

## USER & MAINTENANCE MANUAL DOCUMENT

FOR

### NITROGEN GENERATION PLANT



User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

## Document Prepared and Published By:

# NEOMETRIX ENGINEERING (P) LIMITED.

E-148, SECTOR-63, NOIDA, UP, INDIA - 201301

PHONE: 0120-4500 800, FAX: 0120-4500 888

[contact@neometrix.in](mailto:contact@neometrix.in), [www.neometrix.in](http://www.neometrix.in)

## Table of Contents

Sl No	Description	Page No
1.	<b>Introduction</b>	
2.	<b>General Guidelines</b>	5
3.	<b>Product description</b>	6
3.1	Nitrogen Outstanding Features and Applications	6
3.2	PSA technique	7
3.3	Nitrogen Specifications	8
3.4	Nitrogen Plant General Layout	9
3.5	Adsorbent Material	9
4.	<b>Nitrogen Detailed parts and Functions</b>	10
5.	<b>Description of Operation</b>	12
6.	<b>Installation</b>	14
6.1	Unpackaging, Inspecting and handling	14
6.2	Pre-Installation instructions	15
6.3	Installation site requirements	16
6.4	Electrical power requirements	16
6.5	Feed inlet air supply	17

<b>7.</b>	<b>How to start the Generator?</b>	<b>18</b>
7.1	Initial start- up	19
7.2	Normal start up	19
7.3	Shutting down the generator	19
7.4	Extended shut down	20
7.5	Start- up after extended shut down	20
<b>8.</b>	<b>Maintenance</b>	<b>20</b>
8.1	Replacing filter element	22
8.2	Leak test procedure	23
8.3	Pressure regulator adjustment procedure	24
<b>9.</b>	<b>Trouble Shooting</b>	<b>24</b>
<b>10.</b>	<b>PLC Control Panel and Usage</b>	<b>28</b>
<b>11.</b>	<b>Check List</b>	<b>29</b>
<b>12.</b>	<b>Spare Part List</b>	<b>30</b>

## **1. Introduction**

Congratulations on your purchase of a **NEOMETRIX ENGINEERING PVT LTD. Pressure Swing Adsorption (PSA) type Nitrogen Generator**. This simple, turnkey machine provides a cost-effective means for on-site generation of nitrogen. The Nitrogen Generator is based on the latest PSA technology and utilizes Carbon Molecular Sieve (CMS) to separate the nitrogen from the other gases contained in air. The Nitrogen Generator uses two beds of CMS to separate compressed air into a high-pressure nitrogen product stream and low pressure oxygen enriched waste stream. Pre-Filter and Fine filters are included to remove impurities from the feed air. Each Nitrogen Generator comes pre-tested and fine-tuned to meet the customer specified nitrogen flow rate and purity.

Since the system contains very few moving parts, maintenance and repairs are minimal. Maintenance is simple yet necessary. Air compressor and filter maintenance procedures are especially important and should be followed carefully. If the recommended maintenance procedures are followed, your nitrogen generator will provide you with many years of reliable service.

## Safety Information

### **WARNING**

Do not use this plant or any available optional equipment without completely reading these instructions and any additional instructional material such as user manuals, service manuals or instruction sheets supplied with this product or optional equipment. If you are unable to understand the warnings, cautions or instructions contact a professional, dealer or technical professional before attempting to use this equipment.

	<p>Caution, Read the User Guide.</p>	 <b>Warning</b>	<p>Highlights actions or procedures which, if not performed correctly, could lead to electric shock.</p>
 <b>Warning</b>	<p>Highlights actions or procedures which, if not performed correctly, may lead to personal injury or death.</p>		<p>When disposing of old parts always follow local waste disposal regulations.</p>
 <b>Caution</b>	<p>Highlights actions or procedures which, if not performed correctly, may lead to damage to this product</p>		<p>Highlights information relevant to an operating procedure or process</p>

- The operator must employ safe working practices and rules when operating the nitrogen generator.
- The owner is responsible for maintaining the unit in a safe operating condition.
- Completely depressurize the generator, tanks, and lines prior to performing any mechanical work, including changing the filters. The nitrogen must be vented to the outside or to a large, well-ventilated room to avoid suffocation due to lack of oxygen.
- Safety glasses should be worn if the cabinet door is open while the machine is operating.

## 2 GENERAL GUIDELINES

In order to ensure the safe installation, assembly and the operation of this on Nitrogen plant site, the following instructions MUST be followed strictly.

### **WARNINGS**

This section contains the important information for the safe operation and use of this plant.

Warning	Make sure that your back up/ emergency Nitrogen supply system connected to the manifold system. Without secondary Nitrogen supply system, Don't use this Plant.
Warning	Equipment must be placed in a well-ventilated Area ,Avoid inhalation of gases .
Warning	Nitrogen Plant, you must follow the procedure for service and maintenance instructions.
Warning	All tubes, hoses and piping used for Nitrogen plant must be compatible with Nitrogen.
Warning	Exhaust gas must be led by piping out of the room to outdoor atmospheric air .
Warning	The Panel contains electrical parts that may produce electrical hazard if not handled properly. To prevent electrical shock when servicing the plant, care must be taken. In general electrical installation and servicing is to be performed by trained or authorized personnel only .
Warning	Nitrogen and Air reservoir must be de-pressurized and purged thorough with air to remove all Nitrogen before service or inspection. Always vent Nitrogen to outdoor atmospheric air. Make sure there is no smoking or open flame.
Warning	Smoking should not be permitted in the area where the plant is located .
warning	Do not try to modify or enhance the performance of an Nitrogen plant in anyway .
Caution	Warranty will not covered <ol style="list-style-type: none"> <li>1. If Inlet air temperature below 5 and or above 40 deg C.</li> <li>2. Water, oil, rust, scale and/or other foreign objects carry overin the inlet air due to damaged filter elements and/or failure in drains.</li> <li>3. If the Inlet air quality not comply with ISO 8573 class 4</li> </ol>

Important	For safety, installation and operating etc. of compressor, dryer unit or other equipment refer to the concerned manuals of the equipment.
-----------	---

### 3 Product Description

Nitrogen generators are on-site Nitrogen gas generating plants. Our Nitrogen generators working on the Pressure swing adsorption technique.

The Nitrogen Generator is designed to provide a constant supply of nitrogen gas, at a pre-selected purity, flow, and pressure, as specified. The system uses proven Pressure Swing Adsorption (PSA) technology with Carbon Molecular Sieve (CMS) to separate N<sub>2</sub> from the atmosphere air and store it at a high purity level. The process is completely regenerative which makes it reliable and virtually maintenance free.

#### 3.1 Nitrogen Outstanding features and applications :-

✓ **High Reliability**

Low gas speeds through the molecular sieve beds, first-class components, stainless steel valve bodies and instrument air tubing, heavy-duty industrial PLC  
Manufactured to work .

✓ **Lowest Energy Consumption**

Energy cost is your major expense, not depreciation. Fast pay-back assured.

✓ **Easy Integration**

Easy installation and integration with existing equipment: All system tie-in points are on one side.

✓ **Safe**

Heavy-duty adsorption vessels, designed and certified for an unlimited 765`number of cyclic loads .

✓ **Customization**

Neometrix allows you to define your specific Twin-Tower PSA Nitrogen Generator adjusted to your individual need .

