# Nitrogen Generator Installation, Operation, & Maintenance Manual

Models: N2-120, N2-160, N2-240

Parker

ENGINEERING YOUR SUCCESS.

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## 1. WARRANTY

### SERIAL NUMBER

Each major component in this unit has a serial number. A serial number for the entire unit is attached to the left side panel, near the inlet port. For your own records, and in case service is required, please record the following:

Date In Service: _____

Serial No. _____

### WARRANTY (NORTH AMERICA ONLY)
### (FOR INFORMATION CONTACT YOUR LOCAL REPRESENTATIVE)

Parker Hannifin guarantees to the original purchaser of this product, that if the product fails or is defective within 12 months from the date of purchase, when this product is operated and maintained according to the instructions provided with the product, then Parker guarantees, at Parker's option, to replace the product, repair the product, or refund the original price for the product. This warranty applies only to defects in material or workmanship and does not cover: ring and valve wear on compressors, routine maintenance recommended by the instructions provided with this product, or filter cartridges. Any modification of the product without written approval from Parker will result in voiding this warranty. Complete details of the warranty are available on request. This warranty applies to units purchased and operated in North America.

### MEMBER OF

## 2. SAFETY PRECAUTIONS

These instructions must be thoroughly read and understood before installing and operating this product. Failure to operate this product in accordance with the instructions set forth in this manual and by other safety governing bodies will void the safety certification of this product. Any modification of the product will void the warranty. If you have any questions or concerns, please call the Technical Services Department at 1-800-343-4048, 8 AM to 5 PM Eastern Time or email at GSFsupport@parker.com. (North America only). For other locations, please contact your local representative.

### EXPLANATION OF WARNING SYMBOLS

Caution. Refer to accompanying documents for explanation.

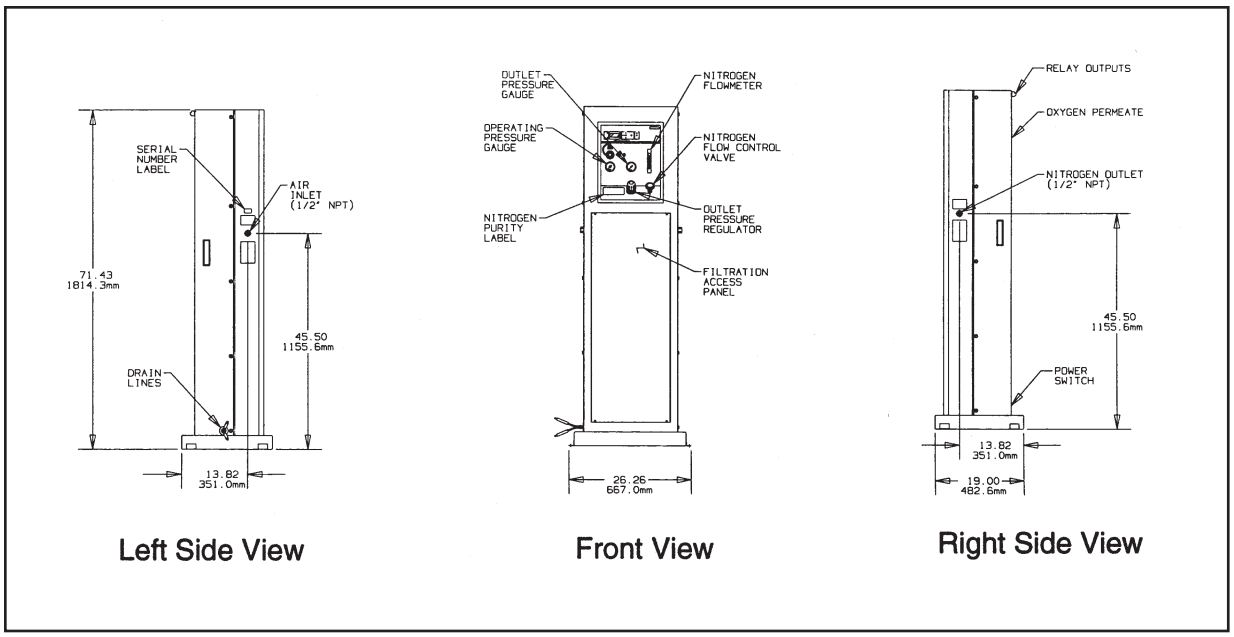


Figure 1
Nitrogen Generators

## 3. GENERAL DESCRIPTION

The Parker Nitrogen Generators are completely engineered systems which will convert a compressed air supply into a 95% to 99.5% purity compressed nitrogen gas. Nitrogen purities as high as 99.9% can be achieved with significant reduction in output flow. The system is based on state-of-the-art membrane separation technology. Hollow fiber membranes are used to separate air into a concentrated nitrogen output stream and an oxygen enriched permeate stream. The model number of the generator represents the approximate nitrogen flow in standard liters per minute that can be achieved at a purity of 97% with a 100 psig (6.9 barg) outlet pressure. To achieve this outlet pressure, the inlet pressure needs to be approximately 110-115 psig (7.6-7.9 barg).

## 4. ENGINEERED SYSTEM

The Parker N2-120, N2-160, and N2-240 Nitrogen Generators have been certified to IEC 1010 Standards (CSA 22.2 No. 61010-1-12). The generators bear the CSA safety marking on the product label.

The Parker Nitrogen Generators include all the components required to generate high purity nitrogen gas from compressed air. The user need only connect a supply of compressed air to the inlet of the nitrogen generator and connect the outlet of the generator to the process requiring high purity nitrogen.

The flow schematic (Figure 2) shows all of the major components of the system. The system can be broken down into four primary functional groups. These are: prefiltration, air separation, flow controls, and final filtration.

### 4.1 Prefiltration

Two Balston® high efficiency coalescing filters, an activated carbon filter, and a particulate filter are incorporated into the Parker Nitrogen Generators to protect the membrane module from contamination. The coalescing filters are located behind the filtration access panel. They remove liquids and particulate matter from the incoming air supply to 0.01 micron. These filters are equipped with float drains which automatically open to empty any liquids which accumulate inside the filter housing. The drains are connected to 1/4" O.D. plastic tubing which discharges to atmosphere on the left side of the generator (see Figure 1).

The activated carbon filter removes hydrocarbons from the compressed air before it enters the separation module. A Balston high efficiency particulate filter is installed between the activated carbon filter and the separation module to protect the membrane from carbon dust.

### 4.2 Air Separation

Air separation takes place in the membrane modules. The modules consist of bundles of hollow fiber membranes. As the air passes through these hollow fibers, oxygen and water molecules pass through the membrane wall at a higher rate than nitrogen molecules. This differential permeation results in a high purity, dry nitrogen gas stream exiting the membrane module. The oxygen enriched permeate stream is exhausted through ports on the membrane module at a very low pressure.

