

Directions For Use
Nitrogen Generator
NG9-3LA

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Document Change History

<u>Issue No</u>	<u>Changed</u>	<u>Initials</u>	<u>Date</u>
1	Document Created	SGM	08/03/02
2	System Upgraded	SGM	20/08/02
3	USA Technical support number updated	FAD	11/10/04
4	New Style Front Added	FAD	08/04/05
5	Update photo page 9	SK	15/12/08

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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 NG9-3LA is a self-contained Nitrogen Generator designed specifically for use 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, clean, dry, pure Nitrogen.

2 Unpacking and 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. It has been designed to fit under most workbenches and is fitted with castors for ease of handling.

Performance of the generator (like all sophisticated equipment) is affected by ambient conditions. 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 located in the fuse-holder at the extreme end of the Din-rail. The fuse is rated at 10 amps. The drawer also contains a spare.

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

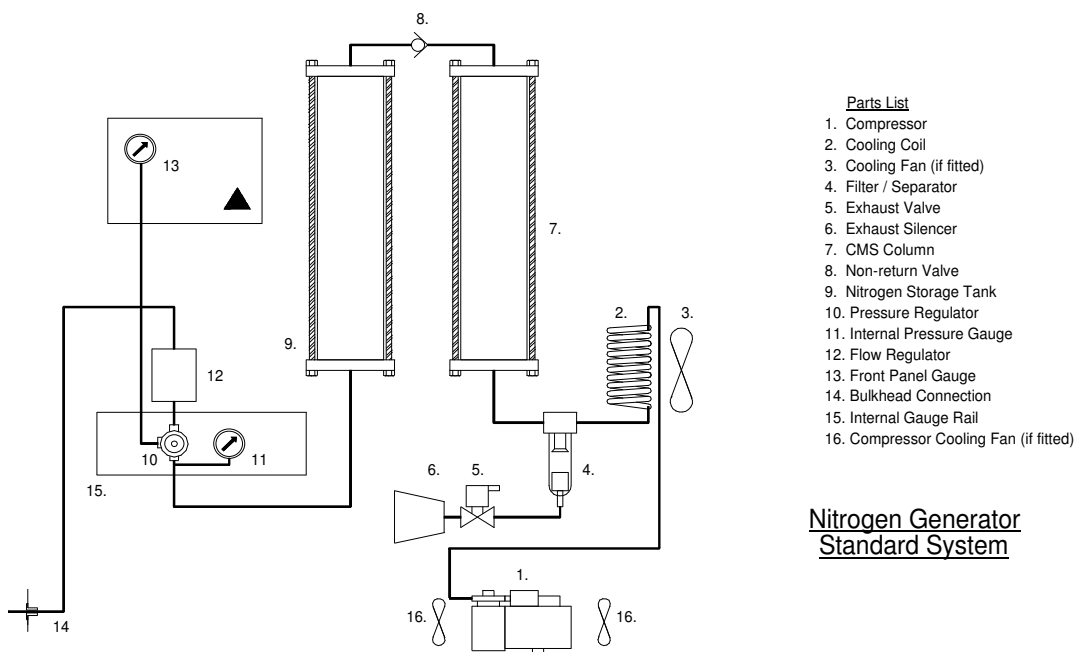
4 Air Connection

The NG9-3LA generator has its own built-in air compressors and therefore does not require an external compressed air source.

The generator has two bulkhead connections to the rear of the unit. The larger (1/4" BSP) is the Nitrogen outlet fitting and should be coupled to the application. The smaller fitting (1/8" BSP) is the drain connection. The generator may liberate water via the drain. Connect a hose to the fitting and lead to a suitable place.

5 Principle of Operation

The NG9-3LA 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. 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.



