Nitrogen NM20ZA Nitrogen Generator

User Manual
NM20ZA – Rev 13

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Contents

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Warranties & Liabilities

1. The Company warrants that it has title to the Goods.

2. Subject to the provisions of this clause the Company warrants that the Goods shall comply in all material respects with any specification referred to in the Order Confirmation (as the same may be amended) and shall, subject thereto, be free from defects in material and workmanship for the lesser of a period of twelve months from the date of delivery or thirteen months from the date of dispatch from the factory.

3. Save as provided in this clause and except where the Goods are sold to a person dealing as a consumer (within the meaning of the Unfair Contract Terms Act 1977) all warranties, conditions or other terms implied by statute or common law are hereby expressly excluded save to the extent they may not be lawfully excluded. When the Goods are sold to a consumer within the meaning of the Unfair Contract Terms Act 1977 their statutory rights are not affected by the provisions of this clause.

4. In the event of the Customer making a claim in respect of any defect in terms of clause 2 hereof the Customer must:-

4.1. reasonably satisfy the Company that the Goods have been properly installed, commissioned, stored, serviced and used and without prejudice to the generality of the foregoing that any defect is not the direct or indirect result of lack of repair and/or servicing, incorrect repair and/or servicing, use of wrong materials and/or incorrect spare parts; and

4.2. allow the company to inspect the Goods and/or any installation and any relevant packaging as and when reasonably required by the Company.

5. Subject to the Company being notified of any defect as is referred to in sub-clause 2 hereof within a reasonable time of it becoming apparent and subject always to the terms of sub-clause 4 hereof, the Company shall, in its option, replace or repair the defective Goods or refund a proportionate part of the Price. The Company shall have no further liability to the Customer (save as mentioned in sub-clause 6 hereof).

6. The Company shall be liable to indemnify the Customer in respect of any claim for death or personal injury to any person in so far as such is attributable to the negligence or breach of duty of the Company or any failure by the Company to comply with the provisions of sub-clause 2 hereof.

7. Save as provided in sub-clause 2 hereof the Company shall not be liable in respect of any claim by the Customer for costs, damages, loss or expenses (whether direct, indirect, consequential or otherwise) or indemnity in any respect howsoever arising including, but not by way of limitation, liability arising in negligence (other than pursuant to clause 6 above) that may be suffered by the Customer or any third party.

⚠ Caution

SAFETY NOTICE TO USERS

These instructions must be read thoroughly and understood before installation and operation of your Peak NM20ZA generator. Use of the generator in a manner not specified by Peak Scientific MAY impair the SAFETY provided by the equipment.

When handling, operating or carrying out any maintenance, personnel must employ safe engineering practices and observe all relevant local health and safety requirements and regulations. The attention of UK users is drawn to the Health and Safety at Work Act 1974, and the Institute of Electrical Engineers regulations.

Declaration of Conformity

RoHS Statement of Compliance

The European RoHS (Restriction of Hazardous Substances) Directive 2002/95/EC aims to reduce the use of hazardous materials within a certain scope of products – mostly electrical and electronic.

Peak Scientific Instruments Ltd has developed all reasonable 'due diligence' controls, to ensure that our products comply with the principles, and requirements, of this directive. Similar directives in the United States and China, for example, have also been captured within this programme.

Where a specific certificate of compliance is required, this can be requested, on a product serial number basis, from Peak Scientific Instruments Ltd, by contacting us though info@peakscientific.com.

WEEE Statement of Compliance (WEE/FJ0116XU)

The WEEE (Waste of Electrical & Electronic Equipment) Directive 2002/96/EC, issued by the European Union, aims to reduce the impact, upon the environment, from disposal of certain types of equipment. It requires producers to implement controls, to ensure that equipment that they produce, is correctly disposed of, following the end of its useful life.

Peak Scientific Instruments Ltd fully complies with it's obligations towards this important legislation. These obligations refer to all electrical equipment that has been dispatched by us from 1st July, 2007, within the United Kingdom. As part of our compliance towards this, we have placed the management of this disposal with the B2B Compliance scheme. They can be contacted directly on 01691-676124, or by visiting their website on www.b2bcompliance.org.uk.