### 4.3 Final Filtration

The final filter on the generators is a Balston Grade GS membrane filter. The final membrane filter removes particulate contamination to 0.01 micron (absolute), and assures the user a clean, commercially sterile supply of high purity nitrogen.

### 4.4 Controls

The flow controls integral to the Parker Nitrogen Generators comprise: an operating pressure gauge, a flowmeter, a flow control valve, an outlet pressure gauge, and an outlet pressure regulator (see Figures 1 and 2). Proper use of these controls will assure the user of a 95% to 99.5% purity nitrogen outlet stream. The pressure gauges, mounted on the front panel, measure operating pressure and outlet pressure. The outlet pressure regulator allows the user to set the pressure of the outlet nitrogen process stream. The flow control valve sets the flow rate of nitrogen exiting the membrane module. The scale on the flowmeter is dimensionless because the operating pressure can range from 60 psig (4.1 barg) to 145 psig (10 barg). The flowmeter adjustment label on the control panel is used to convert the dimensionless flowmeter reading into standard liters per minute of outlet nitrogen based on operating air pressure.

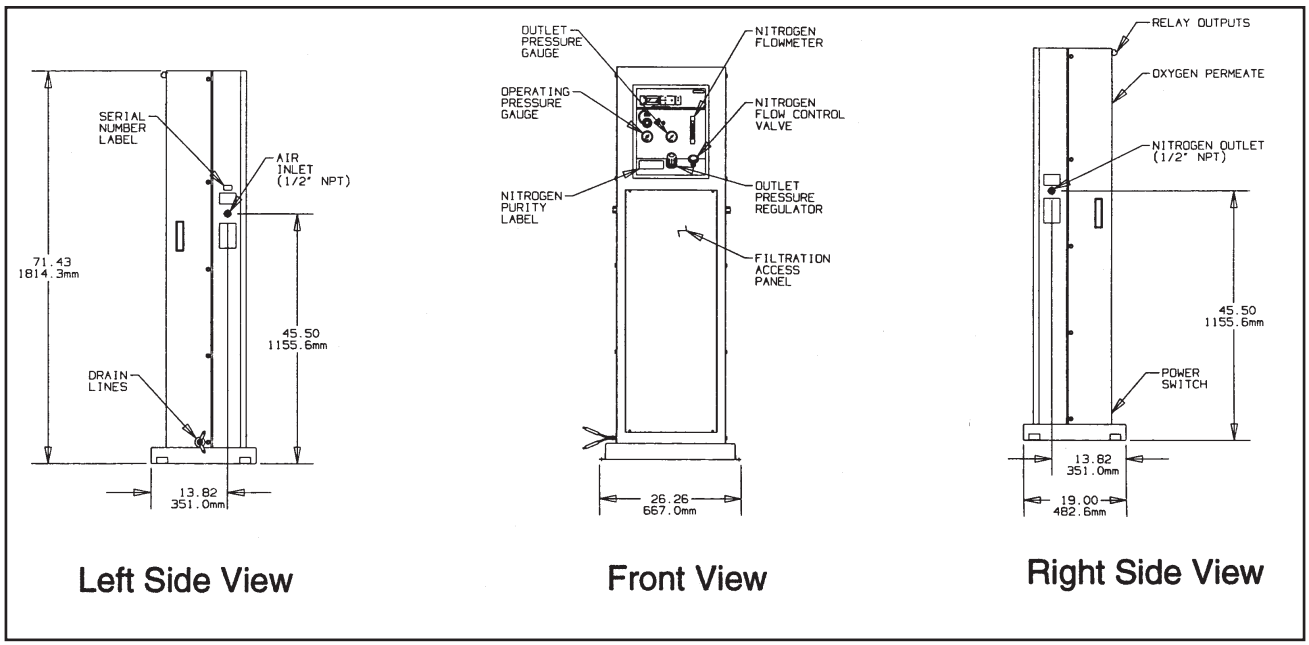


Figure 2
Flow Schematic

## 5. OXYGEN MONITORING

**Note: In hazardous applications where the oxygen content is critical (i.e., blanketing explosive chemicals or packaging food for extended shelf life), an oxygen monitor and/ or trace oxygen analyzer should be used in conjunction with safety interlocks and/or alarm systems to assure proper nitrogen purity levels at all times.**

If an oxygen analyzer is needed, Parker Model 72-730NA, which has built-in alarms for connection to external relays, may be used. This oxygen analyzer has all the controls necessary to assure safe and accurate monitoring of the oxygen concentration in a process stream. It can be easily installed on top of the nitrogen generator and connected to the outlet nitrogen line using appropriate fittings.

## 6. INSTALLATION

**All installation, operation, and maintenance procedures should be performed by suitable personnel using reasonable care.**

### 6.1 Moving

The Parker N2-120, N2-160, and N2-240 Nitrogen Generators are shipped on a wooden skid. Use a lifting device designed for moving skidded products to move the generator to its installation location. Gently move the generator from the skid to its final installation position. Secure to floor if desired. If a future move is required, the generator should be returned to a skid and moved as detailed above. For moves over short distances, the generator may be slid on its supporting base or moved using a two-wheeled moving device.