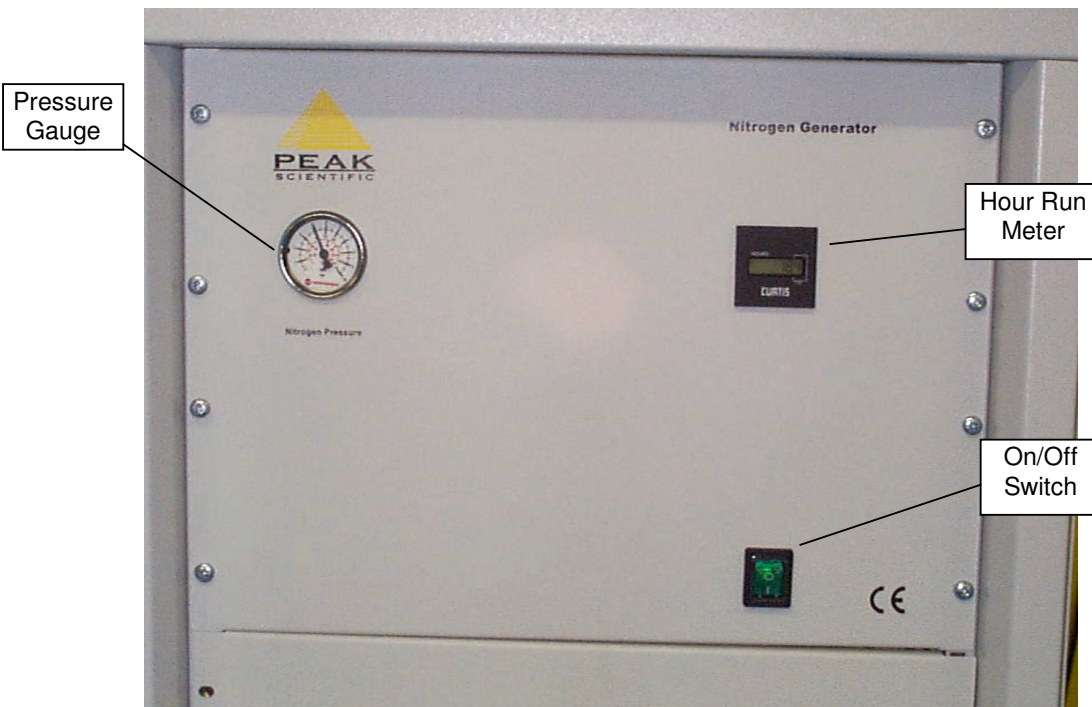
Air is drawn into the system by the Compressor (1) and passed via the Heat Exchanger (2 & 3) and the Filter / Separator (4) into the CMS Column (7). Oxygen molecules in the air are trapped by the sieve however the molecules of Nitrogen pass straight through and be collected in the Nitrogen Storage Tank (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.

The NG9-3LA has two such systems operating in parallel. A full schematic diagram is included at the end of this document.

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 20 seconds.** At the end of the vent cycle the compressors 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 30 psig after approximately 5 minutes.

The Generator is designed to produce a maximum of 9.0 litres ATP per minute at 30 psig. Once the pressure inside the Nitrogen receiver exceeds that setting the Generator will stabilise and produce pure Nitrogen. Maximum purity will be achieved after around 3 hours. At this time the generator can be re-connected to the application.



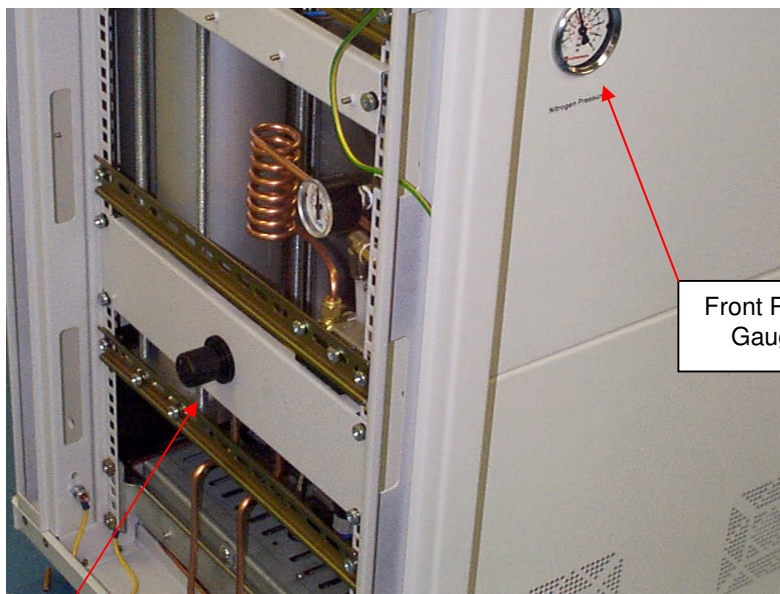
Should the demand for Nitrogen be less than 9 litres, or indeed should the demand stop the generator will continue to operate without any problems. The generator is protected from over-pressure and its normal operating cycle ensures frequent venting.

