

TECHNICAL INFORMATION

Installation, Operation and Maintenance

Parker Balston® HPN2-2000 Nitrogen Generator

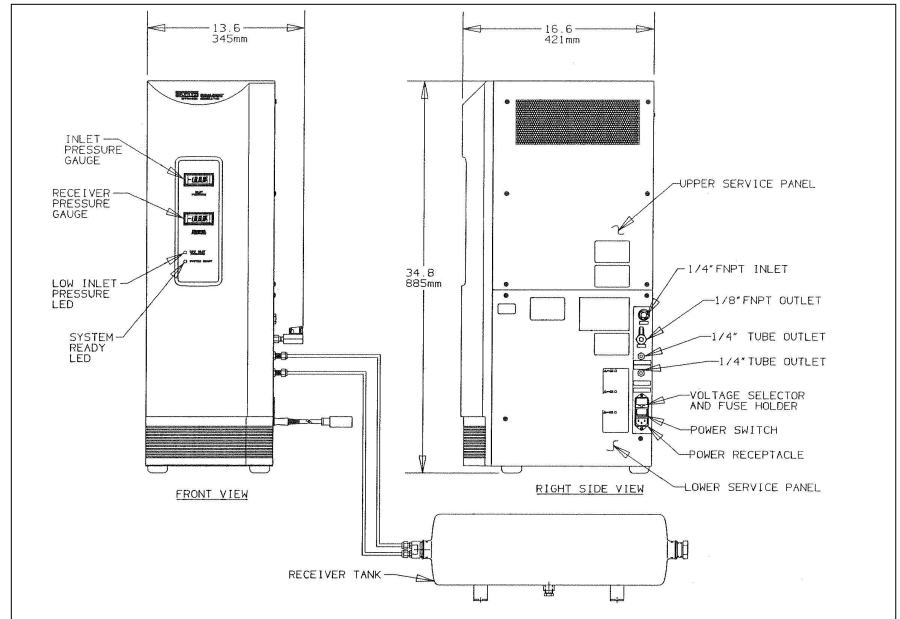


Figure 1 - Overall Dimensions

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. If you have any questions or concerns, please call the Technical Services Department at 800-343-4048 8AM to 5PM Eastern Time. For locations outside North America, please contact your local representative.

Please save product packaging for future use.

General Description

The Parker Balston HPN2-2000 Nitrogen Generator (see Figure 1) is a completely engineered system which converts compressed air into nitrogen with a minimum purity of 99.99%. The system utilizes a combination of purification technologies including filtration and pressure swing adsorption. The Parker Balston Nitrogen Generator is designed to provide nitrogen gas for analytical instrumentation and other laboratory applications.

The Parker Balston HPN2-2000 Nitrogen Generator has been certified to IEC 1010 standards. This unit bears the CSA safety (CSA 22.2 No. 1010.1-92) marking on the product label.

Engineered System

The Parker Balston Nitrogen Generator includes all the components required to convert compressed air into high purity nitrogen (99.99%). The flow schematic (see Figure 2) shows all of the major components of the system. The system can be broken down into three primary stages: prefiltration, pressure swing adsorption, and final filtration.

Prefiltration

A Balston® high efficiency coalescing filter has been incorporated into the design of the Nitrogen Generator as a prefilter to remove oil, water, and particulate contamination from the incoming compressed air supply. The inlet prefilter assembly is equipped with an automatic float drain to eliminate any liquids which have accumulated within the filter housing. In addition to the coalescing prefilter, two particulate filters are incorporated into the design to protect internal components from particulate contamination (see flow schematic, Figure 2).



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General Description

Pressure Swing Adsorption

Two stages of pressure swing adsorption (PSA) technology are utilized in the next stage of the purification process to remove oxygen, water vapor, and carbon dioxide from the compressed air supply.

