



# **Nevis 10C 110v Nitrogen Generator User Manual**

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This manual contains technical information to enable operation, maintenance, troubleshooting and repair of the system.

In all communications with Apex please quote the serial number of the system you are referring to. The serial number can be found on the CE/Services label attached to the rear of the enclosure.

For easy reference, copy the serial numbers into the boxes below:

Generator Model Type:	
Serial Number:	

#### **Disclaimer**

Apex Gasgen Ltd has written this manual to be an easy to use guide for the Nevis nitrogen generator range. All statements, technical information, recommendations in this manual and in any associated guides or related documents are written in good faith. However the accuracy and the completeness thereof are not guaranteed or warranted. They are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. This nitrogen gas generator has been sold subject to the limited warranties set forth in the warranty statement. Further, Apex reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes. This laboratory gas generator is designed for operation only by trained personnel familiar with the use of similar equipment and with safety requirements for the use of nitrogen and other industrial gases. Before operating this equipment, make sure to read and understand this information provided herein. If you have any questions, please contact Apex Gasgen Ltd or your generator supplier.

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# 1. Introduction

## Warnings

1. When required to open the enclosure for repair or maintenance, ensure that the unit is disconnected from the electrical mains supply.
2. No unqualified or untrained personnel should operate, repair or maintain the system.
3. Apex shall not be liable for damages to the customer's own equipment which is the result of the contravention of the products specifications, warnings, cautions and notes, and the common sense of good engineering practice.
4. Do not disconnect or exchange any pipes or cables while the system is powered or under pressure.
5. It is the user's responsibility to observe all safety rules and observe the system product specifications.
6. Do not insert hand or other objects inside the machine unless it is fully isolated from the mains power supply. There are multiple cooling fans located near to the compressor.

## 2. Installation

### Material Listing

After unpacking your Generator, you should have the following components:

- ✓ Nevis Nitrogen Generator
- ✓ Cabinet enclosure key (1 off)

### Positioning the Generator

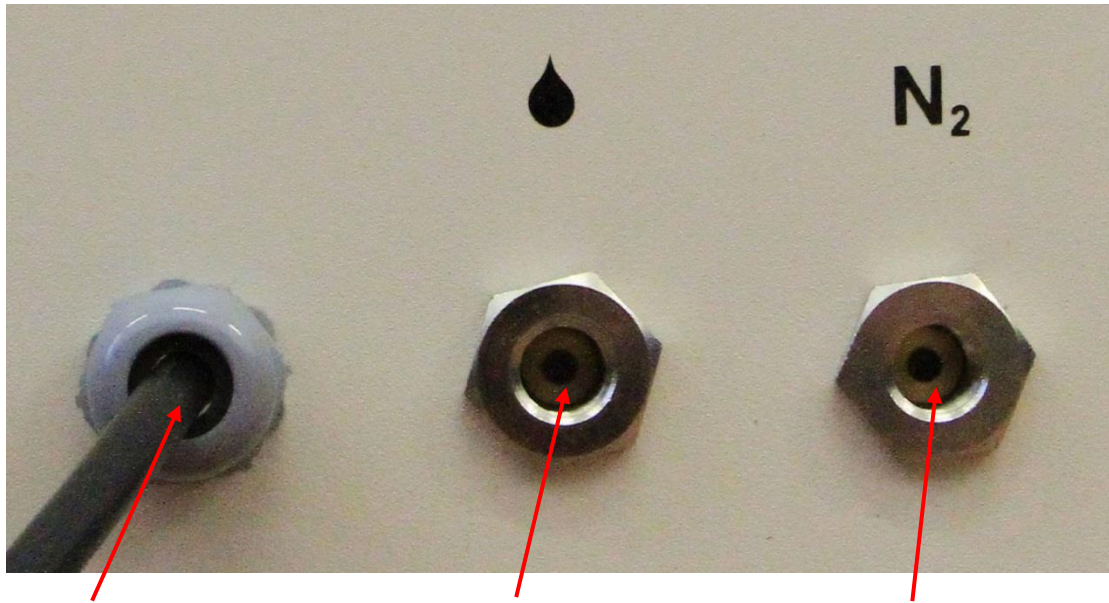
Your Nevis Nitrogen Generator has been designed to conform to most industrial and laboratory environments. The height has been selected such that the system will, in many cases, fit neatly below standard workbenches.

