

ANG 250-1000
User Manual – Revision 1



User Manual
High Purity Nitrogen Generator
ANG250-1000

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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,
- 8)

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 from a clean / dry / OIL FREE air supply to deliver high volume, high pressure, clean, dry, Nitrogen.

2 Unpacking & 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.

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 outlets. The generator should be placed on a steady and level base.

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 the generator **must not** be operated in an ambient temperature exceeding 30°C. 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.

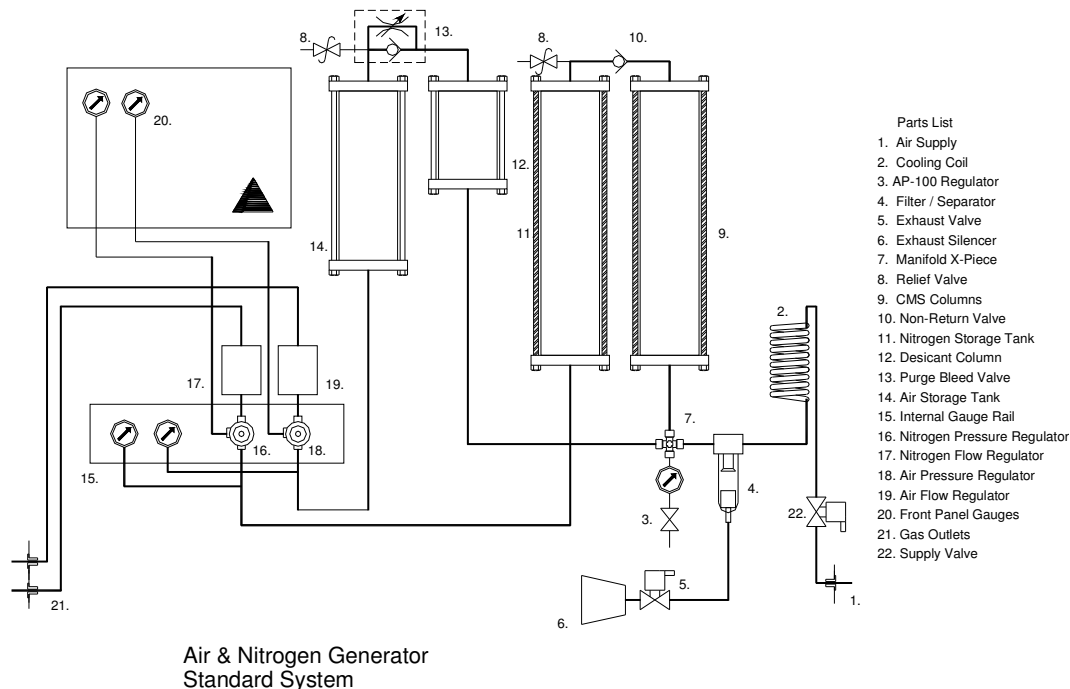
4 Air Connection

The nitrogen generator requires a clean / dry / OIL FREE air supply at a pressure of not less than 120 PSI to operate properly, this should be connected to the ¼" BSPF bulkhead located on the right hand side of the generator.

The generator has two ¼" BSPF bulkhead connections to the left side of the unit. These are clearly marked Nitrogen & Air. These outlet fittings 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 "series" column system where the columns are 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 "swing" system.



Air is taken into the system from the air supply (1) and passed via the cooling coil (2) and the Filter / Separator (4) into the CMS Column (9). Oxygen molecules in the air are trapped by the sieve however the molecules of Nitrogen pass straight through and are collected in the Nitrogen Storage Tank (11). Similarly air also passes into the Desiccant Column (12) where moisture, CO₂ and other impurities are trapped allowing clean air to pass to the Air Storage Tank (14). After a time interval the Supply Valve (22) closes and the Exhaust Valve (5) opens allowing the columns to vent to atmosphere. The trapped Oxygen and impurities are liberated and escape to atmosphere via the Exhaust Valve (5) and the Silencer (6). The generated Nitrogen in the storage tank is regulated to the correct pressure and flow rate. After another time interval the Exhaust Valve shuts and the Supply Valve will open again. 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 Supply Valve will close. The generator will commence its *Venting Cycle*. **The Vent Cycle may last up to 90 seconds.** At the end of the vent cycle the vent valve will close and the supply valve will open and the normal operating cycle will begin. Pressure should begin to build on the gauge on the front panel reaching 80 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 80 psi. 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 in the table below. Since each generator is individually calibrated prior to shipping these settings may vary slightly between machines.

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 80 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 Peak Gas Generator will have a long and trouble free life. However the following components should be replaced as follows:

Filter/Separator/Silencers **Every 12 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.