Final Filtration

The final filter is a Balston Grade GS membrane filter which removes particulate contamination in the nitrogen stream to 0.01 micron (absolute).

Diagnostics

There are two diagnostic indicator gauges on the Parker Balston Nitrogen Generator.

Inlet Pressure Gauge - The inlet pressure gauge displays the pressure of the compressed air supply coming to the generator.

Receiver Pressure Gauge - The receiver pressure gauge displays the pressure swing within the receiver tank. This diagnostic gauge allows the operator to monitor the operation of the PSA towers and determine if there is a leak or overflow condition (downstream) which could adversely affect the quality of the nitrogen supply.

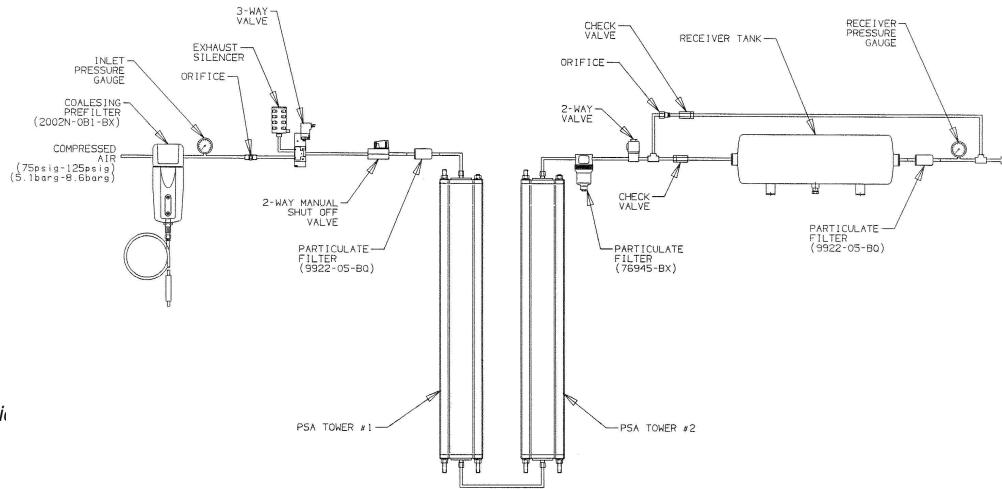


Figure 2 - Flow Schematic

Installation



All installation, operation, and maintenance activities for the Parker Balston Nitrogen Generator should be performed by suitable personnel using reasonable care.