Time Control Settings

The Cycle Times are controlled by a PLC Controller which has been programmed in the factory and should not require adjustment. Adjusting the PLC will affect the volume and purity of the delivered nitrogen and should **NEVER** be adjusted without reference to the factory. The normal settings this generator are 175 seconds ON, 55 seconds OFF. There is a 3-second delay between compressors starts to prevent excessive current inrush.

Nitrogen Pressure Setting

A pressure regulator is provided behind the left hand side panel as shown below. This controls the output pressure and is indicated on the gauge mounted on the front panel.



Pressure
Regulator

Front Panel
Gauge

7 Routine Inspection

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 NM Series Nitrogen Generator will have a long and trouble free life. However the following components should be replaced as follows:

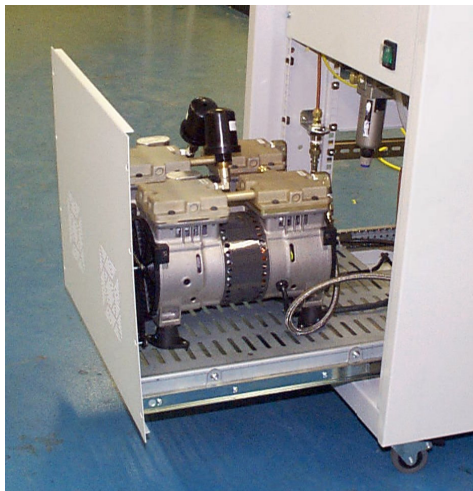
Compressor Inlet Filters	Every 6- months
Filter Separator Elements	Every 12- months
Compressor Units (the lesser of)	Every 6000 hours or 18- months

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**

Access for Maintenance

Access for maintenance is gained by removing the two side panels. In addition the compressors are mounted on a sliding tray. Remove the 8-off screws locating the lower front panel and slide the tray out as shown.

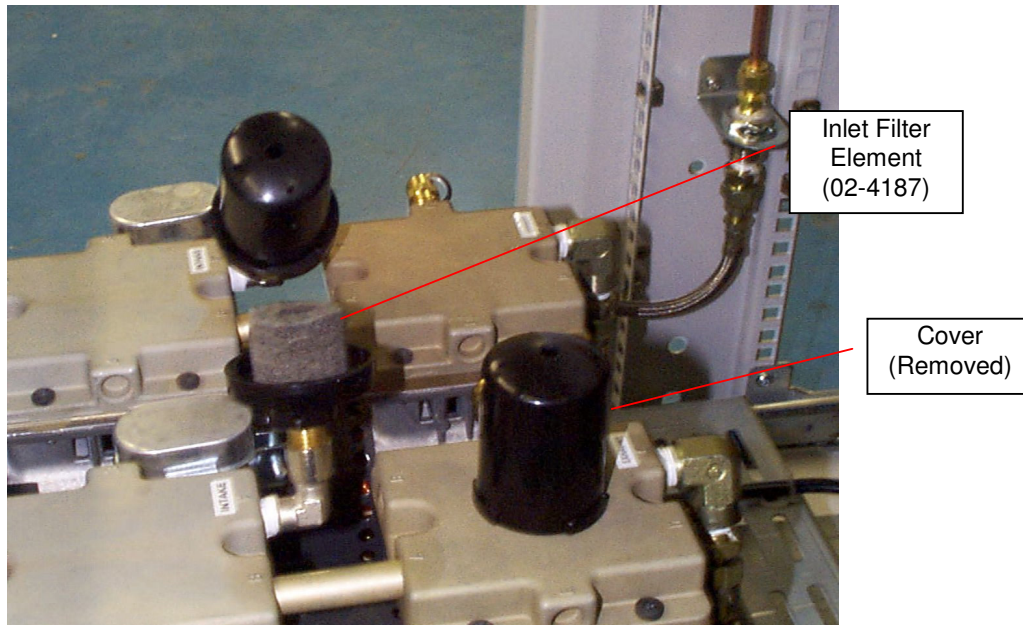


Inlet Filter / Separator Elements

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.

