Directions For Use

High Purity Nitrogen Generator
With Compressor

NG1000A (High Pressure)

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DOCUMENT CHANGE HISTORY

Issue No	Changed	Initials	Date
1	First Issue	SGM	20-06-01
2	Revision	SGM	03-01-02
3	Drawing on page 6 updated	H.D.	18-03-03
4	USA Technical support number updated	FAD	11/11/04
5	New Style Front Added	FAD	08/04/05

CONTENTS

Warranties and 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,

SAFETY NOTICE TO USERS

These instructions must be read thoroughly and understood before installation and operation of your Peak Nitrogen Generator. Use of the Generator in a manner not specified by Peak Scientific Inst. 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.

WARNING: Nitrogen is not a poisonous gas, but if the concentration in the

inhaled air becomes too high there will be a risk of asphyxiation.

1 Introduction

The Peak Scientific Instruments High Purity Nitrogen Generator is designed specifically for use with Laboratory Analytical Instruments as a source of carrier gas. The generator has been designed to operate totally independent of external air supply and only requires an electrical supply to deliver high volume, high pressure, clean, dry, Nitrogen.

2 Unpacking & Installation

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

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

After unpacking and a visual inspection, the unit should be placed in a ventilated area away from direct sunlight. Care should be taken not to obstruct the ventilation holes on the sides of the unit nor the fan outlet at the rear.

The generator should be placed on a steady and level base. The NG1000A (HP) has been designed to fit under most workbenches. Alternatively, the unit may be placed on a workbench or in any location convenient to the user.

Performance of the generator (like all sophisticated equipment) is affected by ambient temperatures. Continuous operation in ambient temperatures exceeding 25°C will lead to a reduction in capacity and prolonged operation in temperatures exceeding 35°C will shorten the life of the unit. Note should also be taken of the proximity of Air Conditioning outlets. These can sometimes give rise to “pockets” of air with high relative humidity. Operation of the generator within such a pocket could adversely affect its performance.

3 Electrical Connection

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.

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

Fuse

The generator protection fuse is in the pull out drawer of the mains inlet IEC euro connector located on the bottom right hand side of the cabinet adjacent to the off/on switch. The fuse is rated at 10.0 A (115V 60Hz) or 6.3A (230V 50Hz). The drawer also holds a spare.

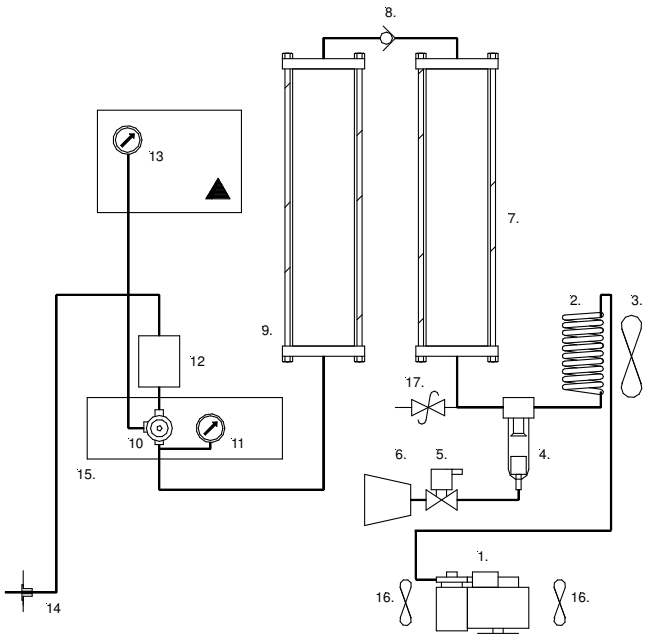
Connect the generator to a single-phase supply using the power cord provided.

4 Air Connection

The nitrogen generator has its own built-in air compressor and therefore does not require an external compressed air source.
The generator has one ¼" BSPF bulkhead connection to the left side or rear of the unit. This is the Nitrogen outlet fitting and should be coupled to the application. There is no drain on this machine. Any moisture liberated by the filter-separator is discharged through the high capacity exhaust system where the sudden reduction in pressure causes instant evaporation. The water vapour is safely removed from the unit by the ventilation system.