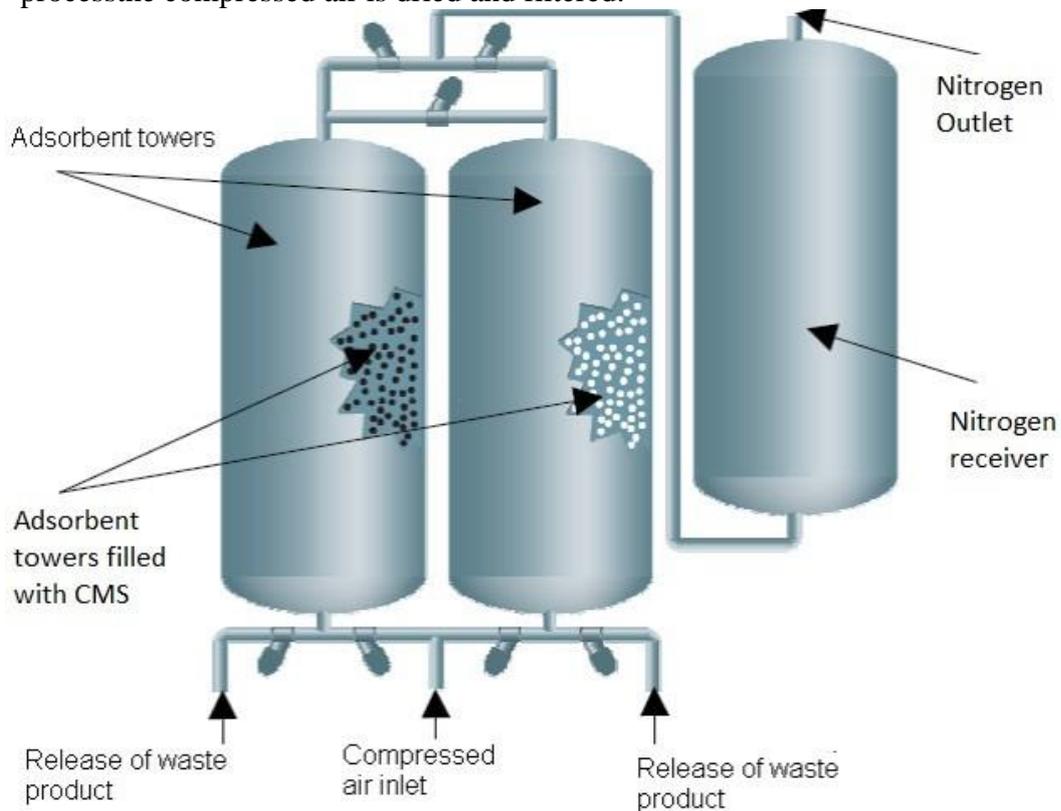
## 3.2 PSA Technique

Nitrogen PSA process can be described with following steps.

The PSA process starts as clean and dry compressed air enters the first cylinder (left). The unwanted gas is adsorbed by the pellets at high pressure, but the molecules you want pass through the sieves. The resulting high-purity gas is stored in the buffer tank.

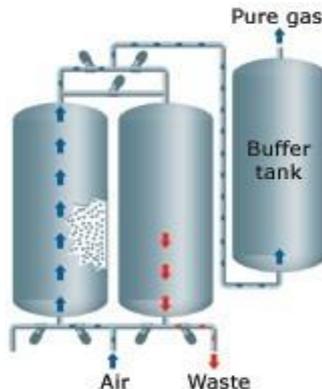
### 1. Compression, drying and filtering of input air:

The ambient air is compressed by an air compressor. Before entering the PSA process the compressed air is dried and filtered.



## 1. Oxygen adsorption on CMS bed:

Our PSA units have two cylinders filled with Carbon Molecular Sieve. (CMS). Compressed and purified air flows through the cylinder; the CMS bed adsorbs oxygen, while nitrogen passes through to the nitrogen accumulation tank. The adsorption process is interrupted before the CMS becomes saturated with nitrogen by diverting the input air to the second cylinder, which at this point starts producing nitrogen. During this step of the cycle, the second cylinder (right) is cleaned.

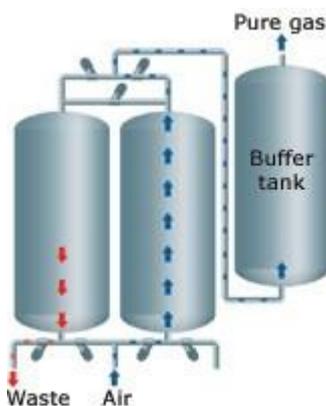


2. Next, the pressure between the two cylinders is equalized.



3. Oxygen desorption and CMS bed regeneration:

The CMS of the first cylinder (now saturated with oxygen) is regenerated by reducing pressure in the cylinder below that of the adsorption step. The adsorbed oxygen is released and vented into atmosphere. After this step it is again ready for another cycle.



4. Nitrogen accumulation in Surge tank:

Adsorption and desorption steps are repeated in the CMS tanks at equal time intervals.

A constant flow of nitrogen is stored to nitrogen surge tank.

## Adsorbent Material

The adsorbent used in the Nitrogen series is produced by a unique manufacturing process. The benefits of using this high performance desiccant include:

- ❖ Uniform in size  
Reduces pressure drop and channeling
- ❖ High crush strength  
Allows rapid pneumatic loading of towers

- ❖ Low abrasion

The low abrasion ensures less dusting during transport, loading, and service life which reduces pressure drop and minimizes downstream valve and filter plugging, common with dustier products.

## 3.3 Nitrogen Specifications

Neometrix makes Nitrogen generating plant are available at various models according to the users requirements of Nitrogen.

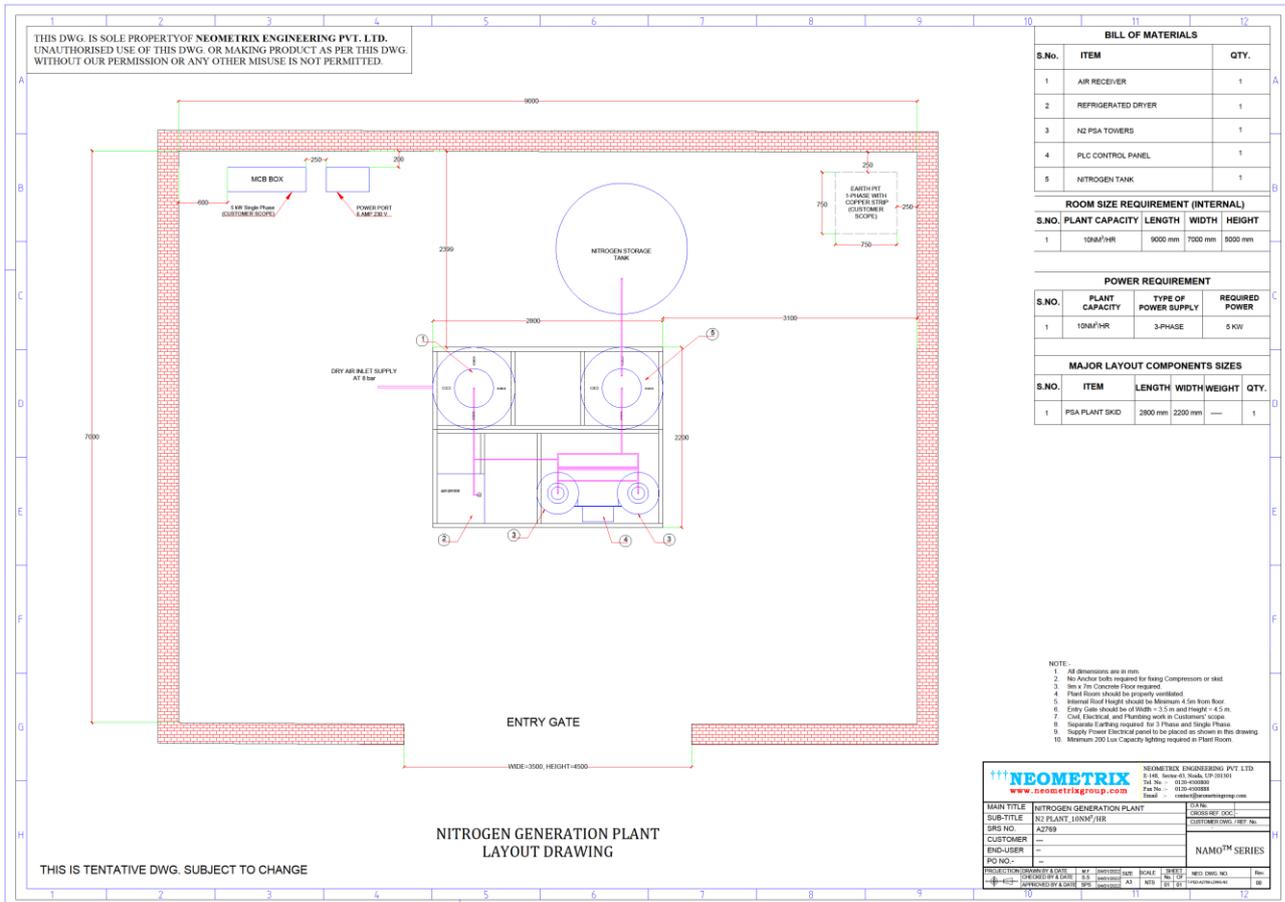
### **Specification**

Nitrogen Purity	: 95 to 99.99%
Rated operating pressure	: 7 bar (g)
Max working Pressure	: 9 bar (g)
Air Inlet Temperature	: 104 deg F max
Voltage	: 100-240 VAC 50/60 Hz, 1 Ph

