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**Service Instructions  
for  
Gas Drying Unit**

**SA76440 (115 Vac)  
SA76441 (230 Vac)**

**May 1995**

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Newton, MA 02158-1010**

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# Service Instructions

## Gas Drying Unit

### 1 Overview

The Gas Drying Unit uses a heatless desiccant device for installations where the user's air or nitrogen supply contains too much moisture for frost free operation of a thermal test enclosure (such as Temptronic's Controlled Environment Enclosure) at low test temperatures.

The Gas Drying Unit is a self-contained system (see Figure 1) that converts standard shop air to dry filtered air for purging the test enclosure. After the air inlet, a pressure regulator allows the air pressure input to be adjusted between 100 psig (max) and 80 psig (min) required by the Gas Drying Unit. The air supply must be capable of a flow rate greater than 16 scfm. In the Gas Drying Unit, the air is prefiltered to remove water and particulates, is dried in a heatless regenerative dryer, and is filtered to 1/2 micron for supply as dry filtered air at a dew point as low as -70 °C. Just before the regulated air outlet, a flow control valve and flow meter allow the air to be adjusted to a nominal flow rate of 10 scfm (13 scfm max). A second unregulated air outlet is available for auxiliary use (such as a prober) if required. The power input is approximately 20 watts at 115 or 230 Vac, and a power switch with indicator is provided.

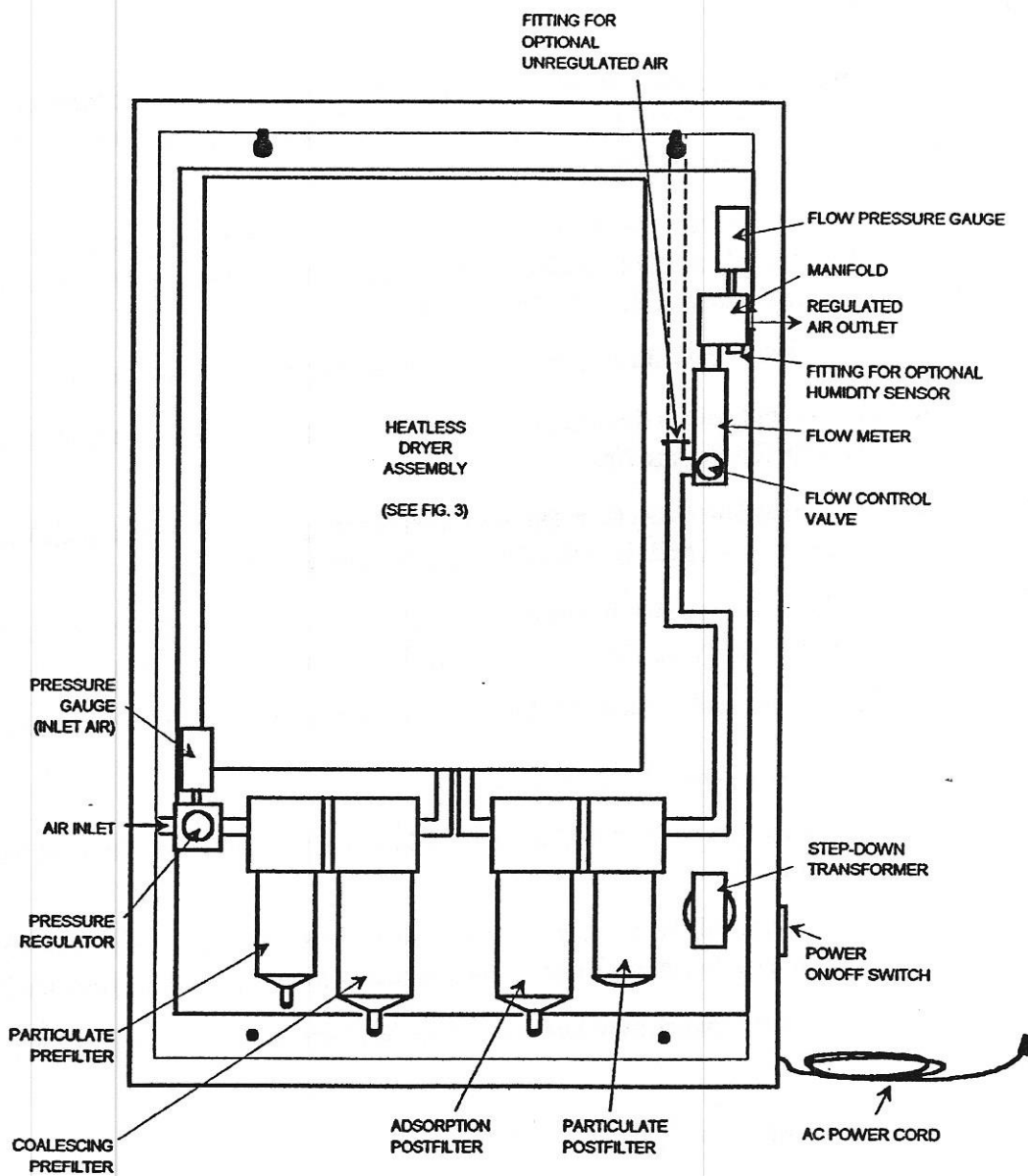


Figure 1. Gas Drying Unit, Interior Components

## 2 Installation

The Gas Drying Unit is a shallow assembly with provisions for wall mounting. It connects between the air supply and the air input to the thermal test enclosure. Figure 2 shows an outline drawing of the unit. To install the Gas Drying Unit,