Compressor Inlet Filter

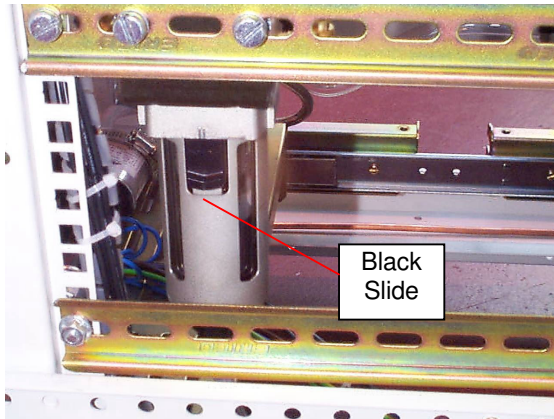
This should be changed at 6-month intervals. Part Number is 02-4187 and the filter is located as shown.



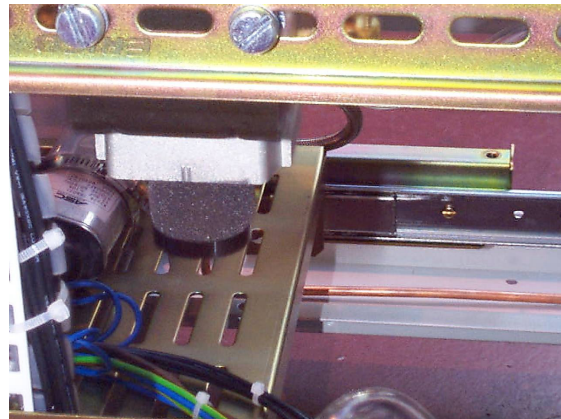
Remove the cover by rotating it anti-clockwise $\frac{1}{4}$ turn. The element can then be removed. Re-fitting is the reverse procedure.

Filter Separator Elements

The Primary Filter Element (02-4335) should be changed at 12-month intervals.



Filter / Separator



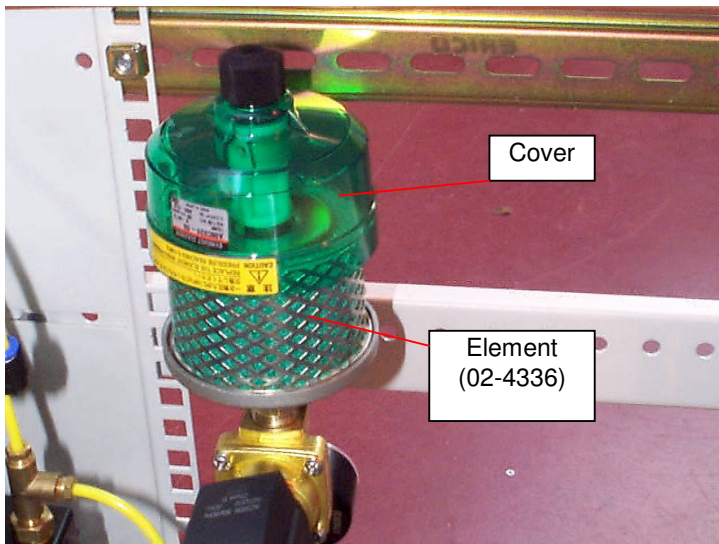
Element

IMPORTANT!!! Ensure that the system is NOT under pressure before attempting to remove the bowl and that the Generator is shut-down and isolated.

The filter housing is removed by depressing the black slide and twisting the bowl through a ¼ turn. The element then un-screws counter clockwise. Re-assembly is the reverse procedure.

Exhaust Silencer

The Exhaust Silencer should be changed at 12-month intervals



Remove the cover by un-screwing clockwise to expose the element and its securing nut.