## 3.4 Process Flow Diagram



## 3.5 Nitrogen Plant Layout



## 3.6 Nitrogen Plant GA Drawing:-

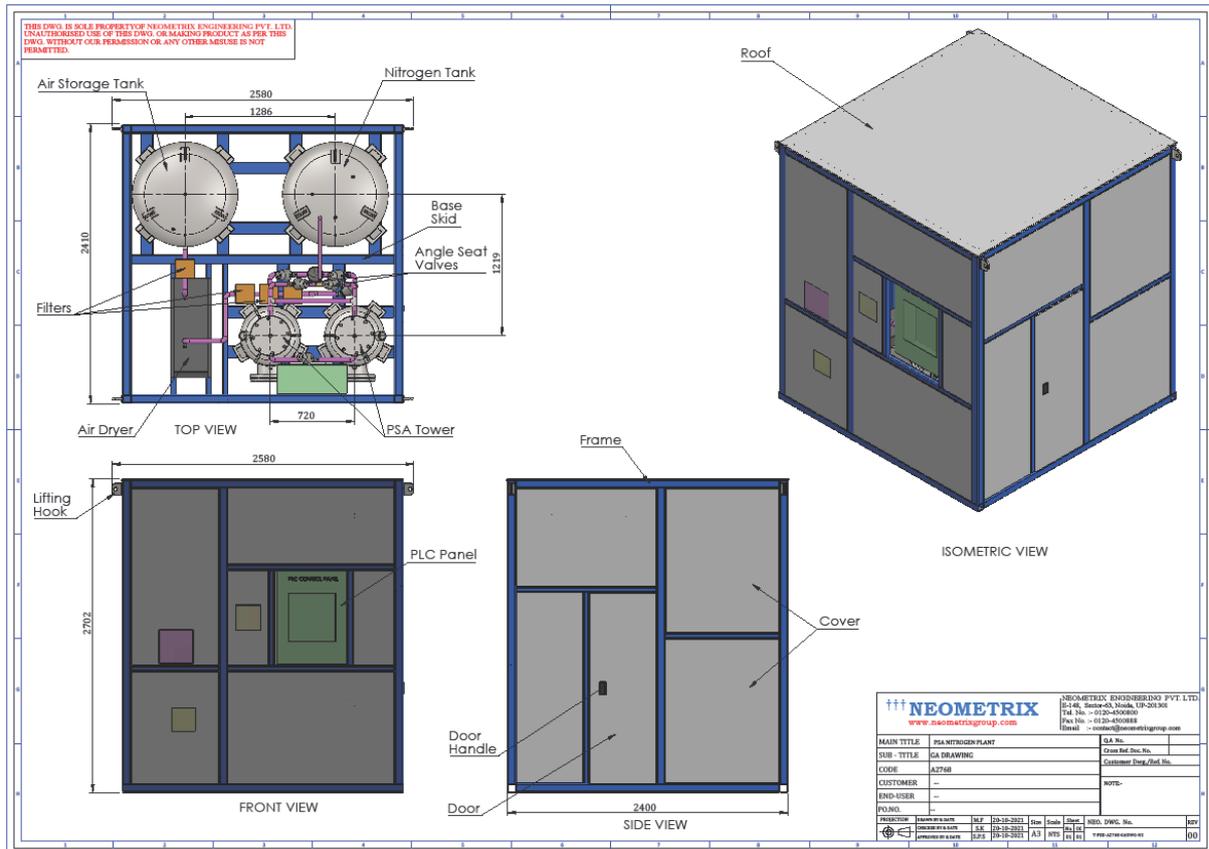
User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:



### 3.7 Nitrogen Parts Description

- Nitrogen Generator consists of the following; devices
  - 2 Adsorbent towers filled with CMS
  - 1 Air Dryer
  - 1 Moisture Separator
  - 1 Pre Filter
  - 1 Post Filter
  - 1 Fine Filter
  - 10 Electronic Control Valve
  - 1 Silencer
  - 2 Auto Drain Valve
  - Pressure Regulators
  - 1 Nitrogen Analyser
  - Manual Ball valves
  - Control panel (with HMI and Buzzer)
  - 1 Pressure Transmitter
  - 1 Pressure Switch

- 1 Back Pressure Valve
- Safety Valve
- 1 UPS

## Adsorbent Towers

Nitrogen plant has 2 Adsorber towers and which contains the Carbon Molecular Sieves. This desiccant bed adsorbs oxygen, and concentrates Nitrogen from the air during drying cycle. Pressure gauges are fitted on this tower to indicate the tower pressure and there is provision for refilling the desiccant.

## Air Dryer

Moisture in compressed air used in Nitrogen plant causes problems in the operation of the desiccant beds as well as solenoid valves and can adversely affect the process and product being manufactured. In order to avoid the above said problem and to supply the dry air an air dryer is required in this plant. The dryer eliminates any water vapour remaining in the compressed air coming at the outlet of the compressor house.

## Air Receiver

Air receiver is connected in between the Air dryer and Adsorbent towers. This air receiver acts as an accumulator and the air supplied to this receiver must be dry air.

## Moisture Separator

This filter removes the moisture which is present in compressed air for dryer use.

## Pre-Filter

This filter avoids dust, dirt, foreign materials and moisture before entering into the molecular sieves bed and damaging the working.

## Fine Filter

This filter avoids dust, dirt, foreign materials and moisture before entering into the molecular sieves bed and damaging the working.

## Inlet Feed Air Solenoid Valves

This valve allows the inlet feed air between the two adsorbent towers during drying

User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

phase. Controls signals for valve operation is taken from the control panel.

## **Electronic Control Valves**

These valves open for a period of when the absorber is pressurized to deliver Nitrogen to the Nitrogen receiver for use.

## **Mufflers**

Mufflers are used for reducing the amount of noise emitted by the exhaust of the wastegases coming out from the adsorbent towers during regeneration phase.

## **Auto Drain Valves**

Electronic auto drain valve (EDV) automatically removes condensate from the filters.

## **Pressure Equalization Valve**

After pressurization cycle on one of the absorbers, the purge valve will open for a period and pressure equalization between the adsorber towers will take place.

## **Pressure Regulators**

The air pressure regulator controls the inlet air pressure before entering into the adsorber tower in the inlet side and control the delivery Nitrogen pressure at delivery side.

## **Pressure Gauges**

These gauge indicates the air pressure inside the adsorbent towers and receiver.

## **Back Pressure Valve**

A Back Pressure Regulator (BPR) is a device that maintains a defined pressure upstream of itself, at its own inlet. When fluid pressure at the inlet exceeds the set point, the valve opens to relieve the excess pressure. These valves prevents the back flow of Nitrogen into the adsorbent towers.

## **Nitrogen Analyser**

This sensor is used to indicate the product purity in terms of % of nitrogen from the Dew point sensor .

## **Exhaust Solenoid Pilot Valves**

This valve allows the waste air from the two adsorbent towers during regenerating phase. Controls signals for the valve operation is taken from the control panel.

## **Control Panel**

The control processes the inputs and outputs to and from the system components and communicates with the touch screen.

## **4 Description OF Operation**

The nitrogen generator works on the PSA principle. The desiccant adsorbs oxygen from the compressed air for generating the nitrogen. For proper removal Oxygen from the dry air regeneration of the desiccant is required. Regeneration is achieved by means of allowing apart of the Nitrogen from the supply outlet.

Cycle of Operations:-

The Nitrogen generator works based on the following phases,

- Drying
- Pressure Equalization
- Depressurization
- Re-pressurization and back pressurization

### **Drying Cycle:-**

The compressed dry air flows through the moisture separator then pre filter. The water particles and foreign materials get filtered by the filter. The filtered air flows in to the adsorbed tower filled with the Molecular Sieves (CMS type). The sieve selectively adsorbs Oxygen, allowing Nitrogen to pass through at the desired purity level.

### **Pressure Equalization Cycle:-**

At the end of drying cycle the second adsorber tower is ready for the next drying cycle so in order to re-pressurize the tower to drying pressure by means of inlet air it take so time to save that energy the air in the tower 1 is fed in to the second tower and the pressures are equalized.