1. Choose a wall location close to the air supply outlet, the ac power outlet, and the thermal test enclosure. The air supply must be capable of delivering 80 psig minimum (100 psig max) at a flow of 16 scfm minimum to the Gas Drying Unit.
2. Fasten the unit to the wall with four 3/8-inch lag screws or other suitable hardware.
3. Connect the air supply outlet through the 3/8-inch ID tubing (supplied) to the quick-release air inlet fitting on the Gas Drying Unit.
4. Connect the regulated air outlet from the quick release fitting on the Gas Drying Unit through the 3/8-inch ID tubing (supplied) to the air inlet of the thermal test enclosure.
5. If the installation requires a supply of unregulated dry air, connect the quick-release unregulated air outlet atop the Gas Drying Unit through the 3/8-inch ID hose to the auxiliary device.

**NOTE:** The auxiliary device must not take more than 2 scfm of flow from the Gas Drying Unit.

6. Turn on the air supply to the Gas Drying Unit.
7. Adjust the pressure regulator for a reading of 80 to 100 psig on the pressure gauge, at the input to the Gas Drying Unit.
8. Adjust the flow control valve at front of the Gas Drying Unit for a start-up reading of 10 to 12 scfm on the flow meter. Set at the desired scfm after the operating conditions have stabilized.

**NOTE:** The flow meter reading must be corrected for flow pressure ( $P_F$ ) by using the following equation:

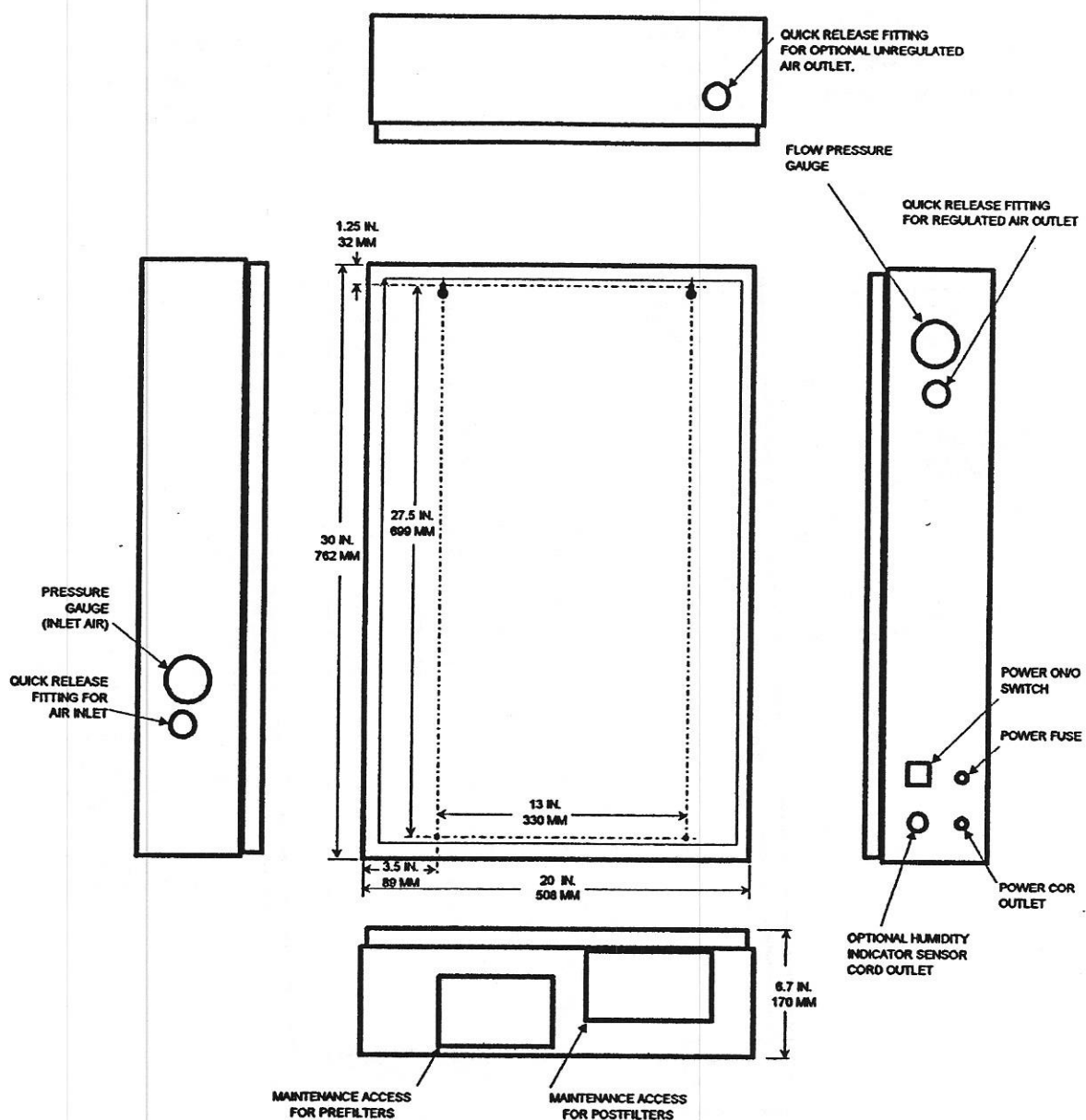
$$\text{actual flow} = \text{indicated flow} \sqrt{[P_F + 15] / 15}$$

The actual flow should be nominally 10 scfm to prevent frost accumulation. A sample equation for an indicated flow of 6.8 scfm and a flow pressure of 17 psig is:

$$\text{actual flow} = 6.8 \sqrt{[17 + 15] / 15}$$

$$\text{actual flow} = 10$$

9. Plug the service cord from the Gas Drying Unit into a wall receptacle that supplies the proper voltage as listed on the nameplate of the unit.
10. Push the power switch on the Gas Drying Unit to the on position (indicator on switch lights).  
The unit is now set for normal operation.