The Nitrogen Generator should be positioned in a convenient location, reasonably close to the application and near an appropriate electrical socket. Alternatively, in view of the fact that the compressor within the unit will start and stop regularly some users may prefer to install the unit in a separate “Machine” room and pipe the outlets to the application. Some variants of the machine are fitted with a compressed air inlet such that the machine can be operated independently of the inbuilt air compressor if required.

We would always recommend positioning the generator such that airflow through the door vents is not obstructed. The air compressor within the unit will generate heat during operation and it is essential that the ventilation through the machine remains unobstructed. The machine has been designed such that the cooling air required will flow from left to right when viewed from the front of the machine.

## Connecting the Generator

The connection panel is to be found at the rear of the machine and will appear as follows:



### **1. Electrical Power Connector**

Connect this cable to the mains supply which should be 110-120V/60HZ AC. The supply should be rated to **20 amps**.

### **2. Moisture outlet Connection**

This drain should be connected with suitable piping, the thread is 1/4" BSPP female. Moisture removed from the compressed air is ejected here and should be drained to a suitable receptacle. (Not supplied)

### **3. Outlet Nitrogen Connection**

This should be connected to your application with suitable piping, the thread is 1/4" BSPP female.

## Basics – The Generator

Front:

### Main Control Panel

The master control panel for controlling the operation of the compressor and generation of nitrogen is located behind the door to this side of the generator



### Compressor

The compressor is located behind the door panel to this side of the generator.

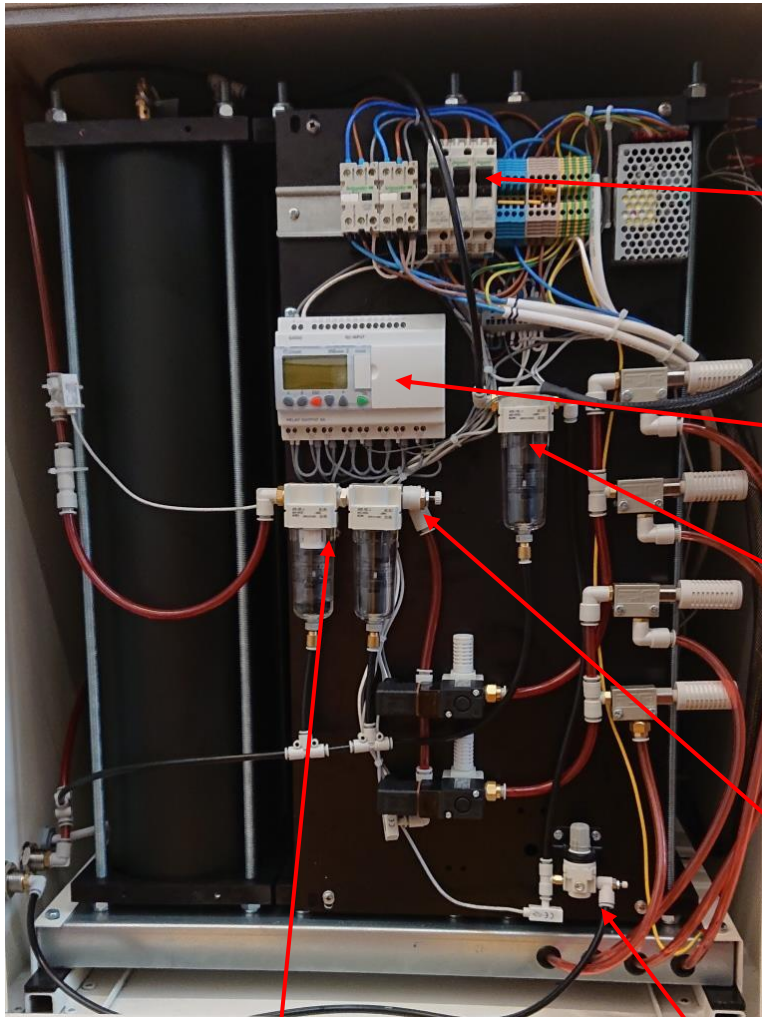
### On Off Switch

This switch is used to switch the generator on or off. When set to position 1, the switch will light and the generator will be operational. Similarly position 0 switches the generator off completely although this does not isolate the machine from the mains supply.

As described above, the control panel for the system is behind the removable door fitted to the left hand side of the generator. This door can be removed by unlocking (turn clockwise) the two locks using the security key supplied and can then be lifted out completely to gain access to the control panel. To refit the panel, place bottom edge of the door into the door access way and close panel. Turn both locks anticlockwise to fix the door panel in place.

