSURE, HIGH PRESSURE, COMP. RUN TIME ALARM** and **HUMIDITY ALARM** appear on the alarm display. The alarm LED will be off in all other cases.

(J.) Check for pressure leaks that may have occurred during shipment.

HUMIDITY BOARD  
TEST SWITCH



P-07580F

**Figure 4**  
**Humidity Board**

## SECTION 5. TEST PROCEDURES

**DANGER!**

*Avoid contact with energized circuits when access doors are open.  
REMOVE ALL JEWELRY before performing  
any tests or maintenance on air dryer.*

With the air dryer in operation, perform the following tests:

### 5.1 Low Pressure Alarm Test

- 5.1.1 Open the front instrument panel.
- 5.1.2 Locate the outlet pressure regulator and loosen the locking nut so that the regulator can be adjusted.
- 5.1.3 Rotate the knob counterclockwise and reduce the pressure on the outlet pressure gauge to approximately 5 PSIG.
- 5.1.4 At this point, **LOW PRESSURE** will appear in the alarm display. Turn the handle clockwise and increase the pressure on the outlet pressure gauge to 10 PSIG. **LOW PRESSURE** will disappear from the alarm display. Alarm set point is set from the factory at 6 PSIG.

### 5.2 High Pressure Alarm Test

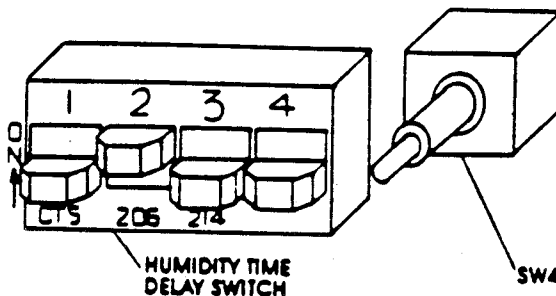
- 5.2.1 Rotate the knob on the pressure regulator clockwise until the outlet pressure gauge reads approximately 15 PSIG. **HIGH PRESSURE** will appear at the alarm display.
- 5.2.2 Reduce the pressure back to 10 PSIG. Toggle the reset switch and **HIGH PRESSURE** will disappear. Alarm set point is set from the factory at 12.5 PSIG.

### 5.3 Humidity Condition Test

- 5.3.1 Locate SW2 (Humidity) on the P-05847-F Control Board. Select the desired time delay by setting one switch only (1-4 minutes). If all four switches are off, a 5-minute delay is set. If longer delays are required, turn SW4 on. This multiplies all delays by 2.

**NOTE:**

*Only one switch should be in the on position at any one time. Figure 5 below, shows the #2 switch in the (ON) position.*



**Figure 5**  
*Humidity Time Delay Switch*

**5.3.2** Locate the instrument test switch on the front of the instrument panel. With the air compressor running, toggle the humidity test switch. Notice the seven humidity LED's. These LED's should begin to de-energize. **HUMIDITY -COND.-** will appear in the alarm display and the humidity bypass solenoid will discharge the air in the air storage tank to the atmosphere. Release the test switch.

Please note the following:

(A.) The alarm LED will not energize during a **HUMIDITY -COND.-** (humidity condition).

(B.) The air compressor must be running during this test.

(C.) In areas where relative humidity is normally low (i.e., 5% relative humidity), it may be necessary to use the humidity board test switch (refer to Humidity Board Diagram, Figure 4, Page 10) for location.

(D.) LD3 (By-pass Solenoid) on P-05847-F Logic Board will de-energize during **HUMIDITY -COND.-**.

**5.3.3** The above test confirms the operation of the following humidity system components:

(A.) Humi-Alarm circuit

(B.) Humidity bypass solenoid

(C.) LED humidity display

(D.) Humidity sensing element

(E.) Associated wiring

## **5.4 Humidity Alarm Test**

**5.4.1** A humidity alarm will result after a system has remained in Humidity Condition (**HUMIDITY -COND.-**) for longer than the time set on the humidity time delay switch (in this case, longer than one minute).

**5.4.2** To perform this test, simply keep the dryer in a Humidity Condition (**HUMIDITY -COND.-**) for longer than two minutes. This can be accomplished by continued toggling of the test switch. To avoid sensor saturation, always use the humidity board test switch on the humidity board, Figure 4, page 10.

**5.4.3** After the dryer has been in a Humidity Condition (**HUMIDITY -COND.-**) for longer than two minutes, the following sequence will occur:

(A.) **HUMIDITY ALARM** Humidity Alarm will appear in the alarm display.

(B.) The alarm LED will be on while **HUMIDITY ALARM** appears in the display.

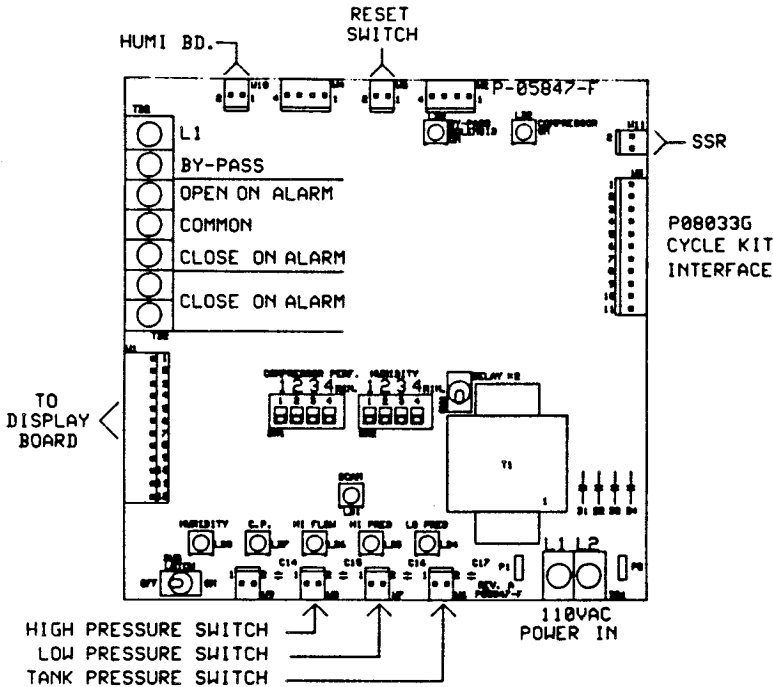
(C.) The air compressor will shut down. LD2 (Compressor On) on P-05847-F Logic Board will de-energize.

(D.) The two green humidity LED's (and possibly some or all red LED's) will de-energize on the humidity display.

**5.4.4** Release the humidity test switch or the humidity board test switch. Toggle the reset switch on the front panel. The following sequence will occur:

(A.) The seven humidity LED's will begin to energize.

(B.) When the first green LED energizes, the by-pass valve will energize and discontinue to vent air to the atmosphere.



**Figure 6**  
*Control Board (P-05847-F)*

## 5.5 Compressor Performance Test

**5.5.1** A compressor performance alarm (COMP. RUN TIME ALARM) will result when the air compressor remains running for a period which is longer than normal for a particular installation.

*Example:* If the time between the air compressor starting and stopping is 1 minute, then the normal running time is 1 minute.

**5.5.2** With the normal cycle at 1 minute, the compressor performance time delay switches (located on the P-05847-F Control Board), should be set with the 2 min. switch on and all others off. SW4 should be set at X1. See Compressor Performance Time Delay Switch Diagram, Figure 7, Page 14.

5.5.3 With the above conditions set, a compressor performance alarm (**COMP. RUN TIME ALARM**) will appear on the alarm display if, for any reason, the air compressor runs continuously for the set period of time.

### **NOTE:**

*The compressor performance time delay is factory set at two minutes.*

The following items represent some possible reasons a **COMP. RUN TIME ALARM** alarm would be displayed:

- (A.) An increase in flow to the cables.
- (B.) A leak in the internal pneumatic connections in the air dryer.
- (C.) A “weak” air compressor. (air compressor needs maintenance)
- (D.) A faulty solenoid valve in the heatless dryer.

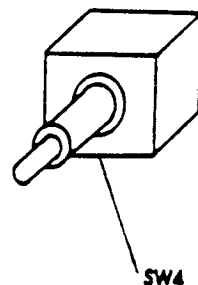
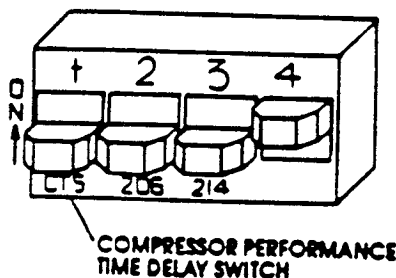
Refer to Troubleshooting Guide, Section 7.2, Page 34 for further details.