5 Principle of Operation

The High Purity Nitrogen Generator utilizes a 'Pressure Swing Adsorption' (PSA) method to extract pure Nitrogen from air. This is where un-wanted gases can be selectively adsorbed from compressed air into a porous carbon molecular sieve material (CMS). The Peak Scientific Instruments Ltd. generator utilizes a unique single column system where the column is alternately pressurised and vented under a finely tuned timing cycle. The rates of pressurisation and venting are accurately set which guarantees high purity better than can be achieved with a similarly sized traditional 2-column system.



Parts List
1. Compressor
2. Cooling Coil
3. Cooling Fan (if fitted)
4. Filter / Separator
5. Exhaust Valve
6. Exhaust Silencer
7. CMS Column
8. Non-return Valve
9. Nitrogen Storage Tank
10. Pressure Regulator
11. Internal Pressure Gauge
12. Flow Regulator
13. Front Panel Gauge
14. Bulkhead Connection
15. Internal Gauge Rail
16. Compressor Cooling Fan (if fitted)
17. Safety Valve

Nitrogen Generator
Standard System

Air is drawn into the system by the Compressor (1) and passed via the Heat Exchanger (2) and the Filter / Separator (4) into the CMS Column (7). Oxygen molecules in the air are trapped by the sieve however the molecules of Nitrogen pass straight through and be collected in the Nitrogen Storage Tank (9). After a time interval the compressor is stopped and the Exhaust Valve (5) opens allowing the sieve column to vent to atmosphere. The trapped Oxygen is liberated and escapes to atmosphere via the Exhaust Valve (5) and the Silencer (6). The generated Nitrogen in the storage tank is the regulated to the correct pressure and flow rate. After another time interval the Exhaust Valve shuts and the compressor starts. This cycle runs continuously.

6 Commissioning

With the Generator installed as described earlier connect power to the unit and turn it on. Disconnect the Nitrogen Outlet connection to allow the generator to vent to atmosphere until the unit is stabilised. At *Switch-On* the Exhaust Valve will open and the generator will commence its *Venting Cycle.* This is to allow venting of any residual pressure in order that the compressor does not start against pressure. **The Vent Cycle may last up to 90 seconds.** At the end of the vent cycle compressor should be heard to run and the normal operating cycle will begin. Pressure should begin to build on the gauge on the front panel reaching 110 psig after approximately 10 minutes.

The Generator has been pre-set in the factory to give the specified output flow-rate and pressure. Once the pressure in the Nitrogen receiver exceeds that setting the Generator will stabilise and produce pure Nitrogen. Maximum purity will be achieved after around 8 hours. After this time the generator can be re-connected to the application.

The design of the generator is that it will deliver up to rated output flow of Nitrogen at 110 psig. Should the demand for Nitrogen be less than the rated output flow, or indeed should the demand stop the generator will continue to operate without any problems. The generator is protected from over-pressure and its normal operating cycle ensures frequent venting.

Timer Setting

The Cycle Timer has been set in the factory and should not require adjustment. Adjusting the timer will affect the volume and purity of the delivered nitrogen and should **NEVER** be adjusted without reference to the factory. The normal settings of this generator are shown below. Since each generator is individually calibrated prior to shipping these settings may vary slightly between machines.

Generator	Rated Output (cc/min)	Nominal "ON" Time	Nominal "OFF" Time
NG1000A (HP)	1000	90 seconds	83 seconds

Pressure Setting

Output pressure is controlled by a pressure regulator located on the Gauge Rail inside the front cover. This has been factory set at 110 psig or in accordance with the customer's instructions.

Flow Setting

Output flow is controlled by a Mass Flow controller. Depending on the model used this will be attached to the outlet from the Pressure Regulator or alternatively on the left side panel. This is factory set should **NOT** be adjusted by the user. Altering the output flow setting will have an effect on Nitrogen Purity.

7 Routine Maintenance

WARNING: Servicing and/or repair of the Generator should only be undertaken by a TECHNICALLY COMPETENT PERSON with the Generator safely isolated.

Due to the simplicity of the design and the small number of moving parts the NG Series Nitrogen Generator will have a long and trouble free life. However the following components should be replaced as follows:

Compressor Inlet Filters	**Every 6- months**
Filter Separator Elements	**Every 12- months**
Compressor Units (the lesser of)	**Every 6000 hours or 18- months**

Service kits are available for all routine maintenance; please contact the factory for further details.

