



**MODEL SV-2000
SOLVENT VAPOR GENERATOR
OPERATING MANUAL**

WARRANTY

Miller-Nelson Instruments, a unit of Assay Technology, Inc., products are warranted against defects in materials and workmanship for a period of one year from the date of shipment. Damage from physical abuse, exposure to corrosive atmospheres, or misapplication is not covered by this warranty.

SV-2000 OPERATING MANUAL

Introduction

The Solvent Vapor Generator is used to facilitate the evaporation of solvents in order to produce an airborne vapor stream. It can be used to produce vapors from aqueous solutions of polar species (e.g. formaldehyde). Caution must be exercised when performing these functions.

Vaporization of Pure Solvents

Check to make sure that you are operating below the explosive temperature and concentration of the solvent being vaporized. Also make sure that the solvent does not react chemically with either brass or copper. Once these two determinations are made, set up the vaporizer as follows:

1. Set vaporizer on the bench and connect a flowing air supply (e.g. MNR HCS-401) to the air INLET connection.
2. Establish the desired flow rate and relative humidity from the flowing air supply.
3. Turn on the vaporizer and set the heater setting to the desired level. **DO NOT TURN ON THE VAPORIZER UNLESS AIR IS FLOWING THROUGH THE SYSTEM.** The heater setting should be just enough to completely evaporate the liquid. Too much heat could decompose the liquid.
4. Fill an appropriate sized syringe with the solvent of interest. Connect the syringe to a length of PTFE tubing that terminates in a needle.
5. Pierce the septum on the INJECTION PORT with the needle and push until the needle stops (about 2 ¼ inches).
6. Place the solvent-filled syringe into a syringe pump and adjust the heater setting until a smooth outflow of vapor is established. If the output from the vaporizer is irregular, the flow from the vaporizer may be passed through a mixing chamber prior to use to obtain a more uniform mixture.

Vaporization of Formaldehyde Solutions

Formaldehyde in air can be produced by injecting known concentrations of either formalin or paraformaldehyde into an air stream and vaporizing.

1. Prepare the formaldehyde solution in the following way. If the presence of methanol is not important, the easiest way is to dilute formalin (37% by weight formaldehyde, 10-15% methanol) to the concentration of interest (see table 1).

