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NM20ZA

Service Manual – Revision 13



Service Manual

High Purity Nitrogen Generator

NM20ZA 230Vac Gas Station (19" Rack System)

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Document Change History

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12	Shipping Weight updated	FAD	17/03/05
13	Flow settings updated	FAD	29/03/05
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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.

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1 Introduction

Welcome to the Service Manual for the Peak Scientific Instruments NM20ZA Laboratory Gas Generator. Enclosed in this manual you will find the information required to ensure that your generator is operated & serviced according to our recommended guide lines which will prepare you for long and trouble free gas generation.

Please review each of the following sections carefully and ensure that an Operational Validation Report is completed in full after every service task is performed and that the maintenance log at the rear of this manual is updated for future reference (Complete IQ/OQ procedures are available from the factory).

Thank you for selecting **Peak Scientific Instruments (PSI)** 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.

2 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 2 people to lift the crate clear and to maneuver the generator onto the floor. Thereafter the generator can be moved to its final location on the castors provided.

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

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

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3 Generator Environment

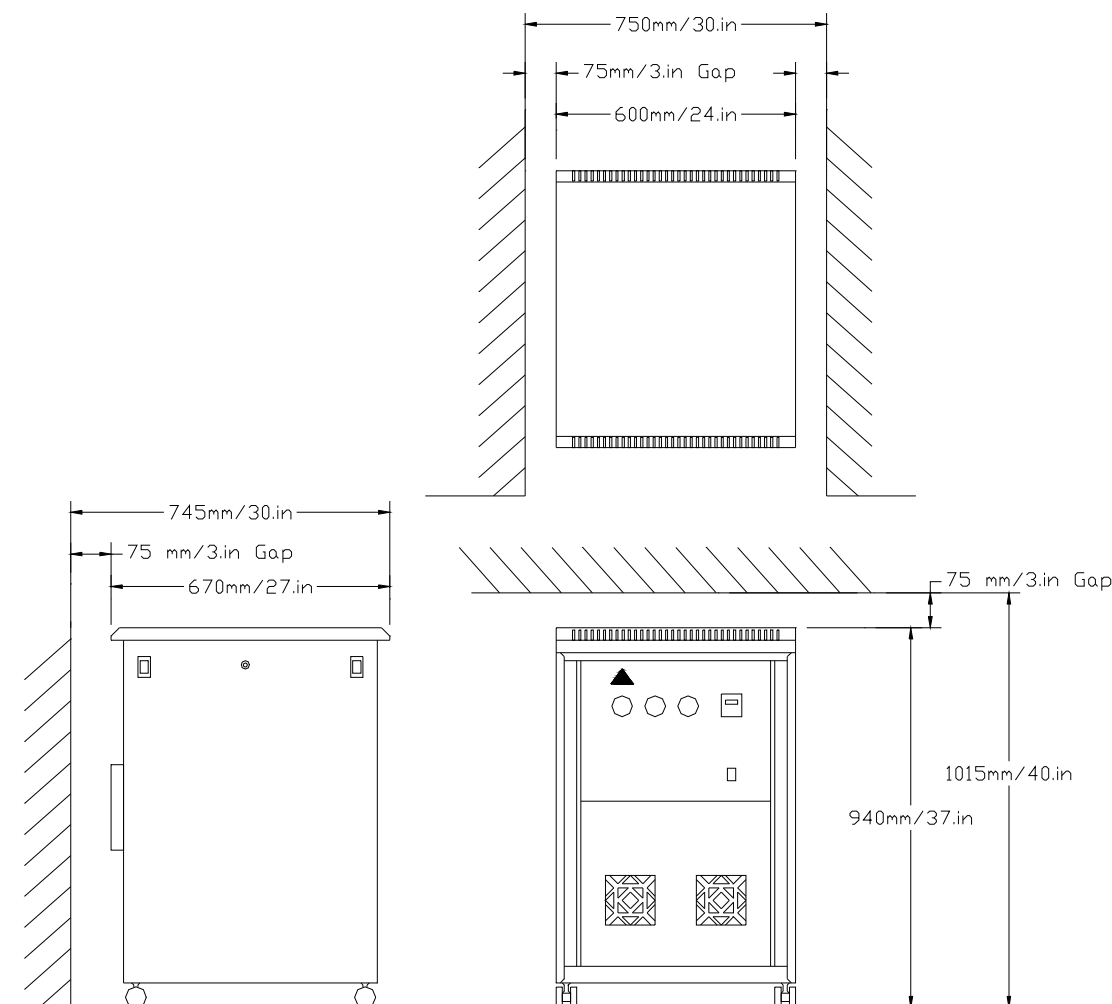
The generator is designed to be installed adjacent to the Mass Spectrometer it is supplying. If this is not convenient then the generator can be sited elsewhere, however, consideration should be made of the lengths of pipe runs as pressure drops can result from extended runs of pipe.

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 30°C will shorten the life of the unit. 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 generator 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 and across the top of the unit. Please refer to the drawing below for the general dimensions of the generator.

MAXIMUM AMBIENT CONDITIONS: -

30°C (dry bulb) 70%RH (Max)

General Dimensions



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4 NM20ZA – Technical Specification

Generator Environment		
Minimum Operating Ambient Temperature		5 °C (41 °F)
Maximum Operating Ambient Temperature		30 °C (86 °F)
Maximum Relative Humidity		70%
Outlet Gas		
Maximum Gas Outlet Pressure Curtain		60 psig
Maximum Gas Outlet Pressure Source		100 psig
Maximum Gas Outlet Pressure Exhaust		60 psig
Maximum Gas Outlet Flow (Zero Grade Air)		30 Litres/min (ATP)
Maximum Gas Outlet Flow (High Purity Nitrogen)		5 Litres/min (ATP)
Start up time for Purity		60 minutes
Air filtration to		0.01um
Electrical Requirements		
@230V±10% ac (50/60Hz)		5.0 Amps
Compressor Circuit Breaker		8.0 Amps
Control Circuit Breaker		2.0 Amps
Electrical Connection		Single Phase Power Cord
General		
Dimensions W x D x H	cm (inches)	60 x 67 x 94 (24 x 27 x 37)
Weight	Kg (lbs)	112.5 (248)
Shipping Weight	Kg (lbs)	169 (372)