5.5.4 To test the alarm, simply create a temporary leak in the dryer which will force the air compressor to run longer than two minutes. After approximately two minutes, **COMP. RUN TIME ALARM** will appear on the alarm display.

5.5.5 Terminate the temporary leak and clear the alarm from the alarm display by toggling the reset switch.

### **NOTE:**

*All Installation, Start Up and Test Procedures (Sections 4 and 5) must be completed in the order listed above or damage to components may result and warranty voided.*



**Figure 7**  
*Compressor Performance Time Delay Switch*

## SECTION 6. MAINTENANCE

### 6.1 Routine Maintenance

The following is the maintenance procedure recommended by PUREGAS. If maintenance problems persist after thoroughly consulting this manual, contact General Cable Company, Apparatus Division, Puregas Technical Service Department at (303) 427-3700 or 1-800-521-5351.

## CAUTION

*When working around energized circuits, extreme caution should be taken to prevent injury to personnel and damage to equipment.*

***IMPORTANT!*** *It is very important that routine maintenance be performed at six-month, one-year (or 4,000 hours), and two-year (or 8,000 hours) intervals to keep dryer operating efficiently. PUREGAS recommends a historical record be maintained on all air dryers.*

#### 6.1.1 Six Month Check

Every six months, do the following:

- Check run times. (ON and OFF)
- Check flow rate (compare to previous flow rate).
- Check humidity alarm.
- Check safety valve.
- Check pressure switch. (ON – 20 PSIG, OFF – 50 PSIG)
- Check high/low pressure alarm. (alarm at 6 PSIG & 12 PSIG)
- Check capacity control valve. (set at 48-52 PSIG)
- Replace the air compressor intake filter felts (P-3986).
- Clean the air precooler.
- Clean or replace cabinet filter element.

#### 6.1.2 One Year (or 4,000 hours)

- Change the compressor maintenance kit after one year or 4,000 hours. Refer to Page 19 for parts list.
- Change humidity sensing element.
- Check all wire connections.
- Repeat 6 month check. **NOTE:** *order maintenance kit.*

#### 6.1.3 2 Years (or 8,000 hours)

- Change heatless dryer maintenance kit P-200-499S.
- Repeat 6 month check.
- Repeat one year check.

## NOTE:

*After performing maintenance on air dryers, always soap test pressure fittings to insure there are no leaks.*

*Wiring should be checked on a routine basis whether maintenance has been performed or not.*

## 6.2 Maintenance Matrix

|  | <u>Maintenance Procedure</u><br><i>(Refer To Manual)</i> | <u>Frequency Interval</u> | <u>Time (minutes Required)</u> |
|--|--|---------------------------|--------------------------------|
| <i>Flowrate</i>                                  | Check  | A                         | 1                              |
| <i>Humidity Alarms</i>                           | Check  | A                         | 5                              |
| <i>High/Low Pressure Alarm</i>                   | Check  | A                         | 5                              |
| <i>Compressor Pressure Switch</i>                | Check  | A                         | 5                              |
| <i>Safety Valve</i>                              | Check  | A                         | 5                              |
| <i>Output Regulator</i>                          | Check/Adjust   | A                         | 5                              |
| <i>Ventilation Filter</i>                        | Replace/Clean  | A                         | 10                             |
| <i>Compressor Intake Filter</i>                  | Replace  | A                         | 5                              |
| <i>Compressor Performance</i>                    | Check  | A                         | 5                              |
| <i>Capacity Control Valve</i>                    | Check  | A                         | 5                              |
| <i>Precooler Coils</i>                           | Clean  | A                         | 10                             |
| <i>Air Fittings</i>                              | Leak Test  | A                         | 15                             |
| <i>*Air Compressor Kit</i>                       | Replace  | B                         | 60                             |
| <i>*Humidity Sensing Element</i>                 | Replace  | B                         | 5                              |
| <i>Heatless Dryer Kit</i>                        | Replace  | C                         | 60                             |
| <i>Humidity and Compressor Performance Delay</i> | Check  | A                         | 10                             |

### Frequency Interval

A – Every 6 months

B – 1 year (or 4,000 hours)

C – 2 years (or 8,000 hours)

*\*These components are supplied in the annual maintenance kit.*

### Chart 2

*P-3100/4200DCO-S Maintenance Chart*

## **NOTE:**

*The part number for the heatless dryer maintenance kit is P-200-499S.*

## 6.3 RECOMMENDED SPARE PARTS LIST

| <u>PART NUMBER</u> | <u>DESCRIPTION</u>             | <u>QTY.*</u> |
|--------------------|--------------------------------|--------------|
| P-02626S           | Vibration Mounts               | 4            |
| P-5000-12-85       | Humidity Bypass Valve          | 1            |
| P-4564             | Pressure Switch (ON/OFF)       | 1            |
| P-05285            | Fan (Precooler)                | 1            |
| P-07580-F2         | Humidity Board                 | 1            |
| P-5000-6-47D       | Humidity Sensor                | 2            |
| P-05847-F1         | Logic Board                    | 1            |
| P-07599-F1         | Display Board                  | 1            |
| P-05992            | Solid State Relay (25 Amp)     | 1            |
| P-06136            | Circuit Breaker 15 Amp         | 1            |
| P-400-589-DC1      | Solenoid Valve Assembly        | 2            |
| P-200-499S         | Heatless Dryer Maintenance Kit | 1            |
| P-06521-F1         | Cycle Timer                    | 1            |
| P-07511            | Compressor Maintenance Kit     | 1            |
| P-4634             | Capacity Control Valve         | 1            |

### OPTIONAL SPARE PARTS:

|            |                                     |
|------------|-------------------------------------|
| P-3966-3LS | 3/4 HP Air Compressor (P-4200DCO-3) |
| P-02293    | 1/2 HP Air Compressor (P-3100DCO-3) |

*\* Quantities listed above are recommended spare parts per 5 air dryers.*



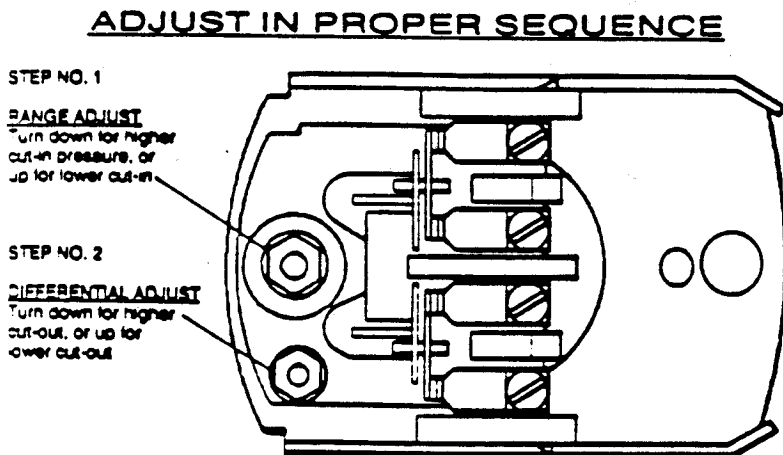
## 6.4 Air Compressor Safety Valves

The air compressor safety valve is factory preset to prevent the air compressor from delivering air over 60 PSIG. Check for proper operation. If adjustment is required, use the following procedure:

- 6.4.1 Locate the capacity control valve (See Figure 13 , Page 30) and lift up the valve lock collar. Turn the valve clockwise until 60 PSIG is noted on the pressure gauge. Adjustment must be made while the compressor is running.
- 6.4.2 Referring to the same drawing, loosen the safety valve lock nut and adjust the valve until the maintained pressure is 55–60 PSIG and the relief valve is releasing air. Once adjustment is made to 55–60 PSIG, retighten the safety valve lock nut.
- 6.4.3 Readjust the capacity control valve to 48–52 PSIG. Insure the storage tank has at least 20–40 PSIG air pressure and the air compressor is running while adjusting. Press the lock collar down into the lock position.
- 6.4.4 Allow the compressor to cycle through the cycling pressure range several times and soap test to insure the air compressor safety valve has seated properly and is not leaking.