**WARNING – There is a cooling fan within the generator and care must be taken not to insert hands or other objects beyond the control panels unless the machine has been fully isolated from the mains supply and the fan has stopped running. This is particularly important when accessing the right hand side of the unit which houses the compressor unit.**

## Control Panel – Key Components



Circuit Breakers controlling the compressors (Left) and 24 volt systems and 230 volt fans (Right).

PLC Controller controlling the system.

0.1 Micron air filter to remove any particles post nitrogen generation and prior to external equipment.

Regulator and Flow Controller controlling the pressure and flow of compressed air into the nitrogen generator.

0.1 & 1.0 Micron air pre-filters to remove any particles prior to nitrogen generation.

Flow controller and regulator controlling flow and pressure of nitrogen leaving the generator.

Note:- The regulator and the air in flow filter are factory set to maximise the efficient operation of the nitrogen generator and should require no further adjustment. The nitrogen outlet regulator and flow controller is preset at the factory to allow a maximum of 10l/pm at 80psi/5.5bar.



The control panel is located at the left hand end of the machine when viewed from the frontal perspective. The key elements of this control panel are as outlined below:

**Circuit Breakers** – The circuit breakers control the key elements of the generator as follows:

No1. Left hand circuit breaker controls the power to the left hand compressor which will switch on and off as directed by the PLC controller.

No2. Middle circuit breaker controls the power to the right hand compressor which will switch on and off as directed by the PLC controller.

No3. Right hand circuit breaker controls the power to the 24 volt circuits within the system and the 230 volt supply to the cooling fans.

To power up the system, first ensure that the lighted switch on the front of the generator is in the on or “1” position and the switch is illuminated.

To start the generator: Go to No3 circuit breaker/ right hand circuit breaker and switch to the on position by pushing the switch upwards. Check that the green LED on the outside of the generator is now illuminated. Now go to No1 circuit breaker/left hand circuit breaker and switch to the on position by pushing the switch upwards. The left hand compressor will now start. Finally go to the No2 circuit breaker/middle circuit breaker breaker and switch to the on position by pushing the switch upwards. The right hand compressor will now start.

**PLC Controller** - This controls the operation of the entire system and can be used to display information on how the system is functioning. The display panel can be illuminated for a short period of time by pushing the green button briefly. The “A” and “B” buttons can be used to cycle through the Seven display screens either forward using the “A” button or in reverse using the “B” button.

**Inlet and outlet Air particle filters** – The elements in these filters require to be replaced on an annual basis (more frequently if the generator is in a dirty environment) and replacement filter elements can be supplied by your Apex distributor or by contacting Apex directly.

### 3. Operation

#### Operation Summary

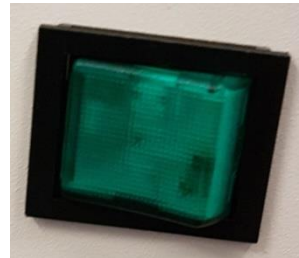
The Nevis Nitrogen Generator is fitted with an energy-saving system that only produces Nitrogen when you require it, while at the same time ensuring that when you do require Nitrogen it is of a consistent purity. This means that you should not switch the Nevis Nitrogen Generator off as it periodically purges the system to maintain purity unless you do not require nitrogen for a prolonged period of time.

The Nevis Nitrogen Generator is fitted with an integral air compressor, and when the unit is not required to produce Nitrogen, the compressor will only switch on when called upon to supply the CMS columns with air. When there is no call for nitrogen production, both generator and compressor will go into “standby” mode.

#### **Generator lights**

Your Nevis Nitrogen Generator has several lights that illuminate to provide information about your system

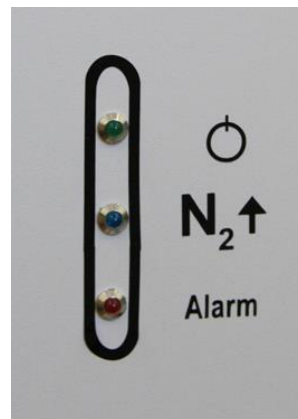
**Power Switch** - The power to the generator is switched on using the rocker switch on the front of the machine . When this is switched to the left, the green light inside the switch will glow red and the machine will be powered up.