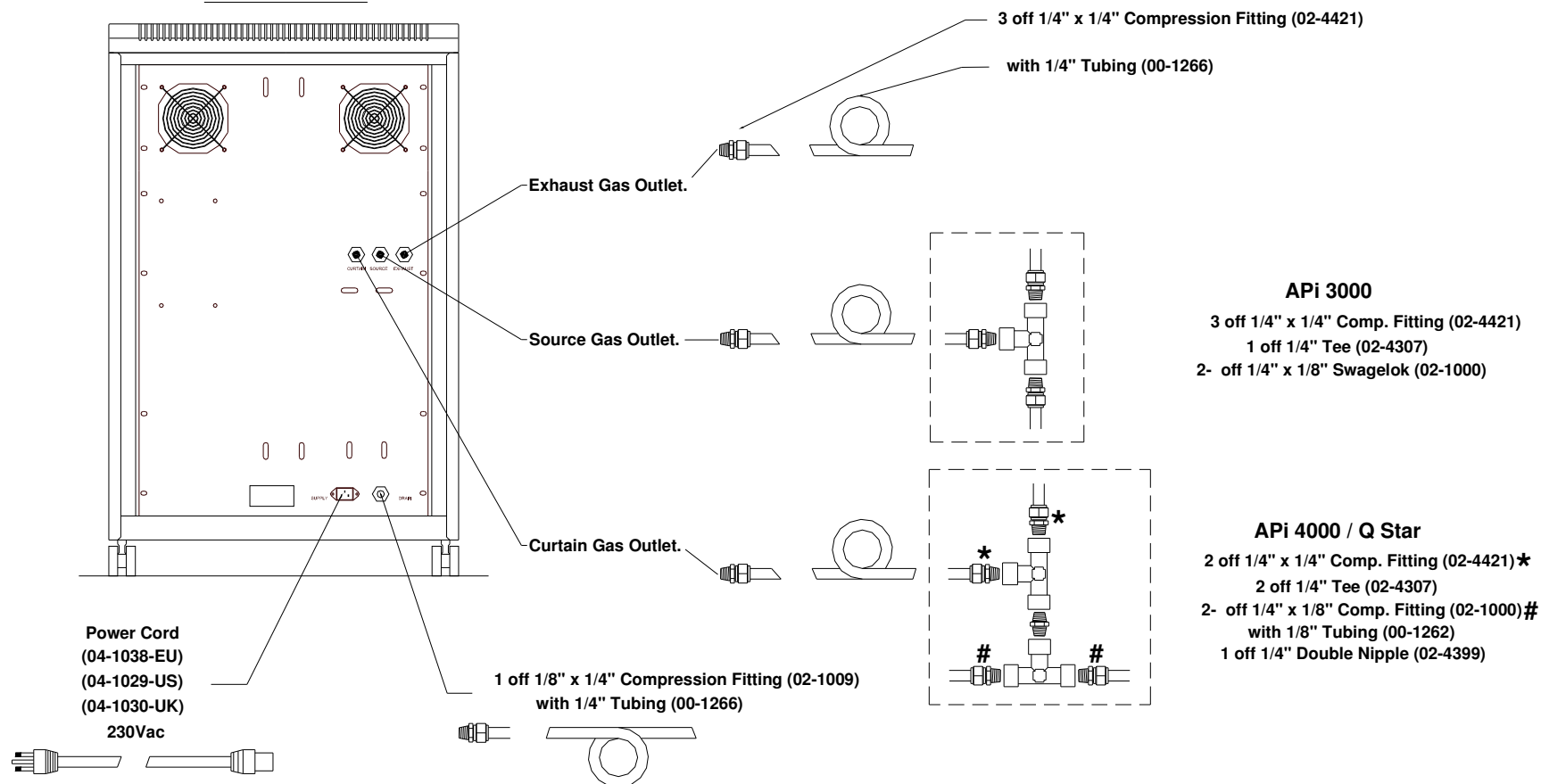
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5 Connection to the Instrument

Rear View.



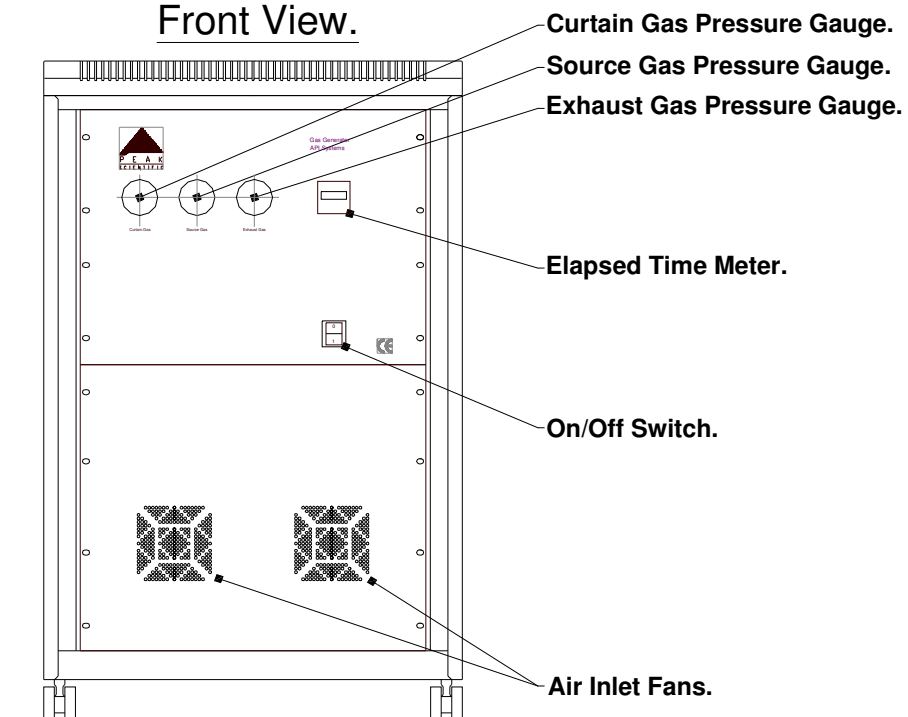
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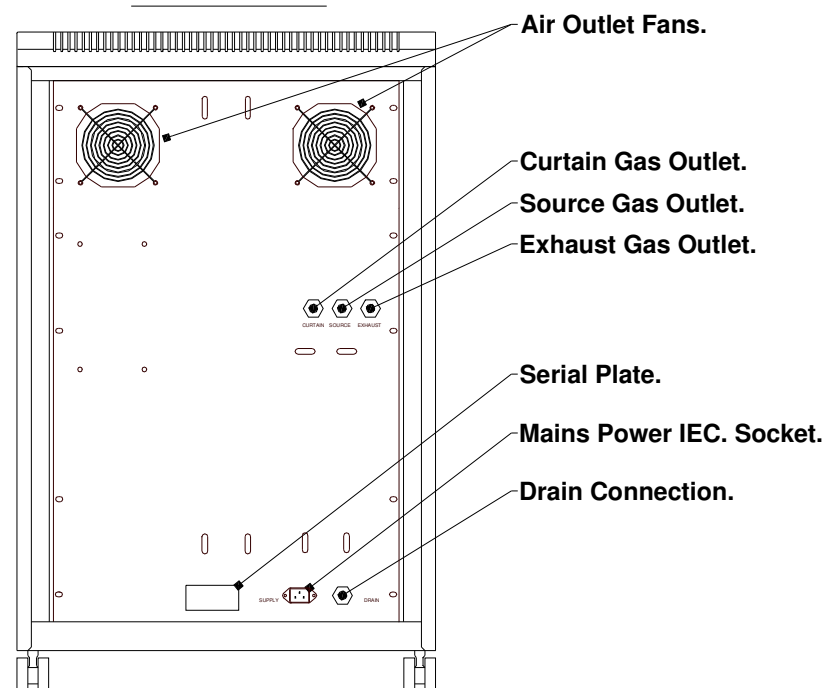