## 6.5 Air Compressor Pressure Switch

The on/off pressure switch is factory set to stop and start the air compressor and maintain the pressure in the air storage tank. The pressure in the tank should cycle between 20–50 PSIG (+2 PSIG), as noted on the high pressure gauge (tank pressure). To adjust the on/off switch, refer to Air Compressor Pressure Switch Diagram, Figure 8, below.

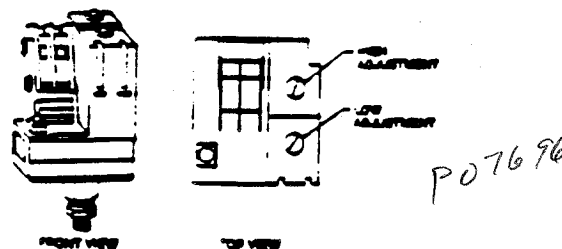


*Figure 8*  
*Air Compressor Pressure Switch*

6.6

**High/Low Pressure Alarm Adjustment**

The high/low pressure switch is located in the air output. To adjust, use the pressure regulator and refer to the High/Low Pressure Switch Diagram, Figure 9, below.



**Figure 9**  
**High/Low Pressure Switch**

6.7

**Capacity Control Valve Adjustment**

To adjust the capacity control valve make sure the air compressor is running and the tank pressure is between 20–40 PSI. Lift up on the valve lock collar and adjust the valve handle clockwise until 48–52 PSIG is read on the heatless dryer gauge which is mounted on the heatless dryer manifold. Then press locking collar back in place. Refer to Figure 13, Page 30.

6.8

**Air Compressor Maintenance Kit (P-07511)**

The maintenance kit contains parts necessary for scheduled routine maintenance on the P-3100/4200DCO-3 Air Dryers when operated under normal conditions. The contents of the maintenance kit are as follows:

| <u>Part No.</u> | <u>Description</u>    | <u>Qty Ea.Kit</u> |
|-----------------|-----------------------|-------------------|
| P-3861          | Piston Seal           | 4                 |
| P-3862          | Piston Ring           | 4                 |
| P-3864          | Manifold Sleeve       | 2                 |
| P-3866          | Head Gasket           | 2                 |
| P-3867          | Outlet Valve          | 2                 |
| P-3868          | Inlet Valve           | 2                 |
| P-3869          | Cylinder Gasket       | 2                 |
| P-3870          | Valve Plate           | 2                 |
| P-3981          | Rider Ring            | 2                 |
| P-3986          | Filter Felt           | 2                 |
| P-5000-6-47D    | Sensing Element       | 1                 |
| P-07510         | Cream-Pressure Switch | 1                 |

***IMPORTANT! If the air compressor shows evidence of overheating or excessive noise, stop immediately for repairs.***

Regular inspection may prevent expensive repairs. The rider ring thickness can be an indication that the air compressor needs maintenance. See Exploded View of Air Compressor and Motor Assembly, Figure 11, Page 28. If a rider ring measures .055 inches or less in thickness, the maintenance kit, P-3865 should be installed. The thickness of a new rider ring is .060 inches.

## 6.9 Air Compressor Troubleshooting Chart

The wear of the air compressor rings are affected by ambient conditions. At 80<sup>o</sup> to 85<sup>o</sup> F. maximum ambient temperature and 40% (maximum average) relative humidity, it is suggested the compressor life between maintenance checks be set at approximately 4,000 hours of run time.

### **NOTE:**

*At higher ambient temperatures, maintenance must be performed more frequently.*

The air compressor is oilless and requires no lubrication. It is recommended the piston rings, piston seals, rider rings, inlet valves, outlet valves, valve plate and gaskets be replaced at 4,000 hours of run time.

| REASON                          | COMPLAINT           |  |                               |                               |
|---------------------------------|---------------------|--|-------------------------------|-------------------------------|
|                                 | <i>Low Pressure</i> | <i>Overheating or excessive AMP Draw</i> | <i>Excessive Noise</i>        | <i>Won't Start Under Load</i> |
| Worn Piston Rings               | X                   |  |                               |                               |
| Worn Rider Rings                | X                   |  | Piston Hitting Cylinder       |                               |
| Dirty Valves                    | X                   |  |                               |                               |
| Bent Valves                     | X                   |  |                               |                               |
| Blown Head Gasket               | X                   |  | Air Blowing Out Intake Filter |                               |
| Dirty Filters                   | X                   |  |                               |                               |
| Low Voltage                     |                     | X  |                               | X                             |
| Cylinder Mis-adjustment         |                     | Piston Hitting Intake Valve              | Piston Hitting Intake Valve   | X                             |
| Leaky Connections               | X                   |  |                               |                               |
| Relief Valve Set Too High       |                     | X  |                               |                               |
| Relief Valve Set Too Low        | X                   |  |                               |                               |
| Wrong Voltage Hookup            |                     | X  | X                             | X                             |
| Dirt or Liquid in Top of Piston | X                   | X  | X                             | X                             |

**Chart 3**  
*Air Compressor Troubleshooting Chart*

## 6.10 Air Compressor Disassembly

- 6.10.1 Remove or loosen the four screws which secure the fan shroud to the motor and slide the shroud off. Remove the four cylinder head bolts and separate them from the cylinder bolts. Remove the air manifold tube and the cylinder head with the valve components.

### **NOTE:**

*Head bolts are different than cylinder bolts.*

- 6.10.2 Remove the two cylinder bolts at the motor and lift the cylinder off the piston.
- 6.10.3 Remove the piston rings, springs and rider rings.
- 6.10.4 Clean all components with non-flammable, non-toxic cleaning solvent.

### **CAUTION**

***DO NOT FLOOD THE PISTON WRIST PIN OR CONNECTING ROD MAIN BEARING WITH SOLVENT OR THE PERMANENT LUBRICANT WILL BE WASHED AWAY.***

- 6.10.5 The head gaskets may have become firmly attached to the flat surfaces of cylinder heads or cylinders. Remove the old gasket material. Use No. 240 grit emery cloth (or wet/dry abrasive material) to flat-sand the cylinder surfaces. Follow with No. 400 grit emery cloth (or wet/dry) to dress these flat surfaces before reassembly with new gaskets.

## 6.11 Air Compressor Assembly

- 6.11.1 Install the new piston springs, rings and rider rings on the piston. Locate the ring joints approximately 180° opposite each other.
- 6.11.2 Attach cylinder to motor with cylinder bolts and lock washer and finger tighten bolts. Move the piston to the top dead center position and adjust the cylinder flush with the top of the piston.

### **NOTE:**

*Top dead center can be checked by using a straight edge across the cylinder head and then move piston flush with the straight edge. Move piston up and down to insure there is no binding in the cylinder and tighten the cylinder bolts.*

**6.11.3** Install valve components, gaskets and valve plate by lining them up as shown in Exploded Air Compressor and Motor Assembly Diagram, Figure 11, Page 28. Valves are pre-lined in the maintenance kit; however, they should be checked. The leaves of the intake and discharge valves have been pre-bent and do not require adjusting. Check to make sure the leaves are bent away from the valve plate.

**6.11.4** Install the head assembly using the four head bolts and finger tighten.

### **NOTE:**

*The ends of two fins on the cylinder head have been omitted.  
They are always on the exhaust port.*

**6.11.5** Install new manifold seals on the manifold and assemble to the elbow fitting on the head assembly. **DO NOT TIGHTEN!**

**6.11.6** Install the second head assembly and assemble the manifold. Tighten all head bolts and manifold nuts. (Head bolts are 150–160 inch pounds.)

**6.11.7** Soap test all fittings with compressor running. A small amount of air will bleed around the heads.

## **6.12 Heatless Dryer**

Open the front panel. No adjustments are necessary on the heatless dryer. No lubrication is required. It is recommended, however, that at intervals the unit be inspected as follows:

The heatless dryer has a solid state timer which switches power to the solenoid valves from one tower to the other every thirty seconds. This can be heard as an air purge. If this air purge cannot be heard, refer to the Troubleshooting Guide, Section 7.5, Page 37, for correct diagnosis.