**Green Power LED** – This light comes on indicate that 24VDC is being supplied after circuit breaker No2/right hand circuit breaker is switched on.

**Blue N2 LED** – This light comes on when the Nitrogen within the system has reached the specified delivery pressure and stays on till the generator enters the standby mode or is powered down or drops below the specified delivery pressure.

**Red Alarm LED**- This illuminates when the compressor running time exceeds 2000hrs and indicates that the system requires a service. This light can only be turned off by Apex, Apex certified service personnel or under their instruction.



## **Start Up**

Status indication throughout the different phases of the operation of the Nitrogen Generator

### **Purging**

Initially the Nevis Nitrogen Generator does not have any nitrogen stored and its nitrogen reservoir is full of air. As the Nevis Nitrogen Generator starts to add nitrogen to its reservoir the nitrogen content will start to increase.

During the purging period, the N2 Outlet Port on the rear of the generator should be left open to atmosphere when it is running to allow the unit to purge itself to the desired outlet purity. Below is a table of the approximate purge times for Nevis Nitrogen Generator.

<b>Nevis Nitrogen Generator System Purity</b>	<b>Purge Time</b>
99.9995%	5 hours

After the initial purging period, you should connect your application to the N2 Outlet Port permanently.

## **Shut down**

The electrical supply must not be cut off from the generator suddenly. The procedure for shut down is to close off the outlet flow of nitrogen from the generator; this will result in the generator going into standby operation and if the compressor has been in operation, it will stop automatically. Standby is indicated by the blue N2 LED on the front of the generator no longer being illuminated.

The rotary switch should only be switched to the 0 or "Off" position when the generator is not going to be used for some considerable time. It is worth bearing in mind that if the generator is switched off for a prolonged period of time you will be required to go through the purge process detailed above in order to ensure the level of purity of nitrogen is appropriate for your requirements.

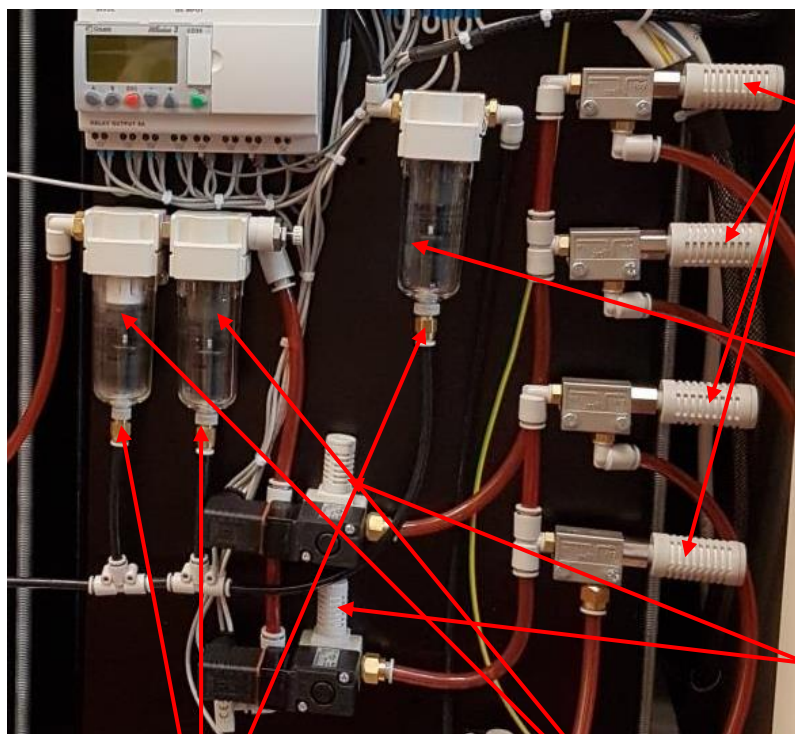
## 4. Maintenance

### Servicing – Nitrogen Generation Parts

#### Filters and Silencers

The filter elements within all three filters and the system silencers should be renewed once a year or when the Alarm light illuminates. If the system operates in a dusty or dirty environment we would recommend that the filters and silencers are changed on a more frequent basis without waiting for the Alarm light to come on.

Ensure that your air supply and the power supply are switched off before any maintenance work is carried out. Any pressure left in the line can be drained by turning the auto drain anticlockwise to the manual override position. Please ensure that the auto drain is reset to automatic again prior to starting up the machine otherwise compressed air will run continuously through the system drain.