WEIGHT APPROXIMATELY 100 LB (45 KG)

**Figure 2. Outline Drawing, Cover Not Shown**

### 3 Description

#### 3-1 Physical Components

The Gas Drying Unit consists of a heatless dryer assembly with associated air filters, regulators, and a flow meter. The heatless dryer assembly (see Figure 3) contains two desiccant towers, two solenoid valves, and an exhaust muffler to dry the user's air supply to a dew point of below  $-70^{\circ}\text{C}$ . This assembly is powered from the 24 Vac output from a step-down transformer. A solid-state timer controls the two solenoid valves and the switching air flows between the two towers in a self-regenerative type of operation. Inlet and outlet air hoses and a power cord for the Gas Drying Unit are provided.

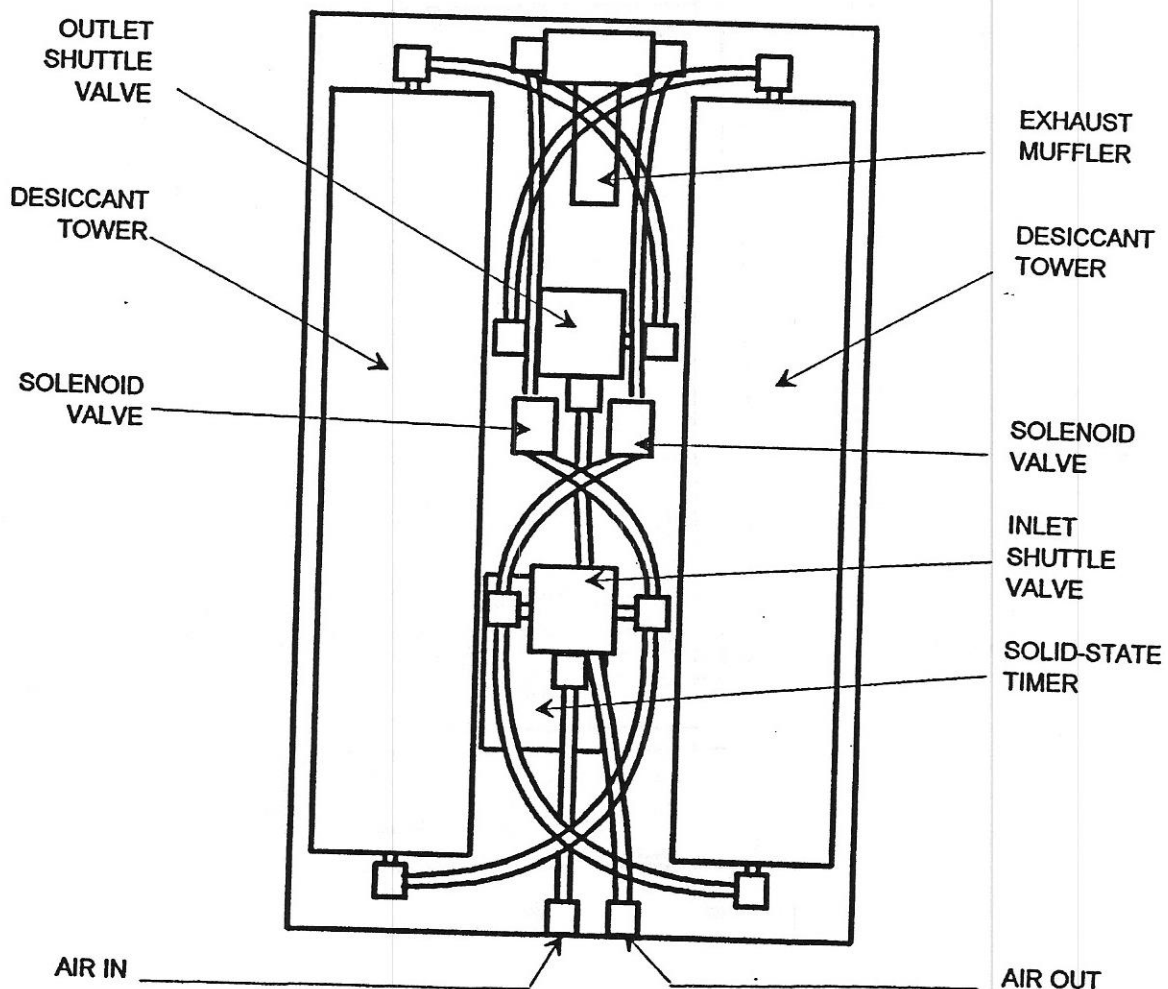


Figure 3. Components in Heatless Dryer Assembly

### 3-2 Functional Flow

Figure 4 shows a functional flow diagram of the Gas Drying Unit. The inlet air is regulated to between 80 and 100 psig by a pressure regulator. Oils and free water are then removed by the first prefilter and particulates are removed by the second prefilter. The air then enters the heatless dryer assembly which utilizes two symmetrical towers filled with small pellets of desiccant. Air alternately flows through one of the towers where nearly all the water vapor is adsorbed.