At two-year intervals (or 8,000 hours) install maintenance kit P-200-499S. The procedure is as follows:

**6.12.1** Remove the heatless dryer from the unit and remove the mufflers from solenoid valve.

**6.12.2** Remove solenoid coil and frame from manifold assembly.

**6.12.3** Using 1 1/16" wrench, remove base assembly containing core assembly and discard.

**6.12.4** Remove O-rings from manifold and install new O-rings (P-400-313-018).

**6.12.5** Install new base assembly containing new core in manifold. Do not overtorque. Tighten only until snug.

- 6.12.6 Reinstall solenoid coils in the frame.
- 6.12.7 Install retaining ring.
- 6.12.8 Reinstall mufflers.
- 6.12.9 Remove desiccant chambers, O-rings and purge orifices.
- 6.12.10 Remove and discard check valve ball and springs and install new check valve ball (P-400-375) and springs (P-300-507).
- 6.12.11 Reinstall purge orifices with new O-rings (P-400-312-908, P-400-313-110). Check orifice to make sure there is no debris.
- 6.12.12 Lubricate desiccant chamber threads and reinstall with O-rings (P-400-312-924). Reinstall heatless dryer.

### 6.13 Pressure Regulator

Preventative maintenance is not required; however, if the pressure regulator becomes erratic or inoperative, it should be replaced.

### 6.14 Bypass Solenoid Valve

The bypass solenoid valve does not require maintenance.

## **NOTE:**

*It is normal for the bypass solenoid valve to be hot during operation.*

### 6.15 Humidity Alarm

If unit is in humidity alarm:

- 6.15.1 Verify that the four green LED's (2%, 3%, 5% and 7% on the front panel) are de-energized. If not, toggle RESET on the front panel. The compressor will be running.

(A.) Locate the green and yellow LED's on the P-07580-F Humidity Board. If the yellow LED is energized, check the cable connections between the board and the sensor. If needed, re-seat all connections. Verify that there is a humidity sensor in the unit. If the above tests are correct, and the yellow LED is energized, then the Humidity Board is defective.

(B.) If the green LED is energized and an alarm is present, then the Humidity Board is defective. (Assuming RESET was toggled).

(C.) If both the green and yellow LED's are de-energized, disconnect the cable from the sensor. First the green LED, then the yellow LED will energize. This verifies that the circuitry is operating correctly and that the unit's drying system is malfunctioning.

## **WARNING!**

**DO NOT MEASURE SENSING ELEMENT RESISTANCE OR  
IN ANY WAY APPLY D.C. VOLTAGE TO THE SENSING  
ELEMENT.**

- 6.15.2** Reconnect the sensing element cord that was disconnected in the previous step. With the air compressor running, check the setting and operation of the capacity control valve (48–52 PSIG). See Paragraph 6.6, Page 19. If the capacity control valve is set low, the performance of the heatless dryer may suffer. If the capacity control valve is set high, the air compressor may overheat. If the alarm energizes again, replace the sensing element (P-5000-6-47D).
- 6.15.3** If the new sensing element does not clear the alarm, a failure in the heatless dryer is indicated. Refer to Section 7.5, Pg. 37, Dehydrator Parts List, Page 26 and Figure 10, Page 27.
- 6.15.4** Listen for strong air purge every 30 seconds ( $\pm$  or 1.5 seconds). If no purge occurs, proceed to 6.15.5. If purge occurs every 30 seconds, replace the check balls and core assemblies and clear the purge orifices with an air gun. Refer to Figure 10, Page 27.
- 6.15.5** Using a voltmeter, Remove the terminal cover and check for 115 VAC at L1 L2. If 115 VAC is present, verify 53 VDC is alternately being applied from DC1 to L2 for 30 seconds, then DC2 to L2 for 30 seconds. If this is not happening, replace the Solid State Timer.
- If the air dryer is still in humidity alarm after the above steps have been completed, contact General Cable Company, Puregas Technical Service Department.

## **P-07511 MAINTENANCE KIT**

### **6.16.1 General**

This maintenance kit is designed to provide the parts necessary for one year's normal routine maintenance on the Puregas Model P-3100/4200DCO-3 Air Dryers. The maintenance indicated should be performed at noted intervals. See Section 6.1.

### **6.16.2 Parts List**

| <u><i>QTY</i></u> | <u><i>Part Number</i></u> | <u><i>Description</i></u> | <u><i>Interval</i></u> |
|-------------------|---------------------------|---------------------------|------------------------|
| 2                 | P-05893                   | Cabinet Air Filter        | 6 Month & 1 Year       |
| 1                 | P-5000-6-47D              | Sensor - Humidity         | 1 Year                 |
| 1                 | P-3865                    | Kit-Comp./Maint.          | 1 Year                 |
| 1                 | P-07510                   | Cream-Pressure Switch     | 1 Year                 |

### **6.16.3 Instructions**

1. Move the On/Off circuit breaker to the "OFF" position. See Figure 12, page 29.

## **CAUTION**

*Wait for system to de-pressurize completely (0 PSIG)  
before proceeding!*

2. Open front door and remove lower compartment panel.
3. Replace the cabinet air intake filter from above the air precooler. (refer to Fig. 12, page 29)
4. Proceed to the air compressor assembly, loosen the thumb screw and slide compressor forward, disassemble the two filter assemblies (counter-clockwise motion), replace felt filter elements. (refer to Fig. 11, page 28 and Fig. 12, page 29)
5. Proceed to the humidity tube, loosen brass hex nut and replace sensing element. (refer to Fig. 13, page 30)
6. Perform air compressor maintenance kit. (refer to Sections 6.8 - 6.11.7.)

### **RE-STARTING THE UNIT**

Place the ON/OFF circuit breaker to the "ON" position. (refer to Fig. 12, page 29 and Paragraph 4.6.2.)

### **IMPORTANT NOTICE:**

In addition to the above, perform all maintenance and checks as described in Section 6 of this instruction manual.

**Immediately re-order Maintenance Kit for next interval.**



## 6.17 Dehydrator Parts List

Reference Numbers refer to parts shown in Figure 10,

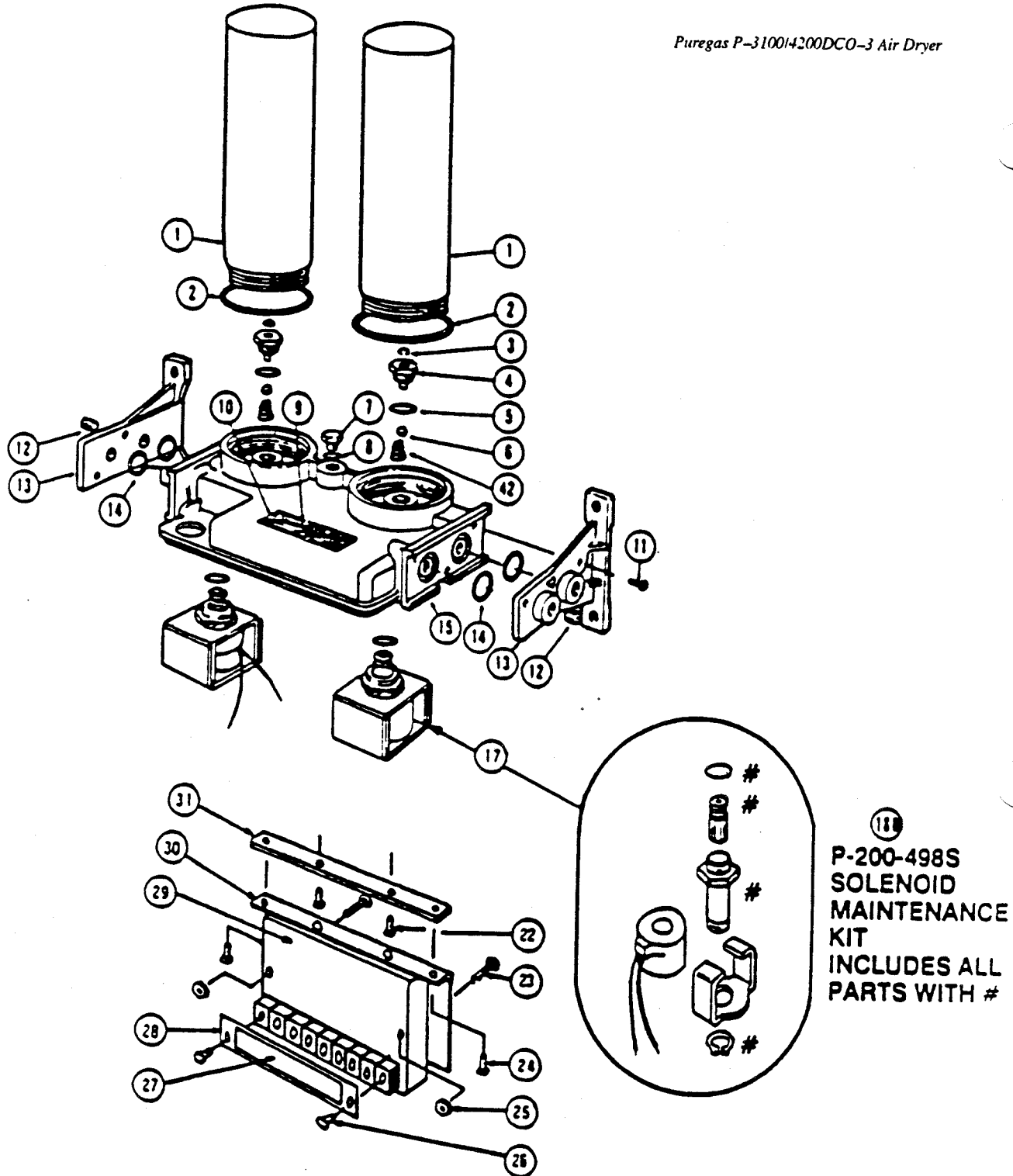
Page 27, Exploded View of Puregas Heatless Dryer (Dehydrator).