## Depressurization:-

After drying for the preset cycle time, the desiccant bed will be saturated with oxygen. For successful removal of oxygen in the next cycle, this oxygen is to be removed from the desiccant. This removal of oxygen cycle starts with depressurization. In this cycle air inside the tower is vent out by the depressurization valve. The pressure is expanded to atmospheric pressure. The sudden depressurization brings out nitrogen molecules trapped in the sieves pores to the surface of the bed.

## Re-Pressurization and Back Pressurization Cycle:-

At the end of drying cycle the second adsorber tower is ready for the next drying cycle so re-pressurization of the tower2 to drying pressure is necessary, this is achieved by allowing the inlet feed air and some amount pure nitrogen from surge tank to the adsorbent tower.

## WORKING:-

- Wet dirt atmospheric air is compressed in the compressor.
- The air coming from the compressor is first fed into the inlet Pre-Filter, here the impurities present itself and water particles are removed.
- After that in order to remove the water vapor present in the air it is allowed to flow through the refrigerant / Desiccant air dryer, where (2 to 7 deg c / -40 deg c) pressure dew point is achieved.
- This dry air is stored in the air receiver under pressure.
- On the first cycle drying phase dry air is allowed to adsorbent tower by means of inlet valve through the fine filter, Where the foreign materials and particles are removed from the air.
- The compressed dry air flowing through mixed bed tower 1 is selectively adsorbs the Oxygen and delivers the nitrogen enriched air to the nitrogen surge tank.
- Where the nitrogen is stored under pressure.
- At this time the tower 2 is in regeneration phase.
- Expansion of this gas to near-atmospheric pressure increases the ability of the purge air to strip the previously adsorbed oxygen from desiccant bed in tower 2. The absorbed gases exhausts through the opened two-way purge valve.
- From the nitrogen surge tank the nitrogen is taken to the user end through the after filter.

The automatic cycling of the adsorption and desorption between the two beds enables the continuous production of nitrogen.

Neometrix make Nitrogen generators have a failure alarm system.

- In the touch screen display the alarms indicates the If the purity of the Nitrogen drops under the rated purity level.
- If the pressure of the Nitrogen outlet drops under the rated pressure.

User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

## 6 Installation

This section provides a step-by-step procedure for easy assembly of the Nitrogen Generator with optional air supply system and tanks.

### Warning:-



Warning

**Failure to follow these instructions can lead to serious injury or death. This dryer should be only be used for drying filtered, compressed air.**

**Ensure inlet air to this air dryer is filtered.**

Only experienced and licensed electricians that are properly trained in compressed air and separation systems should service or repair Neometrix products. Before start-up or performing any maintenance on any Neometrix gas separation product like Nitrogen and oxygen generator, air dryer, filter, drain system, or other equipment, you must first turn off and disconnect all electrical power and service to the equipment at the main disconnect switch. Also, be sure to bypass and depressurize the dryer to 0 PSIG. Do not start or operate the dryer if there is a leak. Make sure the dryer's protection rating is applicable to the installation conditions. Do not operate the generator at pressures and/or temperatures above the maximum allowable marked on the data label. Likewise, verify that incoming voltage matches the voltage marked on the data label. Do not lift the generator by its piping or control box or drop the generator. Doing so may damage the equipment.

### 6.1 Unpacking, Inspecting And Handling:-

The **Nitrogen Generator** is shipped in a single wooden crate, including the accessory kit.



Caution

**WARNING:** Lifting lugs on vessels, if present, are only for handling of the vessels if they are detached from the PSA unit or by the pipes. The PSA-unit is not to be lifted by the lifting lugs on vessels. The Nitrogen Generator must be lifted by the skid, with a suitable lifting device operated by a certified or Neometrix operator. Take the necessary precautions to avoid units tipping over during .

## 6.2 Pre-Installation Instructions:-



**IMPORTANT:** for safe installation and operation etc. of compressor, dryer or other equipment refer to manuals concerned for the equipment.

## Safety :-



**Nitrogen Generator are intended for the separation of compressed air from nitrogen to Nitrogen. Under no circumstance should they be used to dry other gases.**

The adsorbents used are non-toxic. However, they may cause respiratory problems if they are inhaled in dust form. The use of a dust mask is sufficient to protect personnel.

Neometrix make Nitrogen generators are pre - Assembled one. In the case of inbuilt compressor there is no need for any connections. As in case of without air compressor in the unit proper pipe connection should be given, for the pipe sizes refer the models.

## 6.3 Installation Site Requirements:-

- Install the generator in a closed clean, dry room protected from freezing.
- Access to the room should be restricted to personnel qualified in maintenance and operation.
- The room must be adequately ventilated.
- The generator must not be directly exposed to sources of heat.
- The temperature of the room must not exceed 43°C/109°F.
- Make sure that the generator is not near any equipment which does not comply with the electromagnetic compatibility directives and which may degrade generator operation.

- There must be a minimum distance of 3 feet between the dryer and any other equipment which uses electricity.
- Ensure that the generator is installed in the vertical position.
- Generator should be secured by bolting it down.
- Install a system of by-pass valves between the Generator inlet and outlet so the dryer can be serviced without having to interrupt the compressed air supply from the circuit. The upstream and downstream valves must be closed during installation.
- Connect a drain line to the Pre-filter auto drain outlet.
- Check for leaks after all connections have been made.
- Always pressurize generator before power up.

## 6.4 Electrical Power Requirements:-



### Warning:-

**The interior of the cabinet contains electrical parts that may produce electrical hazard if not handled properly. To prevent electrical shock, care must be taken when servicing this equipment. In general electrical installation and servicing is to be performed by trained or authorized personnel only.**

1. 110-240V, 50 Hz, single phase,  
Proper voltage must be provided to the generator at all times. Maximum fuse on power supply 10 ampere.  
Improper voltage will cause damage not covered under the manufacturer's warranty.
2. Power should be supplied to the unit from a **grounded electrical outlet with a 3-prong plug**. It is recommended to use a circuit that will not be accidentally turned off, as this will cause the unit to stop cycling. If power is off and the unit is being used, the product vessel will depressurize.
3. In order to prevent production stop and purity drop in case of electric power failure, a **UPS (power backup) is recommended as an option**.
4. Provide separate MCB connections for both the air dryer and Nitrogen Connect the electrical power cable to an 110 - 240 V, single phase, 50 Hz grounded power supply.

## 6.5 Feed Inlet Air Supply:-

Air from your compressor or feed air supply must be less than 45 Deg C, max, before it reaches the Nitrogen Generator. High feed air (operating) temperature will reduce the performance of the Nitrogen Generator and will cause damage not covered under the manufacturer's warranty. Low feed air (operating) temperatures may cause freezing of

components and damage not covered under the manufacturer's warranty.

## WARNING:-

The compressor, air buffer or other feed air supply and pressurized equipment must be fitted with adequate protective devices to protect against exceeding allowable limits of the concerned equipment e.g. safety relief valves. Feed air supply must be protected against exceeding the maximum allowable pressure. The safety relief valves on generator vessels and receiver tank (if supplied) are solely for the protection of these components.



## WARNING:-

All tubes and piping used for Nitrogen/oxygen must be compatible with oxygen and cleaned for oxygen service.

## 7 HOW TO START THIS GENERATOR ?

When you complete the installation as described in the previous section, the Nitrogen generator is ready for easy start-up and operation.



**Note:** If the power is turned off unexpectedly, the unit will stop cycling. If your application is using Nitrogen when the power is off, the Nitrogen receiver will depressurize.

### 7.1 Initial Start Up :-

1. Make sure the ON/OFF switch on the control panel is set to OFF.
2. Connect the generator with the power circuit and Make sure the power circuit can not be turned off accidentally.
3. Fully close the ball valve placed after the Nitrogen generator.
4. Turn ON the compressor & air dryer, and allow the air receiver to pressurize. Let the compressor keep running and observe that the compressor shifts to unloaded operation, when the compressor pressure has reached the pressure stop set point.

5. Now adjust the pressure regulator placed before the inlet ball valve to required set pressure. Carefully and gently open for feed air supply to the generator.
6. Now switch ON the power circuit of the generator. In the control panel touch screen display press the cycle ON button.
7. Ensure that the drain system works properly by checking, that exhaust air appears from the drain water outlet .
8. Be aware that air and condensate might be exhausted automatically from compressor and air dryer during start up.
9. To obtain the design purity in the nitrogen surge tank Start the generator and let it run for about 15 minutes.
10. In the control panel display NITROGEN to the operator screen on that you can see the Nitrogen purity and pressure.