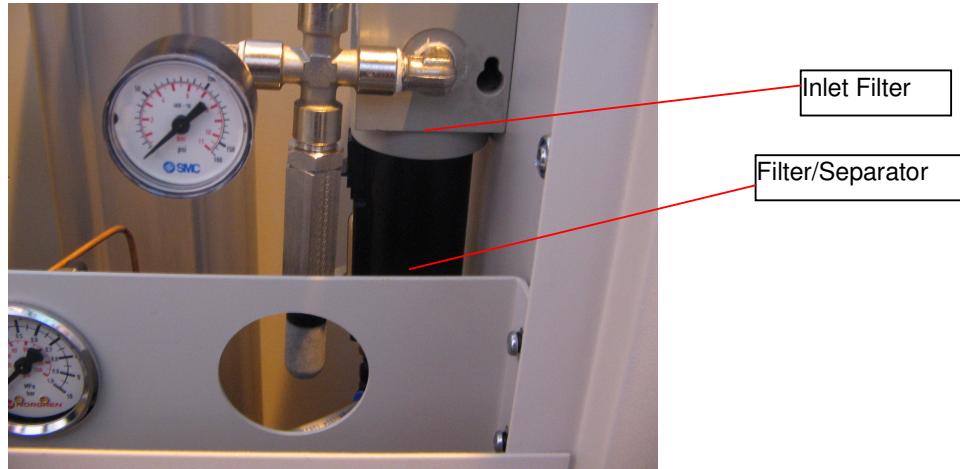
Inlet Filter / Separator Elements

These should be changed at intervals as indicated below. In addition filter bowls should be cleaned.

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

Filter / Separator Element

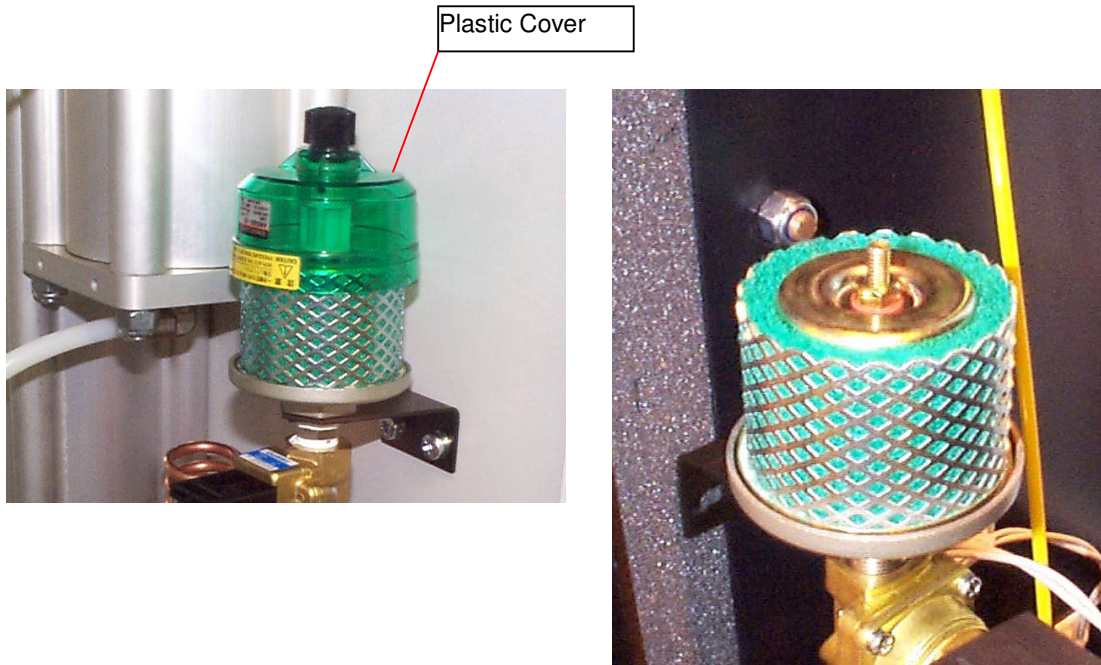
This should be changed at 12-month intervals. The Part No is 02-4509 and it is located as shown.



Holding down the black slide rotate the bowl a 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. A small flat headed screw driver may be needed to release the element. Re-assembly is the reverse procedure. The Element Part No is 02-4336

8 Technical Specifications

General Details

Minimum Operating Ambient Temperature	5 °C (41 °F)
Maximum Operating Ambient Temperature	30 °C (86 °F)
Outlet Conditions	
Nominal Outlet Pressure	80 psig (5.44 barg)