Ken Brown
Quality Assurance Manager

Technical Specification

Generator Environment	
Minimum operating ambient temperature	5°C (41°F)
Maximum operating ambient temperature	30°C (86°F)
Maximum relative humidity	70%
Maximum Altitude	2000 Meters
Outlet Gas	
Maximum Gas Outlet Pressure Curtain	60psig
Maximum Gas Outlet Pressure Source	100 psi
Maximum Gas Outlet Pressure Exhaust	60psig
Maximum Gas Outlet Flow (High purity Nitrogen) Curtain	5 Litres/min (ATP)
Maximum Gas Outlet Flow (Zero Grade AIR)	30 Litres/min (ATP)
Particles	< 0.01 µm
Outlet 1/4" BSP	3
Pressure Gauges	3
Pthalates	None
Suspended Liquids	None
Electrical Requirements	
230V (50/60 Hz)	5 amps
Compressor Circuit Breaker	8.0 amps
PLC / fan Circuit Breaker	2.0 amps
Electrical connection	Single phase power cord
Noise Level	59DBA @ 1m
General	
Dimensions in cm (inches) W x D x H	60 x 67 x 94
	(24 x 27 x 37)
Weight	112 kg (248 lb)
Shipping weight	169 kg (372lb)
Annual Serviceable parts List	**Service kits Part # (08-4434)**
Compressor Intake Filter Element	02-4187 (x4)
Filter Element for Reverse Active Carbon	00-4425 (x2)
Filter Element for AFD3000-02C 0.01um	02-4335 (x2)

Introduction

Welcome to the User Manual for the Peak Scientific NM20ZA Nitrogen Generator. Enclosed in this manual you will find the information required to ensure that your generator is operated & serviced according to our recommended guidelines which will prepare you for long and trouble free Nitrogen generation.

Please review each of the following sections carefully and ensure that the maintenance log at the rear of this manual is updated for future reference.

Thank you for selecting Peak Scientific to meet your gas generation needs, and should you require any further assistance or support please do not hesitate to contact us at the addresses displayed on the front cover of this manual.

Unpacking and Installation

Although Peak Scientific takes every precaution with safe transit and packaging, it is advisable to fully inspect the unit for any sign of transit damage.

Check ‘SHOCK WATCH’ label for signs of rough handling prior to unpacking -

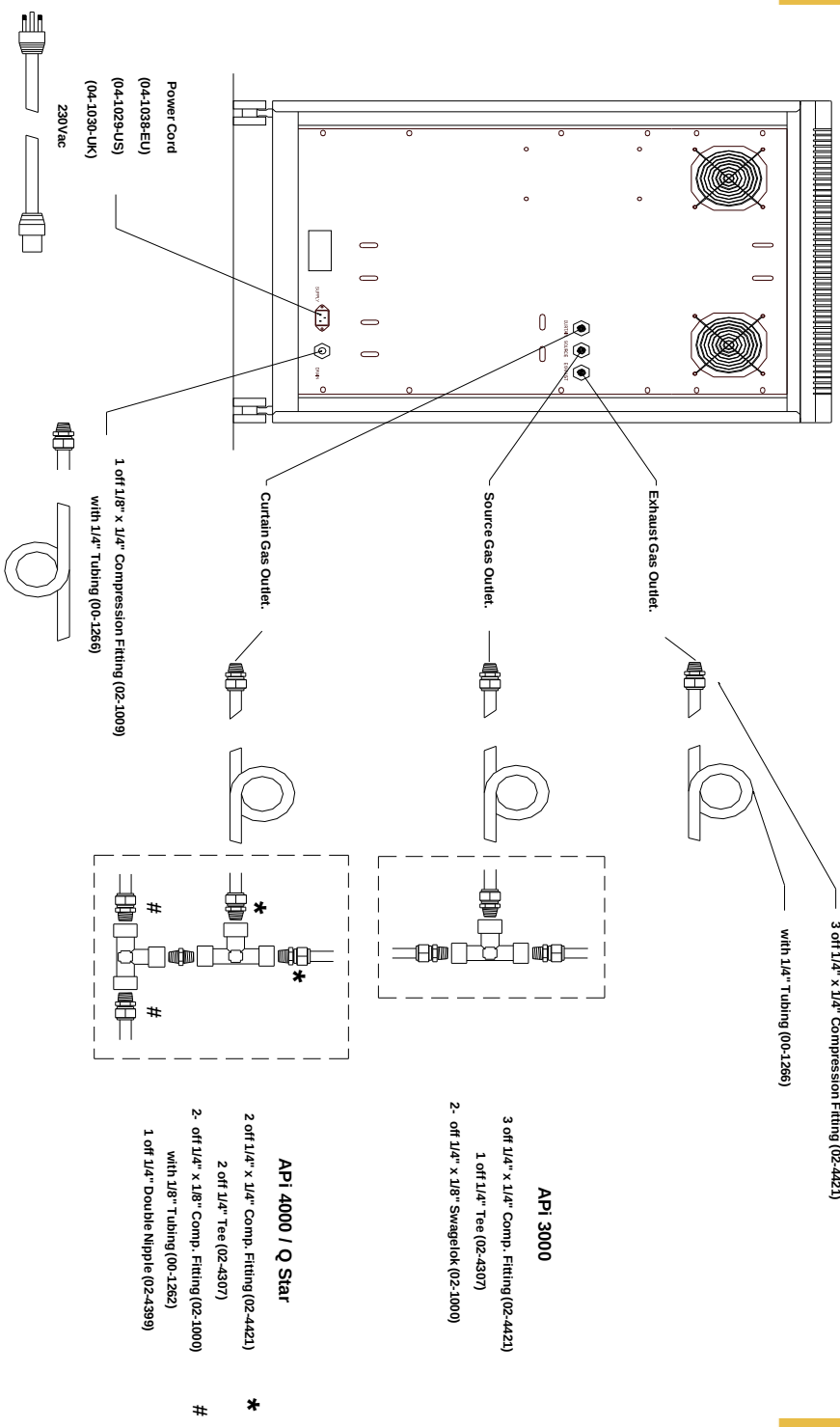
ANY DAMAGE SHOULD BE REPORTED IMMEDIATELY TO THE CARRIER AND PEAK SCIENTIFIC OR THE DISTRIBUTOR FROM WHERE THE UNIT WAS PURCHASED.