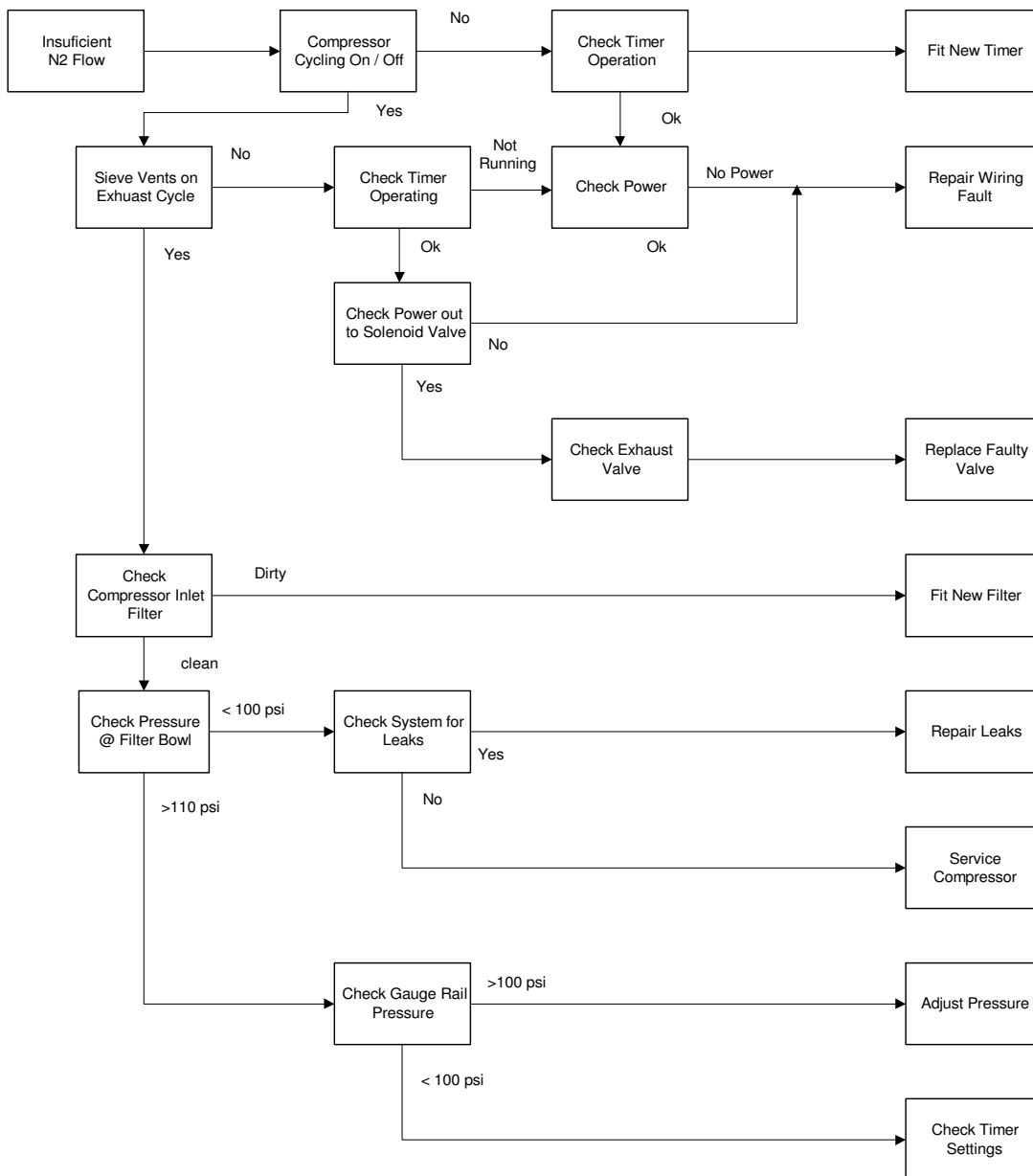
Remove the nut and prize off the element.

Re-assembly is the reverse procedure.