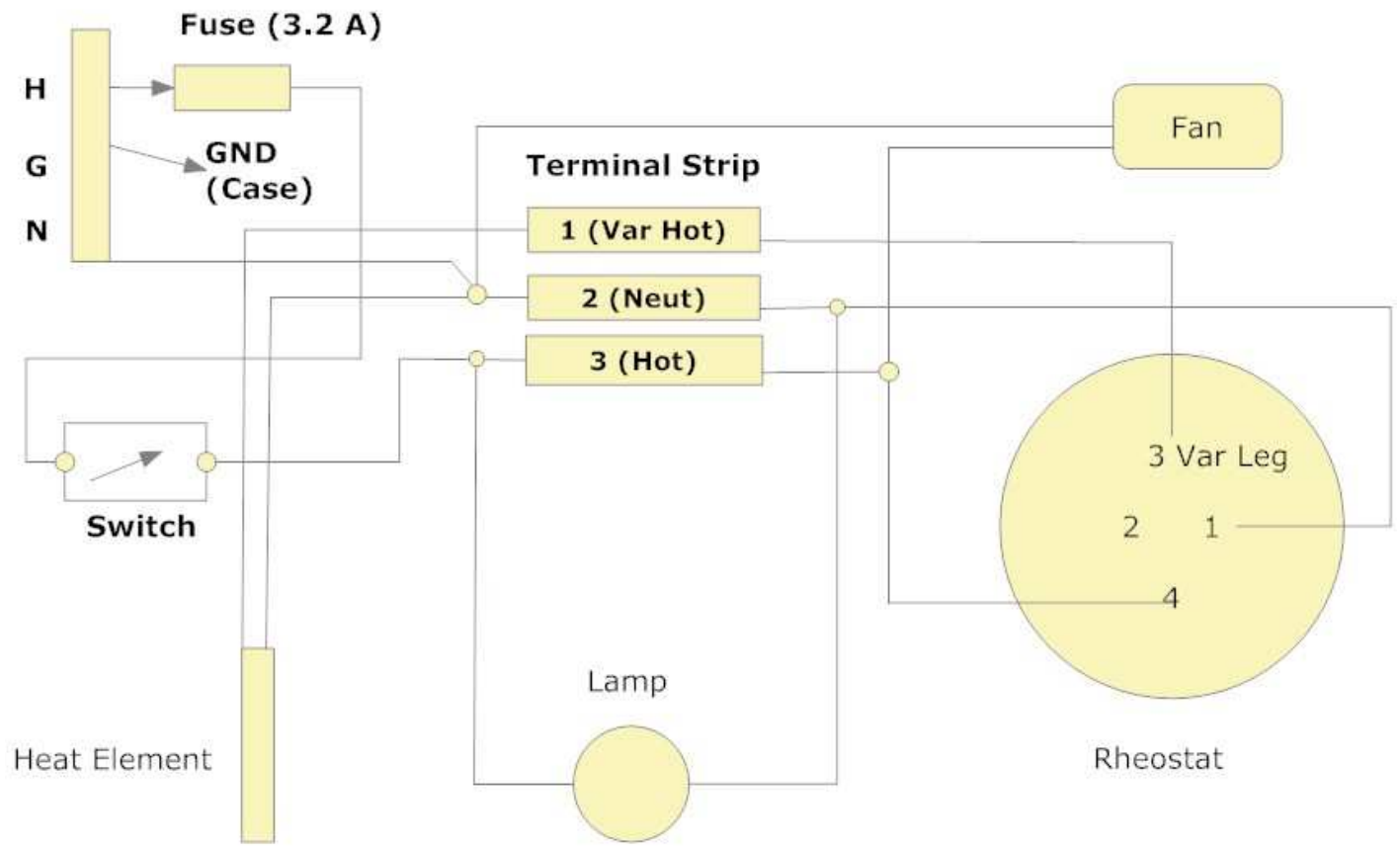
TABLE 1

Formaldehyde Vapor Generation

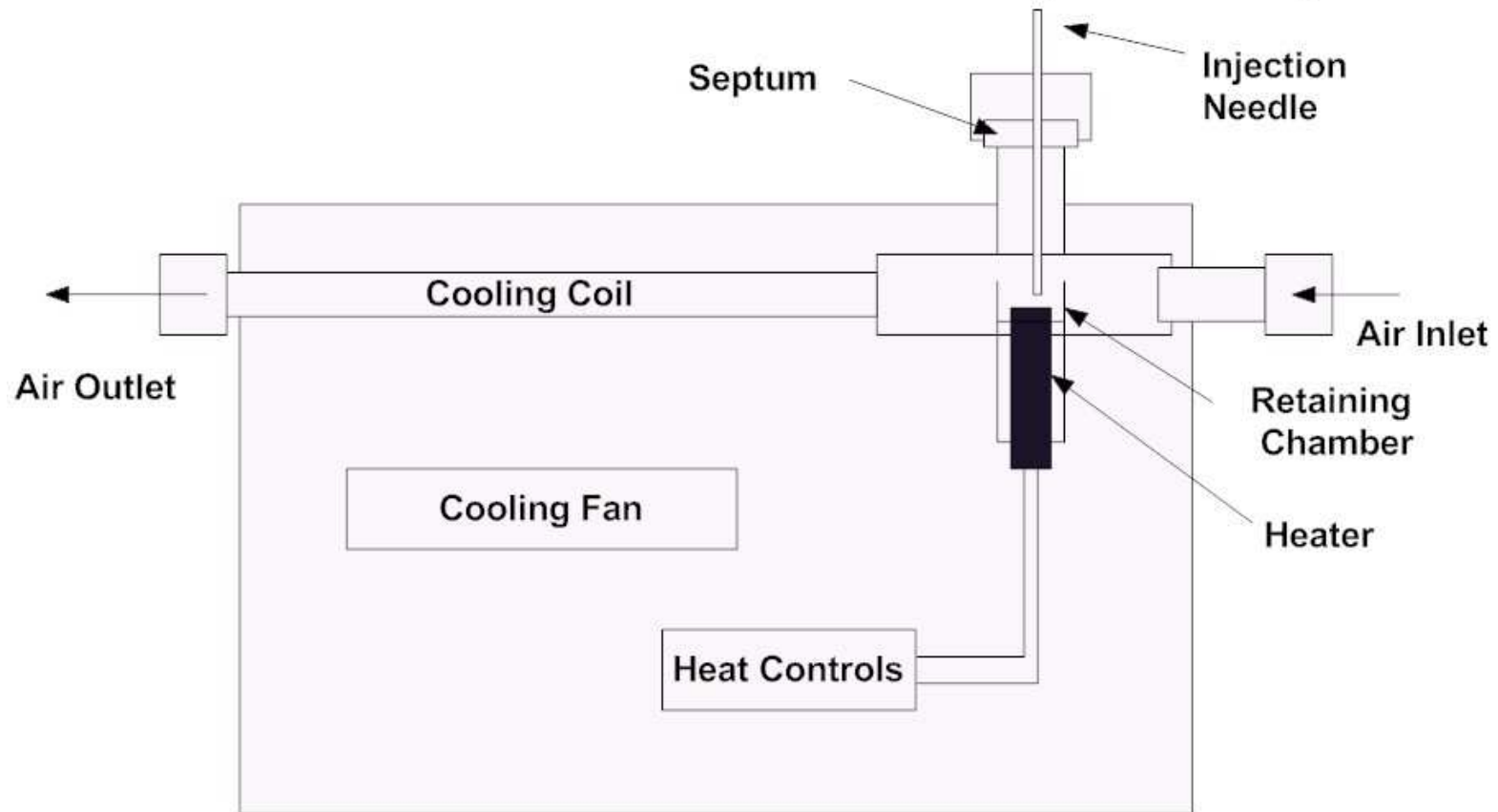
Desired Air Concentration	Liquid HCHO Concentration Used
5	1
10	2
100	10-15

2. If the presence of methanol is a problem, make the formaldehyde from paraformaldehyde. Weigh out 25 grams of solid paraformaldehyde and add to 220 ml of water in a volumetric flask. Place an inverted 100 ml beaker over the top of the flask and heat to 80°C while stirring with a magnetic stirrer. Heat until the solution clarifies (usually about 2-6 hours). Remove the magnetic stirrer and dilute to mark with distilled water. The resulting solution should be about 10% (100 mg/ml) formaldehyde. If in doubt, the concentration may be checked using the Chromotropic acid technique or titrating with 0.1 M HCL (Anal.Chem.53, 2118 (1981)).
3. Set up the formaldehyde generator in the following way. Attach the air supply (clean dry air or air from a Miller-Nelson Research HCS-401 series humidity control system) to the INLET of the vaporizer. Set the air flow to the desired level. If the air flow is greater than 20 lpm, set the vaporizer to 100%.
4. Attach the needle to the syringe using the Teflon tubing provided. Fill the syringe with the formaldehyde solution. The concentration can be calculated from $C = 24.5 \text{ qdX/QM}$.
5. Place the needle into the INJECTION PORT and push in until needle stops. The needle tip must be in direct contact with the heater.
6. Attach the OUTLET of the vaporizer to an infrared analyzer to monitor the formaldehyde concentration produced (3.58 microns). If the concentration is irregular, reposition the injection needle. A mixing chamber may be used to smooth irregularities.

**MNR Vaporizer
Model SV-2000
Wiring Diagram**



Functional Schematic of the of the SV-2000 Vaporization System



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