Follow the un-packing instructions posted on the side of the crate. It will require 2 people to lift the crate clear and to manoeuvre the generator onto the floor. Thereafter the generator can be moved to its final location on the castors provided.

Note:- Included with generator is a pack containing , service filters & fittings. Be careful not to discard these with the packing.

Please save the product packing for storage or future shipment of the generator.

Installation



Installation

Useful Information

The diameter of the tubing which will be connected to the gas outlets is important and is determined by the length of tubing required. Failure to follow these recommendations could lead to accelerated compressor wear**.**

< 10 meters.	Use 6/4 (6mm O/D, 4mm I/D) P.T.F.E. tubing.
> 10 - 40 meters.	Use 10/8 (10mm O/D, 8mm I/D).
> 40 metres.	Please contact Peak with the relevant distance and we will calculate the flow resistance and the tubing size required.

A combination of 6/4 and 10/8 tubing may be used to ensure that there is no large diameter tubing within the lab (i.e. for the first 10 meters use 6/4 tubing and the final 20 meters use 10/8).
Keep the connections and bends to a minimum.

The imperial equivalents are:- 6/4 = 1/4” O/D, 3/16” I/D.
10/8= 3/8” O/D, 5/16” I/D.

Electrical Connection

⚠ **Caution**

Important Electrical Notice
This unit is classified as **SAFETY CLASS 1** equipment. **THIS UNIT MUST BE EARTHED**. Before connecting the unit to the mains supply, please check the information on the serial plate. The mains supply must be of the stated AC voltage and frequency.

The Electrical requirement is:- 230V AC (50/60 Hz), 5 Amps

EARTH/GROUND (E):-	Green & Yellow	or	Green
LIVE (L):-	Brown	or	Black
Neutral (N):-	Blue	or	White

Connect the generator to a single-phase supply using the power cord provided.