FAILURE TO FOLLOW THE PRESCRIBED MAINTENANCE PLAN WILL INVALIDATE THE PRODUCT WARRANTY

Compressor Maintenance

The Intake Filter requires periodic replacement. Initial inspection should be after 500 hours operation. Most compressor related problems could be prevented by keeping the filter clean. A dirty inlet filter will decrease compressor performance and may shorten its life.

The compressor head surfaces and motor casing become very HOT during operation. Do not touch these parts until the unit has been switched off and allowed to cool.

Switch the Generator ***OFF*** and disconnect it from the Electrical supply. Remove the fuse from the Euro-socket to prevent the generator being inadvertently switched on by another person.

This is a non-lubricated compressor and should never be oiled. Oiling this compressor will cause damage or failure.

Compressor Service Kit

Remove the lower front panel and the lid from the cabinet. The upper front panel has a pressure gauge. This can be moved out of the way - **do not disconnect the gauge if it registers a positive pressure.**

Ensure that the internal pressure gauges, located on the gauge rail and at the internal filter/separator read 0 psig. Always ensure the compressor is not pressurised prior to carrying out any work on it.

Note the orientation of the Compressor Ports. Mark them so that they can easily be re-assembled correctly.

Remove the Head Bolts and Head Cover(s).

Remove the Valve Plate(s) and Valves.

Remove the Tubes from the Valve Plates (twin cylinder models).

Remove the Retainer Plate, Cup and Cylinder.

Discard the old cups, cylinders, retaining screws, cylinder o-rings, tube o-rings, head o-rings, valves and valve retainers.

Place the new cup on the Piston Rod (cup faces up).

Re-fit the Retainer Plate and Screws. Apply a thread locking compound (*Loctite 222*) to the retainer's screws and torque to 34-38 in.-lb.

Carefully place the new Cylinder over the cup. (Install at an angle to avoid tearing or damaging the cup)

Clean any residue from the Valve Plate(s) with a water based solvent. (Take care not to scratch the Valve Seats).

Replace the Valves and Valve Retainers in the original positions making sure that the "x" on the corner of the valve retainer is facing up.

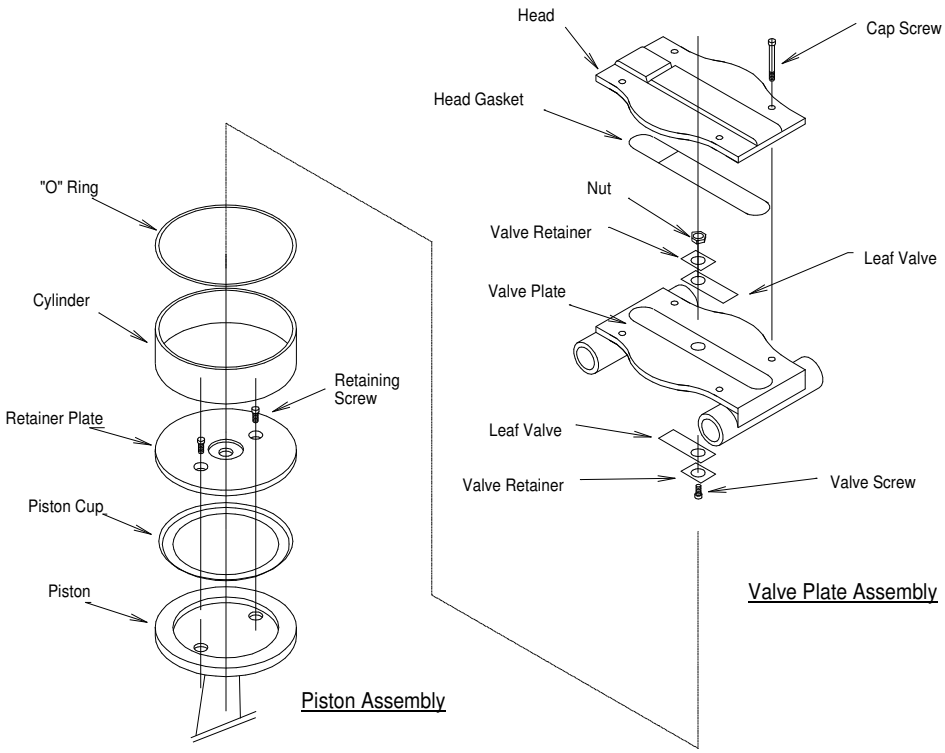
Apply a thread locking compound (*Loctite 222*) to the valve screw and torque to 14-15 in.-lb.