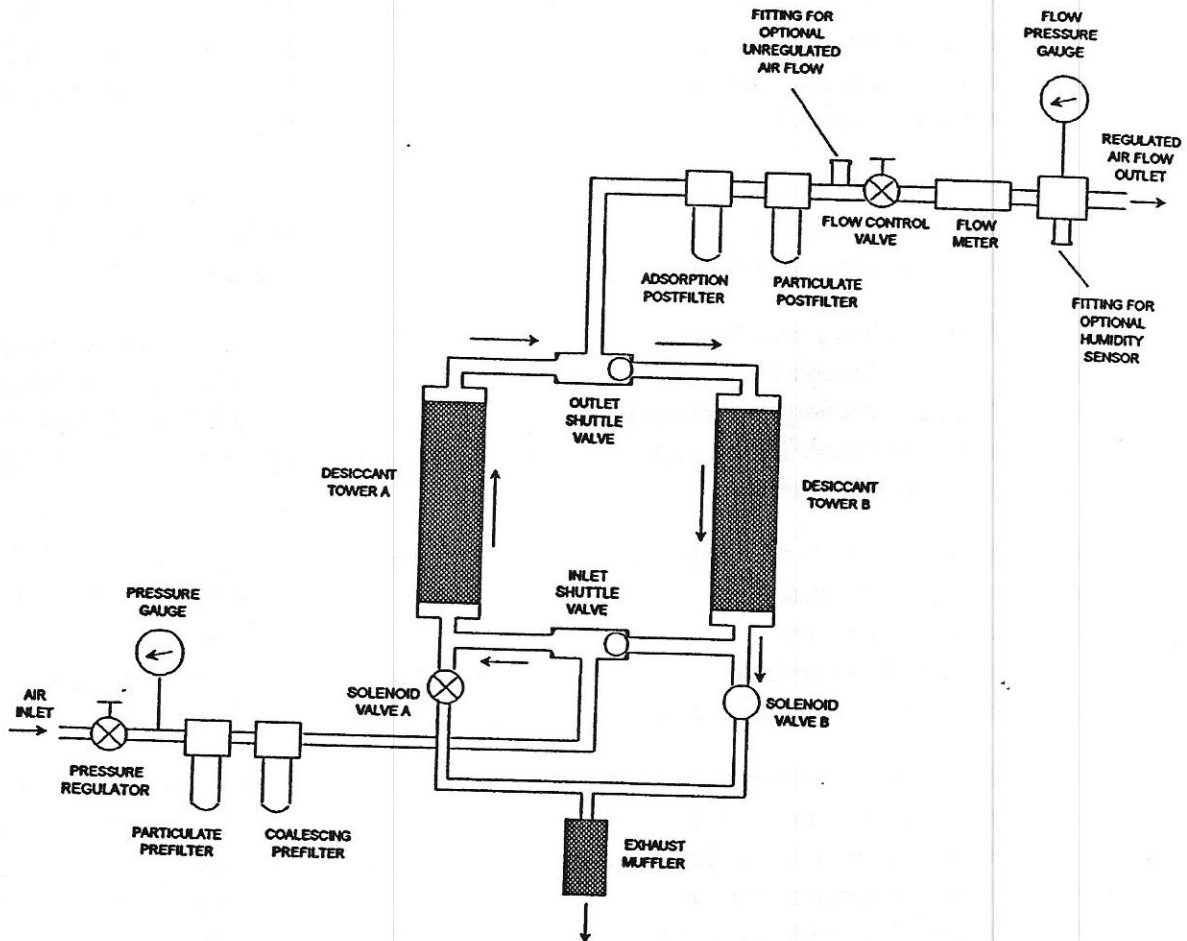
In the air flow illustrated in Figure 4, tower B is being regenerated while tower A is drying the wet inlet air. Inlet air flow direction is controlled by the solenoid valves. In Figure 4, valve B is open and valve A is closed, which allows the inlet shuttle valve to direct the air to tower A.

A portion of the dry air is allowed to flow through an orifice of the outlet shuttle valve into tower B. The dry air flowing through the orifice expands to nearly atmospheric pressure, which dries the purge air still more. This very dry air extracts the water from the desiccant as it flows through tower B and out the solenoid valve B exhaust port. The orifice of the outlet shuttle valve is fixed and sized for a particular flow and pressure.

A solid-state timer controls the cycling of the solenoid valves. After a set period of time, the procedure is reversed. Next, tower A is purged and regenerated while tower B is drying the wet inlet air. During each cycle, the two desiccant towers alternate between either drying the wet inlet air or being reactivated with dry air from the other tower. As the solenoid valves switch, the sound of the rapid expansion of air in the purged tower is minimized by the exhaust muffler.

The air leaving the heatless dryer assembly is filtered in an absorption postfilter and then in a final postfilter to about 1/2 micron before it enters the flow control valve. Flow is adjusted to approximately 10 scfm as indicated on the flow meter and corrected by the equation given in Step 8 of the Installation. The flow then exits through the regulated air outlet to the thermal test enclosure. When supplied for a particular auxiliary application, there is an unregulated outlet of dry air of up to 2 scfm maximum for devices such as a prober.

