

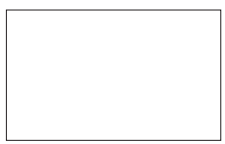


LC/MS Nitrogen Generators

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domnick hunter limited has a continuous policy of product development and although the Company reserves the right to change specifications, it attempts to keep customers informed of any alterations. This publication is for general information only and customers are requested to contact our Industrial Division Sales Department for detailed information and advice on a products suitability for specific applications. All products are sold subject to the Company's standard conditions of sale.

www.domnickhunter.com
a member of the domnick hunter group plc





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Stock No: 176270600 Rev 000

User Guide

8. Declaration Of Conformity

DECLARATION OF CONFORMITY FOR LCMS12-2, LCMS10 to LCMS40 97/23/EC, 98/37/EC		GB
<p>Name of manufacturer or supplier domnick hunter ltd.</p> <p>Full postal address including country of origin Dukesway, TVTE, Gateshead, Tyne & Wear NE11 0PZ United Kingdom</p> <p>Place of issue: Gateshead</p> <p>Description of product: Nitrogen Gas Generator</p> <p>Name, type or model, batch or serial number LCMS12-2, LCMS10 to LCMS40</p> <p>Directives used Low Voltage Directive: 73/23/EEC EMC Directive: 89/336/EEC Pressure Equipment Directive: 97/23/EC Machinery Directive: 98/37/EC 93/68/EEC, 92/31/EEC</p> <p>Standards used, including number, title, issue date and other related documents Generally in accordance with ASMEVIII Div 1 : 2003 and Pressure Equipment Directive essential safety requirements BS EN ISO 12100-1:2003, BS EN ISO 12100-2:2003 EN 61000-6-2:2001, EN 61000-6-3:2000, EN 61000-3-3:1995 BS EN 61010-1:2001</p>		
Notified body for PED Regulations: Lloyds Register of Shipping 71 Fenchurch St. London EC3M 4BS EC Type Examination Certificate: TBA		Conformity Assessment Route : A
<p>Name of authorised representative BARRY WADE</p> <p>Position of authorised representative Business Improvements Manager</p> <p>Full postal address if different from above As above</p> <p>Declaration I declare that as the authorised representative, the above information in relation to the supply / manufacture of this product, is in conformity with the standards and other related documents following the provisions of the above Directives</p>		
Signature of authorised representative		

7. WARRANTY

This warranty applies to LC/MS NITROGEN GENERATORS and associated parts (the Equipment) manufactured and supplied by **domnick hunter ltd (domnick hunter)**.

Use of the LC/MS NITROGEN GENERATOR without the recommended inlet air quality or genuine parts will expressly invalidate the warranty.

Should the Equipment be defective as to materials or workmanship, **domnick hunter** warrants that it will remedy such defect. Where the Equipment is a LC/MS NITROGEN GENERATOR, the warranty period will be 12 months from date of commissioning or 18 months from date of manufacture, whichever is the earlier. In the case of Equipment other than a LC/MS NITROGEN GENERATOR, the warranty period shall commence from the date of despatch. Should any defect occur during the warranty period and be notified in writing to **domnick hunter** or its authorised distributor within the said period, **domnick hunter** will, as its sole option, remedy such defect by repair or provision of a replacement part, provided that the Equipment has been used strictly in accordance with the instructions provided with each item of Equipment and has been stored, installed, commissioned, operated and maintained in accordance with such instruction and with good practice. **domnick hunter** shall not be under any liability whatsoever under the warranty, if, before giving notification in writing to **domnick hunter** as aforesaid, the Customer or any third party meddles, interferes, tampers with or carries out work whatsoever (apart from normal maintenance as specified in the said instructions) in relation to the Equipment or any part thereof.

Any accessories, parts and equipment supplied by **domnick hunter** but not manufactured by **domnick hunter** shall carry whatever warranty the manufacturer has given **domnick hunter** providing it is possible for **domnick hunter** to pass on such warranty to the customer.