It takes some time to pressurize the Nitrogen receiver. After reaching the required Nitrogen pressure in the display open the outlet ball valve and set rated flow of the generator's model.

11. Now the plant is ready for normal operation.



**Note: Don't Overdraw the Nitrogen more than as specified in the generator's model. Because its lead to**

1. Drop in Nitrogen purity
2. Drop in Nitrogen pressure

## **7.2 Normal Start-Up:-**

Follow this procedure to start the generator for normal operation. If this is the first time the unit has been started, follow the Initial Startup procedure.

- Open the air isolation valve.
- Turn on the Main Power switch.
- Open any shut off valves in the product nitrogen line to the user's piping system. Allow the system purity to rise before using product.

## **7.3 Shutting Down the Generator:-**

- If there is an emergency press Emergency switch off button on the control panel.
- For Regular shut down during maintenance and below rated usage of the generator follow the procedure below:
  - Open the secondary Nitrogen supply.
  - Close the outlet ball valve.

- In the control panel touch screen display press the cycle OFF button.
- Switch of the compressor and as well as the air dryer.
- Now switch off the power circuit of the generator.
- Now open the drain valve placed bottom of both the air and Nitrogen receiver and depressurize them.



Warning

**Note: Please ensure that the adsorber towers, air and Nitrogen receiver are depressurized to zero pressure (Atmospheric pressure)**

## **7.4 Extended Shut-Down:-**

To shut down the Neometix Nitrogen Generator for 24 hours or longer, complete all steps in Section 6.2 – Shutdown. In addition perform the Fully close all manual valves to isolate the Nitrogen in the receiver, to prevent the loss of pressure in the receiver, in order to enable a normal Start-up. Turn off all electric powers, e.g. on compressor, air dryer and generator.

If generator is fitted with Nitrogen Analyser, close of the pressure reduction valve on Sensor inlet.

## **7.5 Start-Up After An Extended Shut-Down:-**

After an extended shutdown or an unexpected shutdown, such as an electric power failure, you must purge the Nitrogen receiver of any low purity Nitrogen before the Nitrogen generator can supply Nitrogen within the purity specifications.



**IMPORTANT:-** When the generator is being started up for the first time, or after a long shut-down period, it is possible that the Nitrogen receiver tank is full of air. Before the generator can supply Nitrogen of design purity, any air in the Nitrogen receiver tank must be purged.

## **8 . MAINTENANCE:-**

This Nitrogen plant is specifically designed to minimize routine preventive maintenance. Only professionals of the healthcare field or persons fully conversant with this process such as factory trained personnel should perform preventive maintenance or performance adjustments on the Nitrogen generator.



**Note:- PSA Nitrogen generator are robust, reliable machines. To ensure uninterrupted, problem-free operation, regularly perform the inspections below.**

A Detailed check list is added in this manual you can also refer it for the maintenance.

### **Every Day:-**

1. Check for air and product leaks.
2. Check instrument air pressure.
3. Visually check control panel.
4. Record nitrogen concentration and flow rate; operating or ambient temperature, feed air pressure, product tank pressure, and sieve bed pressures throughout one cycle.  
Verify that the automatic filter drain is working properly.
5. Manually operate air receiver drains.

### **Every Month:-**

1. The drying and regeneration cycles function normally,
2. The silencers are not clogged.

### **Three Months:-**

1. Operate safety valves. (If system contains)
2. Operate manual valves.
3. Check for leaks and repair if necessary.

### **Six Months:-**

1. Change Pre, Fine After filter elements

## **Annually:-**

1. Install valve repair kits on flow control valve and equalizer valves.
2. Disassemble and inspect all air-operated valves; install repair kits if required.
3. Test all air pilot valves .
4. Check for air and product leaks.
5. Check Nitrogen analyzer sensor for proper operation as per manufacturer's instructions and order replacement

## **Three Years:-**

1. Install repair kits in all pneumatically operated valves.



**Note: During the entire operation, the compressor and the generator must be shut down. It is recommended for all personnel who are in the presence of the desiccant to wear dust masks.**

## **Changing the Desiccant:-**

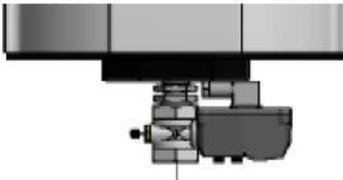
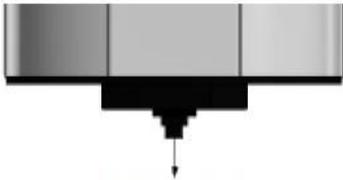
- ◆ Bypass the Nitrogen supply into the secondary line.
- ◆ Disconnect the power supply to the generator.
- ◆ Make sure the inlet air supply to the generator is closed.
- ◆ Depressurize the pressure in both towers
- ◆ Loosen the dummy present in the tower bottom desiccant port

## **8.1 Remove the old desiccant and replace new desiccant ONE Replacing the filter element:-**

1. Before replacing the element we need to check whether the replacement is required.

Clean Stage Indication	Change Stage Indication	Dirty Stage Indication
<b>Green</b> 	<b>Yellow</b> 	<b>Red</b> 

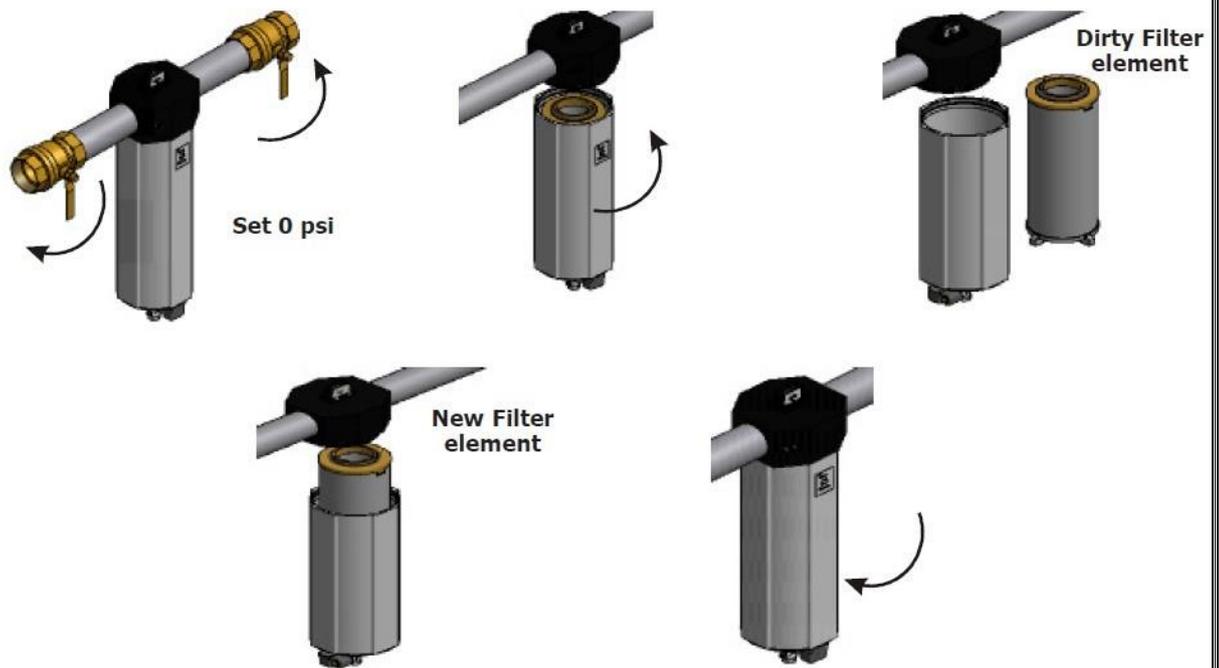
Automatic Float Drain Valve or Electronic Drain Valve Function Check

 Only Water Out	 Only Water Out
---	--

Sensible Leak Check  
Conduct the sensible leak check around the filters.

2. During the change Signal we need to prepare for the filter element change. The filter element must be changed at change stage indication.
3. If you are replacing a coalescing filter element, remove and discard the gasket where the top of the filter element connects to the filter housing.
4. If you are replacing a coalescing filter element, make sure a black gasket is attached to the top of the new element .
5. Check for leaks after all connections have been made. Do not start or operate the filter with leak

If the Electronic Adjustable drain valve connection have been installed, must to ensure the input voltage



For Air dryer maintenance Refer the Air dryers user manual supplied with the product.