### Reference

| <u>Number</u> | <u>Description</u>                | <u>Qty.</u> | <u>Part Number</u>   |
|---------------|-----------------------------------|-------------|----------------------|
| 1             | Desiccant Chamber (12") Assy.     | 2           | P-200-403-12         |
| 2             | O-Ring (included in above)        | 2           | P-400-312-924        |
| 3             | O-Ring                            | 2           | P-400-313-110        |
| 4             | Purge Orifice (3100DCO)           | 2           | P-200-404-34         |
|               | Purge Orifice (4200DCO)           | 2           | P-200-404-41         |
| 5             | O-Ring                            | 2           | P-400-312-908        |
| 6             | Ball, Check Valve                 | 2           | P-400-375            |
| 7             | Plug, Hex                         | 1           | P-400-307-4          |
| 8             | O-Ring                            | 2           | P-400-312-904        |
| 9             | Nameplate                         | 1           | P-300-737            |
| 10            | Drive Screw No. 4 x 3/16"         | 2           | P-400-322-1          |
| 11            | Screw, No. 10-24 x 5/8"           | 6           | P-400-361-2          |
| 12            | Pipe Plug, 1/4"-18 socket         | 2           | P-400-320-3          |
| 13            | Mounting Bracket                  | 2           | P-300-497-P          |
| 14            | O-Ring                            | 4           | P-400-313-209        |
| 15            | Air Manifold                      | 1           | P-300-495-P          |
| 16            | O-Ring                            | 2           | P-400-313-018        |
| 17            | Sol. Valve Assy., 53 VDC          | 2           | P-400-589DC1 (DCO-3) |
| 18            | Solenoid Valve Maintenance Kit    | 2           | P-200-498S           |
| 22            | Screw No. 6032 x 3/8" P.H.        | 2           | P-400-361-1          |
| 23            | Screw No. 3-32 x 1" B.H.          | 2           | H-SB83-OHC-10        |
| 24            | Screw No. 6-32 x 1 1/4" B.H.      | 2           | H-SB83-OFC-04        |
| 25            | Nut, Keps 8-32                    | 2           | H-NK01-OHC-R5        |
| 26            | Screw No. 6-32 x 1/2"             | 2           | H-SB83-OFC-02        |
| 27            | Decal Terminal Cover              | 1           | P-06498              |
| 28            | Cover Terminal                    | 1           | P-06499              |
| 29            | Solid State Timer, 115V, 50/60 Hz | 1           | P-06521-F1 (DCO-3)   |
| 30            | Bracket, Mtg. S/S Timer           | 1           | P-06497              |
| 31            | Plate, Adapter, S/S Timer         | 1           | P-06496              |
| 42            | Spring, Check Ball                | 2           | P-300-507            |