To claim under the warranty, the goods must have been installed and continually maintained in the manner specified in the User Guide. Our product support engineers are qualified and equipped to assist you in this respect. They are also available to make repairs that may become necessary in which event they will require an official order before carrying out the work. If such work is to be the subject of a warranty claim, the order should be endorsed for consideration under warranty.

Where Equipment is sold outside the UK mainland direct to the end user the warranty will cover parts only. Any substitution of parts not manufactured or approved by **domnick hunter** will expressly invalidate the warranty.

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Thank you for purchasing a **domnick hunter** product. Correctly installed, and maintained in accordance with the recommended service intervals, this product will provide an uninterrupted supply of nitrogen gas, for the life of the product.

1. Safety Warnings

Do not operate this gas generator until the instructions in this manual have been read and understood by all personnel concerned.

When handling, installing or operating this gas generator, personnel must employ safe engineering practices and observe all related regulations, health & safety procedures and legal requirements for safety.

Most accidents that occur during the operation and maintenance of machinery are the result of failure to observe basic safety rules and procedures. Accidents can be avoided by recognising that any machinery is potentially hazardous.

domnick hunter can not anticipate every possible circumstance which may represent a potential hazard. The warnings in this manual cover the most known potential hazards, but by definition can not be all-inclusive. If the gas generator user employs an operating procedure, item of equipment or a method of working which is not specifically recommended by **domnick hunter** the user must ensure that the gas generator will not be damaged or made a potential hazard to persons or property.

The gas generator will have warning/hazard labels attached, a list of warning labels and their meaning is given below: -