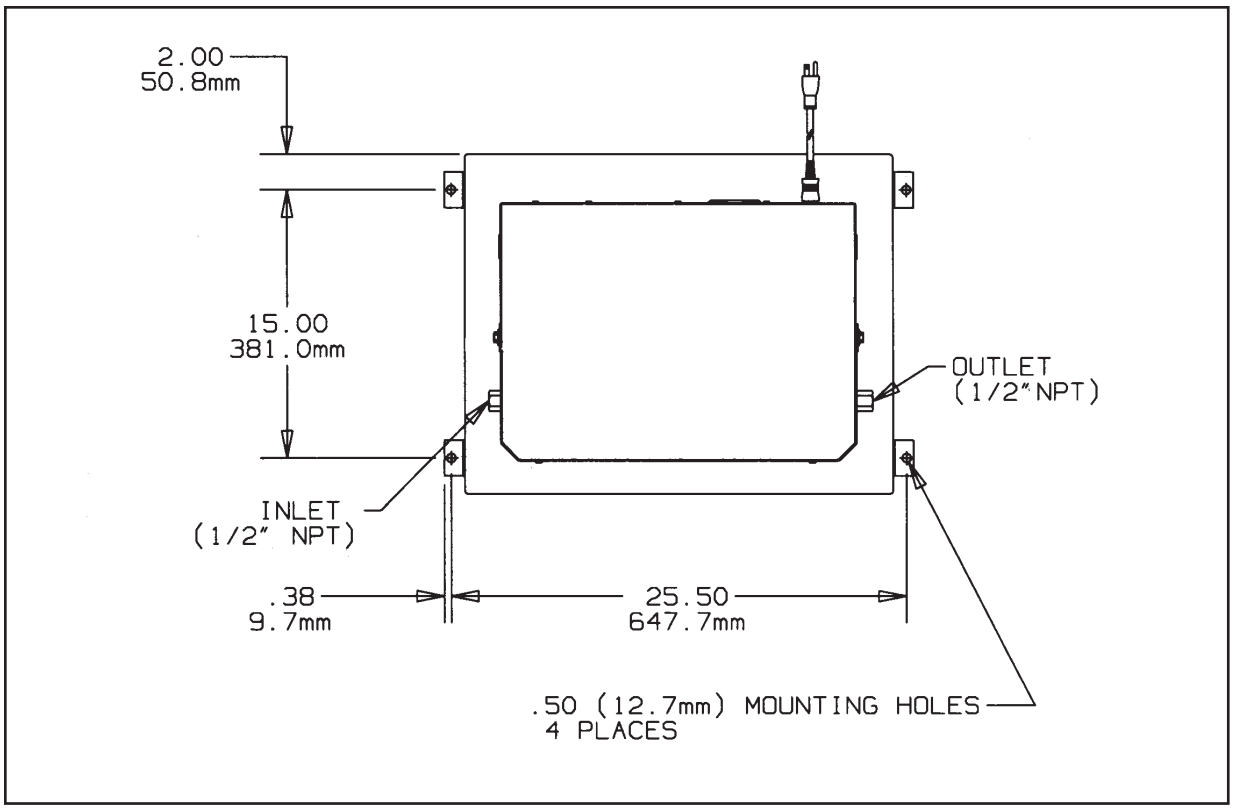


Figure 3
Top View of Base Holes

## 6.2 General

The Nitrogen Generators are free-standing units. **Do not suspend the nitrogen generator from a wall or ceiling. Its considerable weight and size could pose a falling hazard.** Holes have been pre-drilled in the base of the generator (see Figure 3) to secure it to the floor, if desired.

The inlet and outlet ports on the nitrogen generators are 1/2" female NPT. A 1/2" male connector which will withstand 145 psig (10 barg) should be used to connect to the nitrogen generator. Parker offers an installation kit (P/N IK75880) which combines all the basic fittings and refrigeration grade copper tubing required to bring the system online. This kit can be used to connect the generator to up to 2 instruments and to the compressed air supply. See Figure 4 for the recommended installation schematic.

**Shutoff Valve -** A shutoff valve should be installed directly upstream from the nitrogen generator to facilitate routine maintenance and troubleshooting procedures. **The valve should always be opened slowly.** Opening a valve quickly will pressurize the membrane too rapidly and may cause membrane rupture. Membrane failures resulting from improper valve installation will not be covered under warranty.

**Pressure Regulator -** A pressure regulator should be installed directly upstream from the nitrogen generator to set and maintain the inlet air pressure. Maintaining a constant inlet air pressure is critical to the performance of the system.

**Flow Controller -** If the application requires nitrogen at pressures higher than 10 psig (0.7 barg), install a flow controller downstream from the nitrogen generator, close to the point of use (see Adjustment Procedure section, page 14).

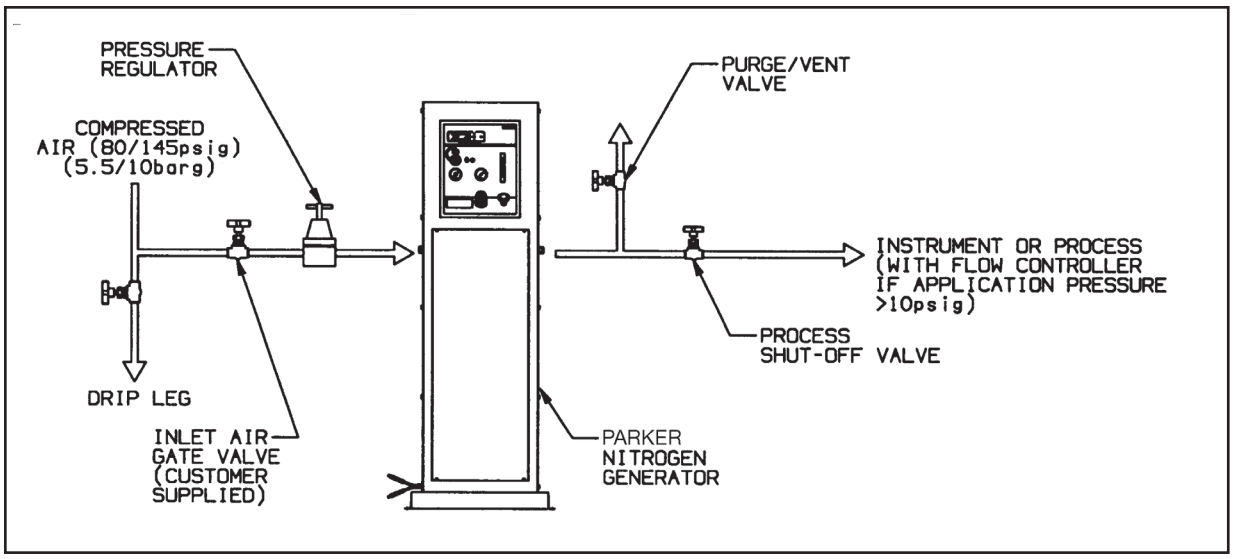


Figure 4
Recommended Installation

### 6.3 Location

The generator should be located indoors, protected from severe weather conditions, and free from excessive ambient dust or dirt. **Do not install the generator outdoors.** Ensure that the ambient temperature of the air surrounding the generator is within the range of that specified for the generator (see specifications page 20). Allow a minimum of 6" (15 cm) clearance on all sides of the generator.

The environment surrounding the nitrogen generator should also be adequately ventilated. The generator creates a 30% to 40% oxygen permeate stream which may pose a flammability risk in an oxygen sensitive environment.

### 6.4 Utilities

**Compressed Air -** The Parker Nitrogen Generators require a source of compressed air at room temperature and relatively free of water, compressor oil, hydrocarbons, and particulate matter. An oil content <0.01 mg/m$^3$ is recommended. The dewpoint of the incoming air is recommended to be less than or equal to 40˚F (5˚C) at 145 psig. The compressed air should be as close to instrument quality as possible and regulated to a pressure between 60 psig and 145 psig (4.1 barg and 10 barg), depending on downstream flow and purity desired.

**DO NOT OPERATE THE NITROGEN GENERATOR WITHOUT THE FRONT SHEET METAL FILTER ACCESS PANEL SECURED IN PLACE.**

**Note:** The piping and fittings on the inlet air delivery system should be at least the same size as the inlet port on the generator. This will help ensure an adequate supply of air to the generator.

**Drain Lines -** The 1/4" plastic drain lines from the first two stages of prefiltration (see Figure 1) should be piped away to an appropriate disposal container. The liquid in this drainage will consist primarily of water and compressor oil and should be disposed of properly.

### 6.5 Installation with a Receiver Tank

In many applications, the process flow requirement for nitrogen fluctuates with time. A receiver tank can be installed between the nitrogen generator and the process to accommodate fluctuations in nitrogen demand while maintaining nitrogen purity.