### Chart 4

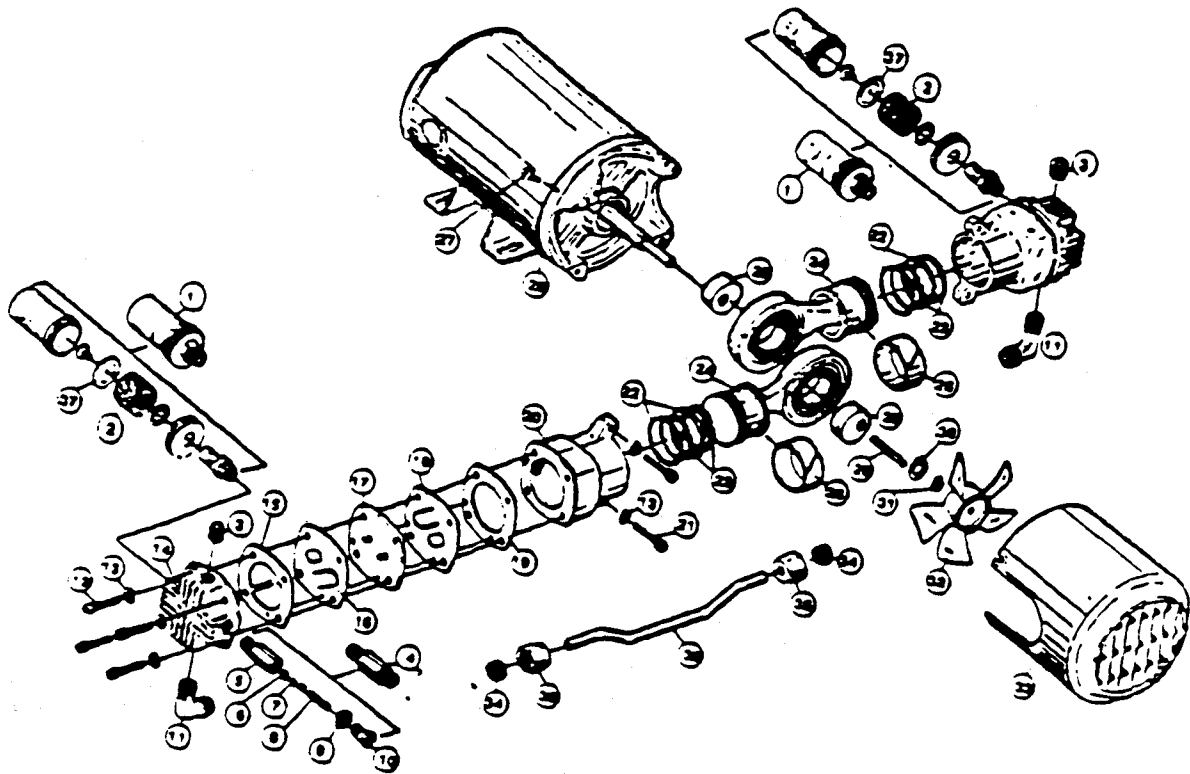
#### *Dehydrator Parts List*



**HEATLESS DRYER  
MAINTENANCE KITS:  
P-200-499S INCLUDES  
ITEMS 2, 3, 5, 6, & 18B**

**11  
P-200-498S  
SOLENOID  
MAINTENANCE  
KIT  
INCLUDES ALL  
PARTS WITH #**

**Figure 10**  
*Exploded View of Puregas Heatless Dryer (Dehydrator)*



**Figure II**  
**Exploded View of Air Compressor and Motor Assembly**

| <i>Ref. No.</i> | <i>Description</i>      | <i>Qty.</i> | <i>Part No.</i> | <i>Ref. No.</i> | <i>Description</i>    | <i>Qty.</i> | <i>Part No.</i> |
|-----------------|-------------------------|-------------|-----------------|-----------------|-----------------------|-------------|-----------------|
| 1               | Air Intake Filter Assy. | 2           | P-02619         | 20              | Cylinder              | 2           | P-3874          |
| 2               | Felt                    | 1           | P-3986          | 21              | Cylinder Screw        | 4           | P-3979          |
| 3               | Pipe Plug               | 2           | P-3998          | 22              | Piston Ring           | 4           | P-3862          |
| 4               | Safety Valve            | 1           | P-3996          | 23              | Piston Seal           | 4           | P-3861          |
| 5               | (Included in #4)        | 1           | -               | 24              | Piston Rod Assy.      | 2           | P-3872          |
| 6               | (Included in #4)        | 1           | -               | 25              | Rider Ring            | 2           | P-3981          |
| 7               | (Included in #4)        | 1           | -               | 26              | Eccentric (3100DCO)   | 2           | P-02646         |
| 8               | (Included in #4)        | 1           | -               |                 | Eccentric (4200DCO)   | 2           | P-01238         |
| 9               | (Included in #4)        | 1           | -               | 27              | Screw                 | 4           | P-4033          |
| 10              | (Included in #4)        | 1           | -               | 28              | Bracket (3100DCO)     | 1           | P-02646         |
| 11              | Manifold Elbow          | 2           | P-4024          |                 | Bracket (4200DCO)     | 1           | P-01239         |
| 12              | Head Screw              | 8           | P-4025          | 29              | Square Key            | 1           | P-4040          |
| 13              | Lock Washer             | 12          | P-4026          | 30              | Ring, Not Supplied    | 1           | -               |
| 14              | Cylinder Head           | 2           | P-3875          | 31              | Retaining Ring        | 1           | P-4041          |
| 15              | Head Gasket             | 2           | P-3866          | 32              | Fan                   | 1           | P-3873          |
| 16              | Valve Outlet            | 2           | P-3867          | 33              | Shroud                | 1           | P-3871          |
| 17              | Valve Plate             | 2           | P-3870          | 34              | Manifold Sleeve       | 2           | P-3864          |
| 18              | Valve Inlet             | 2           | P-3868          | 35              | Manifold Nut          | 2           | P-4043          |
| 19              | Cylinder Gasket         | 2           | P-3869          | 36              | Manifold              | 1           | P-01240         |
|                 |                         |             |                 | 37              | Disc, Filter Hold Dn. | 2           | P-02618         |

FLOW METER  
P-8805 (3100)  
P-02301 (4200)

DIGITAL ALARM DISPLAY  
AND  
HUMIDITY INDICATORS

POWER ON LIGHT  
P-08270

CIRCUIT BREAKER  
P-06136

ALARM RESET  
SWITCH  
P-05695

OUTLET  
PRESSURE  
GAUGE  
P-02281  
0-30

PRECOOLER  
P-4642

PRECOOLER  
FAN  
(NOT SHOWN)  
P-05285

VIBRATION  
MOUNTS  
P-02626S

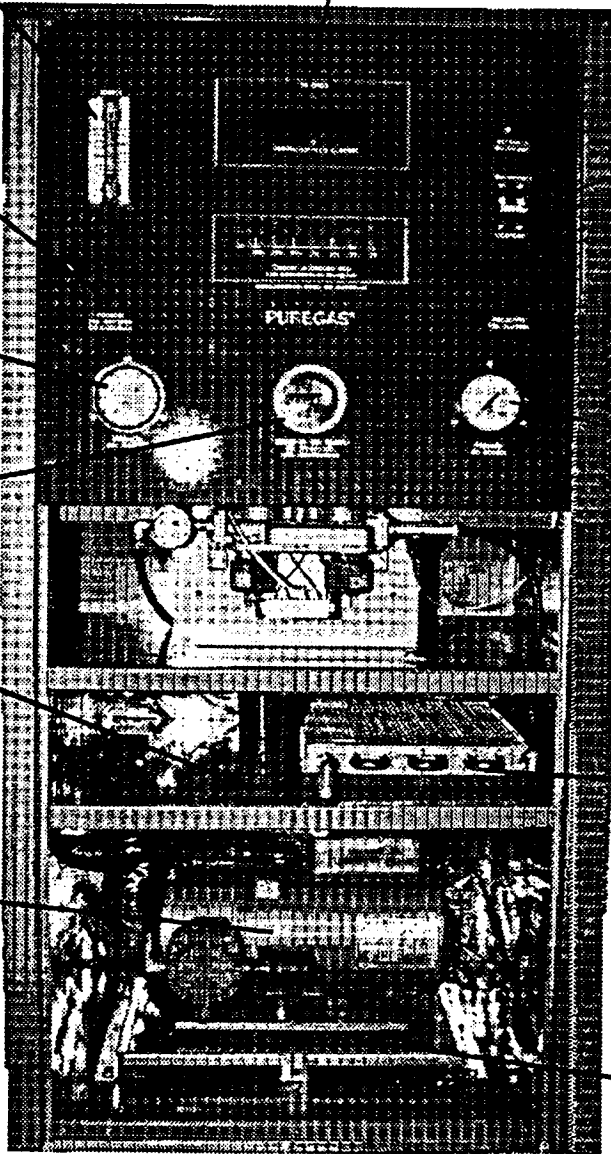
HUMIDITY  
TEST  
SWITCH  
P-05695

TANK  
PRESSURE  
GAUGE  
P-B-101  
0-100

RUNNING TIME  
METER  
P-02358

CABINET  
AIR INLET  
FILTER  
P-05893

AIR  
COMPRESSOR  
P-02293  
(P-3100DCO-3)  
P-3966-3LS  
(P-4200DCO-3)



*Figure 12*  
*Front View*

HUMIDITY TEST  
SOLENOID  
2-WAY  
P-08464

HUMIDITY TUBE  
SENSOR  
(NOT SHOWN)  
P-5000-6-47D

HIGH/LOW  
PRESSURE SWITCH  
P-07677

COMPRESSOR  
PRESSURE  
SWITCH  
P-4564

BYPASS  
SOLENOID  
VALVE  
(3-WAY)  
P-5000-12-85

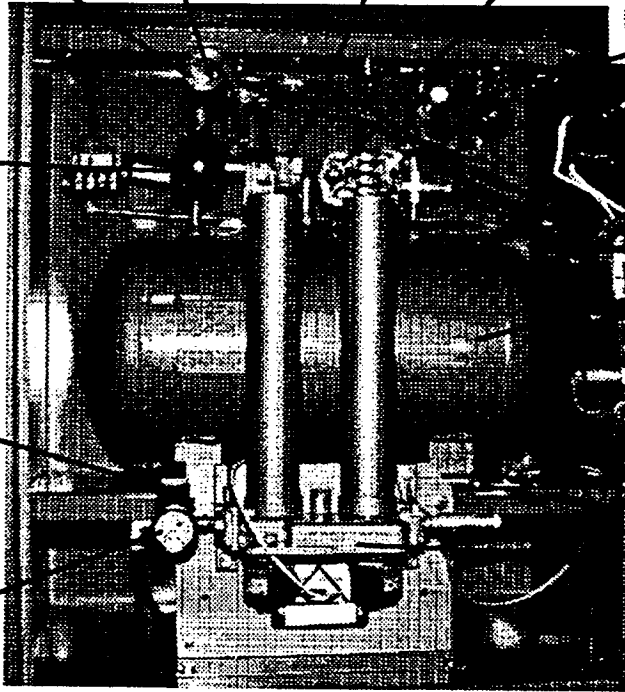
PRESSURE  
REGULATOR  
P-03348

DRY AIR  
STORAGE TANK  
P-02409

CAPACITY  
CONTROL  
VALVE  
P-4634

HEATLESS DRYER  
P-HF2C112041  
(P-4200DCO-3)  
P-HF2C112034  
(P-3100DCO-3)

PRESSURE  
GAUGE  
P-3197



*Figure 13*  
*Top Compartment Front View*

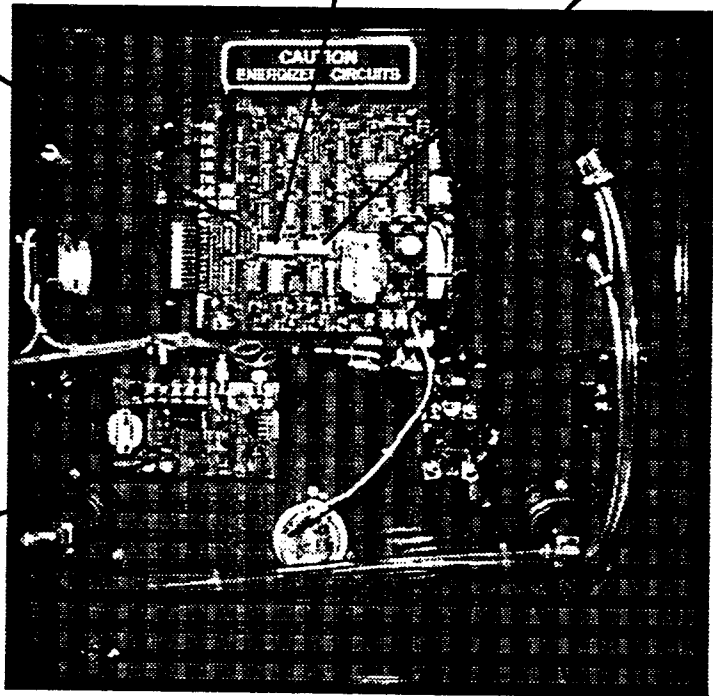
COMPRESSOR  
PERFORMANCE  
TIME DELAY  
SWITCH