## **8.2 Leak Test Procedure:-**

**Note: Every time, After completing maintenance work need to conduct leak test.**

1. Shut off the nitrogen application/consumption.
2. Shut on the feed air supply.
3. Read and note the pressure in nitrogen receiver, Tower 1, Tower 2, if present and feed air tank.
4. Let the plant stand still (rest) and isolated in pressurized condition for an hour.
5. After an hour read and note the pressure in nitrogen receiver, Tower 1, Tower 2 if present and feed air tank.
6. Then determine an eventually pressure drop as the difference between the initial and final pressures taken before.

**8.3 *The Leak Test is OK, if the pressure drop after one hour pressurized isolation is less than 0.1 bar. In case of leaks they must not cause more than 0.1 bar pressure drop per Pressure Regulator Adjustment***

## Procedure

- 8.3.1 Unlock lock on adjustment knob.
- 8.3.2 To increase pressure turn clockwise.
- 8.3.3 To decrease pressure turn counter clockwise.
- 8.3.4 Make small adjustments and let system cycle through one cycle before making another adjustment.
- 8.3.5 If readings are still incorrect, make another adjustment until you are within manufacturer's specifications.

## 9 .TROUBLESHOOTING:-

The following problems may exist while using the Nitrogen plant. This section will give details about the problems and their remedy. Troubleshooting tree will help you to solve the problems

### General Troubleshooting :-

Before reviewing the troubleshooting chart, the following steps may be useful to isolate any malfunctions:-

- Turn the generator on. If unit does not turn on, refer to troubleshooting chart.
- Make sure all filters are clean.
- Make sure the unit is cycling properly. If the unit is not cycling properly, refer to troubleshooting chart.
- If generator is not meeting specifications, make sure that the unit is leak free by testing all tubing connections and fittings with leak testing solution. Repair all leaks by tightening connections and fittings.
- Review troubleshooting chart to isolate and repair any other malfunctions.

### High Pressure Drop across Generator:-

- ✓ Pre-filter may be clogged. Check and replace filter elements.
- ✓ Check whether the generator is being overflowed.

## 9.1 TROUBLESHOOTING TABLE

This section enables the operator to determine the cause of operation problems and suggests remedies for the problems. If there are several likely causes, investigate the simpler solutions first. Regardless of the type of malfunction, a person who is thoroughly familiar with the system performs the troubleshooting best. If further assistance is required, contact your local distributor or Neometrix Engineering Pvt Ltd.

Symptom	Probable cause	Corrective action
Nitrogen generator Not cycling	Low voltage or low amperage	Check electrical source
	Circuit breaker tripped	Reset circuit breaker
	Fuse blown	Replace fuses located inside control panel
	Main power is OFF	Turn Nitrogen Generator power switch ON
	Low feed air pressure	Increase feed air regulator pressure
Nitrogen generator runs continuously / Low product pressure	Defective wiring	check wiring diagram / connections
	Defective N2 pressure sensor	Replace pressure sensor
	Excessive product usage	Check and reduce product consumption
	Product line leak	Conduct leak test / Repair leak
	Cycle pressure too low	Increase feed air regulator pressure
Low product Flow	Energy saving mode pressure setting too high	Check and reduce standby pressure settings
	Feed air flow rate is too low	Adjust air supply pressure and flow
Low product purity	Product flow too high	Decrease product flow

	Nitrogen Analyser malfunction	check and calibrate or replace the sensor
	Feed air pressure too low	Check and increase the feed air pressure regulator
	Control valves not opening / closing	Dirty or defective control valves; Clean or replace
	Muffler clogged	Clean muffler
Filter drains remains open	Drain valve dirty	Clean valve
Filter drain does not open	Drain valve clogged	Clean valve
Low product dew point	Air dryer malfunction	Check and service as per the manufacturer's manual given with the Refrigeration / Desiccant dryer
	Dew point sensor malfunction	Repair / Replace the sensor

## 2. Low Operating Pressure

Lower than normal operating pressure may indicate any of the following,

- A restriction in the suction air intake filter, which limits the amount of air pass through into the generator. Clean the air filters free from foreign materials.
- An improperly operating circuit board or solenoid valve. Confirm that the circuit board and solenoid valves function properly.
- A leak in the unit, which allows system pressure to escape. Perform Leak test in the unit.
- A compressor with reduced output. Ensure that the Nitrogen concentration level at the desired liter flow is within company specifications. If it is below specifications, replace or repair the compressor.

### 3. High Operating Pressure:-

Higher than normal operating pressure may indicate any of the following.

A restrictive muffler, which does not allow the waste (purge) gas to exit the freely. Operate the unit with the muffler disconnected to see if the operating pressure returns to normal.

- An improperly operating circuit board or solenoid valve. Confirm that the circuit board and solenoid valves function properly.
- A restrictive diffuser, which does not allow the inlet feed air as well as exhaust air from the generator. Check the diffuser and correct it.
- Contaminated sieve beds. Change the sieve beds.

### Nitrogen – Detailed spares List

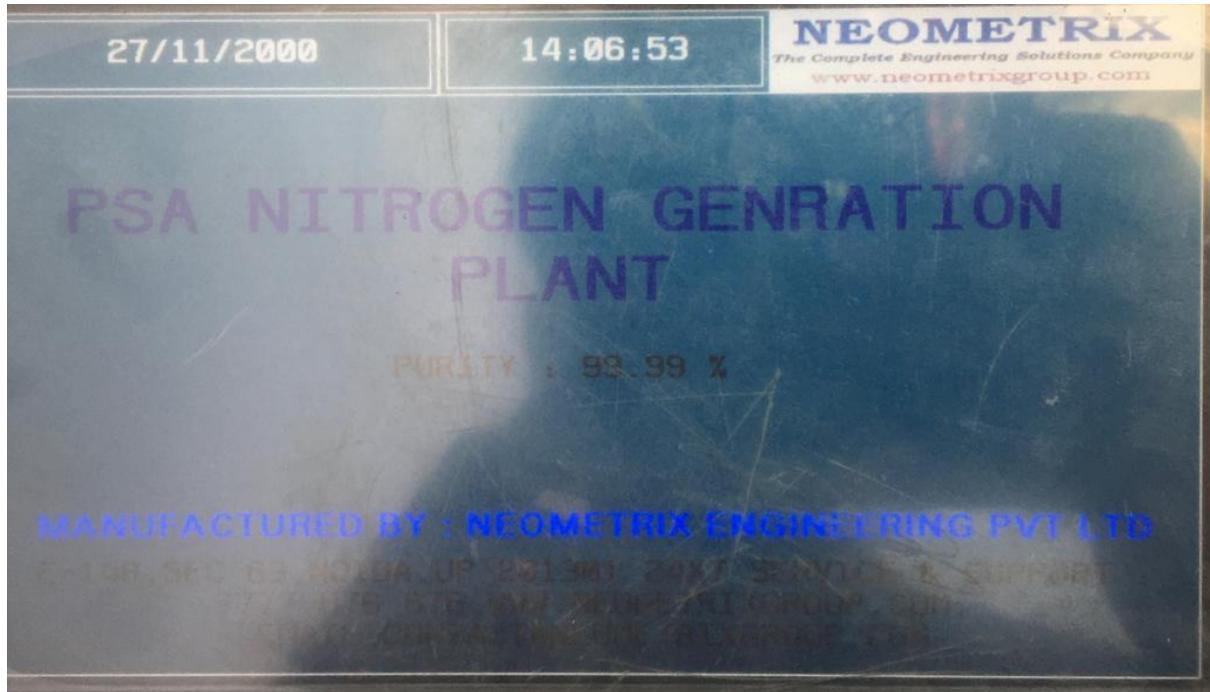
NITROGEN 10	Filter assembly with element T100Y
	Seal kit with desiccant Nitrogen 10
NITROGEN 20	Filter assembly with element T100Y
	Seal kit with desiccant Nitrogen 20
NITROGEN 30	Filter assembly with element T100Y
	Seal kit with desiccant Nitrogen 30
NITROGEN 40	Filter assembly with element T100Y
	Seal kit with desiccant Nitrogen 40
NITROGEN 50	Filter assembly with element T100Y
	Seal kit with desiccant Nitrogen 50

### Break Down Kit

Controller - Nitrogen Generator (Model 10 – 50)	1 No
Control Solenoid valve (1 no)	1 No
Pressure Regulator (Optional)	1 No
Pressure Sensor (Optional)	1 No
Oxygen Sensor (Optional)	1 No

## 10. PLC Control Panel And Usage

Below screen will appear after switch on PLC Control panel



Touch on **anywhere on the screen** to close the event popup screen.

