GD Environmental Supplies, Inc.

NUTECH® 2100
CANISTER CLEAN SYSTEM
OPERATION MANUAL

Version 1.1
December 2008

GD Environmental Supplies, Inc.

Content

1. Introduction

Nutech 2100 is a system designed to clean SUMMA or silica coated canisters or other air sampling containers (using canisters to represent all those in all the following description). By repeatedly filling zero air or other pure gases into the canisters followed by withdrawing air out and keeping vacuum for a period of time the canisters canister will be thoroughly cleaned. The device adopts programmable logic control which enables to easily modify cleaning times, time limit, vacuum control range and zero air-filling pressure control range，it is ideal for cleaning smaller vessels and generating vacuum.

2. Technical Standards

Maximum vacuum pressure： 50motorr（absolute pressure）

Maximum air-filling pressure： 35psi（surface pressure）

Maximum display vacuum pressure： 0.75mtorr

Temperature under： 4~40℃

Humidity under： <80%

Magnetic field intension: <30Gs

Power voltage: AC110V 50Hz or AC220V 50Hz

Consumption power: 1.0KW

3. System composition

The system is composed of vacuum pump, Vacuum pressure gauge, Pressure switch, High Vacuum gauge, Canister , electromagnetic

valves V1~V5 and Programmable Logic Control（PLC）together with Touch Screen Panel TP170.

The system is controlled by two modes: manually control or automatically control.

When manually operation, Pumping, Wet or Dry gas filling can be done by single Step operation.

When automatically，the system can run automatically step by step following predefined requirements (including vacuum pressure limit, Wet gas clean cycle counts, Dry gas clean cycle counts, Vent Off-Delay.) No manually operation is necessary and running status can be displayed through indicator light and high vacuum gauge. In the automatic cycle，vacuum pump keeps running and merely various valves need to be switched on or off as required.

Switching between automatic and manual control is processed by pressing different touch switches，manually operations include Run-m, Pumping, Fill wet gas, Fill Dry gas, Reset and Return touch keys. Under auto mode it can be started by pressing Run-A touch key. Reset key is used to break and reset when the system is running. P1~P3 are display pressure/vacuum values state，which are pre-set（Note：zero air-filling pressure limit for P1 is 30 psi， P2 means vacuum limit for pumping conversion to next filling，P3—final vacuum pressure value），and can be modified when needed。Cycle Value and Vent

Off-Delay Value all can be modified if really necessary，these can be done in“Set”menu.

4. Instruction for Installation

The following preparations need to be done before installation：

1. A working table or desk in 2.5 ~3 feet high and 5~6 feet long which should be used to install mainframe and Manifold；

2. Necessary tools for installation；

3. 110 VAC/220V, 2KW Power for mainframe and 4 heating strip (if heating oven used the power supplier for oven is required)；

4. Super pure water（chromatogram level）；

5. Super zero air or high pure nitrogen, pressure over 35 psi.

Warning: helium is not allowed to use as it will damage the high vacuum gauge.

Unpack the case: First check if case is damaged then unpack the case to count if certain apparatus is missing. Full set of Nutech 2100A&B Canister Cleaning kit includes:

1. Nutech 2100A or B Canister Cleaning mainframe；

2. Manifold and stand;

3. Vacuum pump；

4. 2 feet KF16 stainless stretchable joint pipe for connection between vacuum pump and mainframe；

5. 3 feet KF16 stainless steel stretchable joint pipe for connection

between manifold and mainframe；

6. The system includes 4 stainless steel stretchable joint pipe for connecting the canister. These pipes connect canister and manifold at each end.

7. Humidifier: It has 2 1/8 inch outlets，which connect zero air supply line and zero air entrance of mainframe. The humidifier needs to be filled with super pure water at half level.