Fit new tube o-rings on the tubes and re-install in the valve plates (twin cylinder models).

Replace the cylinder o-ring in the bottom of the valve plate and position the plate over the cylinder, Check that the cylinder is properly aligned with the o-ring groove. Check that the orientation of the ports is correct.

Fit a new head gasket in the groove on the top of the valve plate, check its orientation.

Place the head cover over the valve plate checking the orientation of the ports. Torque the head bolts to 34-38in.-lb.



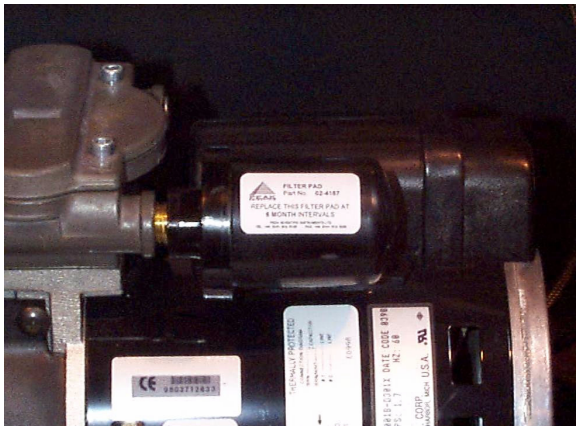
Inlet Filter / Separator Elements

These should be changed at intervals as indicated below. In addition filter bowls should be cleaned and the operation of the auto-drains should be checked.

The Generator MUST be de-pressurised prior to attempting to remove ANY filter bowl. Failure to do this may cause injury.

Compressor Inlet Filter

This should be changed at 6-month intervals. Part Number is 02-4187 and the filter is located as shown.

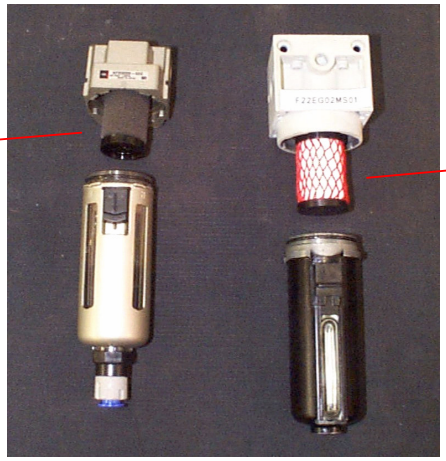


Remove the cover by rotating it anti-clockwise ¼ turn. The element can then be removed. Re-fitting is the reverse procedure.

Filter / Separator Element

This should be changed at 12-month intervals. The filter is located on the Right Hand internal side panel.

Pre 2001 Models
Element
Part No 02-4335



Post 2001 Models
Element
Part No 02-4509

Holding down the black slide rotate the bowl ¼ turn anti-clockwise and pull down. The element un-screws. Re-fitting is the reverse procedure.