If the Gas Drying Unit is equipped for an external humidity indicator unit, the humidity sensor will be already connected to a flow meter air fitting. The humidity sensor cable passes out near the bottom of the Gas Drying Unit for connection to the humidity indicator unit. Refer to the separately supplied manual for instructions relating to the humidity indicator.



**Figure 4. Functional Flow Diagram**

## **4 Preventive Maintenance**

### **4-1 Inspection and Cleaning**

Inspect the two prefilters and the two postfilters below the air dryer monthly to see if they are dirty and need to be replaced. These air filters should be replaced at least once every 6 months. The two prefilters may require more frequent replacement if the user's air supply is dirty or oily. Periodic cleaning of the heatless dryer assembly should not be necessary. The desiccant tower life is indefinitely long unless the desiccant becomes contaminated with oil.

### **4-2 Air Filter Maintenance**

To check and replace the air filters,

1. Turn off ac power at the front panel and disconnect the power cord.
2. Turn the air supply off.
3. Turn the flow control valve open to relieve any pressure.
4. Push in the tab at the top front of the perforated guard on the air filter, turn counterclockwise to loosen, pull down away from its cap mount, and remove the guard.
5. Twist and pull down the glass bowl over the filter element and remove from the cap mount.
6. Inspect the filter element for dust particles, oil contamination, and any broken structure.
7. When the filter element needs to be replaced, twist and pull the filter element from its cap mount.
8. Reassemble the air filter in the reverse order of disassembly.
9. Turn on the air supply.
10. Reconnect the power cord and turn on the ac power at the front panel.
11. Turn the flow control valve for the desired flow rate (refer to Step 8 in Installation).

## **5 Troubleshooting**

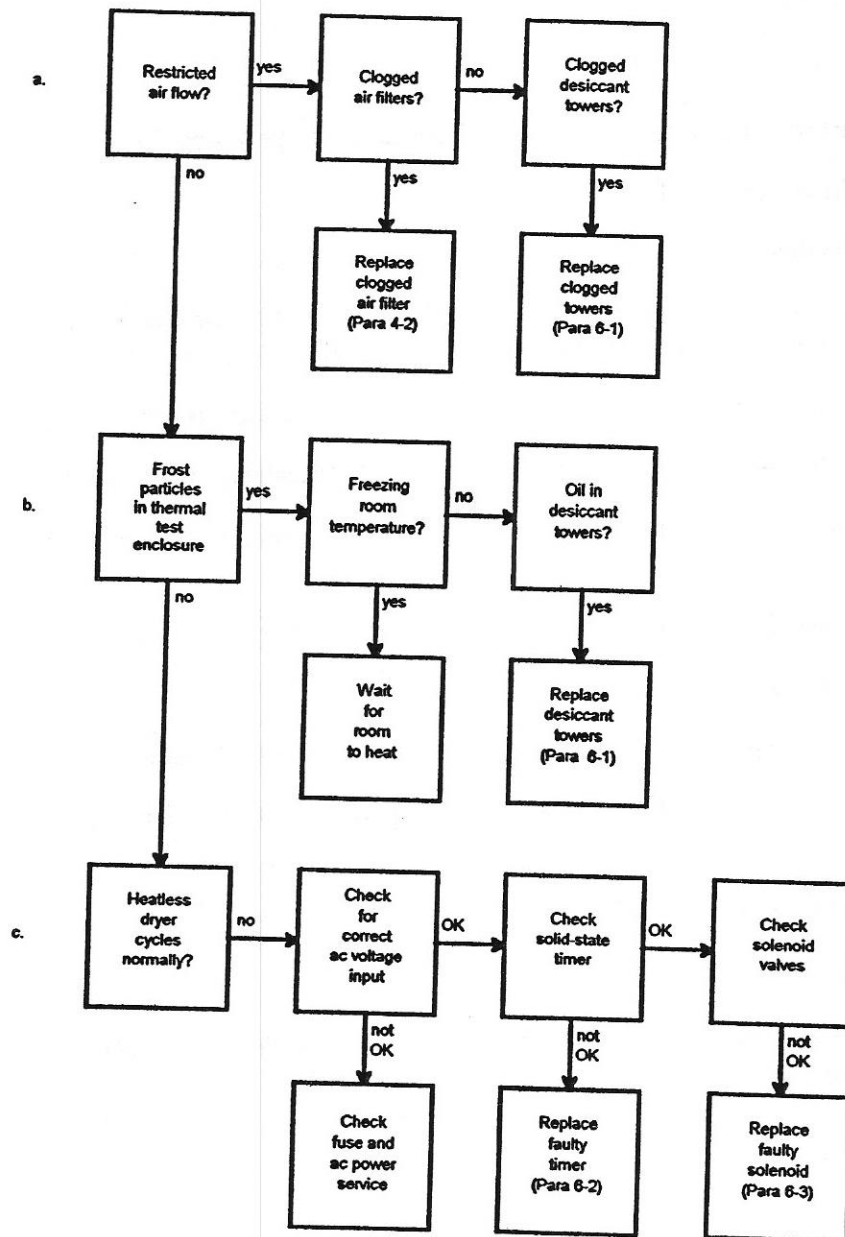
### **5-1 Checkout Procedure**

To checkout the operation of the air dryer, simply listen for its switching sound. You should hear a retort from the muffler exhaust once every 60 seconds.