General Warning



Read Manual



Risk of Electric Shock



Pressurised Components on System



May Start Automatically Without Warning



Use Forklift Truck

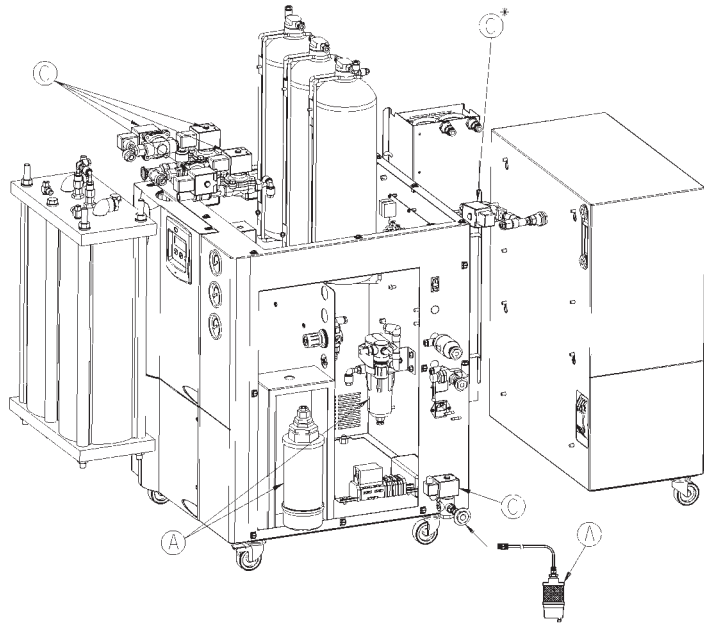


Use Lifting Equipment

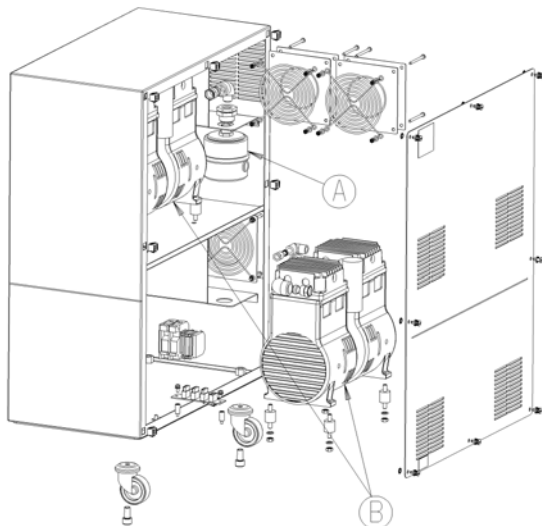
6. Troubleshooting

Problem	Indication	Possible Cause	Action Required
No power to unit	Power On indicator not illuminated	Isolated at supply	Check isolator & switch on
		Power on switch in 'OFF' position	Check power on switch & switch on
		Fuse blown	Check fuse & replace
		Power lead not connected	Check lead connected & connect
		Loose connection inside generator	Consult domnick hunter Service Dept.
		Connected incorrect voltage supply	Check rating plate voltage for suitability
Reduced delivery pressure	Outlet pressure gauges	Compressor failure (option 1 units only)	Check compressor is running, consult domnick hunter Service Dept.
		Compressor over-heating due to insufficient ventilation	Check ventilation clearance & rectify
		Leaking outlet pipe-work	Check pipe-work & rectifier
		Pressure regulator set low	Check pressure regulator setting & reset
		Service interval exceeded	Check service timers and service
		Leaking inlet pipe-work (option 0 units only)	Check pipe-work & rectify
		Inlet pressure set low	Check inlet pressure & increase
		Inlet (option 0 units only) or outlet pipe-work diameter too small	Check pipe-work diameter & replace
Reduced purity	Downstream monitoring	Demand greater than supply capability	Check requirements against original sizing data
		Leaking outlet pipe-work	Check pipe-work & rectify
		Unsuitable pipe-work used on outlet	Check pipe-work and replace
		Generator recently brought online	Check & allow at least 6-hours for purity to be achieved
		Inlet air supply ISO8573.1 2001 air quality class 2.-.1 (option 0 units only)	Check inlet air quality & rectify

SERVICE KIT A - FILTER OVERHAUL
 SERVICE KIT C - VALVE OVERHAUL
 SERVICE KIT C * - AIR INLET OVERHAUL



SERVICE KIT A - FILTER OVERHAUL
 SERVICE KIT B - COMPRESSOR CHANGE



Nitrogen is not a poisonous gas but, in a concentrated form, there is a risk of asphyxiation. The gas generator produces a flow of nitrogen (and air on some options) which quickly disperses in the atmosphere. However, do not directly inhale the output gas from the outlet pipes.

The gas generator is classified as non-hazardous for transportation purposes and as non-flammable for fire regulations. Any fire should be fought by means appropriate to the material causing the fire with the exception being the use of water.

Ensure that the product is de-pressurised and electrically isolated, prior to carrying out any maintenance activity.

This product should be installed in accordance with the recommendations outlined in this manual. Commissioning and service should be undertaken by a domnick hunter trained and approved engineer to maintain warranty.

Extended warranty and tailored service contracts are available for this product. Please contact your local **domnick hunter** sales office for a tailored service agreement to meet your specific requirements.

Note: Any interference with the calibration warning labels will invalidate the gas generator's warranty and may incur costs for the re-calibration of the gas generator.

Details of your nearest domnick hunter sales office can be found at www.domnickhunter.com.

2. Description

domnick hunter LC/MS Nitrogen Generators are designed to provide a constant supply of nitrogen gas to a pre-selected purity (and clean dry compressed air on some options).

The technology used to produce a continuous flow of nitrogen (and clean dry compressed air on some options) is pressure swing adsorption (PSA). This technology uses a combination of molecular sieves to selectively remove oxygen and other contaminants from the compressed air, leaving nitrogen.

The column(s) of molecular sieve alternate between purification and regeneration modes to ensure a continuous nitrogen supply.