If a receiver tank is to be used, a back pressure regulator and a check valve should be installed between the Parker Nitrogen Generator and the receiver tank (see Figure 5). The Balston **72-460-V883** Back Pressure Controller contains both components and may be ordered as an accessory for the Nitrogen Generator. The adjustable back pressure regulator, when set to the appropriate pressure, will maintain a constant pressure drop across the flow control valve. By controlling the pressure drop across the flow control valve, the nitrogen flow and purity will be kept constant. The check valve, when installed properly, will prevent any backflow of nitrogen from the receiver, providing a more effective means of storing the nitrogen.

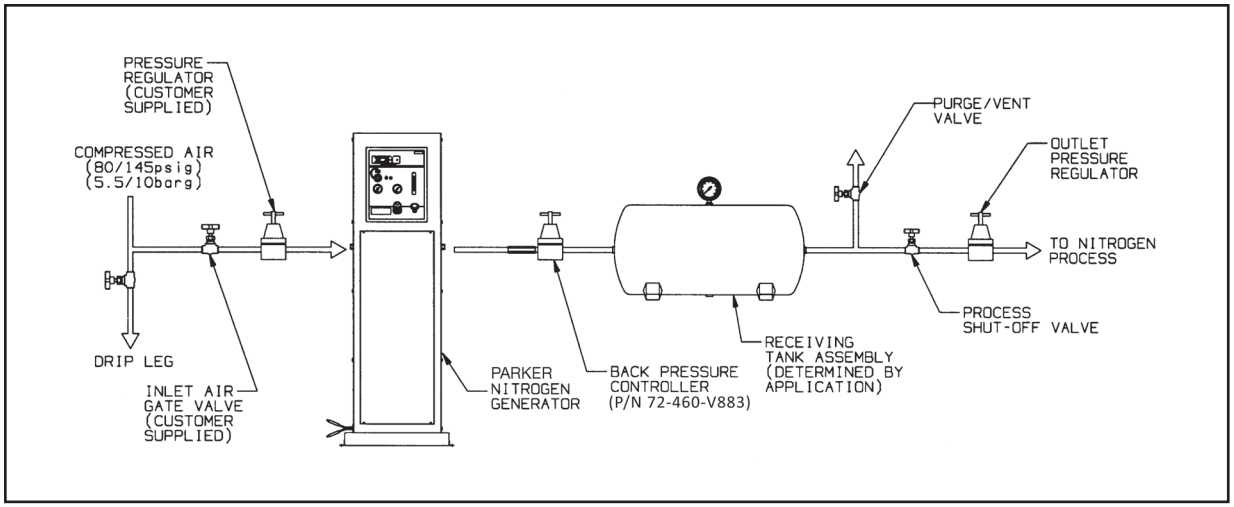


Figure 5
Recommended Installation with a Receiving Tank

# 7. OPERATION

## 7.1 Startup

The inlet and outlet connections to the Parker Nitrogen Generator must be checked for leaks prior to system start-up. After the system is properly installed and checked for leaks, the inlet gate valve can be slowly opened to introduce compressed air to the system.

During start-up and adjustment of the system, the nitrogen produced by the system will vary in purity. If the application for the nitrogen is critically dependent on purity, the nitrogen produced during start-up or adjustment should be vented.

If the outlet nitrogen flow is closed, the system will still consume compressed air. The inlet air is simply vented to atmosphere through the permeate ports of the membrane module. To eliminate compressed air consumption if nitrogen is not required for the process, shut off the compressed air supply to the generator.

## 7.2 System Adjustment for Desired Outlet Purity

The inlet air pressure must be constant for the system to supply nitrogen of consistent purity to the application. The inlet pressure to the Parker Nitrogen Generator should be maximized (within process and generator parameters) to optimize the operation of the membrane module. The inlet air consumption for different operating pressures is shown in the table on page 20. Nitrogen purities and flow rates for different operating pressures are shown on page 12.

Flowmeter settings for a given operating pressure are shown on the Nitrogen Purity label attached to the front of the unit and displayed on the next page. There may be a 5 psig to 15 psig pressure differential between the pressure of the compressed air supply at the inlet and the operating pressure of the membrane module. The pressure differential observed is dependent on the outlet nitrogen flow rate as well as the operating pressure. This pressure loss must be taken into account when determining the inlet pressure which will deliver the desired purity and flow of nitrogen from the generator.

To adjust the pressure regulator on the front panel of the generator, pull the knob out, adjust the pressure and push the knob back in to lock the setting.

## 8. NITROGEN FLOW AT GIVEN OPERATING PRESSURE AND PURITY

Notes on flow rate and purity:

1. On the generator, the flow meter units are dimensionless. For N2-160 & N2-240, read flowmeter at the middle of the ball. For N2-120, read flow meter at the top of the ball. The actual flow at various operating pressures is converted into standard liters per minute (SLPM) in the purity label on the unit.
2. Minimum purity is shown in percent nitrogen. All nitrogen purities are ±0.5%. If a more accurate reading is required, an oxygen analyzer is recommended.
3. All data shown in the table is based on an operating temperature of 25°C (77^F).
4. All flows should be verified with an auxiliary flowmeter at the point of use.

| MIN Purity % $N_2$ | 60 PSIG | | 70 PSIG | | 80 PSIG | | 90 PSIG | | 100 PSIG | | 125 PSIG | | 145 PSIG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM |
| **99.50** | 0.7 | 32 | 0.9 | 43 | 1.1 | 54 | 1.3 | 66 | 1.5 | 78 | 1.9 | 110 | 2.1 | 133 |
| **99.00** | 1.0 | 43 | 1.2 | 55 | 1.5 | 71 | 1.7 | 89 | 2.0 | 106 | 2.5 | 149 | 2.9 | 183 |
| **98.00** | 1.4 | 60 | 1.7 | 79 | 2.1 | 101 | 2.4 | 124 | 2.7 | 147 | 3.6 | 212 | 4.1 | 258 |
| **97.00** | 1.8 | 76 | 2.2 | 102 | 2.7 | 130 | 3.1 | 159 | 3.5 | 187 | 4.5 | 264 | 5.1 | 325 |
| **96.00** | 2.1 | 90 | 2.7 | 125 | 3.3 | 159 | 3.8 | 194 | 4.2 | 228 | 5.4 | 320 | 6.3 | 400 |
| **95.00** | 2.5 | 107 | 3.1 | 141 | 3.7 | 180 | 4.3 | 222 | 5.0 | 268 | 6.3 | 375 | 7.4 | 467 |