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

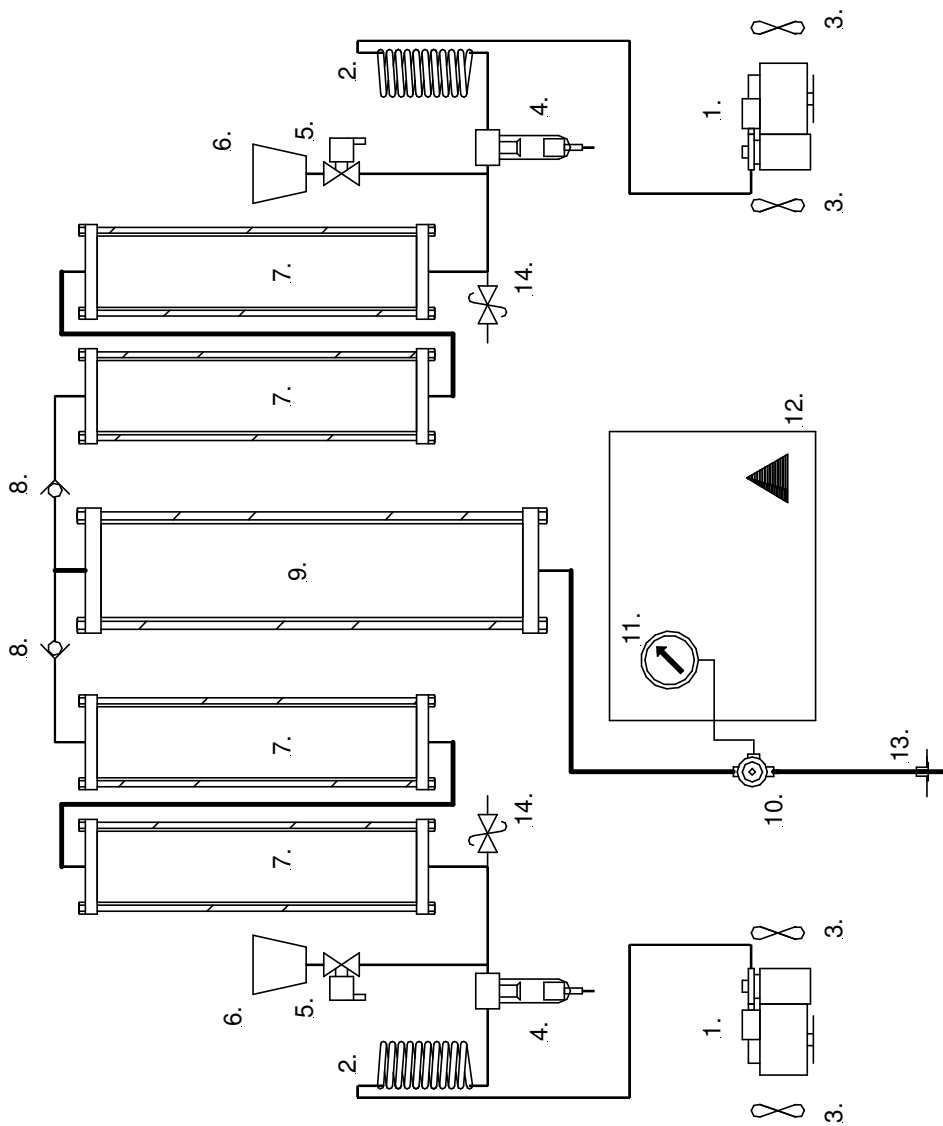
General Details

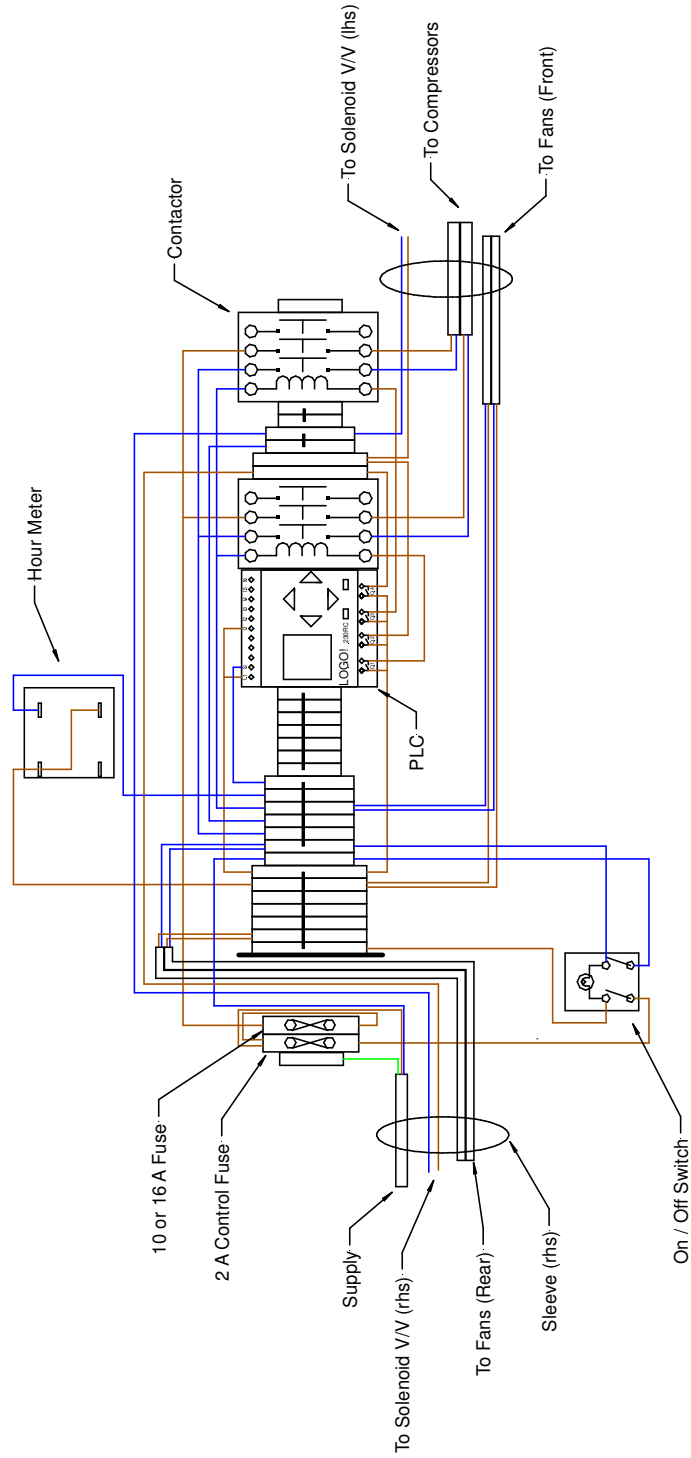
Minimum Operating Ambient Temperature	5 °C (41 °F)
Maximum Operating Ambient Temperature	35 °C (95 °F)
Inlet Conditions (Free of oil and bulk moisture)	
Minimum Air Inlet Pressure	N/A
Maximum Air Inlet Pressure	N/A
Minimum Air Inlet Flow Rate	N/A
Outlet Gas	
Maximum Pressure Drop (Outlet-Inlet) δP	N/A
Maximum Gas Outlet Pressure	80 psig
Maximum Gas Outlet Flow for Specified Purity	9.0 Litres/min (ATP)
Pressure Dewpoint	-75°C (-103°F) (1.4ppm @ ATP)
Start up time for Purity	3 hours
Particles	0.01um
Electrical Requirements	
@230V ac (50Hz)	3.6 Amps
@115V ac (50/60Hz)	7.2 Amps
Fuse (230V 50Hz ac)	10 Amps
Fuse (115V 60Hz ac)	10 Amps
Electrical Connection	Single Phase Power Cord
General	
Dimensions W x D x H	cm (inches)
	60 x 63 x 93 (24 x 25 x 37)
Weight	Kg (lbs)