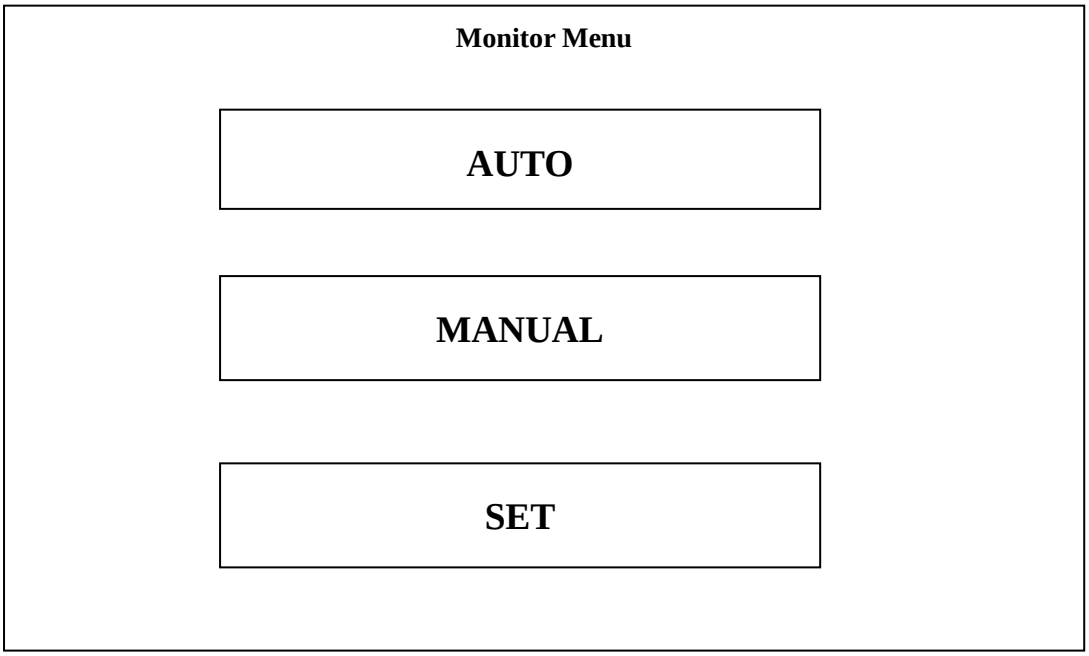
Check if canister body, inner parts and pump is damaged or join pipe is filled with stuff. If everything remains fine，first remove block of the pipe, then connect the pipe and wire. Mount the stand before connecting the pipe，secondly connect pipe wire for air route as required. Pipe wire must be firmly connected to ensure all the tie-ins are air-proof (Note：Make sure there is no stuff in the pipe before connecting pipe wires or it will spoil the pump). Then connect intake pipe for zero air，and set pressure of zero air at about 35 psi through regulator (it is recommended that air should be purified by purifier before being filled to keep air clean) After connecting air route pipes，plug in 110VAC/220 VAC as instructed.

5. Basic operations

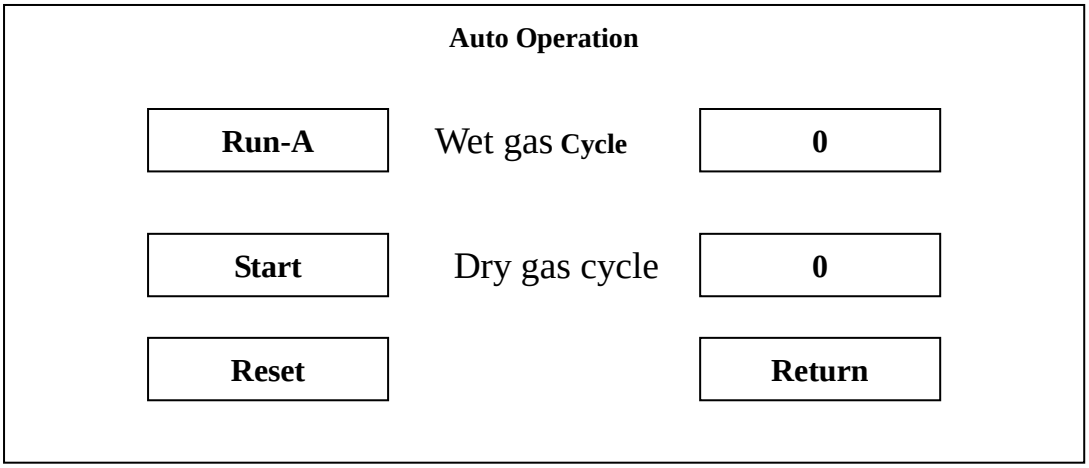
A. Introduction of touch screen operation menu

The system adopts touch screen for operation and control, it includes 4 screens as shown below： Screen 1 is main menu which contains 3

buttons AUTO, MANUAL and Set. When a certain button is pressed, the next an operation screen will be displayed accordingly.