HUMIDITY TIME  
DELAY SWITCH

LOGIC BOARD  
P-05847F1

DISPLAY BOARD  
(LOCATED BENEATH  
LOGIC BOARD)  
P-07599F1

HUMIDITY BOARD  
P-07580F2



SOLID STATE RELAY  
P-05992

***Figure 14***  
***Rear View of Front Door***

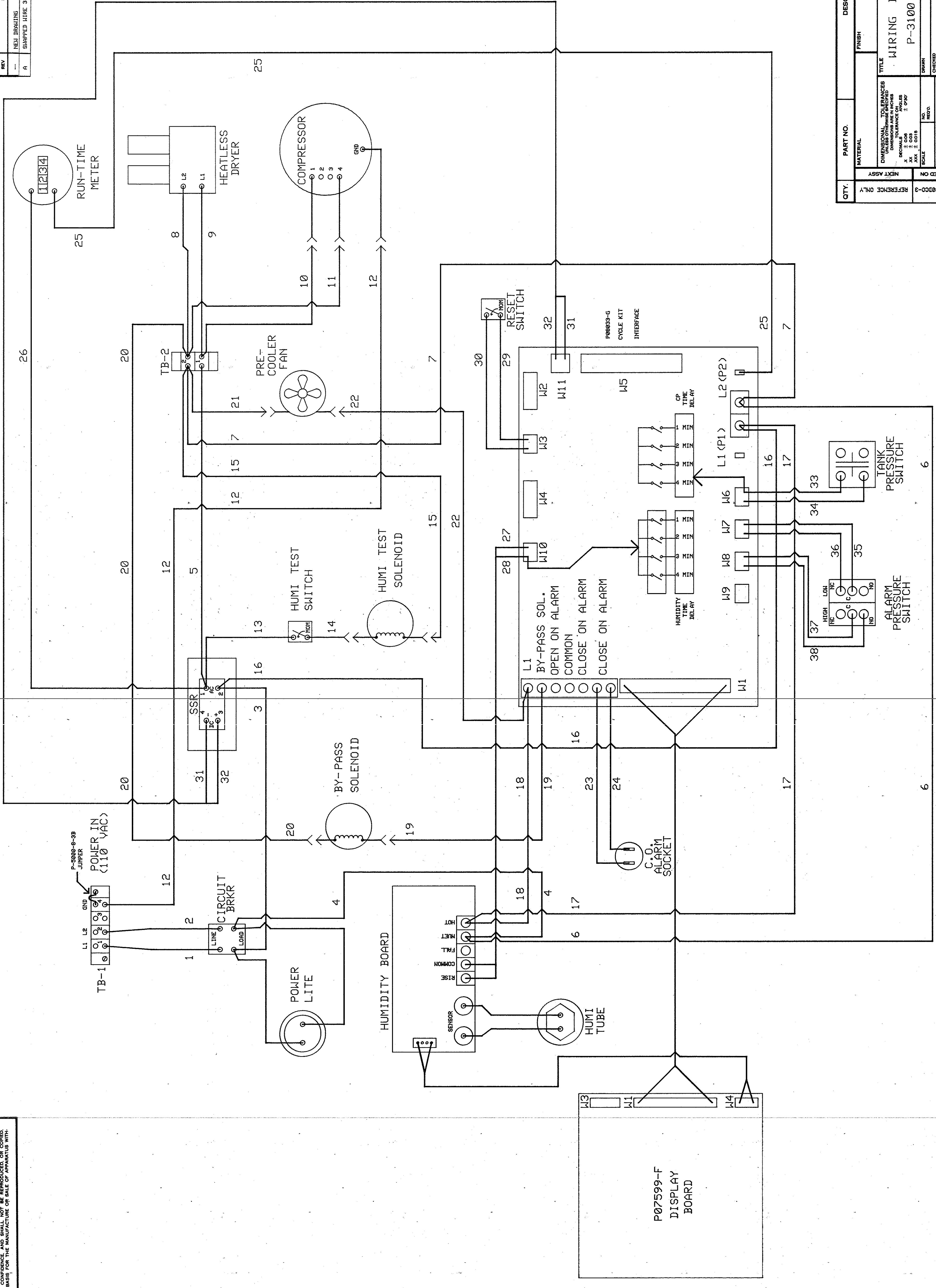
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| REV | DESCRIPTION                  | DATE     | BY   | ECO   |
|-----|------------------------------|----------|------|-------|
| 1   | HEAT DRYING                  | 10-16-90 | C.K. | 16794 |
| A   | SHIPPED HIRE 31 & 32 AT SSR. | 3-13-91  | C.K. | 17585 |

DWG. NO. P-08250

31/32

31/32



| QTY. | PART NO. | DESCRIPTION    | WT. | ITEM NO. |
|------|----------|----------------|-----|----------|
| 1    | 08250-3  | REFERENCE ONLY |     |          |
| 1    | 08250    | 100000-3       |     |          |

| DATE | DATE | DATE |
|------|------|------|
| DATE | DATE | DATE |

| SCALE | NO. | NO. | NO. |
|-------|-----|-----|-----|
| SCALE | NO. | NO. | NO. |

| DATE | DATE | DATE |
|------|------|------|
| DATE | DATE | DATE |

| DATE | DATE | DATE |
|------|------|------|
| DATE | DATE | DATE |

| SIZE | WT.     | CP | REV |
|------|---------|----|-----|
| D    | P-08250 | A  | A   |

| MATERIAL | FINISH | DESCRIPTION | WT. | ITEM NO. |
|----------|--------|-------------|-----|----------|
| MATERIAL | FINISH | DESCRIPTION | WT. | ITEM NO. |

| TITLE | FINISH | DESCRIPTION |
|-------|--------|-------------|
| TITLE | FINISH | DESCRIPTION |

| GENERAL CABLE CORPORATION | APPROVED |
|---------------------------|----------|
| GENERAL CABLE CORPORATION | APPROVED |

| DESIGNER      |
|---------------|
| E.E. DESIGNER |

This troubleshooting guide is set in a columnar format to simplify the isolation of problems, possible causes, areas to check and corrective action required to restore the air dryer to normal operation. It is further divided into system headings for easy referral. Where possible, the most likely causes have been listed first. Otherwise, the causes start with the simplest and progress to more complicated possibilities. The steps should be followed in sequence to expedite service. It is further suggested that once the problem has been isolated, the corresponding text in the Maintenance Section be reviewed to provide additional information. After the air dryer has been serviced, the alarms should be re-tested to assure the alarm system is working properly.

The alarm troubleshooting guide is easy to use and very effective when used properly. Therefore, it is suggested to always start at the beginning and continue in sequence by reading the possible cause, check and corrective action paragraphs and follow the procedures indicated.

This guide will require a Volt Ohm Meter (VOM) and will specify DC (direct current) or AC (alternating current) setting.

The Troubleshooting Information Guide can by no means cover every possible cause for malfunction, but will help solve most problems. If the problem persists after thoroughly consulting the troubleshooting section, contact Puregas Technical Service at (800) 521-5351 or (303) 427-3700.