Model N2-240

| MIN Purity % $N_2$ | 4 BARG | | 5 BARG | | 6 BARG | | 7 BARG | | 8 BARG | | 9 BARG | | 10 BARG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM |
| **99.50** | 0.7 | 30 | 1.0 | 46 | 1.3 | 63 | 1.6 | 80 | 1.8 | 100 | 2.0 | 117 | 2.1 | 133 |
| **99.00** | 0.9 | 40 | 1.3 | 58 | 1.7 | 83 | 2.1 | 108 | 2.3 | 133 | 2.7 | 158 | 2.9 | 183 |
| **98.00** | 1.3 | 57 | 1.8 | 83 | 2.4 | 117 | 2.9 | 150 | 3.3 | 192 | 3.8 | 225 | 4.1 | 258 |
| **97.00** | 1.6 | 71 | 2.3 | 108 | 3.1 | 150 | 3.7 | 192 | 4.1 | 233 | 4.8 | 283 | 5.1 | 325 |
| **96.00** | 1.9 | 83 | 2.9 | 133 | 3.8 | 183 | 4.3 | 233 | 4.9 | 283 | 5.8 | 342 | 6.3 | 400 |
| **95.00** | 2.3 | 100 | 3.2 | 150 | 4.3 | 208 | 5.2 | 275 | 5.7 | 333 | 6.7 | 400 | 7.4 | 467 |

Model N2-240

| MIN Purity % $N_2$ | 60 PSIG | | 70 PSIG | | 80 PSIG | | 90 PSIG | | 100 PSIG | | 125 PSIG | | 145 PSIG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM |
| **99.50** | 0.9 | 24 | 1.2 | 32 | 1.4 | 41 | 1.6 | 50 | 1.9 | 59 | 2.4 | 83 | 2.7 | 100 |
| **99.00** | 1.3 | 32 | 1.5 | 41 | 1.9 | 53 | 2.2 | 66 | 2.5 | 79 | 3.2 | 112 | 3.7 | 138 |
| **98.00** | 1.8 | 45 | 2.2 | 59 | 2.6 | 75 | 3.1 | 93 | 3.5 | 110 | 4.6 | 159 | 5.2 | 194 |
| **97.00** | 2.2 | 57 | 2.8 | 76 | 3.4 | 97 | 3.9 | 119 | 4.4 | 141 | 5.7 | 198 | 6.5 | 244 |
| **96.00** | 2.7 | 68 | 3.4 | 94 | 4.2 | 119 | 4.8 | 145 | 5.4 | 171 | 6.9 | 240 | 8.0 | 300 |
| **95.00** | 3.1 | 80 | 3.9 | 106 | 4.7 | 135 | 5.5 | 167 | 6.4 | 201 | 8.1 | 281 | 9.4 | 350 |

Model N2-160

| MIN Purity % $N_2$ | 4 BARG | | 5 BARG | | 6 BARG | | 7 BARG | | 8 BARG | | 9 BARG | | 10 BARG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM |
| **99.50** | 0.9 | 23 | 1.3 | 34 | 1.6 | 47 | 2.0 | 60 | 2.2 | 75 | 2.5 | 88 | 2.7 | 100 |
| **99.00** | 1.2 | 30 | 1.6 | 44 | 2.2 | 63 | 2.7 | 81 | 2.9 | 100 | 3.4 | 119 | 3.7 | 138 |
| **98.00** | 1.7 | 43 | 2.3 | 63 | 3.0 | 88 | 3.7 | 113 | 4.2 | 144 | 4.8 | 169 | 5.2 | 194 |
| **97.00** | 2.1 | 53 | 3.0 | 81 | 3.9 | 113 | 4.8 | 144 | 5.1 | 175 | 6.1 | 213 | 6.5 | 244 |
| **96.00** | 2.5 | 63 | 3.7 | 100 | 4.8 | 138 | 5.8 | 175 | 6.4 | 213 | 7.3 | 256 | 8.0 | 300 |
| **95.00** | 2.9 | 75 | 4.1 | 113 | 5.4 | 156 | 6.8 | 206 | 7.6 | 250 | 8.6 | 300 | 9.4 | 350 |

Model N2-160

| MIN Purity % $N_2$ | 60 PSIG | | 70 PSIG | | 80 PSIG | | 90 PSIG | | 100 PSIG | | 125 PSIG | | 145 PSIG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM |
| **99.50** | - | 16 | - | 22 | - | 27 | - | 33 | 2.0 | 39 | 2.2 | 55 | 2.5 | 67 |
| **99.00** | - | 21 | - | 28 | 2.0 | 36 | 2.0 | 44 | 2.3 | 53 | 2.9 | 74 | 3.4 | 92 |
| **98.00** | - | 30 | 2.0 | 39 | 2.4 | 50 | 2.8 | 62 | 3.2 | 73 | 4.2 | 106 | 4.7 | 129 |
| **97.00** | 2.0 | 38 | 2.6 | 51 | 3.1 | 65 | 3.6 | 79 | 4.1 | 94 | 5.2 | 132 | 6.0 | 163 |
| **96.00** | 2.4 | 45 | 3.1 | 62 | 3.8 | 80 | 4.4 | 97 | 4.9 | 114 | 6.3 | 160 | 7.4 | 200 |
| **95.00** | 2.9 | 53 | 3.6 | 71 | 4.3 | 90 | 5.0 | 111 | 5.8 | 134 | 7.4 | 187 | 8.6 | 233 |

Model N2-120

| MIN Purity % $N_2$ | 4 BARG | | 5 BARG | | 6 BARG | | 7 BARG | | 8 BARG | | 9 BARG | | 10 BARG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM | Meter | SLPM |
| **99.50** | - | 15 | - | 23 | - | 31 | 2.0 | 40 | 2.2 | 50 | 2.3 | 58 | 2.5 | 67 |
| **99.00** | - | 20 | - | 29 | 2.0 | 42 | 2.3 | 54 | 2.9 | 67 | 3.1 | 79 | 3.4 | 92 |
| **98.00** | - | 28 | 2.1 | 42 | 2.8 | 58 | 3.3 | 75 | 4.2 | 96 | 4.4 | 113 | 4.7 | 129 |
| **97.00** | - | 35 | 2.7 | 54 | 3.6 | 75 | 4.2 | 96 | 5.1 | 117 | 5.6 | 142 | 6.0 | 163 |
| **96.00** | 2.3 | 42 | 3.4 | 67 | 4.4 | 92 | 5.0 | 117 | 6.1 | 142 | 6.7 | 171 | 7.4 | 200 |
| **95.00** | 2.8 | 50 | 3.8 | 75 | 5.0 | 104 | 5.9 | 138 | 7.2 | 167 | 7.2 | 200 | 8.6 | 233 |

Model N2-120

## 9. OPERATION - ADJUSTMENT PROCEDURES

### 9.1 Atmospheric Pressure Applications (<10 psig / 0.7 barg)

If the Nitrogen Generator is being used to deliver nitrogen at or near atmospheric pressure (e.g. purging or blanketing applications), use the following procedure for start-up and adjustment of the system.