Below screen will appear when User will close the popup screen.

## OPERATION SCREEN

User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301  
(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:



## BUTTONS:

- ❖ **START** - Used to start the process.
- ❖ **Emergency button** - Used to stop the process.
- ❖ **OPERATION**- Navigation to OPERATION page. In this screen operator can see Nitrogen pressure, and compressor status.
- ❖ **HOME** - Touch the home operator can see the welcome screen.

When the operator touch **the setting** the given below screen will be show

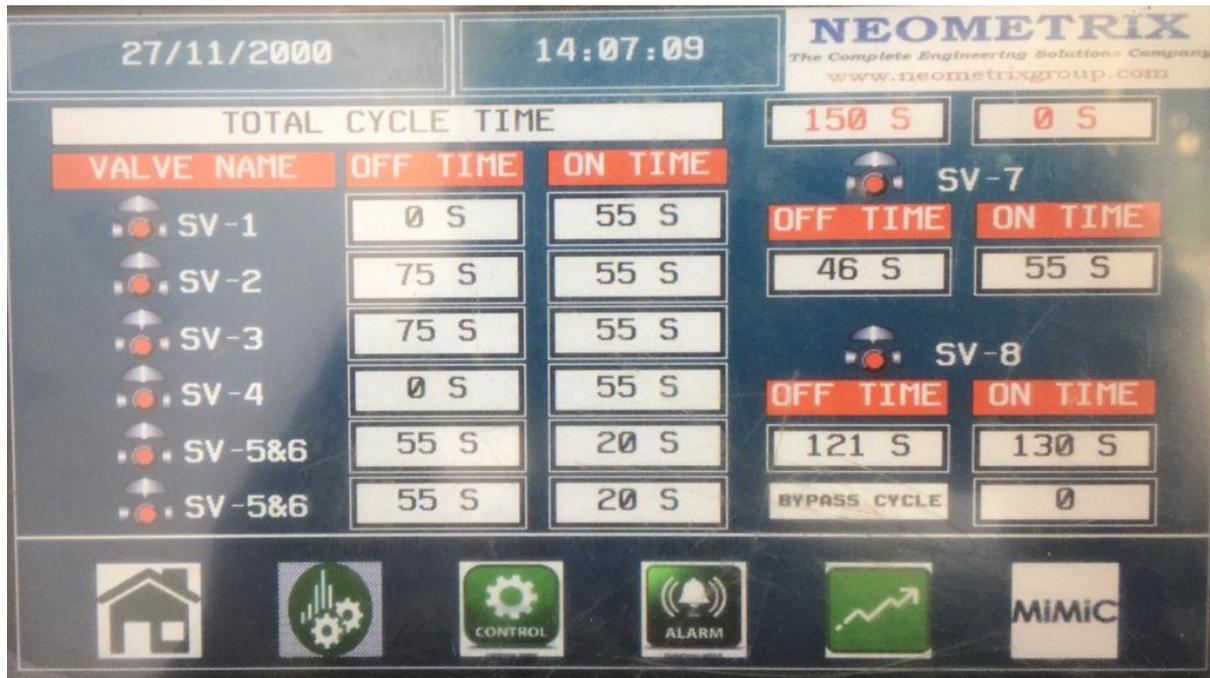
## SETTING SCREEN



### BUTTONS:

- ❖ **SETTING** – Operator can see in this screen Timer setting . Operator can set the Nitrogen pressure limit and also set the operation time from here.
- ❖ **TIMER SETTING** – For time setting operator touch the timer setting then the next page will be appear below.

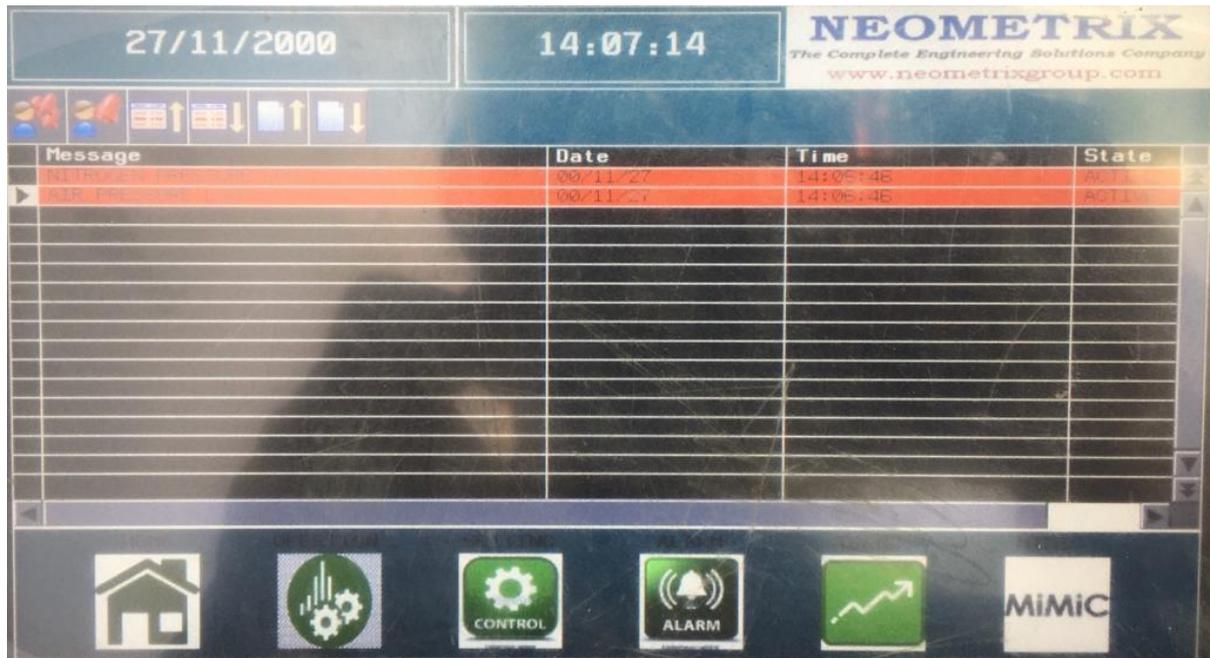
## RUNNING HOURS SCREEN



- ❖ **TIMER SETTING** – Operator can see the all valve timer setting and also monitor the opening and closing the valve.
- ❖ **ALARM**- Touch the alarm operator can see the next screen.

When the touch the alarm screen the below screen will be appear.

## ALARM SCREEN



All alarm will show on above screen.

## BUTTONS:

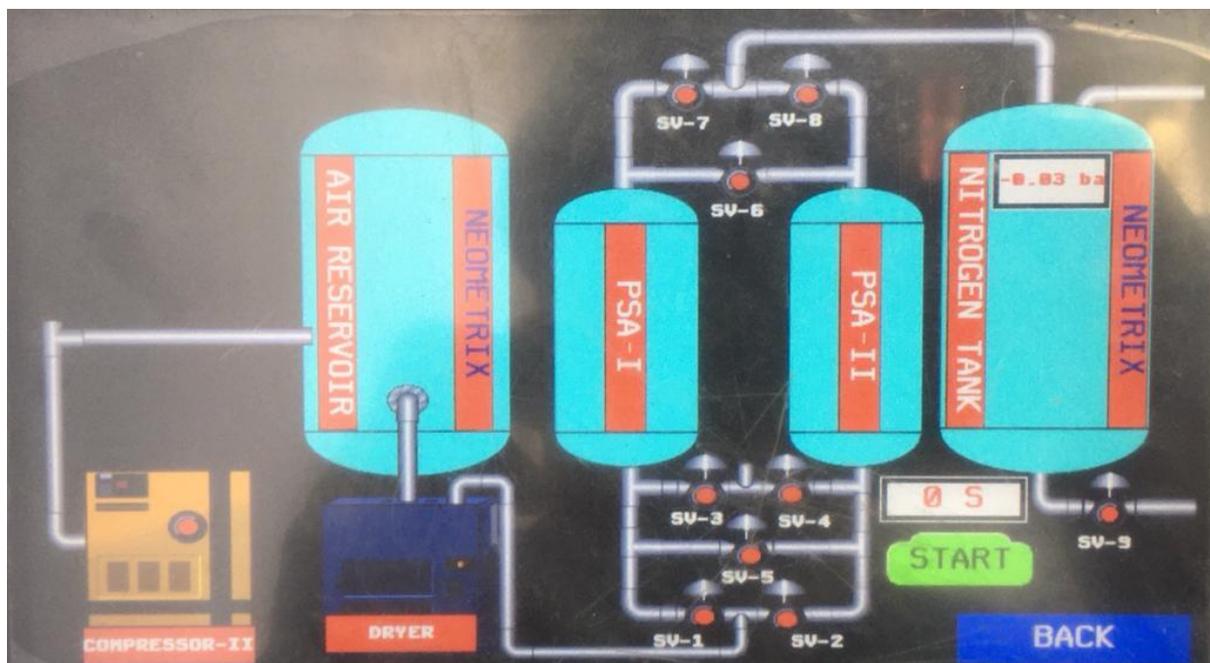
- ❖ **ALARM** – This screen shows the alarm date and time wise
- ❖ **TREND** – Touch the trend button operator can see the next screen

