# High Purity Nitrogen Generator

## User Manual
## ANG250A-ANG4000A – Rev8


Peak Scientific Instruments Ltd.

www.peakscientific.com

UK

Fountain Crescent
Inchinnan Business Park
Inchinnan
Renfrew PA4 9RE
Scotland
UK

Tel. +44 (0) 141 812 8100
Fax. +44 (0) 141 812 8200
info@peakscientific.com

USA

19 Sterling Road
Unit 5B
Billerica
MA 01862
USA

Tel. +1 866 647 1649
Fax. +1 781 275 5651
usasupport@peakscientific.com

# Contents

## History

### Document Change History

| Rev No. | Change | Initials | Date |
|---|---|---|---|
| 1 | First issue | SMG | 11/10/2001 |
| 2 | Compressor & Filter Separator Updated | HD | 26/02/2003 |
| 3 | Updated to include 110v Configuration | GL | 15/08/2004 |
| 4 | New on timer settings ANG250A-ANG4000A | FAD | 18/03/2005 |
| 5 | New Style Front Panel added | FAD | 04/04/2005 |
| 6 | New picture of filter separator | SF | 24/08/2005 |
| 7 | Update timing | SK | 15/12/2008 |
| 8 | New Format | SK | 03/04/2009 |
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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 Nitrogen Gas 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.**

**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.**

## 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

### General Details

| | |
|---|---|
| Minimum Operating Ambient Temperature | 5 °C (41 °F) |
| Maximum Operating Ambient Temperature | 35 °C (95 °F) |
| Outlet Conditions | |
| Nominal Outlet Pressure | 80 psig (5.5 barg) |

### Physical Details

| Model | ANG250A | ANG600A | ANG1000A | ANG2000A | ANG3000A | ANG4000A |
|---|---|---|---|---|---|---|
| Max Output N2 (cc/min) | 250 | 600 | 1000 | 2000 | 3000 | 4000 |
| Max Output Air (cc/min) | 1200 | 1200 | 1200 | 2000 | 3000 | 4000 |
| Current load (230V ) | 2.2A | 2.2A | 2.2A | 3.2A | 3.2A | 3.2A |
| (110V) | 5.2A | 5.2A | 5.2A | 7.4A | 7.4A | 7.4A |

## Introduction

Welcome to the User Manual for the Peak Scientific high purity Nitrogen Gas 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.

The peak Scientific 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 requires an electrical supply to deliver high volume, high pressure clean, dry Nitrogen.

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.

**General Dimension**

| Model | ANG250A | ANG600A | ANG1000A | ANG2000A | ANG3000A | ANG4000A |
|---|---|---|---|---|---|---|
| Dims (HxWxD) cm | 88x43x41 | 88x43x41 | 88x43x41 | 126x41x43 | 126x43x41 | 126x43x41 |
| inches | 35x17x16 | 35x17x16 | 35x17x16 | 49x16x17 | 49x17x16 | 49x17x16 |
| Shipping Weight Kg | 85 | 85 | 85 | 120 | 128 | 128 |
| lbs | 187 | 187 | 187 | 265 | 280 | 280 |

## 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.

**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 two people to lift the crate clear and to manoeuvre the generator onto the floor.

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 and the fan outlet at the side of the unit.
The generator should be placed on a steady and level base. The ANG250A, ANG600A & ANG1000A have 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 the generator must not be operated in an ambient temperature exceeding 35°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.

⚠ **Caution**

## 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. Single Phase power cord is provided.

The Electrical requirement is:- 230V AC (50/60 Hz), Amps 6.3

| | | | |
|---|---|---|---|
| EARTH/GROUND (E):- | Green & Yellow | or | Green |
| LIVE (L):- | Brown | or | Black |
| Neutral (N):- | Blue | or | 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 on IEC socket also holds a spare.