1. Open the (customer installed) inlet air gate valve.
2. Adjust the (customer installed) inlet air pressure regulator until the Operating Pressure gauge (see Figure 1) shows the pressure required to deliver nitrogen at the desired flow rate (per flowmeter adjustment label).
3. Set the Flow Control Valve to its fully open position.
4. Adjust the Outlet Pressure Regulator (see Figure 1) until the Outlet Pressure gauge displays the desired process pressure (<10 psig/0.7 barg).
5. Consult the Nitrogen Purity Label on the control panel of the generator to determine the proper dimensionless flow meter setting necessary to achieve the desired nitrogen purity. Adjust the flow control valve on the control panel (see Figure 1) to yield the proper flow meter reading.

6. Allow the system to reach equilibrium at the desired flow rate, pressure, and purity parameters. This should take approximately 15 minutes. Vent substandard nitrogen if necessary (see Figure 4).

7.. Check the purity readings on the oxygen analyzer on a routine basis. If nitrogen purity falls below the desired level, check the calibration of the oxygen analyzer, and readjust the flow control valve until the proper nitrogen purity level is reached. **(Note: If more than minor adjustments of the flow control valve are required to reach the desired purity level, please see the Troubleshooting section of this manual for further guidance.)**

### 9.2 Elevated Pressure Applications (>10 psig)

If the Nitrogen Generator is being used to deliver nitrogen at an elevated pressure (>10 psig/0.7 barg), use the following procedure for start-up and adjustment of the system. **(Note: In elevated pressure applications, the customer should install a flow controller downstream from the application, as detailed in the Installation section of this manual.)**

1. Open the (customer installed) inlet air gate valve.
2. Adjust the (customer installed) inlet air pressure regulator until the Operating Pressure gauge (see Figure 1) shows the pressure required to deliver nitrogen at the desired flow rate (per flowmeter adjustment label.)
3. Turn the flow control valve to its fully open position.
4. Set the Outlet Pressure Regulator (see Figure 1) to the desired outlet nitrogen pressure.
5. Consult the Nitrogen Purity Label on the control panel of the generator to determine the proper dimensionless flow meter setting necessary to achieve the desired nitrogen flow. Adjust the (customer installed) flow controller until the dimensionless flowmeter shows the correct reading (based on the label).
6. Allow the system to reach equilibrium at the desired flow rate, pressure, and purity parameters. This should take approximately 15 minutes. Vent substandard nitrogen if necessary (see Figure 4).
7. Check the nitrogen purity readings using an oxygen analyzer for a critical process. If nitrogen purity falls below the desired level, check the calibration of the Oxygen Analyzer, and readjust the (customer installed) downstream flow controller until the proper nitrogen purity level is reached. **(Note: If more than minor adjustments of the downstream flow controller are required to reach the desired purity level, please see the Troubleshooting section of this manual for further guidance.)**

### 9.3 Receiving Tank Applications

After all the components have been properly installed (see Figure 5), the following procedure should be followed to ensure optimal operation of the entire nitrogen supply system (which incorporates the use of a receiving tank).

1. Set the inlet pressure to the Parker Nitrogen Generator using the customer-provided pressure regulator and initiate the air flow through the system.
2. Set the flow control valve to its fully open position. The nitrogen flowmeter reading should be at the top of the scale.
3. Close the shutoff valve to the process and open the vent valve downstream from the receiving tank to prevent substandard nitrogen from entering the process.
4. Fully open the outlet pressure regulator on the nitrogen generator and adjust the back pressure controller until the outlet pressure gauge on the nitrogen generator reads 10 psig (0.7 barg) less than the desired nitrogen storage pressure. Maximize the storage pressure to minimize the size of the receiver tank needed.
5. Set the flow control valve on the front panel of the nitrogen generator to the proper reading, as specified by the Flowmeter Adjustment Label.
6. Purge the entire system, venting the initial nitrogen stream through the vent valve to atmosphere. Purge time is dependent on receiver size and length of piping installed.
7. Close the vent valve, open the process shutoff valve, and initiate the flow of nitrogen to the process.

The use of a receiving tank upstream from the process, as detailed in this literature, significantly reduces the effects of fluctuating nitrogen demand on the purity of the emergent nitrogen process stream from the Parker Nitrogen Generator. Parker recommends a thorough purge of the system (see Steps 3 through 7 above) each time the unit is started.

### 9.4 Temperature Equilibrium

If the temperature of the inlet air to the Parker Nitrogen Generator differs from the temperature of the module (i.e. ambient temperature), the system must be allowed to reach thermal equilibrium before a nitrogen stream of consistent purity can be delivered from the system. If the temperature difference is 10˚F-20˚F (5˚C-10˚C), this equilibrium period may take up to 60 minutes. The inlet air temperature and, more importantly, inlet air dewpoint, must not be higher than the temperature of the system, or condensation of water within the system may occur, resulting in inefficient performance of and/or damage to the system.

### 9.5 Evaluation

Performance of the Parker Nitrogen Generator is highly dependent on the temperature of the inlet air. The data on the flow rate presented in this bulletin is based on an inlet air temperature of 77^F (25^C).

The performance and operating conditions of the Parker Nitrogen Generator should be monitored on a routine basis, as dictated by the application. This routine system check should include correcting any changes in the flow meter reading, confirming operating and outlet pressure gauge reading stability, checking the downstream flow meter (if applicable) to ensure flows are consistent with the rated capacity of the generator. If these readings have changed significantly from their original settings, adjustments must be made as described in the Adjustment Procedure section of this bulletin.

### 9.6 System Upsets

System upsets relative to pressure or flow rate (e.g., compressor malfunctions or plumbing leaks) will result in variations in the purity of the outlet gas. System upsets relative to temperature, dewpoint, or hydrocarbon content of the inlet compressed air may also result in variations of the system performance. These types of upsets should be eliminated from the compressed air delivery system to assure consistent performance of the Parker Nitrogen Generator.

### 9.7 Shutting Down

Proper shutdown of the Parker Nitrogen Generator can be accomplished by simply closing the (customer supplied) inlet air gate valve (see Figure 4 or 5). If this valve is left open, the system will continue to consume compressed air. Closing the outlet flow control valve will not prevent air consumption because the membrane module permeate port is open to atmosphere.

## 10. MAINTENANCE

**To avoid system damage and/or personal harm, isolate the Parker Nitrogen Generator from the compressed air supply and fully depressurize prior to performing any maintenance activities. All maintenance activities for the N2-120, N2-160, and N2-240 Nitrogen Generators should be performed by suitable personnel using reasonable care.**

The primary maintenance tasks required by the Parker Nitrogen Generators every 6 months are: changing the prefilter cartridges, changing the carbon dust filter, changing the final membrane filter, and replacing the activated carbon filter. See Figure 6 for the locations of the various maintenance items. A summary of the replacement part numbers and recommended service frequency is shown at the end of this Maintenance section.

Replacement prefilter cartridges, carbon dust filter cartridges, final membrane filter cartridges, and activated carbon filters may be ordered through your local Parker representative. Parker also offers a convenient Filtration Maintenance Kit (P/N 75478) which contains two Grade DXE coalescing filters, two Grade BXE coalescing filters, two Grade BXE carbon dust filters, and two GS Grade Membrane filters.