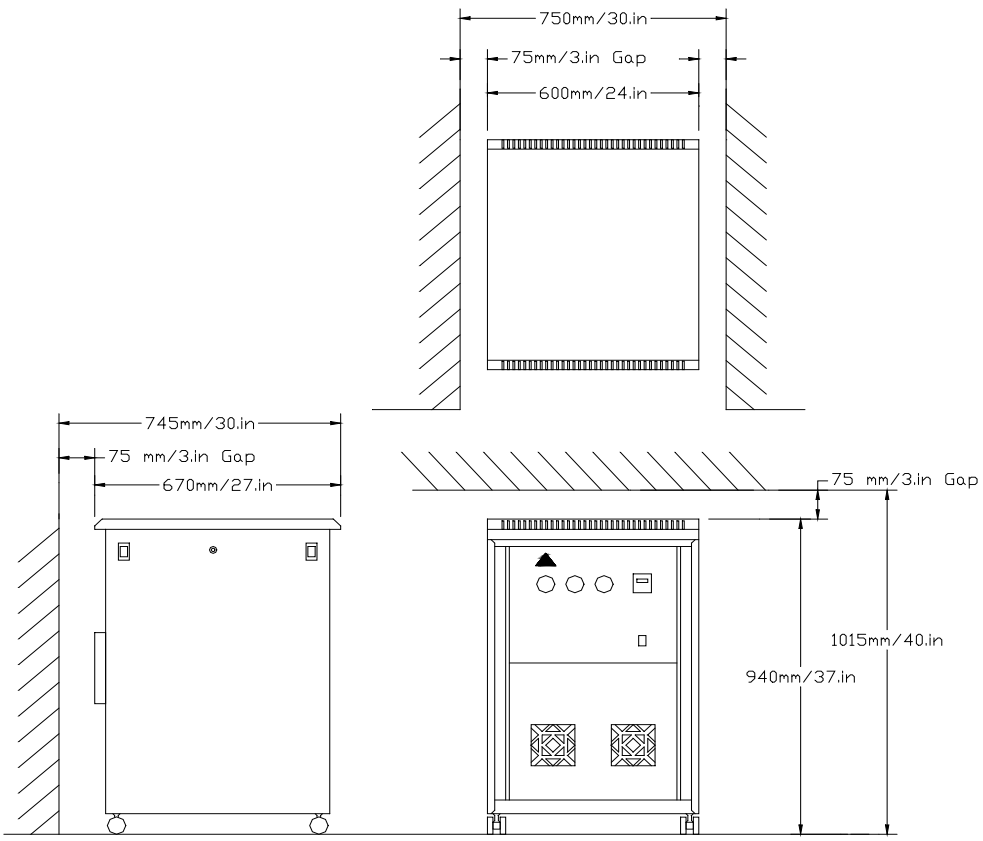
Generator Environment

The Generator is designed for indoor use only.
The unit should be installed adjacent to the Mass Spectrometer it is supplying. If this is not convenient then the unit can be sited elsewhere, however, consideration should be made of the lengths of pipe runs as pressure drops can result from extended runs of pipe. Please see the “Useful Information” section for further details.

Performance of the generator (like all sophisticated equipment) is affected by ambient conditions. Note should also be taken to the proximity of Air Conditioning outlets. These can sometimes give rise to “pockets” of air with high relative humidity. Operation of the unit within such a pocket could adversely affect its performance. Consideration should also be given to the air flow around the unit. It is recommended that an air gap of 75mm (3”) should be maintained down both sides, at the rear and across the top of the unit. Please refer to the drawing below for the general dimensions of the unit.