2.1 Control Options

i) Air Supply

The gas generators are available with integrated compressor (option 1) or without integrated compressor (option 0). Option 0 units require a supply of compressed air to ISO8573.1 2001 air quality class 2.-.1

ii) Rapid Cycle Mode

The purity of the nitrogen gas will deteriorate when the generator is first returned online following a period of time in Standby. The time taken to return to pre-selected purity is dependent on the period of time that the gas generator was in Standby, the table below gives typical purity recovery times: -

Time in Standby (hours)	Typical Purity Recovery Time (minutes)
4	20
12	20
24	20
48	30
48+	60

Service	Typical Recommended Maintenance Intervals (Run Hours)									
	4000	8000	12000	16000	20000	24000	28000	32000	36000	40000
A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B		✓		✓		✓		✓		✓
C						✓				

Service	Typical Recommended Maintenance Intervals (Run Hours)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B		✓		✓		✓		✓		✓
C		✓						✓		

5.2 Service Kits

Service	Variant	Service Kit Number	
A	ALL	1	606272251
B	115V / 50-60Hz	2	606272261
	230V / 50-60Hz	3	606272253
C	115V / 50-60Hz	4	606272263
	230V / 50-60Hz	5	606272255
C*	115V / 50-60Hz	6	606272265
	230V / 50-60Hz	7	606272257

C * - Additional valve service kit also required with Service kit C for Opt 0 Units.

5. Service

5.1 Service Intervals

Description Of Maintenance Required		Typical Recommended Maintenance Interval				
Component	Operation	Daily	Weekly	6 Months 4000 Hrs	12 Months 8000 Hrs	36 Months 24000 Hrs
Generator	Check POWER ON indicator located on control panel is illuminated and cycles from red to green	C				
Generator	Check drain valve is discharging on a regular basis.	C				
Generator	Check for leaks		C			
Generator	Check pressure gauges during operation		C			
Generator	Ensure there is ventilation clearance around generator		C			
Generator	Check condition of electrical supply cables and conduits			C		
Generator	Replace filters Recommended Service A			R		
Generator	Replace compressor (Integral Compressor Units ONLY) Recommended Service B				R	
Generator	Replace Valves Recommended Service C					R

C - Check R – Replace

Rapid Cycle Mode enables the gas generator to flush impurities from the system following a period of time in Standby, enabling the pre-selected purity to be achieved in a faster time.



The gas generator can remain in Rapid Cycle Mode for up to 15 minutes, during which time no nitrogen gas is delivered to the application.

Important: If Rapid Cycle Mode is included on your gas generator and the above performance characteristics are unacceptable for your application, can be disabled via the keypad, refer to section 4.5 (Normal Operation) of this manual.

3 Technical Specification

3.1 Technical Data

Parameter	Units	LCMS 15		LCMS 20		LCMS 30		LCMS 40
Air Source								
Integral Compressor		No	Yes	No	Yes	No	Yes	No
Inlet Air Pressure	barg (psi g)	9.0 (130.5)	-	9.0 (130.5)	-	9.0 (130.5)	-	9.0 (130.5)
Maximum Inlet Air Temperature	°C (°F)	40 (104)						
Inlet Air Capacity	l/min (CFM)	-	85 (3.0)	-	85 (3.0)	-	85 (3.0)	-
Inlet Air Quality	ISO8573.1 2001	2.-.1	-	2.-.1	-	2.-.1	-	2.-.1
Nitrogen (N2)								
Outlet Flow	l/min (CFM)	15 (0.53)	15 (0.53)	20 (0.71)	20 (0.71)	30 (1.01)	30 (1.01)	40 (1.41)
Maximum Outlet Pressure	barg (psi g)	7 (101.5)						
Purity (with respect to O ₂)	%	<0.5		<1			<2	<1
Mechanical Connections								
Air Inlet	Insert Inlet	1/4" Swagelok	-	1/4" Swagelok	-	1/4" Swagelok	-	1/4" Swagelok