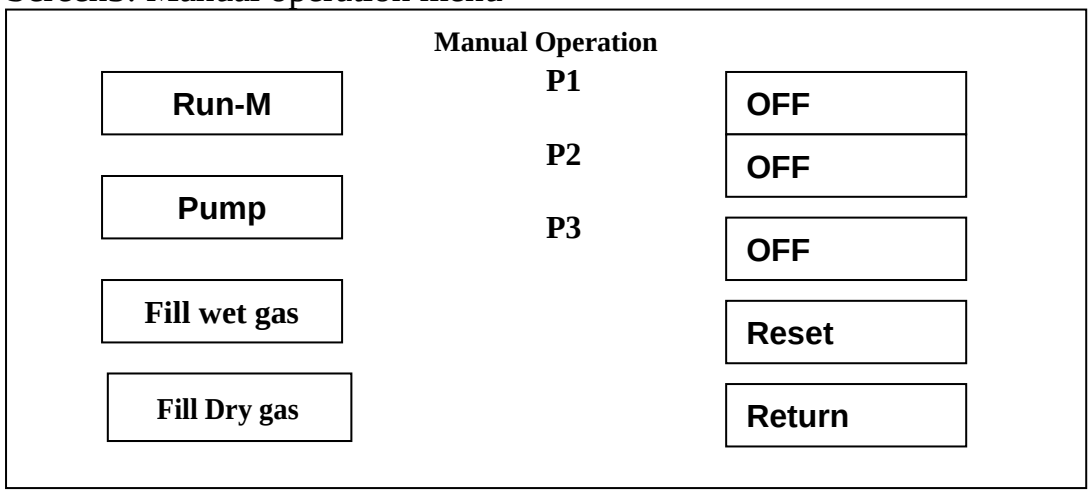


Screen 2: Automatic operation menu



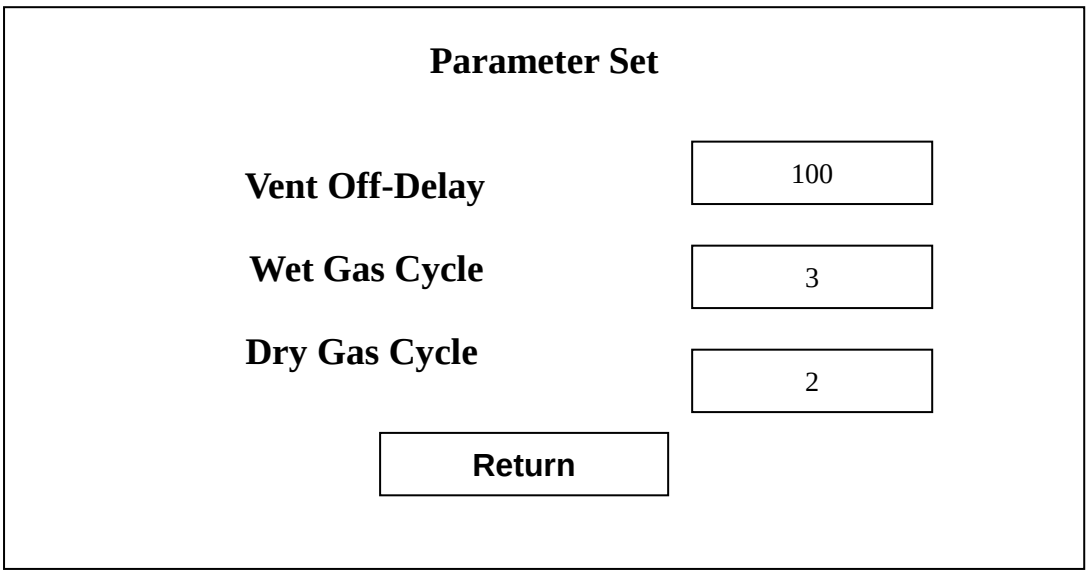
It contains 4 buttons and 2 feedback variable status boxes, automatic operation will start when Run-A and Start are pressed（press Run-A first then Start），Wet gas **Cycle** box will now display wet gas clean cycle value；Dry gas **Cycle** box will now display dry gas clean cycle value； When two cycle is completed, 1 will be incremented in the box. When all cycles are done until the set value is reached, the counting will stop and vacuum pump will keeps running. When vacuum degree reaches the set value (P3), the system will give an alarm which indicates that canisters have been thoroughly cleaned and close the valve of the canisters. Now press “Return” to return to main menu.