Maximum Ambient Conditions: **25°C (dry bulb) 70%RH (Max)**

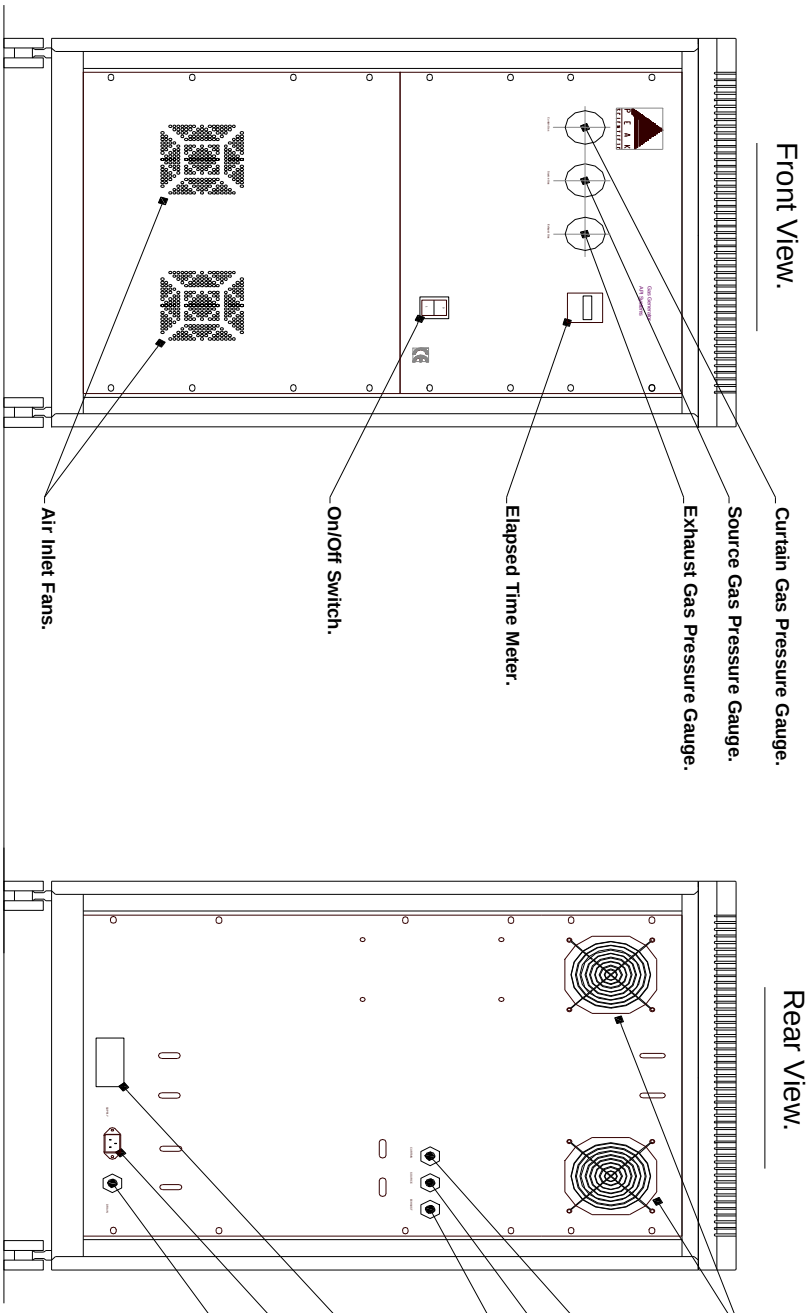
General Dimensions



Unit must always be placed on a level surface. Failure to do so will effect the performance of the Generator.

Connections and controls

Connections and Controls



Operation

The NM20ZA generator is designed specifically to minimize operator involvement. Given that the system is installed as described in earlier sections and is serviced in accordance with the following maintenance recommendations then it should simply be a matter of turning the generator on. The generator will automatically produce the factory default flow and pressure.

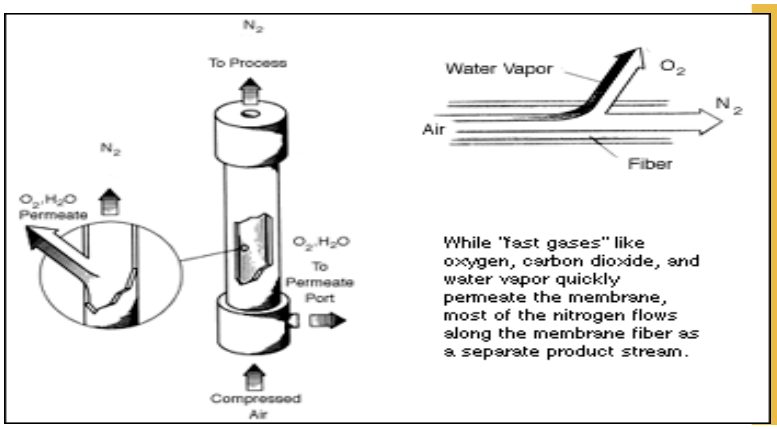
Outlet	Output flow	Output pressure
CURTAIN	5 Litres per min (APT)	60psi
SOURCE	22 Litres per min (APT)	100psi
EXHAUST	8 Litres per min (APT)	60psi

Should the demand for gas be less than the rated flow then the generator will automatically regulate the internal pressure and cycle of the compressors as required. This should be all the input your generator requires from you, the only additional tasks required are,
If at any time the generator begins to emit excessive noise or vibration, then it should be switched off and you should contact your local representative or the factory as soon as possible.
Please ensure that the drain port at the rear of the generator is led to a suitable connection or container. It should be noted that the generator will liberate considerable amounts of water from this port (approx. 1-2 liters weekly). If a container is used it should be emptied at regular intervals.
Ensure that the generator is serviced in accordance with the following maintenance recommendations.