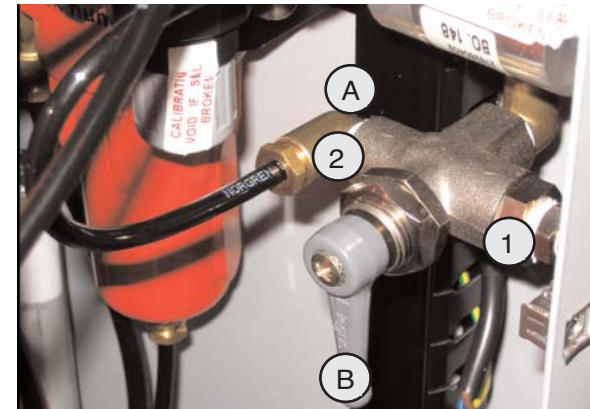
	Symbol							
Nitrogen Outlet		1/8" Swagelok						
Nitrogen Outlet with Mass Flow controller		1/8" Swagelok						
Electrical Connections								
115V Variants								
Connection Type		IEC320						
Operating Voltage Range	V	115+ / -10% / 50Hz / 60Hz / 1phase + protective earth						
Maximum Current	A	1.6	11.6	1.6	11.6	1.6	11.6	1.6
Fuse Rating	A	2.0 Anti Surge	12.5 Anti Surge	2.0 Anti Surge	12.5 Anti Surge	2.0 Anti Surge	12.5 Anti Surge	2.0 Anti Surge
230V Variants								
Connection Type		IEC320						
Operating Voltage Range	V	230+/-10% / 50Hz / 60Hz / 1phase + protective earth						
Maximum Current	A	0.8	5.8	0.8	5.8	0.8	5.8	0.8
Fuse Rating	A	2.0 Anti Surge	6.3 Anti Surge	2.0 Anti Surge	6.3 Anti Surge	2.0 Anti Surge	6.3 Anti Surge	2.0 Anti Surge
Environment								
Minimum Ambient Temperature	°C (°F)	+5 (41)						
Maximum Ambient Temperature	°C (°F)	40 (104)						

4.7 Special Functions

Bypassing Mass Flow Controller

The integral mass flow controller should only be bypassed if there is a mass flow controller fitted to the inlet of the downstream equipment, and the mass flow controller is set to the maximum outlet flow of the gas generator.

- Shutdown the gas generator following the procedure outlined in 4.6 above.
- Remove the service cover from the gas generator and locate the 3-way bypass valve. The bypass valve handle should be in the down position (B), this will direct the gas flow through the integral mass flow controller.



Valve in Bypass Position

- Rotate the valve handle clockwise to the up position (A), this will redirect the gas flow bypassing the integral mass flow controller.
- Remove blanking plug from port 1, and screw into port 2.
- Connect the application pipe-work to port 1.
- Replace the service cover.
- Set the external mass flow controller to the maximum outlet flow of the gas generator.
- Start up the generator.

4.5 Normal Operation

The gas generator is designed to run continuously without any intervention.

If Rapid Cycle Modes are activated, the gas generator will not supply nitrogen gas to the application for up to 15-minutes following a period of time.

To disable Rapid Cycle Mode follow instructions below: -

- Return the generator to Standby Mode, by following the on screen instructions.
- When “STANDBY” is displayed, press and hold the Down Key and the Return Key for 5-seconds.
- Switch Rapid Cycle Mode on and off using the Up Key and the Down Key.
- Return to “STANDBY” by pressing the Return Key.

In the event of any kind of interruption to the operation, the unit must be run for 1-hour offline (i.e. no gas to application) to enable the purity to recover.

4.6 Shutdown

The generator will contain a residual internal pressure that must be released if unit is to be shipped or serviced. In order to depressurise the unit follow the instructions below: -

- Close isolation valves fitted to the system (refer to 4.4 Initial Start-Up – System Configurations).
- Return the generator to Standby Mode, by following the on screen instructions.