6 Generator Controls

Front View.



Rear View.



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7 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.

The Electrical requirement is 230Vac (50/60 Hz), 5.0 Amps

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

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

8 Operator Training

The NM20ZA Laboratory Gas Generator is designed specifically to minimize operator involvement. Given that the generator 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 flows and pressures noted below.

CURTAIN	5 litres per min (ATP)	60 PSI.G
SOURCE	22 litres per min (ATP)	100 PSI.G
EXHAUST	8 litres per min (ATP)	60 PSI.G

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 litres 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.

9 START-UP Sequence.

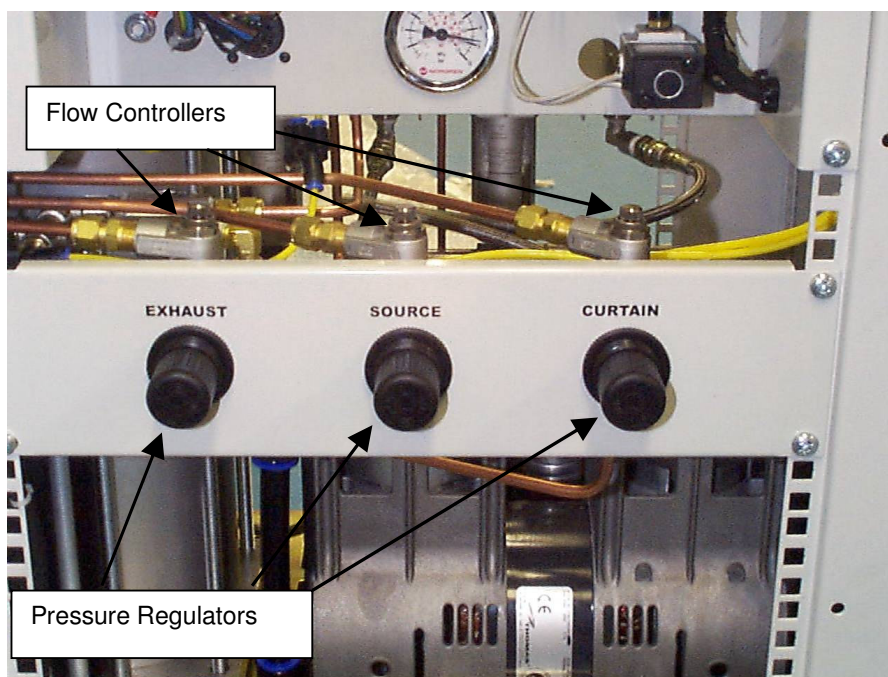
With the generator installed as described previously, disconnect the Curtain, Source and Exhaust gas outputs (**ENSURING THAT ANY INTERNAL PRESSURE HAS BEEN SAFELY DISSIPATED**), and switch the generator on. The on/off switch should illuminate and the cooling fans should start immediately. There will 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.

CURTAIN	5 litres per min (ATP)	60 PSI.G
SOURCE	22 litres per min (ATP)	100 PSI.G
EXHAUST	8 litres per min (ATP)	60 PSI.G

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.

10 Pressure & Flow Settings.

Output pressures and flow rates are controlled by pressure regulators located behind the left side panel as shown below. The Factory settings for the 3 outputs are shown above:-



The above settings should allow the PSI Gas Station to be operated with all standard configurations for the Api range of LC/MS/MS instruments. Should the above settings not provide sufficient flow or pressure for your application please contact the factory for assistance.

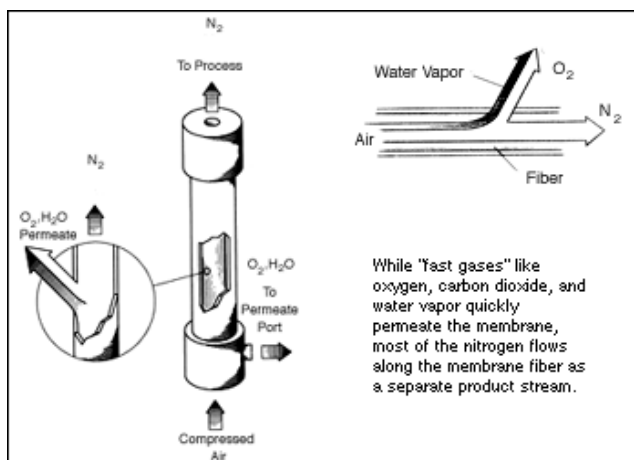
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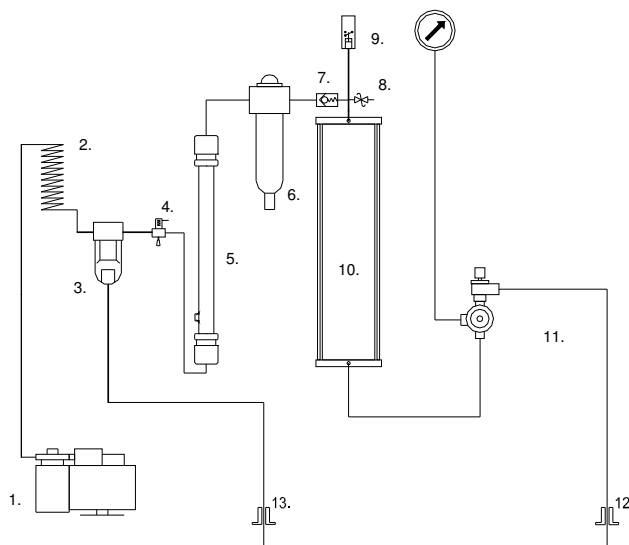


11 Principal of Operation.

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 Fibre 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).