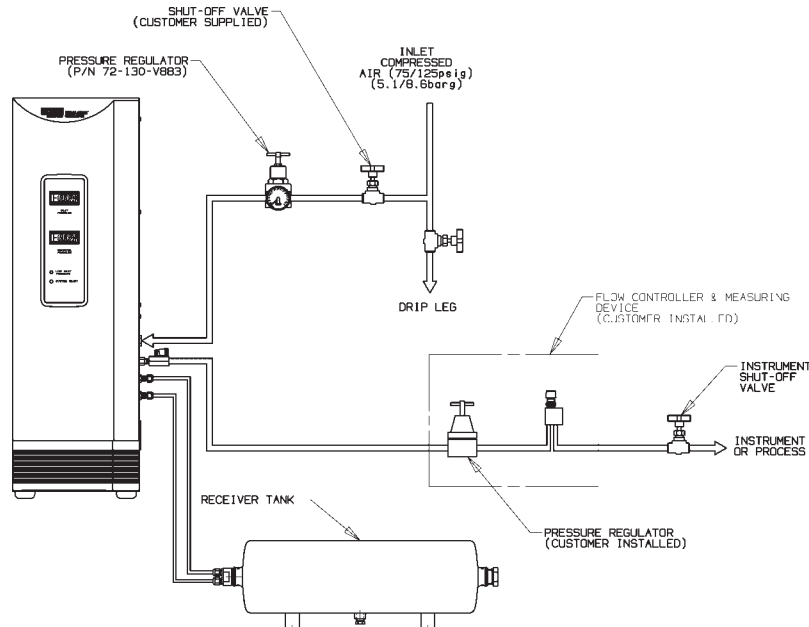


Figure 3 - Recommended Installation

General



The Parker Balston HPN2-2000 Nitrogen Generator is a free-standing unit. **Do not suspend the Nitrogen Generator from the wall or ceiling. Its considerable weight could pose a falling hazard to personnel and equipment in its proximity.** When moving the generator, use proper equipment and lifting techniques. Do not grasp the front panel when moving the generator. Lift the generator by the metal case only.

Location

The inlet fitting for the Nitrogen Generator is 1/4" female NPT, and the outlet fitting is a 1/8" female NPT. A shut-off valve and pressure regulator should be installed directly upstream from the Parker Balston Nitrogen Generator (see Figure 3). The shut-off valve isolates the unit from the compressed air line for maintenance and troubleshooting activities. The pressure regulator controls the inlet air pressure and should be set to deliver compressed air to the generator between 75 psig and 125 psig (5.1 barg and 8.6 barg).

The Parker Balston Nitrogen Generator should be located in an area where the ambient temperature is between 60°F and 100°F (16°C and 38°C). Installation of the nitrogen generator in an area where the ambient temperature is not within the recommended range may adversely affect the performance and/or life of the system or void the warranty. Install the generator in a location which is protected from severe weather conditions, and is free from excessive ambient dust or dirt.

Utilities

Compressed Air - The Parker Balston Nitrogen Generator requires a source of clean, dry compressed air for optimal operation. The compressed air should be as close to instrument quality as possible and supplied at a pressure between 75 psig and 125 psig (5.1 barg and 8.6 barg). The supply air should be at room temperature and relatively free of water, compressor oil, hydrocarbons, and particulate matter. If the compressed air supply has excessive oil and water carryover from the compressor, install a prefilter upstream from the generator (see Recommended Accessories section, page 5).

The inlet air supply should be supplied by 1/4" or larger tubing. **At least 1.5 SCFM (43 lpm) of compressed air should be available for the generator to operate properly.**



For optimal performance, run the generator continuously. Power and pressure interruptions will cause increased levels of impurities in the nitrogen stream.

Power - The Parker Balston Nitrogen Generator may be operated by a 120 VAC or 230 VAC, 50/60 Hz power supply. The generator is shipped with a tag on the power receptacle which specifies the factory setting of the voltage selector. For optimal performance of the generator, set the voltage selector to match the local power supply. To change the setting on the voltage selector, simply remove the selector/fuse drawer from the receptacle using a small screwdriver, turn the selector so the desired voltage shows in the window, and reassemble. To connect the generator to the power supply, plug the female end of the electrical cord into the receptacle on the right side of the generator, and the opposite end into a three-pronged earthed power receptacle. **Main supply line voltage must be within 10% of nominal rated voltage for the generator.**



Before plugging the power cord into the power receptacle, check the voltage selector setting. The voltage setting must match the local power supply voltage.

Piping Components - The inlet and outlet ports for the Parker Balston Nitrogen Generator are located on the right side of the unit (see Figure 1). The inlet port is 1/4" female NPT, and the customer supplied inlet tubing and fittings should be clean and rated for 125 psig (8.6 barg) minimally. The outlet port is 1/8" female NPT.

Drain Line - The 1/4" diameter plastic drain line attached to the compressed air prefilter is coiled underneath the generator. Upon installation, pull the drain line out and pipe away to an appropriate disposal container. The liquid in this drainage will consist of water and compressor oil which should be disposed of properly.

Parker strongly recommends installing a second shutoff valve at the process or instrument being supplied with nitrogen from the generator unless the process or instrument has its own internal shutoff valve to isolate it from the nitrogen line.