Exhaust Silencer Element

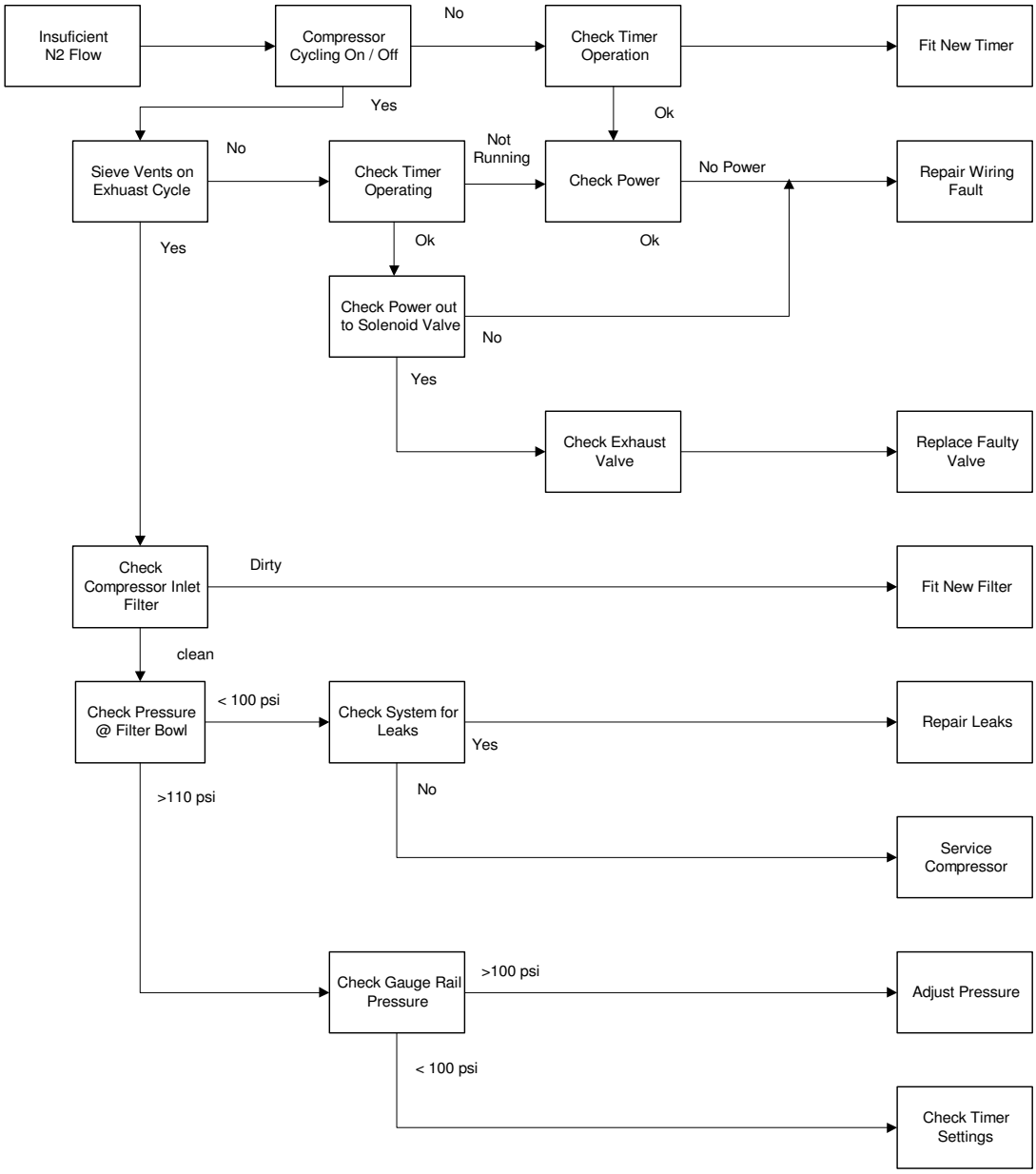
The Exhaust silencer is located as shown, and should be changed at 12-month intervals.

The *Plastic Cover* indicated above is un-screwed by hand to reveal the element. Removing the retaining nut (shown above) releases the element. Re-assembly is the reverse procedure.
The Element Part No is 02-4336

8 Troubleshooting

The PSA method for Nitrogen Production is the most reliable of the popular methods. Many thousands of PSA systems are currently operating worldwide and have given many years trouble-free operation. Provided the CMS material is protected from oils and oxygen enrichment the purity of the nitrogen produced will remain consistent over the lifetime of the machine.

Problems associated with the generator will be confined to the compressed air or control systems and will probably be shown up through loss of capacity. Reference should be made to the following Fault Finding Chart.



9 Technical Specifications

General Details

Minimum Operating Ambient Temperature	5 °C (41 °F)
Maximum Operating Ambient Temperature	35 °C (95 °F)
Outlet Conditions	
Nominal Outlet Pressure	110 psig (7.5 barg)