12 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 can be seen below.

Isolating the Generator:

- a) Switch off the unit & disconnect it from the application.
- b) Unplug the generator from the mains supply and remove the power cord from the rear of the unit.
- c) Remove the Left hand (when viewed from the front) side panel and ensure the 2 pressure gauges on the electrical panel read zero.

Maintenance Schedule

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**

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Compressor Inlet Filters.

Introduction:

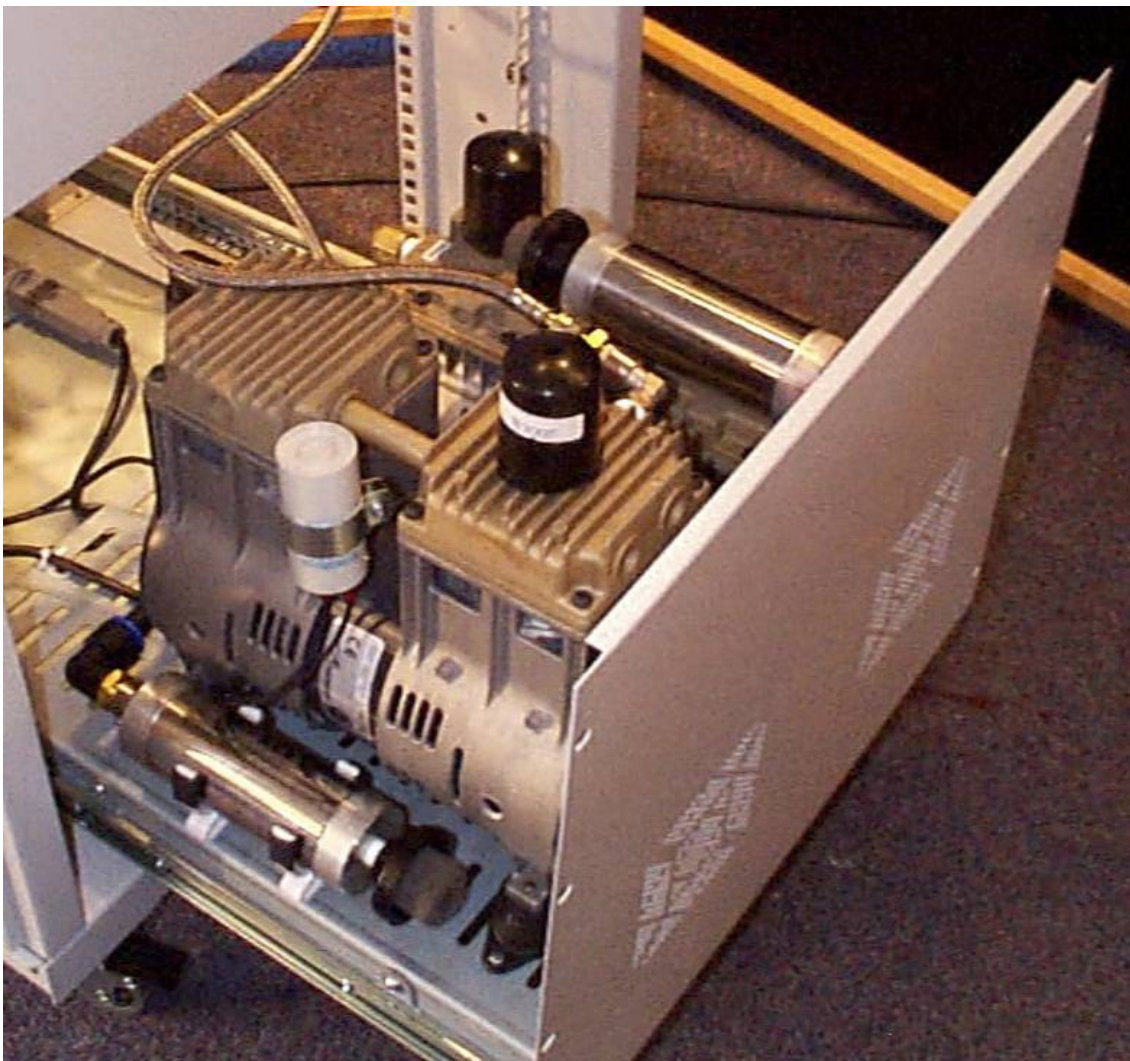
The Compressor Inlet Filters are located next to the Air Compressors and are accessed through the lower front panel, which is attached to the compressor tray.

Procedure:

ENSURE THE GENERATOR IS IN THE SAFELY ISOLATED CONDITION AS DESCRIBED ABOVE BEFORE CARRYING OUT ANY MAINTENANCE.

NOTE: - Compressed gas systems are dangerous and attempting to remove or open any component whilst under pressure could result in injury or death.

Remove the 8-off fixing screws securing the Lower Front Panel and push forward the sliding tray as shown.