### 10.1 Cleaning

This product is not intended for use in extremely dirty environments. The Nitrogen Generators may be wiped clean with a dry cloth on an as needed basis. **Do not use water, aerosols, or other cleaning agents to clean the unit. Use of any liquid detergent to clean the generator could present an electrical hazard.**

### 10.2 Filter Cartridge Replacement

All filter housings which require routine service are easily accessible when the front filtration access panel is opened. (Remove four 10-32 screws). No tools are required to change the filter cartridges in the prefilters, carbon dust filter, or final membrane filter. **Depressurize generator prior to changing filter cartridges.** The two coalescing prefilters are Balston 2104N-1B1-DX and 2104N-1B1-BX filter assemblies. Replace these filter cartridges with Balston 100-18-DXE and 100-18-BXE filter cartridges. When replacing the prefilter cartridges, be sure to install the proper grade filter in the proper housing (the housings are labeled). The particulate filter is a Balston CO2-2265 filter assembly. Replace this particulate filter with a Balston 100-25-BXE filter cartridge. The final membrane filter is a Balston 2104N-OAO-95 filter assembly. Replace this membrane filter with a Balston Grade GS 100-25-95 membrane filter cartridge.

The filter cartridges in the filter assemblies may be removed by loosening the bowl from the head of the filter assembly (turn bowl 1/4 revolution counterclockwise), lowering the filter bowl away from the filter head, and unscrewing the element retainer from the base of the cartridge. Insert the new filter cartridge and reassemble the housing in reverse order.

The time required to service all four stages of filtration (above) is less than 30 minutes.

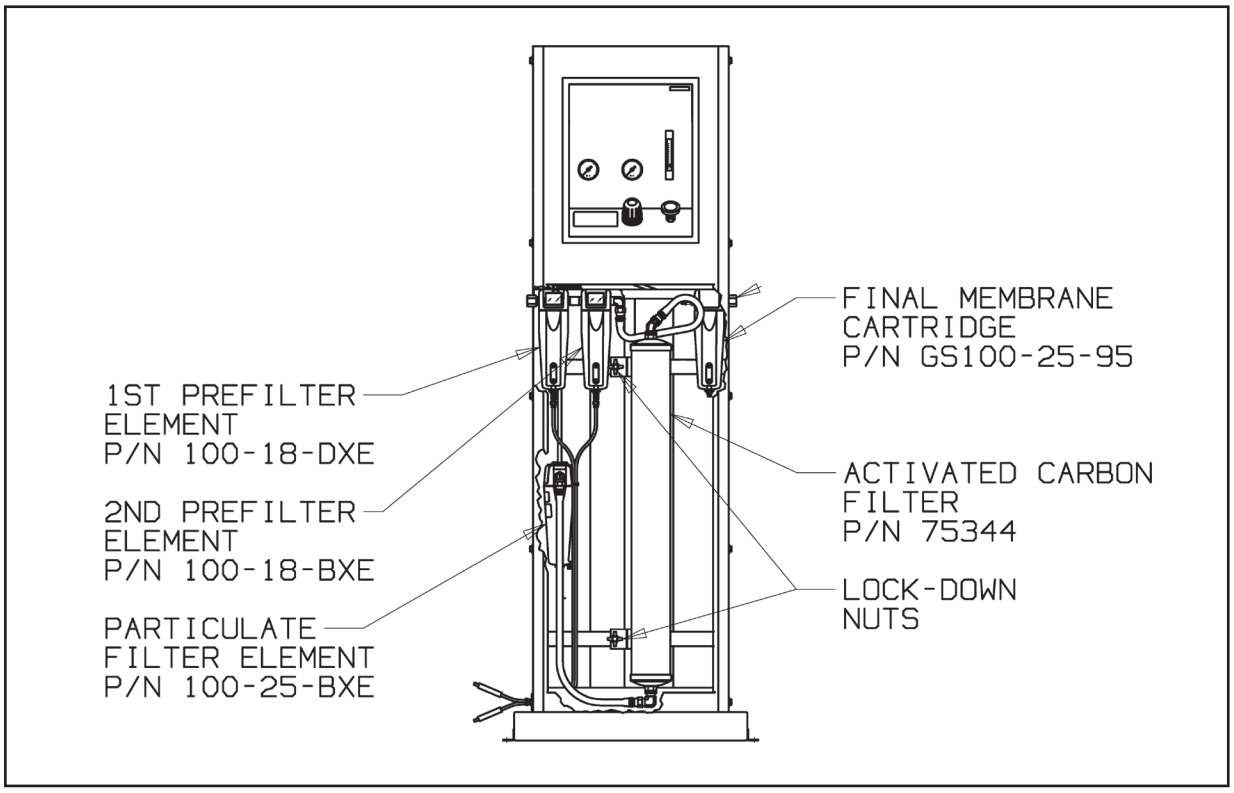


Figure 6
Maintenance Items

### 10.3 Activated Carbon Filter Replacement

The activated carbon filter (P/N 75344) must be changed every six months to protect the separation membrane from hydrocarbon buildup. Failure to replace the carbon filter every six months could cause premature failure of the membrane and will void the warranty. The carbon filter is located behind the filtration access panel. Contact the local Parker representative for ordering information and pricing for a replacement carbon filter. Spent carbon towers may be disposed of locally by the user. If there are disposal concerns, please contact the Technical Services Department at 800-343-4048, 8AM-5PM Eastern Time.

The only tool required to change the carbon filter is a 7/8" open end wrench. The procedure for replacing the activated carbon filter is as follows:

1. Turn off the air supply to the generator and allow the system to depressurize.
2. Disconnect the upper hose from the filter using the 7/8" open end wrench.
3. Remove the two lockdown knobs to release the filter.
4. Disconnect the lower hose (exposed by removing the lockdown knobs) using the open end wrench and remove the filter from the generator.
5. Install the new activated carbon filter by reversing the removal process. Tighten the inlet and outlet fittings to 1-1/4 turns past finger tight.
6. Dispose of the spent carbon filter according to local regulations.

The time required to replace the activated carbon filter is approximately 30 minutes.

### 10.4 Ordering Information

| | 1st Prefilter | 2nd Prefilter | Activated Carbon Filter |
|---|---|---|---|
| **Replacement Component** | 100-18-DXE | 100-18-BXE | 75344 |
| **Change Frequency** | 6 Months | 6 Months | 6 Months |

| | Carbon Dust Filter | Final Membrane Filter |
|---|---|---|
| **Replacement Component** | 100-25-BXE | GS-100-25-95 |
| **Change Frequency** | 6 Months | 6 Months |
| **Filter Maintenance Kit** | 75478 (carbon tower not included.) | |

Note: To ensure consistent product performance and reliability, use only genuine Balston replacement parts and filter cartridges.