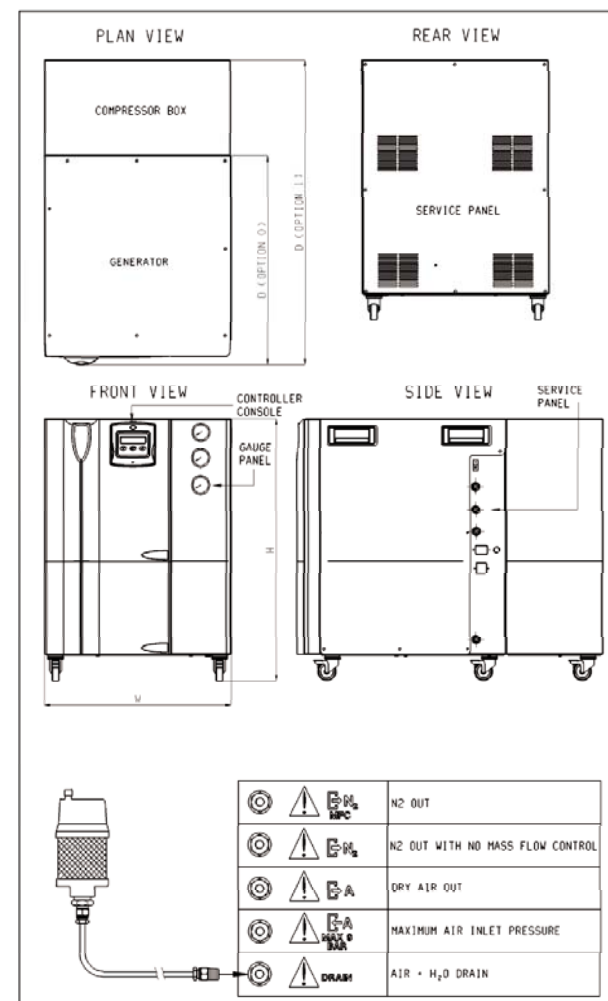
Note: When the generator is shutting down the unit may continue to run for up to 10-minutes. This will permit the unit to finish its cycle and ensures that the inlet pipe-work & columns are fully depressurised

- Switch off the electrical supply to the generator and disconnect.
- Disconnect the inlet pipe-work (non-compressor models only).
- Blank the inlet, outlet and drain ports.
- Allow 30-minutes for the compressor/s to cooldown (integral compressor units only).

3.2 Dimensions

Dimensions								
Height	mm	705						
	(inches)	(27.8)						
Width	mm	510						
	(inches)	(20.1)						
Depth	mm	559	826	559	826	760	826	760
	(inches)	(22.1)	(32.5)	(22.1)	(32.5)	(29.9)	(32.5)	(29.9)
Weight	kg	89	129	89	129	135	129	135
	(lbs)	(196)	(284)	(196)	(284)	(298)	(284)	(298)