#### **Large Silencers**

Replace the four silencers. Refer to page 17 for part numbers.

#### **Outlet Air Filter**

Replace the black air filter element on an annual basis or more often if required. Refer to page 17 for part numbers.

#### **Small Silencers**

Replace the two silencers. Refer to page 17 for part numbers.

#### **Auto Drain – Manual override**

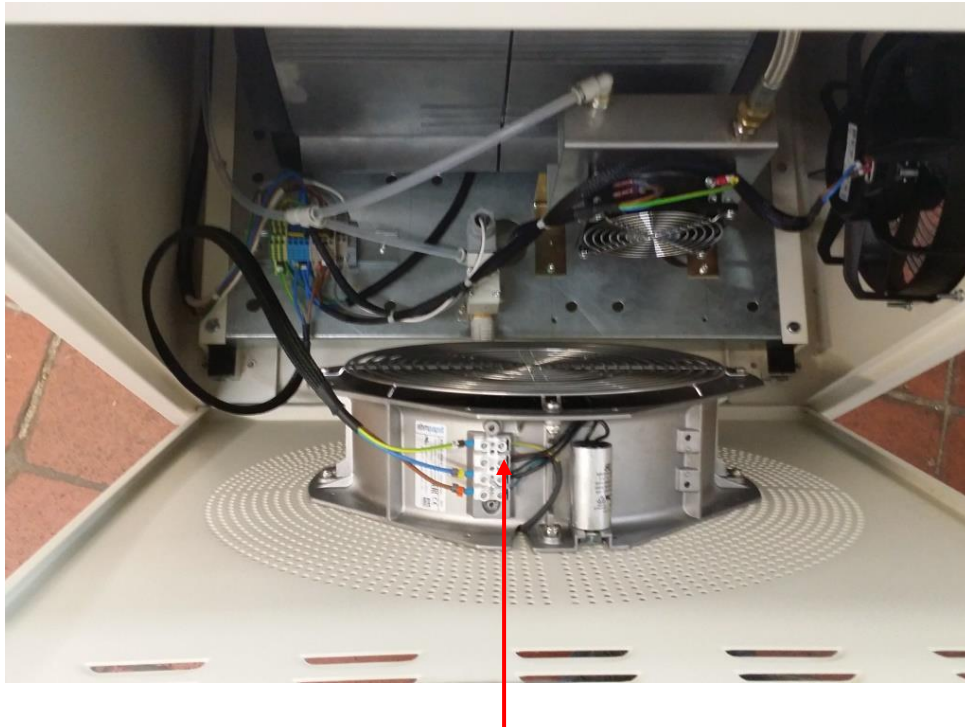
Turn anticlockwise to engage manual override. Remember to turn clockwise to engage the auto drain once you have finished maintenance.

#### **Inlet Air Filters**

Replace the white (right hand unit) and black (left hand unit) air filters on an annual basis or more often if required. Refer to page 17 for part numbers.

## Servicing – Compressor Parts

To access the compressor part of the system you will need to open the Right hand side door of the system. You should note that there is a fan attached to this door and thus it is heavier than the other door. There should be enough free length on the electrical connection of the fan for the door to be safely put to the side of the system but if required the fan can be disconnected. This is done by first ensuring the system is switched off and ideally disconnected from its power supply and then undoing three small screw connectors for the fan's Live (+ve), neutral (-ve) and earth connections as below.



### **Fan power connections**

Disconnect the 3 wires from the fan, Brown is +ve, Blue is -ve and yellow/green is neutral. Do not forget to reconnect these once you have completed the service.



**Compressor – Air Filters**  
Remove and replace the intake filters located as indicated. Refer to page 17 for part numbers. These are obtained from Apex and should be replaced on an annual basis or more frequently if required.

**Compressor – Process valve Silencers**  
Replace the large silencer. Refer to page 17 for part number. This is obtained from Apex and should be replaced on an annual basis or more frequently if required.

## 5. System Control Interface

### System PLC Controller

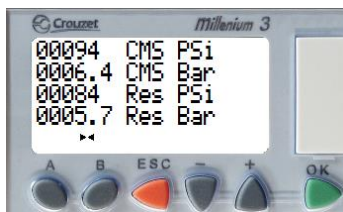
The PLC controller that controls the operation of the system is located on the front panel. This controller has a number of buttons of which only the following are operational:

1. Green Button – pushing this briefly has the effect of illuminating the panel for a brief period of time.
2. Button “A” – pushing this button briefly allows you to cycle forwards through the display screens that are available to the user.
3. Button “B” – pushing this button briefly allows you to cycle in reverse through the display screens that are available to the user.