**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.

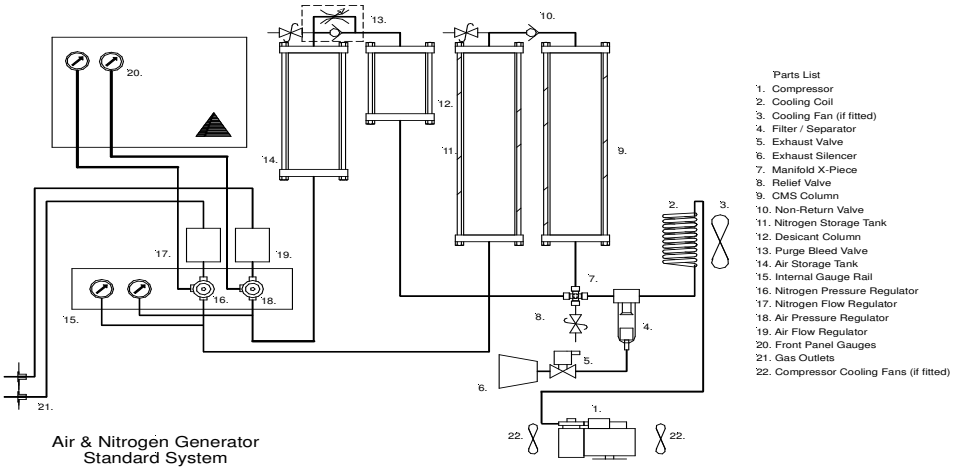
Performance of the generator (like all sophisticated equipment) is affected by ambient conditions. Note should also be taken to the proximity of Air Conditioning outlets. These can sometimes give rise to “pockets” of air with high relative humidity. Operation of the unit within such a pocket could adversely 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℃ (dry bulb) 70%RH (Max)**

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

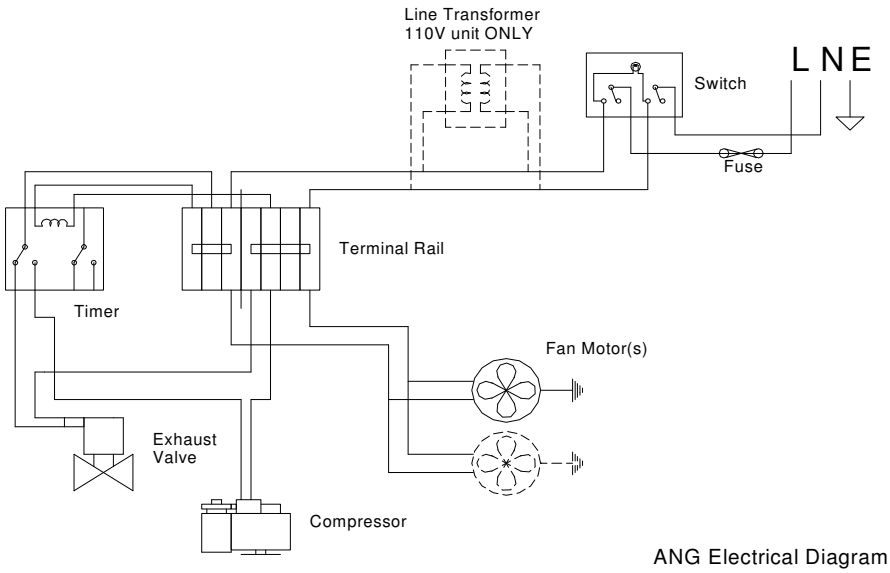
## Operation

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.




Air & 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 (9). 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 (10). 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 compressor is stopped 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 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.




ANG Electrical Diagram

## Additional Points to Note

### 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. This is factory set should NOT be adjusted by the user. Altering the output flow setting will have an effect on Nitrogen Purity.

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 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 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. Since each generator is individually calibrated prior to shipping these settings may vary slightly between machines.

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 generator.
c) Ensure the pressure gauges on the front panel reads zero. (If gauges do not fall to zero, loosen outlet fitting slightly to allow trapped gas to escape.)
d) Disconnect from the application.

e) **Important Note:** Allow 1hour 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

| Interval | Action |
|---|---|
| 6 Months | Replace Compressor Inlet Element |
| 12 Months | Replace Filter Separator Element<br>Replace Exhaust Silencer |
| 18 Months | Service Compressor (Kit Required) |