A pressure regulator, flow controller, and flow measuring device as detailed below, **must** be installed between the generator and the point-of-use to maintain pressure, flow, and purity specifications. If these control devices are incorporated into the downstream equipment being used, there is no need to install them separately.

Pressure Regulator (downstream) - The emergent nitrogen stream from the generator must be regulated to the application pressure by installing a pressure regulator, downstream from the generator.

Flow Controller - If the rated flow capacity of the generator is exceeded, the nitrogen purity will be adversely affected. Specifically, the nitrogen stream will have increased levels of oxygen, carbon dioxide, and water vapor. If the equipment or process used downstream from the generator does not contain a flow control device, install a metering valve and flow measuring device to set the nitrogen flow rate.

Receiver Installation - The receiver ports are 1/4" Swagelok compression fittings. To install the receiver tank, insert the 1/4" tubing into the Swagelok tube fittings; make sure the tubing rests firmly on the shoulder of the fitting and that the nut is finger-tight. While holding the fitting body steady with a backup wrench, tighten the nut 1 1/4 turns.

Recommended Accessories

Prefiltration - If instrument quality compressed air is not available, or if excess water drains from the prefilter, the **Balston 2002N-1B1-DX** filter assembly should be installed, in series, on the compressed air supply line, upstream from the generator.

Pressure Regulator (upstream) - To control the incoming air pressure to between 75 psig and 125 psig (5.1 barg and 8.6 barg), use a self-relieving pressure regulator. The **Balston 72-130-V883 Pressure Regulator** is a self-relieving pressure regulator with 1/2" NPT inlet and outlet ports and a pressure gauge.

Operation

The Parker Balston Nitrogen Generator requires 1 1/2 hours of start-up time to achieve rated purity.

Startup

Prior to shipment from the factory, the PSA towers are pressurized with high purity nitrogen to prevent contamination from the atmosphere. The nitrogen is sealed into the towers by a 2-way valve directly upstream from the towers. Before starting the generator, remove the service panel and open this 2-way valve (see Figure 4). Replace the service panel. Ensure the 2-way valve at the outlet of the generator is closed prior to start-up.

Open the inlet air supply valve (customer supplied) and turn the power switch (see Figure 1) on the generator upward to the ON position. The green "Power On" LED will be illuminated. The inlet air pressure should be regulated to be between 75 psig and 125 psig (5.1 barg to 8.6 barg). Check the connections between the receiver and generator for leaks when the receiver pressure reaches 60 psig. Ensure that a pressure regulator and flow meter are installed downstream from the generator.

Open the outlet valve on the generator and check all external connections and piping for leaks using a bubble-type leak detecting solution.