Screen3: Manual operation menu



It contains 6 buttons and 3 feedback variable status boxes. Press “Run-M” to start manually operation and then continue other necessary operations. “Reset” is used to reset the operation and “Return” is to return to main menu.

Screen 4: Parameter modification menu



It contains 1timing units Vent Off-Delay and 2 counting units Wet Gas Cycle, Dry Gas Cycle. The value in the display box is default value, press “Return” is to return to main menu. In case data in a certain

display box needs to be modified, a keyboard screen will display by simply pressing the corresponding display box, a desired value can be selected and press “Enter” button, modification process is completed.

B. Preparations for operation

1）Check if pipes are correctly connected, and check if electrical wiring is correct and power voltage is 110VAC or 220VAC. Then correctly plug in power. Check if power for upper side vacuum pump return switch is connected.

2）Turn on power switch and warm up high vacuum gauge for 10 minutes.

3）Make sure if all parameters need to be modified.（Including wet gas and dry gas cycle times, all vacuum degree set values P2, P3.）

Parameters. The default values of the parameters are:： wet gas cycle =3 dry gas cycle =2, P2=500mtorr， P3=200mtorr）。If change is needed, open main menu and select “Set” screen， then modify the needed parameters.

4) Close the valve of the canisters, select “Manual” screen, start vacuum pump manually, conduct a vacuum pumping test and see if the system is airproof as required.

C. Instructions for manual operations

1）Select “Manual” in the main menu screen and open manual operation menu.

2）Press“Run-M”and enter manual operation status.

3）Press“Pump”button and start pumping vacuum. Make sure canister valve is opened.

4）Press“Fill wet gas”or “Fill dry gas ”button and start filling wet or dry zero air，when filling pressure P1≥30Psi，the system will automatically shut down air valve.

5）Repeat step 3 and 4 until cleaning process is completed. Press “Reset” to return to default status and exit the operation.

D. Instructions for automatic operation

1）Open main menu, select Auto button and open the “Auto Operation Menu”.

2）Press“Run-A” and enter automatic operation status，press“Start”to start auto operation process. The system first enters wet zero air filling process. canisters is filled with wet zero air，The vent valve has been open when air filling pressure reaches P1 (P1=30Psi)，then the vacuum pump valve open. The system enters wet gas clean cycle.

3）When the system reaches set vacuum pressure value，that is P2≤ set value（P2 default value is 500mtorr，it is changeable when needed)，the process is shifted to wet zero air filling process.

4）When the system enters wet gas filling process，canister is filled with wet zero air(dry zero air pass through Humidifier get humidity)，air

filling pressure P1 of the system is being constantly monitored，when P1≥30Psi，it shifts to next air pumping cycle (Note：during the cycle process，vacuum pump keeps running）.

5）The program runs in cycles repeatedly，after several cycles, when Wet gas cycles value is equal to preset value（Wet gas cycles value default value is 3，it is changeable when needed），it runs enters dry gas cycle. When Dry gas cycles value is equal to preset value toward the end, when P3 value is less than or equal to set value（P5 default value is 200mtorr，it is changeable when needed），the system will give an alarm to indicate that cleaning is thoroughly completed.

E. Modification of preset parameters

1）Modification of P1 value

P1 value is controlled by Pressure Switch，The default value is 30Psi. P1 Value can be changed by inserting the needle to another place. This should be done by specialist, it is recommend that the user should not change it by himself.