## TREND SCREEN



- ❖ **TREND** –This screen shows the graph of purity, pressure and flow.
- ❖ **MIMIC**-Touch the mimic button, operator can see the next screen given below .

## MIMIC SCREEN



User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

- ❖ **MIMIC**- Operator can see all plant operation on the screen as per time setting of valve.
- ❖ **START** – Operator can start the process.
- ❖ **BACK**- Touch the back button and go to the home page.

## CHECK LIST

Note: Perform if applicable

Service Check List						
Activities	Frequency					
	Hourly	Daily	Weekly	Monthly	Half Yearly	Yearly
Check Compressor Pressure	✓					
Check Compressor oil level		✓				
Service compressor according to supplier instructions						✓
Check Nitrogen Pressure	✓					
Check rated nitrogen flow	✓					
Check Nitrogen Purity	✓					
Check Dew point at dryer outlet	✓					
Service Air dryer according to supplier instructions						
Check Air Dryer condensate drain	✓					
Check Tower pressure	✓					✓
Check drain on all Filter		✓				
Replace all filter element					✓	
Check pressure in Air tank	✓					
Check pressure in Nitrogen tank	✓					
Check Pressure safety valve					✓	
Calibrate all Pressure gauge					✓	
Calibrate Oxygen sensor						✓
Check solenoid valves for corrosion			✓			
Check pipes / hoses				✓		

User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

Replace desiccant						
Leak test						
Check for Control panel working		✓				
Check exhaust gas sound				✓		
Check for all safety precautions		✓				

## CERTIFICATE

User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301

(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

ISO 13485 : 2016

## Registration Certificate

This is to Certify That The Management Systems Of

### NEOMETRIX ENGINEERING PRIVATE LIMITED

E-148 SECTOR-63 NOIDA UP-201301 (INDIA)

for their

### QUALITY MANAGEMENT SYSTEMS - MEDICAL DEVICES

## ISO 13485:2016

For the following scope

Design, Development, Manufacturing, Installation, Commissioning & Long Term On Site Support of PSA Technology Oxygen Generation Plants for Hospitals/ Medical Use [1 NM3/Hr to 500 NM3/Hr], Oxygen Gas Panels, Pipelines & Distribution Circuits for Hospitals, High Pressure Oxygen Boosting Systems (Up to 350 Bar), Design Development Manufacturing Maintenance Repair & Support of Onboard Oxygen Generation Systems (OBOGS), Oxygen Boosting Systems, Oxygen Charging Storage & Distribution Systems (UGSSO2), Oxygen Charging Hoses (up to 350 Bar WP), Oxygen Breathing Systems (Oxygen Pressure Regulators, Masks and Diving Equipments).

Certificate no.	:	EUAC/MD/10024-2021
Issued on	:	02/03/2021
Validity Date	:	01/03/2024
1 <sup>st</sup> Surveillance Due On	:	02/02/2022
2 <sup>nd</sup> Surveillance Due On	:	02/02/2023

THE VALIDITY OF CERTIFICATE IS SUBJECT TO REGULAR SURVEILLANCE AUDIT ON OR ABOVE MENTIONED DATES AND IT'S ONLY VALID AFTER SUCCESSFUL SURVEILLANCE WITH CONTINUATION LETTER ISSUED BY PCMS.

TO VERIFY THIS CERTIFICATE STATUS PLEASE VISIT ACCREDITATION BOARD WEBSITE [www.europeanaccreditationboard.com](http://www.europeanaccreditationboard.com)

Ass No.: EUAC110

Address : Kemp House, 160 City Road,  
London, EC1V2NX, United Kingdom  
[www.pcmsworld.com](http://www.pcmsworld.com)

AUTHORISED BY  
CHAIRMAN/DIRECTOR  
P.C. MANAGEMENT SYSTEM PVT. LTD.

The Certificate Remains The Property Of PCMS As Per Certificate Audit Contract

## CERTIFICATE

User Manual/Maintenance Manual - A2769

Model No: A2769-N<sub>2</sub>-PSA-99.99-10NM<sup>3</sup>

Neometrix Engineering Private Limited Office / Factory: E-148, Sector- 63, Noida, UP- 201301  
(DELHI NCR INDIA) [www.neometrixgroup.com](http://www.neometrixgroup.com), [contact@neometrixgroup.com](mailto:contact@neometrixgroup.com),

Phone: 0120-4500800 (100 Lines), Fax: 0120-4500888:

Page 1 of 1

Company Certificate  
एन एस आई सी  
**NSIC**  
ISO 9001 : 2015

राष्ट्रीय लघु उद्योग निगम लिमिटेड  
**THE NATIONAL SMALL INDUSTRIES CORPORATION LIMITED**  
(A Government of India Enterprise)

Sr. No. 83573 S.No. NOI-0000244

Branch Office : III-B/118, Sector-18, Noida-201301(UP)  
Ph : 0120-4595000-45 Fax : 0120-4556453  
Email : bonoida@nsic.co.in Website : www.nsic.co.in

## GOVERNMENT PURCHASE ENLISTMENT CERTIFICATE

Renewal Certificate (Valid From 14/08/2019 to 13/08/2021)

Ref.No NSIC/NOIDA/GP/1076/09 Date: 08/08/2019

M/s. NEOMETRIX ENGINEERING PVT. LTD.  
104, FF Plot No. 4, LSC, National Arcade, Ghazipur  
Main Road,  
DELHI,  
DELHI- 110096

Factory Address:  
1 E-148, SECTOR-63  
NOIDA, UTTAR PRADESH -201301

Name of the Directors  
1. SH. SHAILENDRA PRATAP SINGH  
2. SMT. PRIYANKA SINGH  
Constitution of the firm- Private Limited UAM up28b0007547 Enterprise Social Class: GENERAL

GOVERNMENT PURCHASE REGISTRATION NO: NSIC/GP/NOV/2015/0015031  
GOVERNMENT PURCHASE OLD REGISTRATION NO: NSIC/NOIDA.GP/RS/07/NN-049  
Monetary Limit: ₹ 604 lakhs ( ₹ Six Hundred Four Lakh Only)  
TURNOVER (Rupees in Lakhs)

Financial Year	Annual Turnover
2015-16	979.31
2016-17	1123.97
2017-18	1206.89
Monetary Limit	604

MSEs registered with NSIC are exempted from deposit of Earnest Money irrespective of value of Monetary Limit.

Your name has been registered as a MSE Unit eligible for participation in the Central Government Store Purchase Programme as per the Single Point Registration Scheme for the following Item(s)/Store (s)/Service(s).

Name of the Store(s)/ Service(s)	Specification(s)	Qualitative Capacity	Quantitative Capacity P.M.
"As per List Attached" (66 item only)			

M/s. NEOMETRIX ENGINEERING PVT. LTD.  
"Authenticity of the certificate can be checked through the web portal: [www.nsicsonline.com](http://www.nsicsonline.com)"

संजय यादव Sr. Branch Manager  
Authorised Signatory  
The National Small Industries Corporation Limited  
III-B/118, Sector-18, Shopping Complex, Noida

http://www.nsicsonline.com/app/Administrator/RegistrationCertificatePageView.aspx?id=... 8/8/2019

CIN : U74140DL1955GOI002481 Conditions overleaf.