## 5-2 Troubleshooting Approach

Troubleshooting should be done in a systematic manner. These instructions will aid you in narrowing a trouble down to a faulty component. The following troubleshooting chart (Chart 1) is included next to help you localize a particular problem. Within this chart, the steps (or levels) are identified alphabetically for reference to the detailed instructions accompanying the chart. To help diagnose a problem, refer to Figure 4. Procedures for making part replacements are included under Section 6, Corrective Maintenance.

**Chart 1. Troubleshooting Diagram**



## Troubleshooting Chart Instructions

### Step 1-a

When the Gas Drying Unit has restricted air flow, first check if the prefilters and the postfilters are clogged. If any of these air filters is clogged, replace the filter. Examine the particles in the old postfilters; if they are all desiccant particles, the desiccant towers probably need to be replaced.

When the restricted air flow is not caused by a clogged filter, the desiccant towers must be clogged with small desiccant particles as a result of many hours of operation. In this case, replace the desiccant towers.

### Step 1-b

When frost particles occur in the thermal test enclosure, the heatless dryer assembly must be ineffective. If the Gas Drying Unit is operating in a room with a temperature below freezing, the moisture in the desiccant towers freezes and prevents the drying operation. In this case, wait for the room to heat above freezing before expecting frost free operation from the unit.

When frost particles occur at normal operating temperatures, the desiccant towers may be contaminated with oil. Oil contamination of the desiccant can cause a complete loss of drying of the compressed air. Even with a non-lubricated air compressor, there may be enough oil ingested from the atmosphere to cause oil contamination. If the desiccant has become contaminated, correct the problem causing the contamination and then replace the desiccant towers.

### Step 1-c

When the heatless dryer assembly does not cycle normally (cannot hear switching sound every 60 seconds), check that ac power is applied to the unit. You should be able to measure 24 volts ac across terminals 1 and 2 of the terminal block in the dryer. If 24 volts is not present, check the fuse at the input to the Gas Drying Unit, and then its source of ac power.

When power is applied and the heatless dryer assembly does not cycle, check the operation of the solid-state timer. If it is not alternately switching power at its S1 and S2 terminals to the solenoid coils, replace the timer.

If the cycling problem still persists, the trouble must be that one of the solenoid valves is not operating. Flip open the access cover on the top of each valve to check its operation. Or, disconnect the leads of each solenoid at the terminal block and check for continuity. Replace a faulty solenoid coil.

## 6 Corrective Maintenance

Maintenance and service of the Gas Drying Unit should be performed only by trained (qualified) technical personnel using accepted techniques.

**WARNING:** Turn off the ac power before performing any corrective maintenance on the unit. Then disconnect the air inlet and outlet tubings and the ac power cord to the Gas Drying Unit before attempting any of the following procedures.

To access the interior of the Gas Drying Unit, simply turn the knob in the front cover and swing the cover open.

### 6-1 Desiccant Tower Replacement

To replace a faulty desiccant tower in the heatless dryer,

1. At each end of the desiccant tower, loosen the compression fitting and pull out the air line.
2. At each end of the desiccant tower, unscrew the elbow fitting and remove.
3. At the bottom end of the desiccant tower, remove the two mounting bolts, and then lift out the tower.
4. Install a new desiccant tower in the reverse order of removal. When replacing the elbow fitting in each end of the new tower, use a new piece of pipe thread tape for sealing.

### 6-2 Solid-State Timer Replacement

To replace a faulty solid-state timer in the heatless dryer,

1. Note the wire marking and pull off the four push-on leads to the timer.
2. Remove the mounting screw at each end of the timer, and lift out the timer.
3. Install a new timer in the reverse order of removal.

### 6-3 Solenoid Replacement

To replace a faulty solenoid in one of the solenoid valve assemblies,

1. Cut the wire ties around the solenoid wires, and disconnect the faulty solenoid coil leads (one push-on terminal on timer and one spade-lug terminal on terminal block).
2. Remove the four hex-head bolts holding the solenoid flange on the valve body.
3. Carefully pull out the solenoid and remove the old gasket that seals the solenoid flange on the valve body.

4. Install a new solenoid in the reverse order of disassembly. Make sure to install the new gasket (supplied with new solenoid) between the solenoid flange and the valve body.

## 7 Parts Lists and Drawings

### 7-1 Parts Lists

Replaceable parts available for the Gas Drying Unit are listed below (refer to Figure 1).

<u>Part Number</u>	<u>Description</u>
ZZ06180	Single Replacement Tower
KK01470	Solid-State Timer (24 Vac)
KK01480	Solenoid Valve
ZZ06390	Filter Assembly (particulate prefilter)
ZZ06910	Filter Repair Kit* (particulate prefilter)
ZZ06400	Filter Assembly (coalescing prefilter)
ZZ07460	Filter Repair Kit* (coalescing prefilter)
ZZ06410	Filter Assembly (adsorption postfilter)
ZZ07470	Filter Repair Kit* (adsorption postfilter)
ZZ06380	Filter Assembly (particulate postfilter)
ZZ06920	Filter Repair Kit* (particulate postfilter)
FF00110	Fuse, 1/2 ampere (for 115 Vac Gas Drying Unit)
FF00120	Fuse, 1/4 ampere (for 230 Vac Gas Drying Unit)

You may order replaceable parts from Temptronic Service by one of the following means:

Toll-free telephone 1-800-558-5080

or

Telex: 211-938-SERVSUR

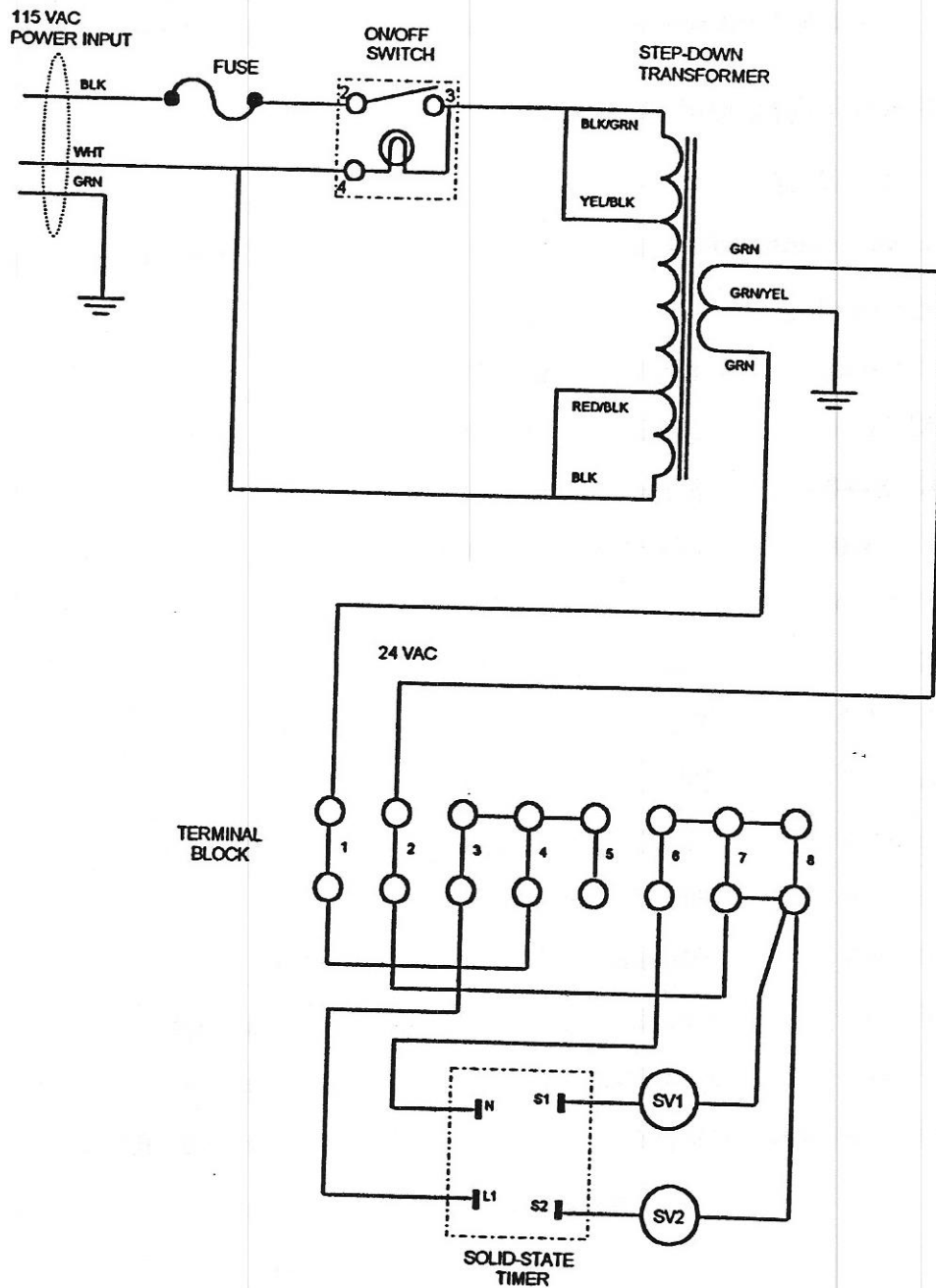
FAX: 617-969-2475

### 7-2 Drawings

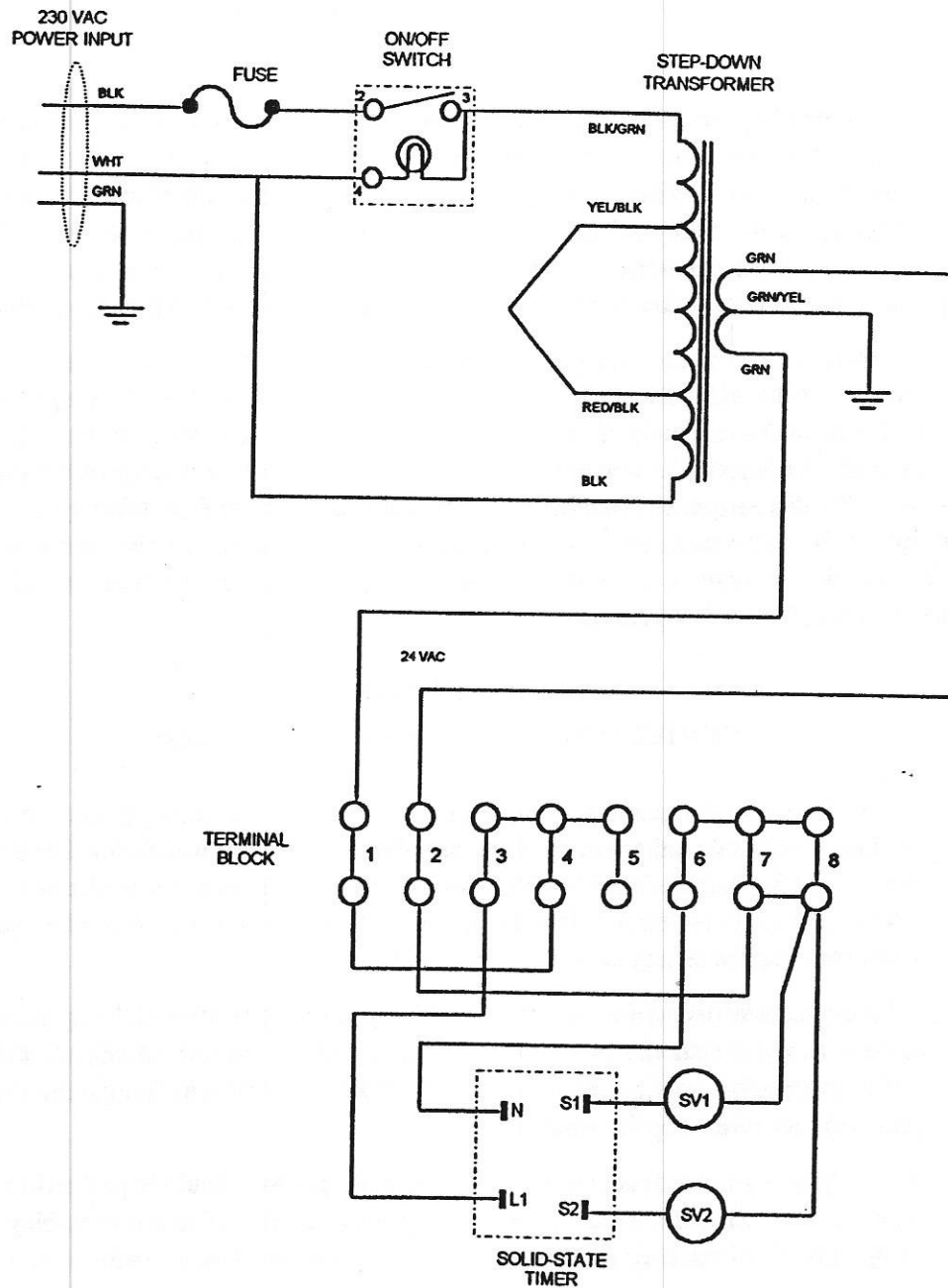
A schematic diagram of the 115 Vac Gas Drying Unit is included next as Figure 5. A schematic diagram of the 230 Vac Gas Drying Unit is included as Figure 6.

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\* Each filter repair kit contains the appropriate air filter element and O-ring seal(s).



**Figure 5. Schematic Diagram of 115 Vac Gas Drying Unit**



**Figure 6. Schematic Diagram of 230 Vac Gas Drying Unit**

# Warranty

Temptronic Corporation warrants all equipment of its manufacture to be free from defects in materials and workmanship for a period of one year from the date of shipment to the original buyer. The liability under this warranty is limited to replacement parts and labor on equipment when the equipment is returned prepaid to the factory or its authorized service center with prior authorization from Temptronic Corporation, and upon examination by Temptronic Corporation, is determined to be defective. At Temptronic Corporation's option, a service representative may be dispatched to the equipment location.

As an additional protection, Temptronic Corporation warrants that for a period of 90 days from the date of shipment to the original buyer, there will be no charge for service related shipping of parts and/or equipment or for authorized travel of a service representative to the equipment location. After 90 days, all costs incurred for shipping the equipment or parts thereof or for travel are the responsibility of the buyer. Our warranty for this equipment is rendered void if the unit has been repaired, taken apart or modified, or attempted to be, unless such actions have been taken in accordance with written instructions received from Temptronic Corporation. The warranty is also void if the equipment has been subjected to abuse, accident or other abnormal conditions.