3.3 Configuration



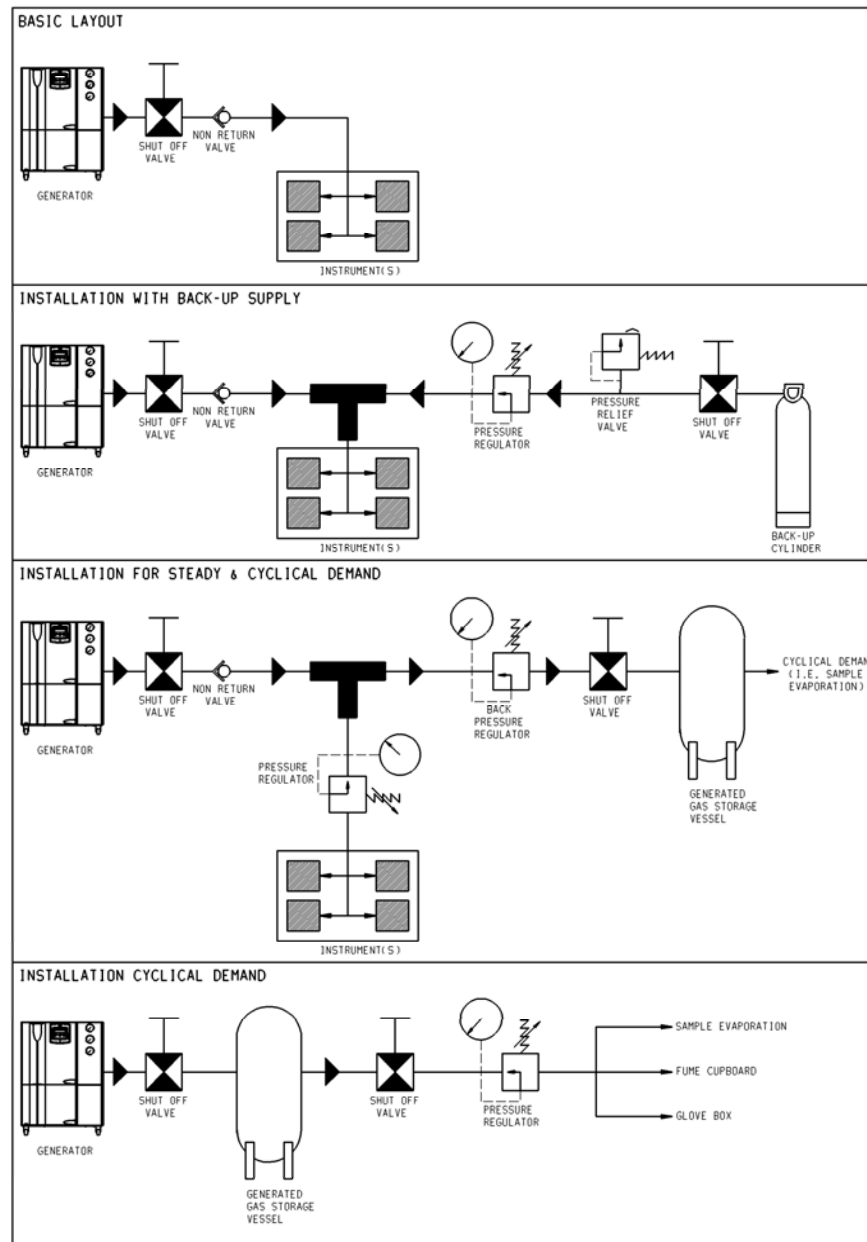
4.0 Installation

4.1 Unpacking

WARNING: Heavy unit not to be manually lifted.

- a) Using appropriate sized pallet truck position the packing crate on a level surface leaving enough surrounding space for unpacking & removal of the unit. Once positioned in a suitable location remove & dispose of all strapping.
- b) Use the tool provided & follow this procedure when removing each fastening clip. Place one hand at the base of the clip holding it firmly in place. With the other hand place the end of tool underneath one end of the clip & prise out using an anti-clockwise motion.
- c) Remove the lid panel.
- d) Remove either one of the larger side panels.
- e) Remove the panel covering the back face of the unit (ply wood panel). Retain this panel along with one fastening clip to use as a ramp in procedure (k)
- f) Remove the other remaining larger side panel.
- g) Remove the final panel covering the front face of the unit.
- h) Remove all foam inserts.
- i) Using ply wood panel from procedure (e) place end with slot for clip onto the recess of the crate base (side with slot for clip), creating a ramp.
- j) Using one of the fastening clips removed, insert the longest end into the slot on the ramp & push remaining end into the slot on the base. Now test the ramp to ensure it is securely fastened.
- k) Leave the unit in the bubble wrap &, whilst supporting the unit, slowly wheel down the ramp.
- l) Finally remove & dispose of the bubble wrap packing ensuring not to scratch the paint work.

Care should be taken and inspection undertaken during unpacking to ensure that the gas generator is not damaged.