	104 (230)
Shipping Weight	Kg (lbs)
	154 (340)

10 Spare Parts

<u>Item</u>	<u>NG9-3LA (220V 50/60Hz)</u>	<u>NG9-3LA-(110V 60Hz)</u>
Compressor Inlet Filter Element	02-4187	02-4187
Filter Separator Element	02-4335	02-4335
Exhaust Silencer Element	02-4336	02-4336
Compressor Service Kit	06-5529	06-5530
Compressor Anti-vib Mounts	06-1022	06-1020
Compressor	06-5969	06-5510
Logic Controller	04-4410	04-4410
Exhaust Valve	02-4289	02-4290
Relief Valve	02-1120	02-1120
Cooling Fan	04-1021	04-1022
Internal Pressure Gauge	02-1021	02-1021

- Parts List
1. Compressor
 2. Cooling Coil
 3. Cooling Fan
 4. Filter / Separator
 5. Exhaust Valve
 6. Exhaust Silencer
 7. CMS Column
 8. Non-return Valve
 9. Nitrogen Storage Tank
 10. Pressure Regulator
 11. Pressure Gauge
 12. Upper Front Panel
 13. Gas Outlet Connection
 14. Relieving Valve





Maintenance Record Log

Model- NG9-3LA.

Serial number _____

Work done	Remarks	Date	Name

Notes