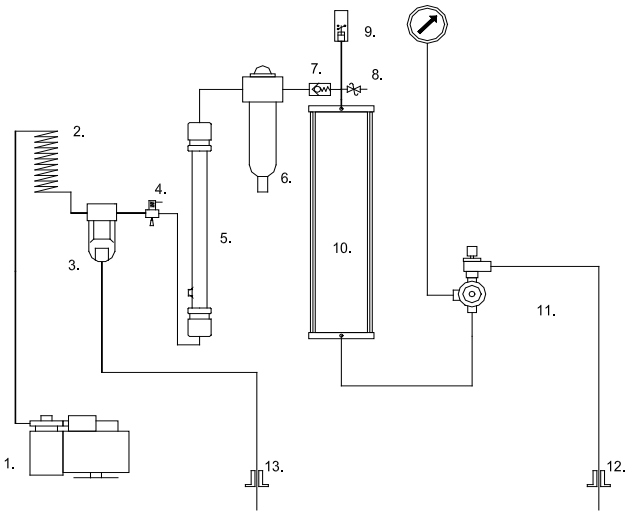
Principle of Operation

Principle of Operation

Peak Scientific Instruments NM20ZA Generators utilize two different types of air preparation membranes to produce the required Gas outputs. The Nitrogen side of the generator employs "*Hollow Fiber Membrane*" Technology to efficiently separate Nitrogen from other gases present in ambient air. An overview of this process can be seen below.



The Zero Air side of the generator uses the latest technology in membrane dryers to produce a clean dry supply of Zero grade air. Both membranes are mounted in a similar fashion in the generator and utilize standard ancillary components to maximize the interchangeability of the systems. The standard membrane diagram can be seen below.



Membrane - Standard Diagram

Air is drawn into the system by the Compressor (1) and passed through the Cooling Coil (2) and the AFD – 3000 Micro Mist Filter (3) into the Membrane (5). After the Membrane (5) the gas is passed through a Reverse Acting Carbon Filter (6) to remove any remaining impurities and via the Non-Return Valve (Check Valve) (7) into the Receiver (10). The stored gas is regulated (11) to give the required output pressure and flow. Receiver pressure is measured (9) to allow the generator to un-load (4) and shut-down should demand cease. A Safety Relief Valve (8) is fitted to protect the system against over pressure. Gas is delivered out of the machine via the Outlet Port (12). Any moisture collected by the AFD – 3000 Micro Mist Filter (3) is expelled via the Drain Port (13).

Maintenance

Routine Maintenance

WARNING

Servicing and/or repair of the Generator should only be undertaken by a TECHNICALLY COMPETENT PERSON, with the generator in its safely isolated condition.

SAFELY ISOLATED CONDITION

Definition: The unit is in a Safely Isolated Condition when it is disconnected from its application, fully de-pressurised and isolated from the Electrical Supply. Directions for isolating the generator are shown below.

Isolating the Generator:

a) Switch off the unit.
b) Unplug the generator from the mains supply and remove the power cord from the rear of the unit.
c) Ensure the pressure gauges on the front panel reads zero. (If gauge does not fall to zero, loosen outlet fittings slightly to allow trapped gas to escape.)
d) Disconnect from the application.
e) **Important Note:** Allow 10 minutes for unit to fully de-pressurise. After this time pull out the 'Quick Release Ring' on the Pressure Relief valve situated on the tank. Ensure tank is fully depressurised before releasing the ring.

Maintenance Schedule

Parts	Replacement Period
Compressor Inlet Filters	**Every 6 months**
Filter Separator Elements	**Every 12- months**
Compressor units (the lesser of)*	**Every 6000hrs or 18-months**

*Compressors can be re-fitted as an alternative to replacement up to a maximum of 3 times, this is a more cost effective solution, however a degree of technical expertise is required and can be time consuming.

With the generator installed as described previously, disconnect the Curtain, Source and Exhaust gas outputs (ENSURING THAT ANY INTERNAL PRESSURE HAS BEEN SAFELY DISSIPATED), and switch the generator on. The on/off switch should illuminate and the cooling fans should start immediately. There will be a 10 second delay before the first compressor starts, then after a further 3 seconds the second compressor should also start. The three pressure gauges on the front panel will begin to climb, and after approx 3 minutes the gauges should all have reached their rated pressure of either 60 or 100 PSI.G. The output flows from the generator should now be measured to ensure they conform to the specification below.

Outlet	Output flow	Output pressure
CURTAIN	5 Litres per min (APT)	60psi
SOURCE	22 Litres per min (APT)	100psi
EXHAUST	8 Litres per min (APT)	60psi

The generator should now be left to run for approx. 1 hour to allow the generator to fully flush the internal receivers etc of air and allow the membranes to stabilize. After this time the Curtain, Source and Exhaust outputs can be re-connected and the interconnecting pipe work checked carefully for leakage.

Maintenance Log

Maintenance Log for Serial Number _____

Work Done	Remarks	Name	Date