System Configurations

4.4 Initial Start-Up

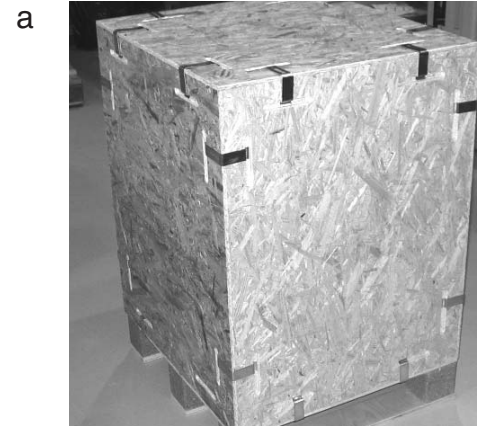
Should be undertaken by a **domnick hunter** trained and approved service engineer.

1. Switch on electrical power to the generator. The LCD & LED on the front console will illuminate.
2. Start the gas generator by pressing the return key on the console.
3. The generator will now display hours run, cycle from Red LED to Green LED and will produce an uninterrupted supply of reduced purity nitrogen gas. If the unit has Rapid Cycle Mode fitted and activated, "Rapid Cycle" will be displayed for the first few cycles and no gas will be delivered during this period.

Note: The generator should be run for a minimum of six hours prior to connection to the application, to ensure that the required purity of gas is achieved.

4. Ensure that the drain valve is discharging on a regular basis, if the drain line is blocked purity will not be achieved.
5. After a minimum of six hours the gas generator will produce an uninterrupted supply of high purity nitrogen gas (and clean dry compressed air on some models) and can now be connected to the application. Ensure that pipe-work is adequately supported.
6. Identify the required system configuration from those shown on the next page and connect to the application, using either copper or stainless steel tubing. Ensure that the correct tube is connected to the N2 Out (and Dry Air Out on some models) ports on the gas generator.

Note: The application supply pipe-work will need to be flushed through for one hour for every 10-metres of pipe-work, before normal purity is achieved.



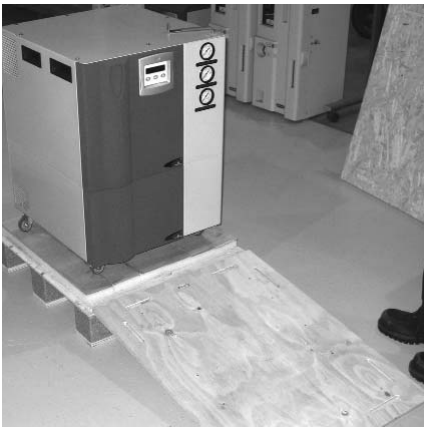
g



h



i



j



k



l



9

4.2 Installation Guidelines

1. Only a **domnick hunter** trained and approved service engineer should undertake commissioning.
2. Ensure that the gas generator is correctly sized for the application.
3. Identify a suitable location for the gas generator, ensuring the following: -
 - a) The gas generator should be installed on a flat surface
 - b) Environmental restrictions (refer to section 3.1 Technical Specification) are taken into consideration.
 - c) The gas generator should be located as close to the application as possible.
 - d) There is at least 100mm clearance, on both sides and rear of the generator, for ventilation.
 - e) Isolation valves should be fitted to the system (refer to 4.4 Initial Start-Up – System Configurations), these must be accessible when generator is installed.
 - f) The mounting surface is capable of supporting the weight of the gas generator (refer to section 3.2 Dimensions).
 - g) There is sufficient space around the gas generator for maintenance activities.
4. Ensure that the inlet air supply for non-compressor variants is treated to ISO8573.1 2001 air quality class 2.-.1

4.3 Connection

1. Remove blanking plugs and install fittings supplied with generator but do not connect to the application at this stage.
2. Ensure all ports and fittings are free from blockages and debris.
3. The Air Inlet connection of non-compressor units should be connected to an ISO8573.1 2001 air quality class 2.-.1 compressed air supply. Ensuring that all pipe-work is adequately supported.
4. Check rating plate for correct supply voltage and frequency. Connect the mains lead supplied to the electrical connector on the side of the generator and connect to a suitably rated power supply complete with protective earth.

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