### **WARNING !**

***This section requires access to components inside the cabinet of the air dryer. In most cases, an energized and operating air dryer is necessary to conduct a test and make adjustments. Extreme care should be exercised to avoid contact with live electrical or moving parts.***



A. Alarm Display Summary

**Problem A1: Low Pressure Alarm.**

Possible Cause:

Check:

Corrective Action:

*Refer to Principles of Operation, Section II J, Pg. 7 and to the Low Pressure Alarm Adjustment, Section V H, Pg. 22*

**Problem A2: Comp. Run Time Alarm.**

*Refer to Principles of Operation, Section II J, Pg. 7 and to the Compressor Performance Test, Section IV D, Pg. 16.*

**Problem A3: Humidity -Cond.- Alarm.**

*Refer to Principles of Operation, Section II J, Pg. 7 and to the Humidity Condition Test, Section IV B, Pg. 13.*

**Problem A4: Humidity Alarm.**

*Refer to Principles of Operation, Section II J, Pg. 7 and to the Humidity Alarm Guide, Section V Q, Pgs. 28 and 29.*

**B. Air System****Problem B1: Low Pressure Alarm.**

| <u>Possible Cause:</u>                            | <u>Check:</u>  | <u>Corrective Action</u>  |
|---|--|---|
| a. Outlet pressure is too low.                    | Check the outlet pressure gauge. (The factory preset alarm point is .25 PSIG.)     | If setting is below .25 PSIG, readjust the pressure regulator.                                    |
| b. Leak in the air system.                        | With no outlet flow, check all fittings with an appropriate leak testing solution. | Tighten any loose connections and fittings as required.   |
| c. Defective outlet pressure gauge.               | Using a digital pressure gauge, check the outlet pressure test valve.              | The readings should be the same ( $\pm 1$ PSIG). If so, proceed to Step g. If not, replace gauge. |
| d. Weak air compressor.                           | Check to see if compressor runs excessively.                                       | Install routing maintenance kit.  |
| e. Pressure alarm out of adjustment or defective. | Check the low outlet pressure alarm setting as described in Section IV A.          | Readjust the pressure switch or replace if defective.   |
| f. High ambient temperature.                      | Check the ambient temperature.   | If above 120° F., cool area around air dryer or relocate air dryer to a cooler environment.       |
| g. Defective pressure switch.                     | Disconnect wire from the switch.   | If alarm clears, replace pressure switch. If alarm remains, replace logic board.                  |

**Problem B2: Compressor Will Not Build Pressure.**

|  |   |                               |
|--|---|-------------------------------|
| a. Incorrect compressor safety relief valve setting.           | Check for too low safety relief valve setting.      | See Section V C.              |
| b. Compressor requires maintenance.                            | Check rings and valves for excessive wear.          | Install maintenance Kit.      |
| c. Capacity control Valve is defective or requires adjustment. | Check capacity control valve for proper adjustment. | Adjust to 50 ( $\pm 2$ ) PSI. |

## B. Air System (continued)

**Problem B3: Rapid On/Off Cycling.**

| <u>Possible Cause:</u>                          | <u>Check</u>  | <u>Corrective Action</u>  |
|---|---|---|
| a. Leak in Air System.                          | -   | See Problem A, above.   |
| b. Incorrect capacity control valve adjustment. | Check the capacity control valve. It should be at 50 $\pm$ 2 PSIG when compressor is operating. When compressor is off, it should be at 0 PSIG. | Adjust (clockwise) capacity control valve to 50 $\pm$ 2 PSIG as described in Section V E. |

C. Humidity Alarm System**Problem C1: Air Dryer in Humidity Alarm.**

|  |  |   |
|--|--|---|
| a. Humidity circuit defective.           | Check the humidity alarm circuit (see Section IV B).                       | See Section V B.  |
| b. Loose or poor electrical connections. | Check wire connections.  | Replace as necessary  |
| c. Low system pressure.                  | Check the capacity control valve setting. It should be at 50 $\pm$ 2 PSIG. | Adjust capacity control valve to 50 $\pm$ 2 PSIG as described in Section V E. |
| d. Leaking humidity test solenoid valve. | Check humidity test solenoid valve for leakage into humidity tube.         | Replace humidity test solenoid valve if defective.                            |
| e. Defective timer in dehydrator         | Refer to Section II B for proper timer operation.                          | Replace timer if it is defective.   |
| f. Excessively high ambient temperature. | Check ambient temperature. It should be below 120° F.                      | Cool environment around dryer or relocate dryer to cooler environment.        |

## C. Humidity Alarm System (continued)

**Problem C2: Air Dryer Humidity Alarm Doesn't Function.**

*Note: The following are possible causes for a humidity condition. After isolating and correcting the problem, the air dryer may have to be run up to 5 minutes to dry out the entire system and clear the alarm. The higher the system pressure, the faster the towers will dry out. It is advisable to run the dehydrator at 48-52 PSIG to dry out the towers.*

**CAUTION:**

**DO NOT MEASURE SENSING ELEMENT OR IN ANY WAY APPLY DC VOLTAGE TO THE SENSING ELEMENT**

| <b><u>Possible Cause:</u></b>            | <b><u>Check</u></b>   | <b><u>Corrective Action</u></b>  |
|--|---|--|
| a. Defective humidity sensing element.   | Toggle the humidity switch or the humidity board test switch. | If the dryer does not go into a humidity condition and hold that condition, replace the sensing element. |
| b. Loose or poor electrical connections. | Check wires for good connections.                             | -  |

D. **Electrical System****Problem D1: No Power To The Air Dryer.**

|  |   |   |
|--|---|---|
| a. Power has been interrupted to the air dryer.  | Check the main power supply or fuse panel.  | Reset the main power supply or replace the bad fuse.              |
| b. Circuit breaker tripped at main power supply. | Check circuit breaker to see if it has tripped. Check for proper AC voltage at power connections. | Reset circuit breaker. Check power supply for sufficient voltage. |
| c. Loose or poor electrical connections.         | Check power connections.  | Repair any bad electrical connections.                            |

## D. Electrical System (continued)

**Problem D2: No Power To The Air Compressor, But Other Components Have Power.**

| <u>Possible Cause:</u>                   | <u>Check</u>  | <u>Corrective Action</u>               |
|--|---|--|
| a. Loose or poor electrical connections. | Check for proper AC voltage at air compressor.                  | Repair any bad electrical connections. |
| b. Solid State Relay (SSR).              | Check for +5 VDC across 3 and 4. Verify LED 2 ON (Logic Board). | Replace SSR.                           |

**Problem D3: Power To Dryer, But The Air Compressor Does Not Operate.**

|  |   |   |
|--|---|---|
| a. Humidity Alarm after set time delay.                      | Check for humidity alarm on display.  | If dryer is in a humidity alarm, refer to Section 5 Q. Pgs 28 and 29. |
| b. Loose or poor electrical connections.                     | Check power connections at terminal block.  | Repair any bad electrical connections.                                |
| c. Check circuit breaker.                                    | With the breaker on, check for proper AC voltage at supply side and load side of the circuit breaker. | If voltage fails to be on both sides, replace breaker.                |
| d. Tank pressure switch.                                     | This switch operates on 5 VDC. When the contacts are closed, the compressor will operate.             | Change sides of the switch or clean contacts.                         |
| e. Compressor overload protection switch has been activated. | Check fresh air ventilating fan for operation.  | Replace if necessary.   |
|  | Check cabinet air filter for restrictions.  | Clean if necessary.   |
|  | Check compressor inlet filters for clogging.  | Replace if necessary.   |
|  | Rapid on/off cycling.   | See Air System. Problem C.  |

**E. Dehydrator****Problem E1: Heatless Dryer Delivers Wet Air.**

| <u>Possible Cause:</u>                | <u>Check</u>   | <u>Corrective Action</u>   |
|---------------------------------------|--|--|
| a. Defective solenoid valve.          | Check core assembly for broken spring and proper seating.  | Defective parts should be replaced (core assembly or worn parts).                                |
| b. Purge orifice plugged.             | Check orifice for residue.   | Clean orifice with air pressure. Do not use wire or anything abrasive. This will damage orifice. |
| c. Solenoid coil burned out.          | Check magnetic pull of coil with screwdriver. (Refer to next step before replacing coil.) <i>Note: Each coil should be energized every 30 seconds.</i> | Replace if necessary.  |
| d. Improper operation of cycle timer. | Check for proper AC voltage on screws L1 and L2. Tighten connections, if needed.   | If no operation with voltage applied, replace timer.   |

**Problem E2: A White Powder Is In The Flowmeter or Exhaust.**

|                                |  |  |
|--------------------------------|--|--|
| Deteriorated desiccant towers. | Check movement of perforated disc at open end of chambers. Disc should not depress more than 1/4" from retaining ring. | Replace chamber or have repacked. (Puregas recommends tower be repacked at the factory.) |
|--------------------------------|--|--|

**Problem E3: Heatless Dryer Has Excessive Drop In Outlet Pressure.**

|                                       |   |  |
|---------------------------------------|---|--|
| a. Improper operating conditions.     | See Heatless dryer characteristics, II, B.  | Install the maintenance kit. P-200-499S.   |
| b. Solenoid coil burned out.          | Check to see if every 30 seconds exhaust air will purge from the bottom of one side or the other. | If one side fails to purge, replace solenoid valve.                                |
| c. Improper operation of cycle timer. | Check to see if every 30 seconds the timer switches sides of operation.                           | If proper voltage is applied and this switching does not occur, replace the timer. |
| d. Valve balls not seated properly.   | Check Rings and valves for excessive wear.  | Replace if necessary.  |