## 11. NITROGEN GENERATION SYSTEM SPECIFICATIONS

| Model Number | N2-120, N2-160, N2-240 |
|---|---|
| Purity Range (% Nitrogen) | 99.0-99.5 |
| CSA Certification Standard | CSA 222 No. 61010.1-12 (IEC 1010) |
| IEC 1010 Installation Category | Category II |
| IEC 1010 Pollution Degree | Degree 2 |
| Dewpoint | -58˚F (-50˚C) |
| Particles > 0.01µm | None |
| Suspended Liquids | None |
| Commercially Sterile | Yes |
| Min/Max Operating Pressure | 60 psig/145 psig (4.1 barg/10 barg) |
| Maximum Pressure Drop | 15 psig (0.7 barg) |
| Min/Max Ambient Operating Temp. | 34˚F/140˚F (1˚C/60˚C) |
| Recommended Ambient Operating Temp. | 68˚F (20˚C) |
| Max. Relative Humidity | 80% |
| Altitude | 2000 m Max |
| Min/Max Inlet Air Temp. | 40˚F/131˚F (5˚C/55˚C) |
| Inlet/Outlet Port | 1/2" NPT |
| Electrical Requirements | None |
| Dimensions | 24" w x 20" d x 67" h<br>(61 cm x 51 cm x 170 cm) |
| Shipping Weight | 250 lb (114 kg) |

### 11.1 Approximate Inlet Air Consumption at 68˚F by Purity and Pressure

| Operating Pressure | | Purity | N2-120 | N2-160 | N2-240 |
|---|---|---|---|---|---|
| psig | barg | (% N2) | SLPM | SLPM | SLPM |
| 145 | 10 | 99 | 271 | 398 | 540 |
| 145 | 10 | 95 | 431 | 648 | 864 |
| 125 | 8.6 | 99 | 226 | 342 | 454 |
| 125 | 8.6 | 95 | 355 | 534 | 713 |
| 100 | 6.9 | 99 | 167 | 249 | 334 |
| 100 | 6.9 | 95 | 261 | 392 | 523 |
| 80 | 5.5 | 99 | 125 | 186 | 249 |
| 80 | 5.5 | 95 | 194 | 290 | 387 |

## 11.2 Optional Accessories

| | Part Number |
|---|---|
| **Back Pressure Controller** | 72-460-V883 |
| **Pressure Regulator (0-130 psig/0-8.8 barg)** | 72-130-V883 |
| **Oxygen Analyzer** | 72-730NA |
| **Activated Carbon Filter** | 75344 |
| **Installation Kit** | IK75880 |
| **Maintenance Kit (carbon tower not included)** | 75478 |

## 11.3 Cautions

1. The Parker Membrane Nitrogen Generators should be installed in an area with adequate ventilation to reduce the flammability of the oxygen-rich permeate stream. The system should not be located in an area where the permeate stream poses the risk of explosion or combustion.
2. **Nitrogen is nontoxic and largely inert. It can act as a simple asphyxiant by displacing oxygen in air. Inhalation of nitrogen in excessive concentrations can result in unconsciousness without any warning symptoms such as dizziness, fatigue, etc.**
3. The maximum operating pressure of the system is 145 psig (10 barg). Operating the nitrogen generator at pressures above 145 psig (10 barg) may result in damage to system components.
4. Flow/purity/air consumption data is accurate at inlet air temperatures from 68˚F to 90˚F.
5. The drain lines from the first two stages of filtration should be piped away to an appropriate collection vessel or waste treatment system to avoid any possible re-entrainment of liquid in the emergent filtered air which feeds the membrane module.
6. Open all shutoff valves slowly to prevent pressure shock to the system.

## 12. TROUBLESHOOTING

| Symptom - Nitrogen Generator | Course of Action |
|---|---|
| Loss of Outlet Pressure | Check that the flow control valve on the generator is fully open and control the flow with a valve at the process.<br>Check operating pressure to assure that it is greater than 80 psig (5.5 barg).<br>Check the system for leaks. |
| Loss of Outlet Flow | Check operating pressure to assure that it is greater than 80 psig.<br>Check setting of flow control valve. Adjust if necessary.<br>Check the system for leaks. |
| Purity is Lower than Specified | Check setting of flow rate.<br>Check the operating pressure to assure that it has not varied from the original reading.<br>Check the system for leaks.<br>Calibrate oxygen analyzer (if needed). |
| Air Leak Through Drains of Prefilters | Check inlet pressure. It should be greater than 15 psig (1 barg) to seal drain.<br>Remove tubing from the drain outlet, hold finger over drain opening for a few seconds to allow pressure to build and drain to seal.<br>Remove bowl from filter assembly and rinse with water.<br>If leak persists, replace automatic float drain (P/N 21552). |

If issue remains unresolved, please call the Technical Services Department at 1-800-343-4048, 8 AM to 5 PM Eastern Time or email at GSFsupport@parker.com (North America only). For other locations, please contact your local representative.

# Parker Filtration Group

**Aerospace Filtration Division**
Greensboro, North Carolina
336 668 4444

**Bioscience & Water Filtration Division**
Bioscience Filtration
Oxnard, California
877 784 2234

Water Purification
Carson, California
310 608 5600

**Engine Mobile Aftermarket Division**
Kearney, Nebraska
308 234 1951

**Engine Mobile Original Equipment Division**
Modesto, California
209 521 7860

**HVAC Filtration Division**
Jeffersonville, Indiana
866 247 4827

**Hydraulic & Fuel Filtration Division**
Metamora, Ohio
419 644 4311

**Industrial Gas Filtration & Generation Division**
Lancaster, NY
800 343 4048

**Industrial Pro cess Filtration Division**
Mineral Wells, Texas
940 325 2575

**Bioscience Engineering Filtration Division EMEA**
Birtley, United Kingdom
+44 (0) 191 410 5121

**Engine Mobile Filtration Division EMEA**
Dewsbury, United Kingdom
+44 (0) 1924 487 037

**Gas Separation & Filtration Division EMEA**
Team Valley, United Kingdom
+44 (0) 191 402 9000

**Gas Turbine Filtration Division**
Alton, United Kingdom
+44 (0) 1420 541188

**Hydraulic & Industrial Filtration Division EMEA**
Arnhem, Netherlands
+31 (0) 26 376 0376

**Australia Filtration Division**
Castle Hill, Australia
+61 2 9634 7777

**China Filtration Division**
Shanghai, China
+86 21 2067 2067

**India Filtration Division**
Chennai, India
+91 22 4391 0700

**Korea Filtration Division**
Hwaseon City, Korea
+82 31 359 0852

**Latin America Filtration Division**
Sao Paulo, Brazil
+55 12 4009 3500

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Parker Hannifin Corporation
**Industrial Gas Filtration and Generation Division**
4087 Walden Avenue
Lancaster, NY 14086
phone 800 343 4048
www.parker.com/igfg