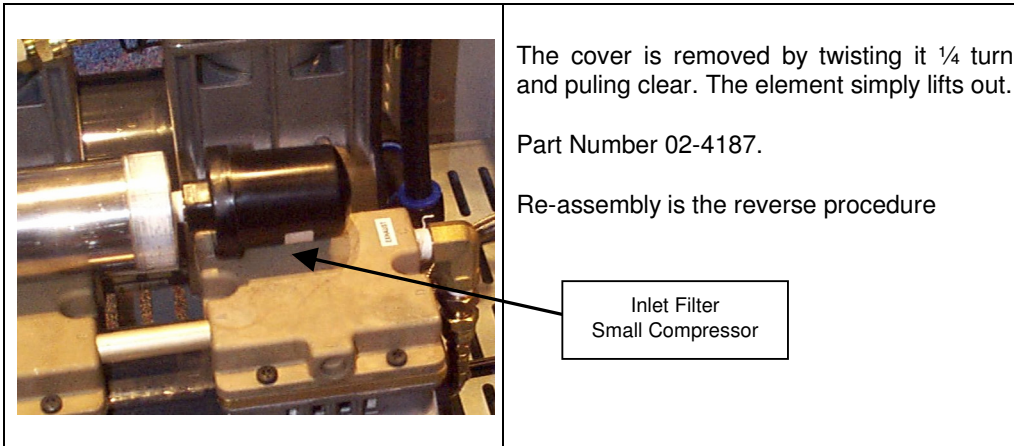


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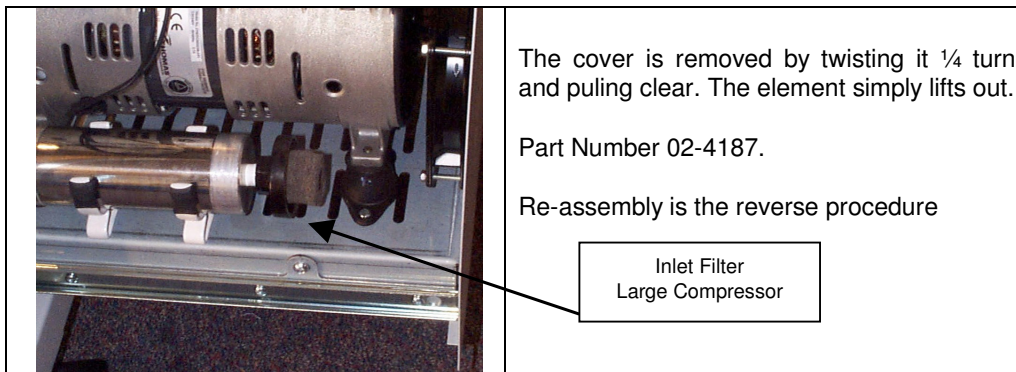
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1. **Small Compressor:** - The filter is located on top of the compressor facing towards the rear as shown below.



2. **Large Compressor:** - The filter is located on the tray at the left hand side towards the front.



Once the filters are replaced, carefully slide the tray back into place ensuring that the power cables and silver braided hoses are clear of all obstructions. Re-fit the 8-off screws ensuring they are properly tightened to prevent vibration.

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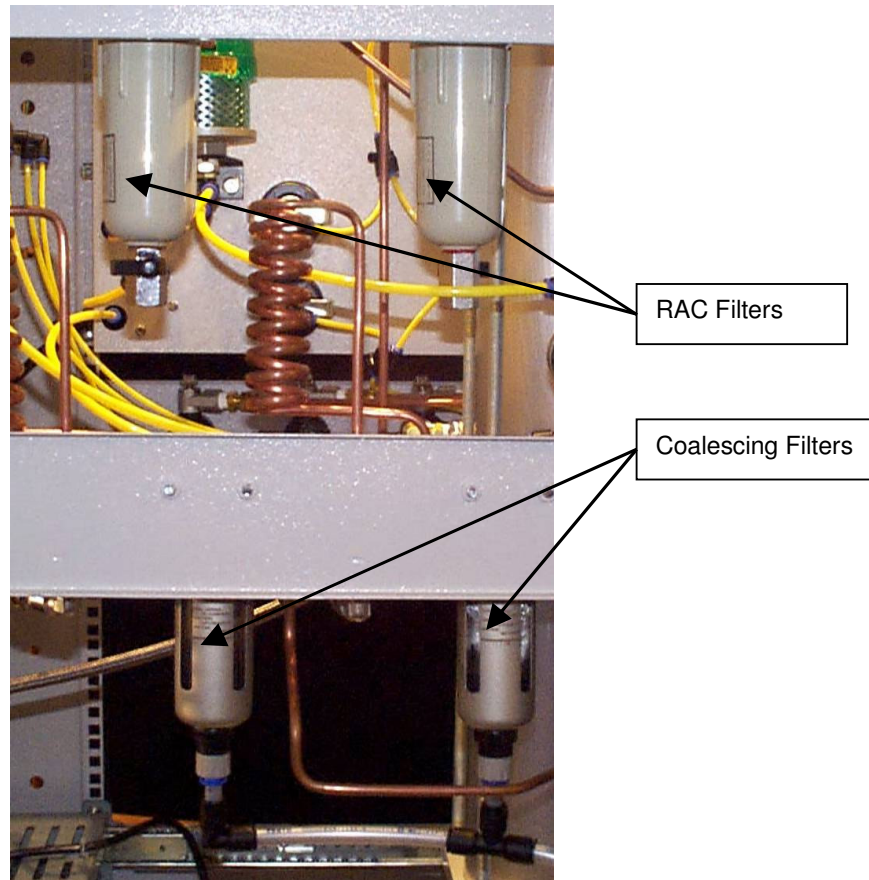
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Filter Separator Elements.

Introduction:

The In-Line Coalescing and RAC Filters are located on the side rails and accessed through the Right Side Panel and are arranged as shown.



Procedure:

ENSURE THE GENERATOR IS IN THE SAFELY ISOLATED CONDITION AS DESCRIBED ABOVE BEFORE CARRYING OUT ANY MAINTENANCE.

NOTE: - Compressed gas systems are dangerous and attempting to remove or open any component whilst under pressure could result in injury or death.

Un-lock and remove the right side panel.

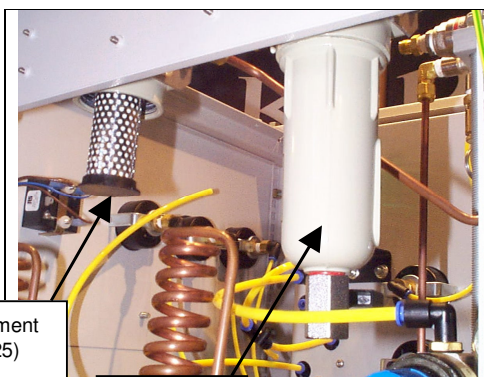
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Filter Replacement

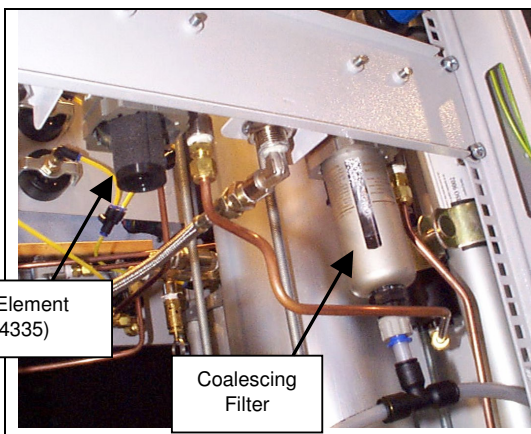


Filter Element
(00-4425)

RAC
Filter

RAC Filter :-

Remove Filter Bowl by un-screwing in a counter-clockwise direction. The element (Part No 00-4425) is removed by pulling downwards. Re-assembly is the reverse procedure.