Maintenance

## Serviceable Parts list

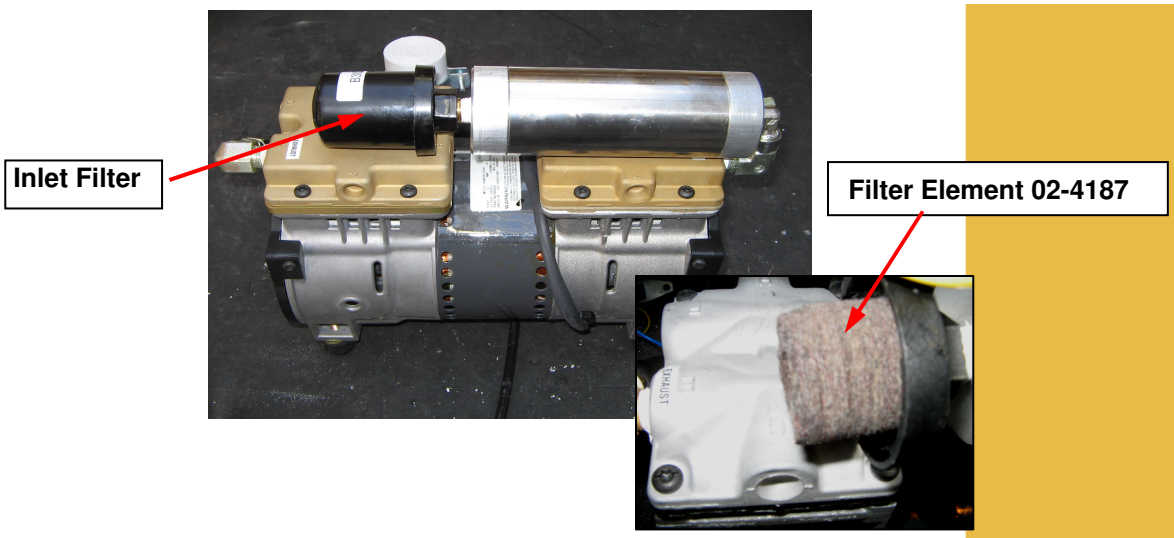
| Model | ANG250A | ANG600A | ANG1000A | ANG2000A | ANG3000A | ANG4000A |
|---|---|---|---|---|---|---|
| Compressor Inlet Filter | 02-4187 | 02-4187 | 02-4187 | 02-4187 | 02-4187 | 02-4187 |
| Filter Separator Element | 02-4509 | 02-4509 | 02-4509 | 02-4509 | 02-4509 | 02-4509 |
| Exhaust Silencer<br>BPV silencer | 02-4336<br>02-1016 | 02-4336<br>02-1016 | 02-4336<br>02-1016 | 02-4336<br>02-1016 | 02-4336<br>02-1016 | 02-4336<br>02-1016 |
| Compressor Service Kit | 06-5542 | 06-5542 | 06-5542 | 06-5529 | 06-5529 | 06-5529 |
| Replacement Compressor (230V)<br>(110V) | 06-5523<br>06-5519 | 06-5523<br>06-5519 | 06-5523<br>06-5519 | 06-5522<br>06-5518 | 06-5522<br>06-5518 | 06-5522<br>06-5518 |
| Cooling Fan (230V)<br>(110V) | 04-1021<br>04-1022 | 04-1021<br>04-1022 | 04-1021<br>04-1022 | 04-1021<br>04-1022 | 04-1021<br>04-1022 | 04-1021<br>04-1022 |
| Exhaust Valve (220v)<br>(110v) | 02-4289<br>02-4290 | 02-4289<br>02-4290 | 02-4289<br>02-4290 | 02-4289<br>02-4290 | 02-4289<br>02-4290 | 02-4289<br>02-4290 |
| Electronic Timer | 04-1019 | 04-1019 | 04-1019 | 04-1019 | 04-1019 | 04-1019 |

*Compressors can be re-fitted with service kit 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.