Physical Details

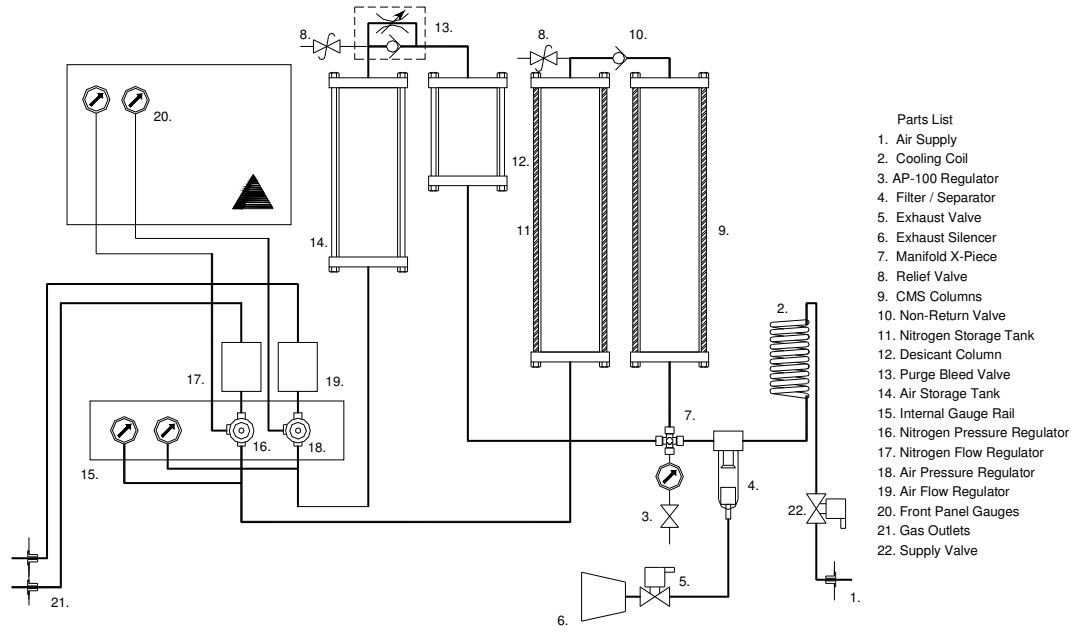
MODEL	ANG250	ANG600	ANG1000
Max Output N2 cc/min	250	600	1000
Max Output AIR cc/min	1200	1200	1200
Fan Watts	18	18	18
Current Load (230v)	300mA	300mA	300mA
(110V)	500mA	500mA	500mA

Serviceable Parts list

<u>Model</u>	<u>ANG250-1000A</u>
Filter/Separator Element	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

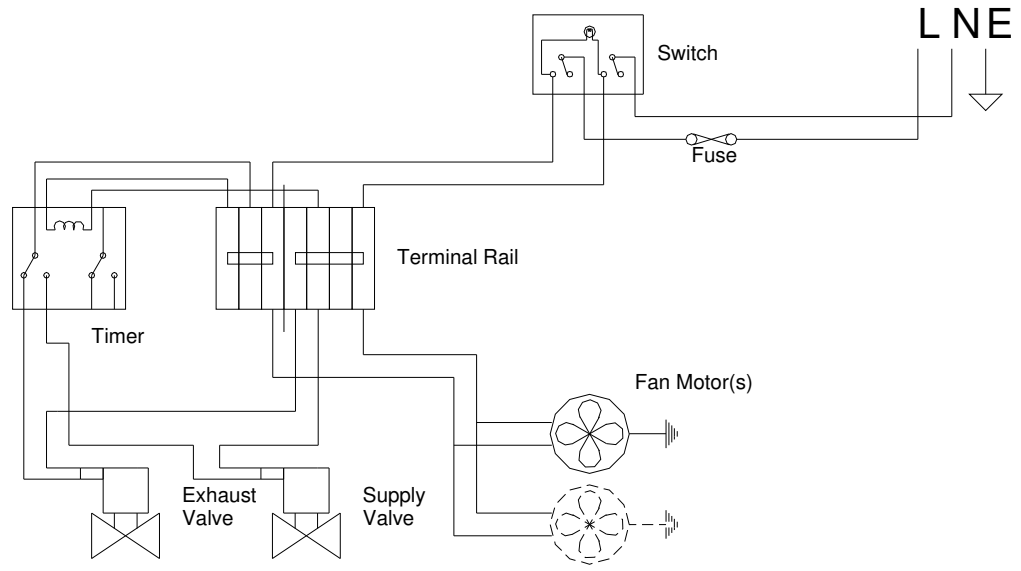
Service Schedule

<u>Interval</u>	<u>Action</u>
12 Months	Replace Filter/Separator Element Replace Exhaust Silencer



- Parts List
1. Air Supply
 2. Cooling Coil
 3. AP-100 Regulator
 4. Filter / Separator
 5. Exhaust Valve
 6. Exhaust Silencer
 7. Manifold X-Piece
 8. Relief Valve
 9. CMS Columns
 10. Non-Return Valve
 11. Nitrogen Storage Tank
 12. Desiccant Column
 13. Purge Bleed Valve
 14. Air Storage Tank
 15. Internal Gauge Rail
 16. Nitrogen Pressure Regulator
 17. Nitrogen Flow Regulator
 18. Air Pressure Regulator
 19. Air Flow Regulator
 20. Front Panel Gauges
 21. Gas Outlets
 22. Supply Valve

Air & Nitrogen Generator Standard System



ANG Electrical Diagram

Maintenance Record Log

Model- ANG

Serial number

Work done	Remarks	Date	Name

Notes