Filter Element
(02-4335)

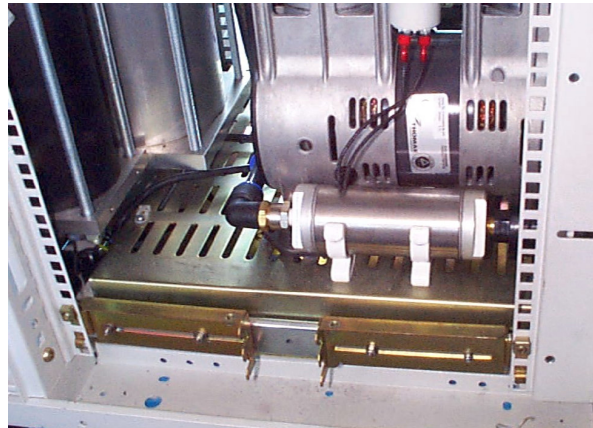
Coalescing
Filter

Coalescing Filter :-

Remove Filter Bowl by pulling down the black slide with your thumb and rotating the bowl 1/4 turn. The element (Part No 02-4335) is removed by unscrewing in a counter-clockwise direction. Clean the bowl with a damp cloth prior to re-assembly. Re-assembly is the reverse procedure. Ensure the drain pipe is secure in the fitting at the bottom of the bowl

Compressor Maintenance

It is not envisaged that the compressors would be serviced on site, but that the complete tray assembly would be exchanged as required. Earlier models of the generator may have an older style gold compressor tray as shown below, if this is the case then please refer to the COMPRESSOR TRAY UPGRADE document available from our factory.



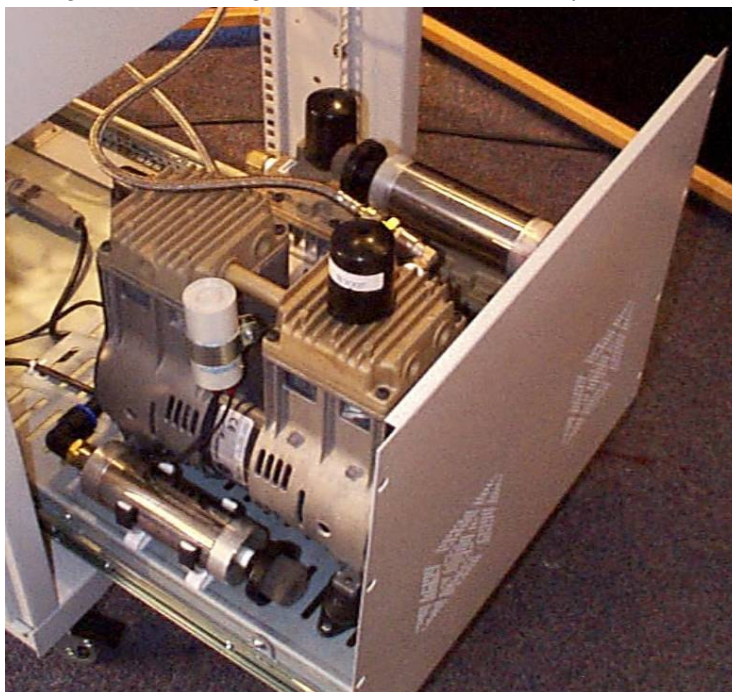
The **Elapsed Time Meter** on the front panel indicates the Compressor Running Hours.

Procedure for Exchanging the Compressor Tray.

ENSURE THE GENERATOR IS IN THE SAFELY ISOLATED CONDITION AS DESCRIBED ABOVE BEFORE CARRYING OUT ANY MAINTENANCE.

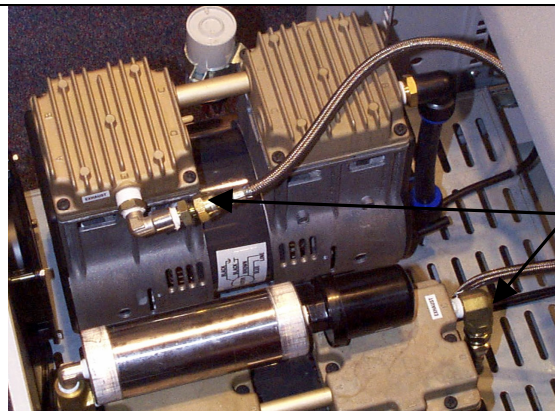
NOTE: - Compressed gas systems are dangerous and attempting to remove or open any component whilst under pressure could result in injury or death.

Remove the 8-off fixing screws securing the Lower Front Panel and pull out the sliding tray as shown.

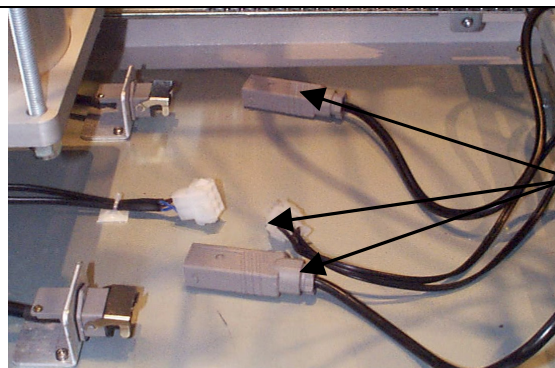


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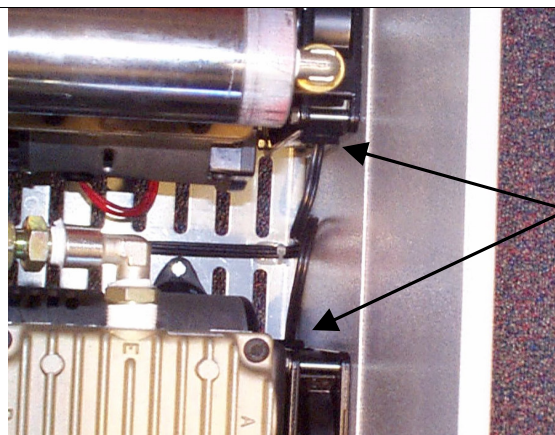
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Disconnect the two braided hoses to the compressors



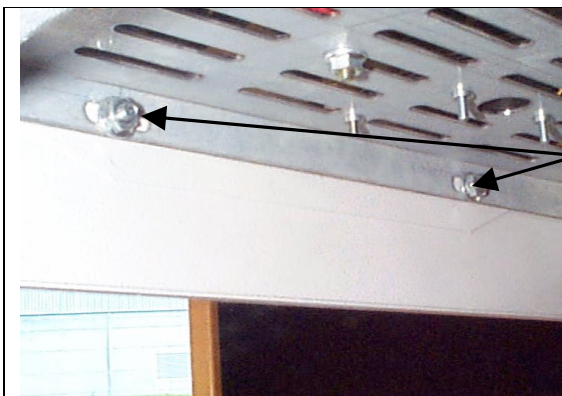
Disconnect the two grey compressor plugs (ensuring the metal clip has been loosened) and the white fan plug.