## Maintenance

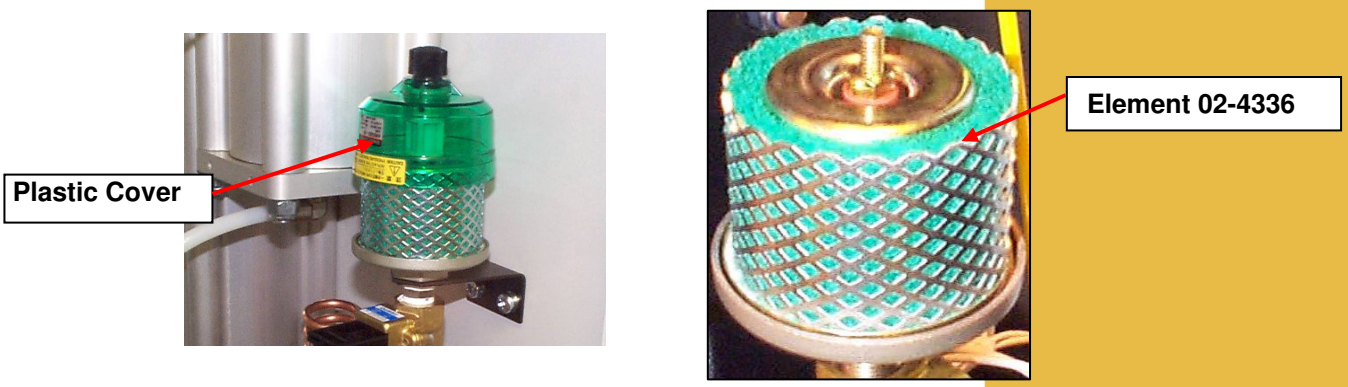
### Compressor Inlet Filter

The Intake Filter requires periodic replacement. Initial inspection should be after 500 hours operation. Most compressor related problems can 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. The Generator MUST be de-pressurised prior to attempting to remove ANY filter bowl. Failure to do this may cause injury.
This should be changed at 6-month intervals. Part Number is 02-4187 and the filter is located as shown.




### Exhaust Silencer Element

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

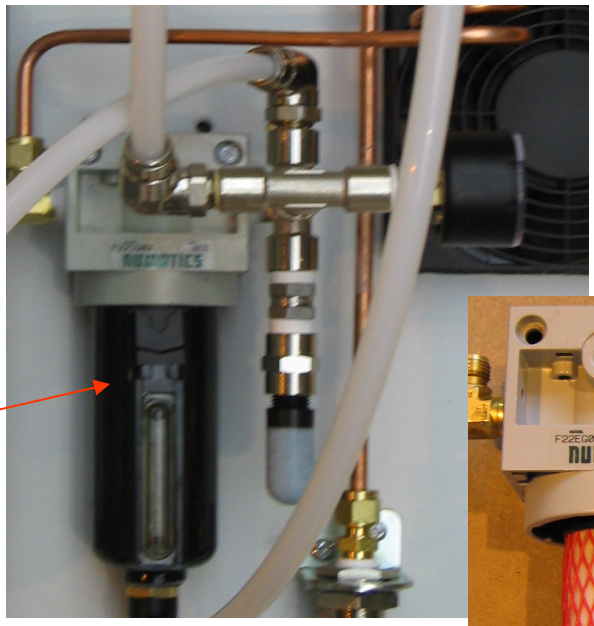


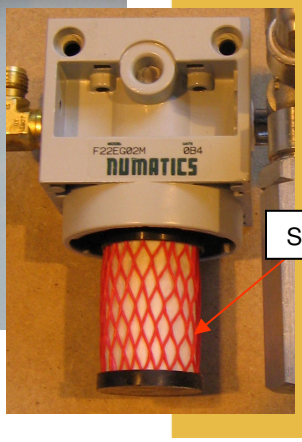

The *Plastic Cover* indicated above is un-screwed by hand to reveal the element. Removing the retaining nut (shown above) releases the element. Re-assembly is the reverse procedure.
The Element Part No is 02-4336

## Maintenance

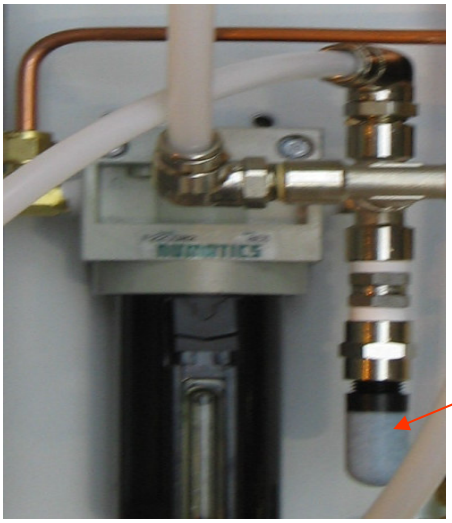
### Filter Separator Element

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




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.




Un-screw silencer Part No:- 02-1016 by hand above and Re-assembly is in reverse procedure.

Maintenance Log

## Maintenance Log for Serial Number _____

| Work Done | Remarks | Name | Date |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
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