The following screen prints detail the information available to the user:



Welcome screen detailing the version of the machine together with software release currently installed.



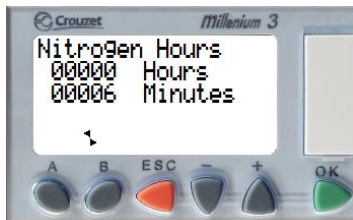
This displays the current pressure within the operational CMS columns and the nitrogen receiver (RES). The display provides readings measured in both Barg and PSI.



This displays the current air pressure in the compressor air reservoir, measured in both Barg and PSI.



This displays the current air pressure being produced by both compressors, measured in both Barg and PSI.



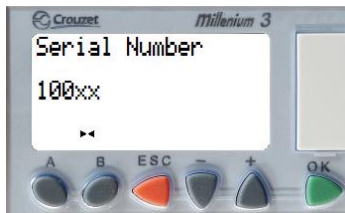
Total hours and minutes of nitrogen production since the unit was installed.



This screen details the specification of the air compressor installed within the unit.



Total hours and minutes of operation for the compressor since they were installed.



The serial number of the system



## 6. Service Parts

### Generator Spare Parts (Excluding Compressor)

Apex Part Number		Part Description	Qty	Replacement Period
<b>SP0200</b>		<b>Service Pack for Nevis 10C Generator</b>	<b>1</b>	<b>Annually</b>
203456	Included	Black filter element for inlet and outlet filter	2	
203457	Included	White filter element for inlet filter	1	
202086	Included	Silencer 1/8" Large	6	
100007	Included	Silencer 1/8" Small	2	

### Compressor Spare Parts

Apex Part Number		Part Description	Qty	Replacement Period
<b>SP0201</b>		<b>Intermediate Service Kit for Jun Air Compressor.</b>	<b>1</b>	<b>Annually</b>
300043	Included	Compressor air intake filter	4	
<b>SP0205</b>		<b>Comprehensive Service kit for Jun Air Compressor</b>	<b>1</b>	<b>After 4 years</b>
300156	Included	Cylinder head gaskets for compressor	2	
300162	Included	Compressor Con Rod assembly	2	

## 7. Appendices

### Troubleshooting

#### **Appendix A** Flow Measurement/Adjustment

Connect a flow meter (to the Nitrogen outlet port via a length of tube (we usually use 6mm polyurethane) Make sure the needle valve on the flow meter is fully open. Leave the outlet of the flow meter to atmosphere, do not restrict.

Use a 0-30 l/min or similar flow meter for accuracy.

Adjust the nitrogen outlet flow controller on the nitrogen regulator to change flow and set your systems output. Remember this generator is designed for 10l/pm if you draw more nitrogen than that the purity will decline.

Note: if no flow when adjusting, the pressure regulator may be fully closed

#### **Appendix B** Pressure Measurement/Adjustment

Connect a pressure gauge to Nitrogen outlet (0-10 bar pressure gauge)

Outlet pressure regulator can be adjusted clockwise to increase pressure, counter clockwise to decrease pressure. To make any changes pull the top handle of the regulator upwards to unlock it so that adjustments can be made.

Note: if no pressure when adjusting, the outlet flow controller may be fully closed

#### **Appendix C** Inlet Flow Control Adjustment

Flow control should be fully open.

When adjusting inlet flow control, always take note of the factory preset position, by counting the amount of turns closed or opened when adjusting. The purpose of this flow control is to restrict the inlet air flow as much as possible while still reaching the required pressure by the end of the ON cycle. This can be seen on the LCD display under the reservoir (RES) pressure reading, the pressure should reach 105 psi within the last 20 seconds of the ON cycle (before the pressure is exhausted).

To set this, if the maximum pressure reading on the LCD reservoir pressure is 105 psi or more. Record that pressure, and then close the inlet flow controller until this pressure reduces. (adjust by only 1/8 of a turn, then let the generator run for a few cycles before you can see the effect). Once the flow control is restricting the inlet flow enough, take the flow control back one increment.