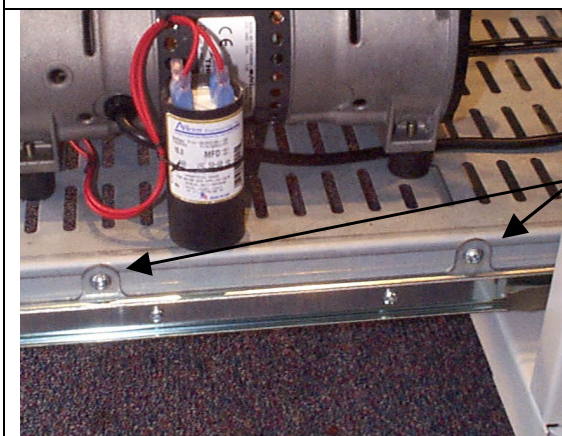
Disconnect the two black plugs from the front panel fans.

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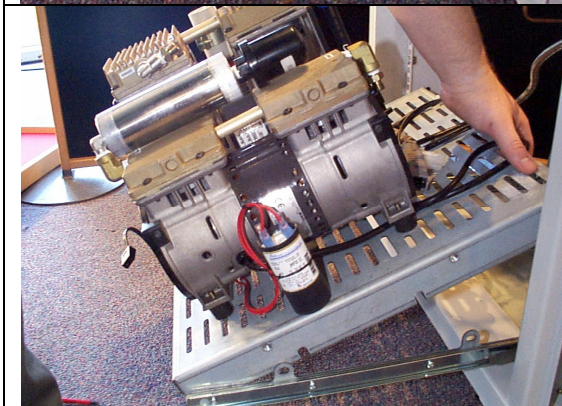
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Remove the 2-off nuts securing the front panel to the underside of the compressor tray & lift the panel clear.



Remove the four fixing screws from the sides of the compressor tray.