2）Setting and modification of P2 and P3 values

Setting and modification of P2 and P3 values can be done through SVG-1TM high vacuum gauge. Each pressure value has its upper and lower range limit, take P2 for example its default value is 5.0E2=500mtorr, and its pressure range limit is from 5.0E2=550mtorr to 5.5E2=500mtorr, the upper limit is 550mtorr and lower limit is 500mtorr。

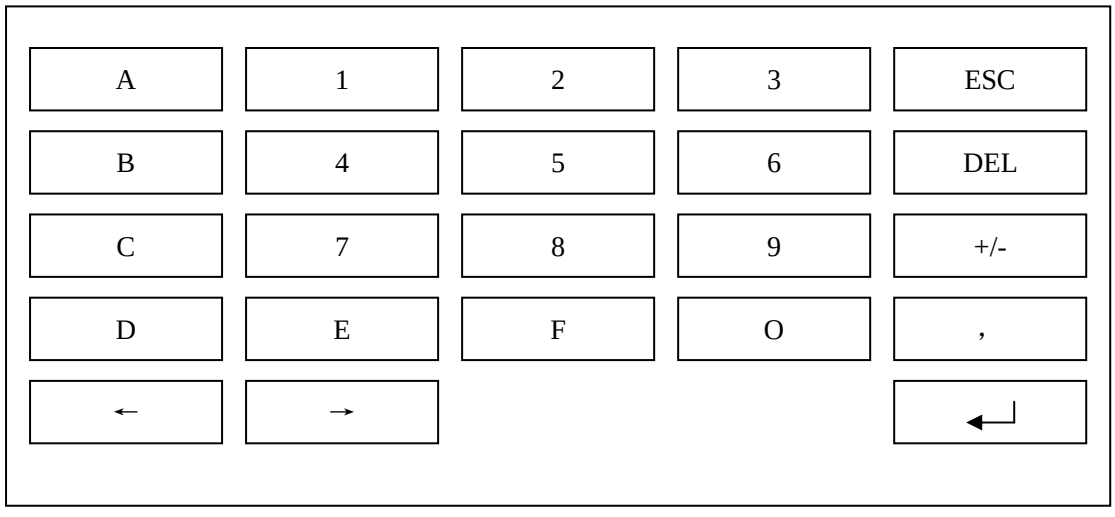
Please note that the upper and lower limits can be changeable while the upper value should not be less than the lower limit.

Example of modification of P2 and P3 values is as follows：when the vacuum gauge is displaying the measured value, press “Function” button to enter input status of vacuum pressure control value，”0” indicates that the lower limit data is at input status, then press “Function” to display a upper limit value of P2 previously set,（its default value is set as 5.5E2=550mtorr），in the meanwhile the number at first digit flashes（integer digit），use “Set digit” to input flash digit，each time “Set digit” is pressed, the number will increment by 1，until it reaches “9”，and press “Set digit” again，it will return to“0”（it is a cycling process）.Input the value and then press“Function”，the second digit flashes（fraction digit），use “Set digit” to input the needed data the same way, then press “Function”，make the third digit flash（sign digit），use “Set digit” to enable change from “E-” to “E”，or from “E” to “E-”，input the sign digit（here it refers to E），then press “Function” the fourth digit flash（exponent digit），press“Set digit”” to input the value in the same way。Then press“Function”，display“1”，it indicates the upper limit of“P2” vacuum pressure value will enter input status，input the lower limit value of“P2” the same way as above（the default value is 5.0E2=500mtorr）。Accordingly “2” and “3” will be displayed，set the lower and upper limit value for “P3” the same way,，（the upper default value of P3 is already

set as2.2E2=220mtorr, the lower default value is set as 2.0E2=200mtorr）。After setting all the values, then press “Function” to enter working status. During the operation above, if “Reset” is pressed, then measuring status is entered.

3）Setting and modification of PLC parameters

As human-friendly monitoring screen TP170 is adopted，it is very easy to modify PLC parameters，this can be done by selecting “Set” button and opening Parameter Set. Screen of Menu 4 It contains all the parameters available，if a parameter is to be changed, just press the corresponding display box and a keyboard screen will be displayed, select the number key in the keyboard and press enter to modify the parameter.



6. Maintenance and common debugs.

1. Make sure the power supplier’s voltage is match the instrument.

2. Avoid intense vibration when the system is working. Do not put stuff on the machine and the top, so that the heat can easily scatter.

3. The main equipments should put aside from strong magnetic field. The good ground is necessary for instrument operating.

4. It is forbidden to pull out electrified socket or wires so that inner apparatus will not be damaged.

5. It is forbidden to change PLC parameters without permit. If change is needed，it only can be done by specialists.

6. Ensure the plug in power for vacuum pump is 220VAC, it is forbidden to use 110 VAC power.

7. Please refer to attached “Instructions for use of vacuum pump” for maintenance and common debugs for vacuum pump.