## IF ANY FAULT DEVELOPS, THE FOLLOWING STEPS SHOULD BE TAKEN:

1. Notify Temptronic Corporation by calling 1-800-558-5080. Overseas customers should contact the local Temptronic authorized service center. Please be prepared with the model number, serial number and full details of the difficulty. Upon receipt of this information, service data or shipping instructions will be provided by Temptronic Corporation. Do not return the unit for repair without first contacting the factory or its representative for instructions.
2. After the initial 90 day period, on receipt of shipping instructions, forward the equipment prepaid to the factory or its authorized service center as instructed. If requested, an estimate of the charges will be made before work begins, especially with those cases where the Temptronic Corporation product is not covered by the warranty.
3. If the original carton and packing are not available, the product should be packed in a container with a strong exterior and surrounded by a protective layer of shock-absorbing material. Temptronic Corporation advises returning the equipment at full value to the carrier.

Temptronic Corporation reserves the right to make changes in design at any time without incurring any obligation to install the same changes on units previously purchased.

This warranty states the essence of the obligations or liabilities on the part of Temptronic Corporation. THE FORMAL, COMPLETE AND EXCLUSIVE STATEMENT OF TEMPTRONIC CORPORATION'S WARRANTY IS CONTAINED IN ITS QUOTATIONS, ACKNOWLEDGEMENTS AND INVOICES. Temptronic Corporation neither assumes, nor authorizes any person to assume for it, any liability in connection with the sale of its equipment other than those set forth herein.