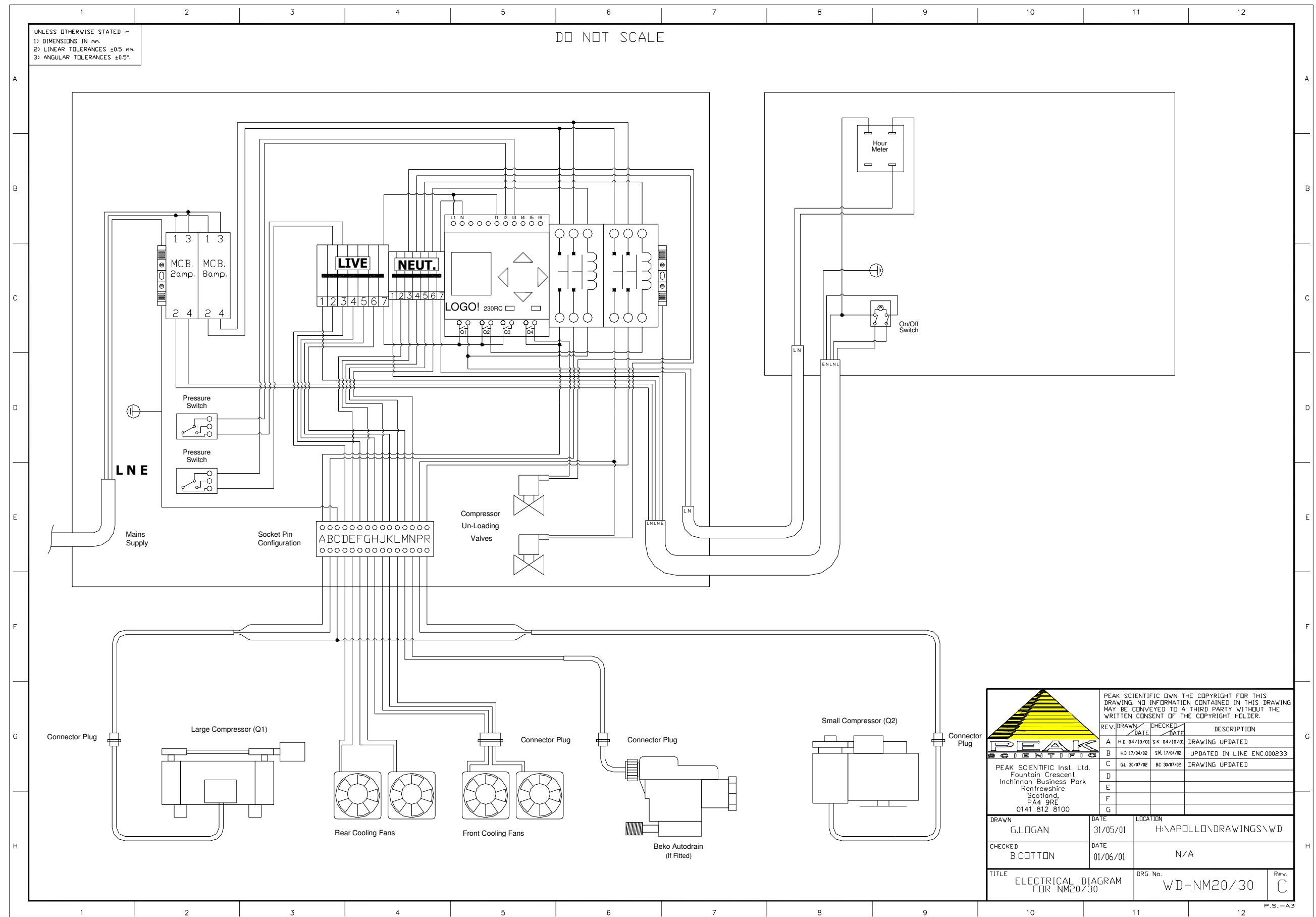


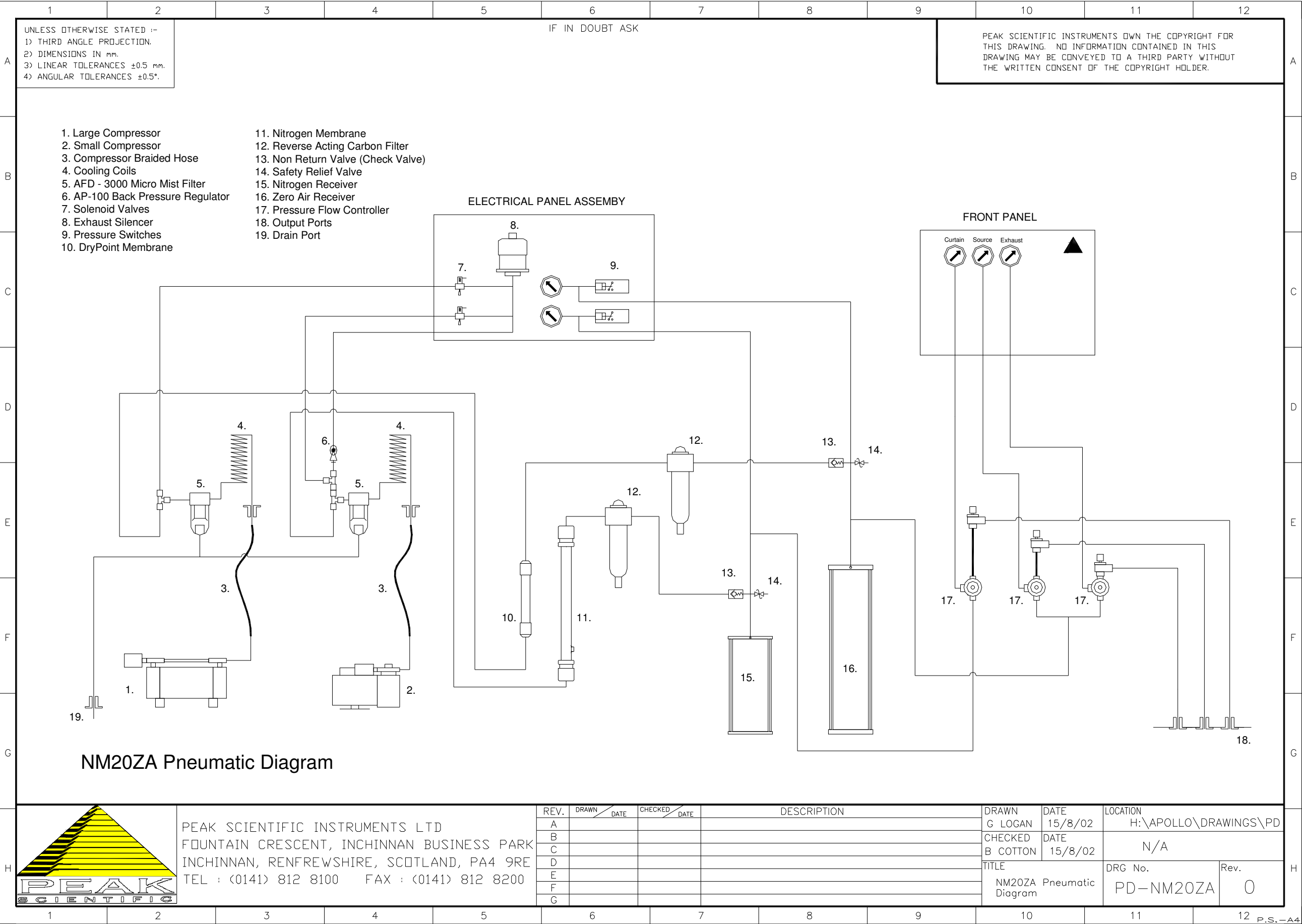
The tray assembly can now be lifted clear.

Re-assembly is the reverse procedure. After re-fitting switch the generator on and check for leaks.

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15 Parts List

	Peak Part #	App.Bio Part#
Preventative Maintenance		
Annual Service Kit	08-4434	WP084434
Reverse Acting Carbon Filter Element	00-4425	
AFD-3000 Micro Mist Filter Element	02-4335	WP024335 (Avail Sep)
Compressor Inlet Filter Element	02-4187	
Pneumatic Parts		
Tubing, Nylon 4MM Yellow	00-1305	WP001305
Tubing, Nylon 6MM Yellow	00-1306	WP001306
Safety Relief Valve	02-4544	
Non Return Valve (Check Valve)	02-4546	
Panel Mounted Gauge	02-1020	WP021020
DryPoint Membrane	06-4441	WP064441
Nitrogen Membrane	08-5075	WP085075
AFD-3000 Micro Mist Filter Assy	02-4486	WP024486
Exhaust Silencer Element	02-4336	WP024336 (Avail Sep)
Reverse Acting Carbon Filter	02-4552	WP024552
Electrical Parts		
On/Off Switch	04-1005	
Elapsed Time Meter	04-4414	
Rear Cooling Fan	08-5068	
Front Cooling Fan	04-1021	WP041021
Inlet Electrical Filter	04-4434	
Sub Assemblies		
Electrical Panel	08-4479	WP084479
Solenoid Valve	08-4482	WP084482
Pressure Switch	08-4481	WP084481
Motor Contactor	04-4439	WP044439
2 amp Circuit Breaker	04-4436	
8 amp Circuit Breaker	04-4437	
Programmable Logic Controller (PLC)	08-1104	WP081104
Compressor Tray Assembly	08-4649	WP084649
Compressor Braided Hose	02-1100	
Large Compressor Assy	08-4643	WP084643
Anti-vib Mount	06-1022	
Capacitor	04-4472	
Service Kit	06-5529	
Small Compressor Assy	08-4644	WP084644
Anit-vib Mount	06-1020	
Capacitor	04-4470	
Service Kit	06-5530	
Air Preparation Assembly	08-4513	
Valve – 130PSI Relief St/Steel 1/4" BSP M+F	02-1215	
Output Regulator Assembly	08-4484	
Pressure / Flow Controller	08-4486	
Preventative Maintenance		
Kit, Svc Flow Meters peak Gas Gen	08-5100	WP085100
Gauge Pressure 100mm 0-11 BAR for Service Engineers	02-4593	WP024593
CD, NM20ZA SERVICE INFO PEAK	NM20ZAV11	WPNM20ZAV11

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Notes:

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16 Maintenance Log

Model- NM20ZA.

Serial number : _____

Work Done	Remarks	Date	Name

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