Physical Details

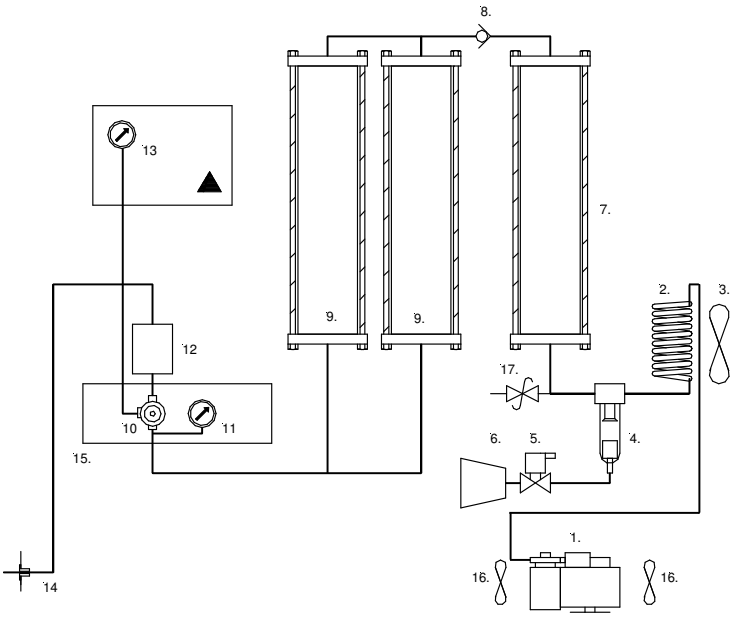
Model	**NG1000A**
Max Output (cc/min)	1000
Compressor Watts	250
Fan Watts	18
Current Load (230V)	2.2A
Current Load (110V)	5.2A
Dims (HxWxD) cm	62x43x41
Dims (HxWxD) Inches	25x17x16
Shipping Weight Kg	21
Shipping Weight Lbs	45

Serviceable Parts list

Model	**NG1000A**
Compressor Inlet Filter	02-4187
Compressor Service Kit	02-4428
Filter/Separator Element (pre 2001)	02-4335
Filter/Separator Element (post 2001)	02-4509
Cooling Fan (230V)	04-1021
Exhaust Valve (230V)	02-4289
Cooling Fan (110V)	04-1022
Exhaust Valve (110V)	02-4290
Exhaust valve Silencer	02-4336
Electronic Timer	04-1019

Service Schedule

Interval	**Action**
6 Months	Replace Compressor Inlet Element
12 Months	Replace Filter/Separator Element Replace Exhaust Silencer
18 Months	Service Compressor (Kit Required)



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13. Front Panel Gauge
14. Bulkhead Connection
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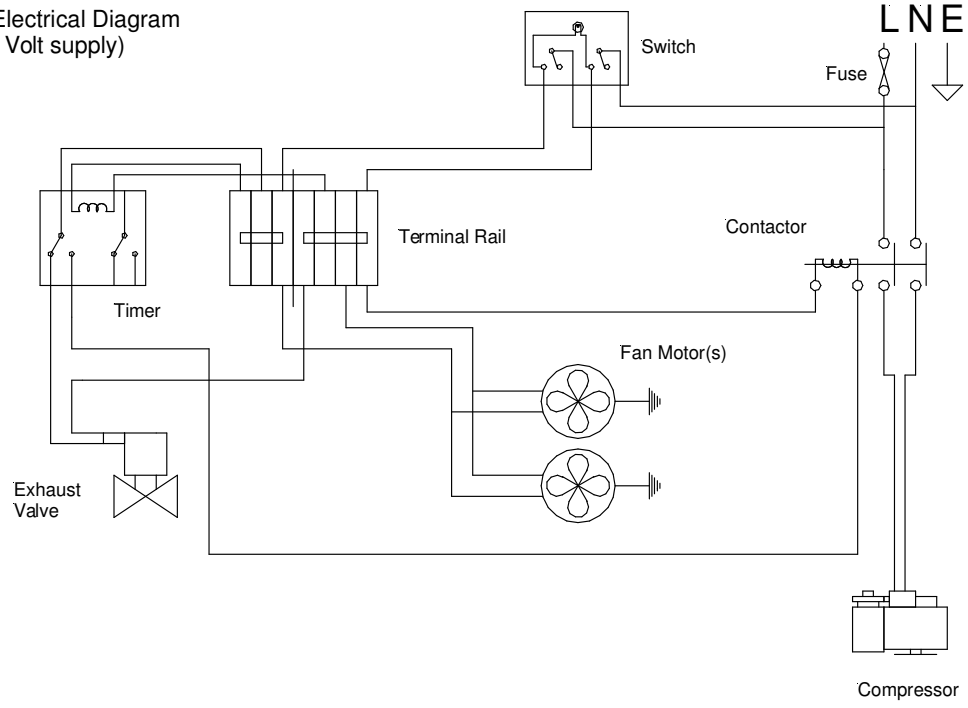
16. Compressor Cooling Fan (if fitted)
17. Safety Valve

Nitrogen Generator
HP System

NGxxxA Electrical Diagram
(110 Volt supply)



Maintenance Record Log

Model- NG1000A . **Serial number**

Work done	Remarks	Date	Name

Notes