#### LCD Display

On the control panel there is an electronic PLC which runs a program controlling the pneumatics on the control panel. This also displays the pressure readings from a pressure transducer on the inlet and outlet pipes. The pressure readings are displayed on the LCD display on the PLC:-

#### Cycle Explanation

Basis of the cycle is a timer cycle, which has an ON cycle 180 sec (valve opens to let compressed air into the CMS column). OFF cycle for 180 secs (valve closes stopping compressed air feed to the CMS column, and dumps all the pressure in the CMS column to atmosphere at the same time).

With 2 CMS columns the cycle alternates, so that as one CMS column fills the other is venting.

#### Standby Operation

If no flow is taken from the nitrogen outlet therefore the reservoir (outlet pressure on LCD) does not drop, then the program will recognise this and go into standby mode, where the generator will shut down and only run 1 cycle per hour (to maintain purity). When the generator does not demand air from the compressor the compressor will also go into standby.

## 8. Warranty

### **LIMITED WARRANTY**

**LIMITED WARRANTY:** APEX GASGEN LTD. ("APEX") warrants that the ITEMS LISTED BELOW shall be free from defects in material and workmanship for the stated period of time commencing from date of shipment or as stated below:

APEX GAS GENERATOR SYSTEM: One (1) year from customer receipt

Repair or replacement parts for Apex Gas Generator System: Ninety (90) days from customer receipt

### **EXCLUDED FROM THIS LIMITED WARRANTY:**

The following shall be excluded from the Limited Warranty:

- Parts and items considered consumable in normal operations, including those parts and items supplied with the Apex Gas Generator System ("System") for maintenance.
- Any System and its parts that are not installed, operated, and maintained in accordance with the unit's manual supplied with the System.
- Damages due to accident, abuse, acts of God, acts of terrorism, misuse or negligence, or which result, in whole or in part, from improper or unauthorized use or repair of the System, or use of the System in a manner for which it was not designed, or by causes external to the System such as, but not limited to, power or air conditioning failure or voltage irregularities.

**REMEDY:** BUYER'S sole and exclusive remedy in the event of defect, and the liability of APEX hereunder is limited to the adjustment, repair, or replacement of the defective item or part with a similar item or part free of defect.

Such adjustments, repairs, or replacements will be made at APEX's Glasgow, Scotland plant or, by agreement of both parties, at the site of the System, if BUYER so elects. All costs for shipping equipment or parts shall be on the account of the BUYER whether to or from the point of manufacture. Labour costs associated with travel, expenses, and subsistence costs for field services shall be on the account of the BUYER.

**VOIDING OF THE LIMITED WARRANTY:** This Limited Warranty is immediately void upon:

- THE OPENING OR DISASSEMBLY OF THE SYSTEM CABINET (OR ANY PART THEREIN), OR
- THE SALE, ASSIGNMENT OR ANY OTHER TRANSFER OF TITLE BY BUYER OF THE ITEMS OR PARTS OTHERWISE COVERED UNDER THIS LIMITED WARRANTY

**WAIVER OF ALL OTHER WARRANTIES:** THE LIMITED WARRANTY PROVIDED HEREUNDER AND THE RIGHTS AND REMEDIES OF THE BUYER HEREUNDER ARE IN LIEU OF, AND BUYER EXPRESSLY WAIVES, ALL OTHER WARRANTIES, GUARANTEES, OBLIGATIONS, LIABILITIES, OR REMEDIES, EXPRESSED OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND NON-INFRINGEMENT, IMPLIED WARRANTIES ARISING FROM THE COURSE OF DEALING OR USAGE OF TRADE AND IMPLIED WARRANTIES OF SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

**LIMITATION OF LIABILITY:** THE REMEDIES PROVIDED IN THIS LIMITED WARRANTY ARE EXCLUSIVE AND APEX SHALL IN NO WAY BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER INCLUDING WITHOUT LIMITATION LOSS OF USE, REVENUE OR PROFIT.

## 9. Service

### Contacting Apex Gasgen Service Department

Apex provides worldwide engineering and technical field service support for all its products. Field Service representatives are available for contact at the addresses below:

#### **Worldwide:**

Apex Gasgen Ltd  
Unit 36 Elderpark Workspaces  
Elderpark Street  
Glasgow  
Scotland  
G51 3TR  
Tel: (44) 0141 530 7417

[www.apexgasgenerators.co.uk](http://www.apexgasgenerators.co.uk)

[sales@apexgasgenerators.co.uk](mailto:sales@apexgasgenerators.co.uk)