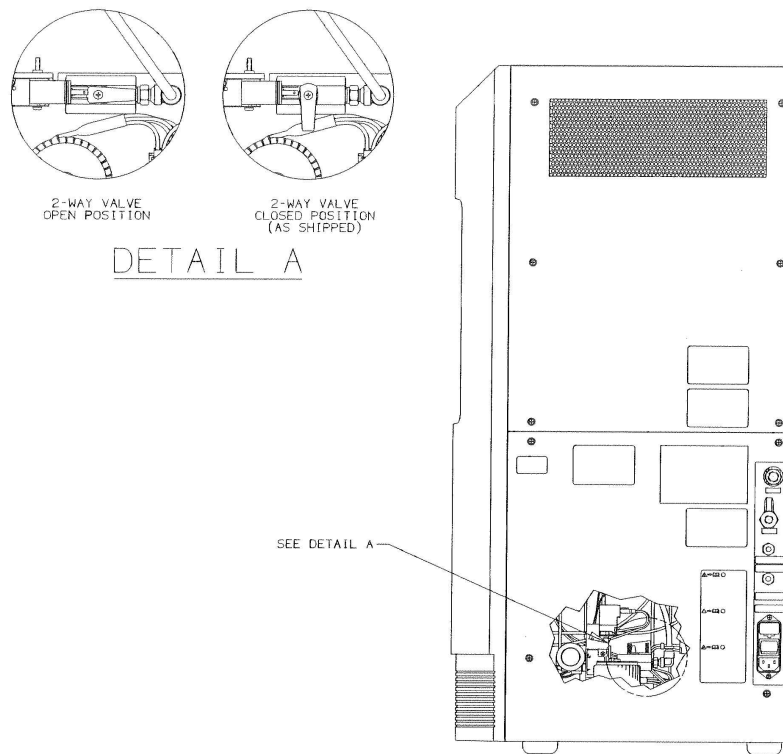


Figure 4- Manual Shut-Off Valve

Operation

After the initial start-up cycle (1.5 hours) has been completed, the generator is ready to supply high purity nitrogen to the application.

Flow Rate Adjustment

The flow of nitrogen from the nitrogen generator must be controlled using a metering valve or flow controller downstream from the unit. The flow control device may be integral to the equipment being used downstream, or it may be an independent controller (see Installation Section) purchased and installed by the customer. In either case, a device to measure the flow should also be installed (either with the flow controller or downstream from the application). If the demand of nitrogen exceeds the delivery capacity of the generator, the purity and pressure of the emergent nitrogen stream will not meet specifications.

The outlet pressure and flow from the generator must be adjusted according to the operating parameters listed below. If the outlet flow exceeds the rated flow for a given inlet pressure, the nitrogen purity will not meet specifications; the concentration of oxygen will exceed **100 ppm**.

Outlet Flow Operating Parameters

Minimum Inlet Pressure		Maximum Outlet Flow	Maximum Outlet Pressure		Receiver Pressure	
120 psig	8.6 barg	3.25 lpm	80 psig	5.5 barg	84-108 psig	5.8-7.4 barg
105 psig	7.2 barg	3.0 lpm	65 psig	4.5 barg	72-96 psig	5.0-6.5 barg
90 psig	6.2 barg	2.5 lpm	55 psig	3.7 barg	60-76 psig	4.1-5.2 barg
75 psig	5.1 barg	2.0 lpm	40 psig	2.7 barg	47-62 psig	3.2-4.3 barg

Shutdown



To shut down the generator, turn off the power to the unit, close the external manual outlet valve, and close the (customer installed) inlet air valve. Allow the generator to purge for 10 minutes. After the 10 minute purge, open the lower service panel and turn off the 2-way manual valve upstream from the PSA towers (see Figure 4). **If the generator is not shut down according to this procedure, the PSA towers may be poisoned and the warranty will be void.**

Best results will be obtained by continuously running the generator at or below the maximum outlet flow. Frequent shut-downs and excessive outlet flows will cause increased levels of impurities in the nitrogen stream.



Before servicing the Parker Balston Nitrogen Generator, isolate the unit from the compressed air and electrical power supplies. All maintenance tasks for the Nitrogen Generator should be performed by suitable personnel using reasonable care.

The primary maintenance tasks required by the Parker Balston Nitrogen Generator are changing the filter cartridges in the coalescing prefilter and particulate filters (annually), and replacing the disposable filter units (annually). A summary of the replacement part numbers and recommended service frequency is shown at the end of this Maintenance section. See Figure 5 for the locations of the various maintenance items.

Additional coalescing prefilter cartridges, particulate filter cartridges, and membrane filter cartridges for the Parker Balston HPN2-2000 Nitrogen Generator may be ordered through your local representative. For convenience, a one-year supply of these replacement cartridges has been assembled into a maintenance kit (P/N MKHPN22000). The Maintenance Kit contains one coalescing prefilter cartridges (P/N 100-12-BXE), two disposable filter units (P/N 9922-05-BQ) and one final filter cartridges (P/N 050-05-BXE).



If necessary, the nitrogen generator 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. The use of any liquid detergent to clean the generator could present an electrical hazard.

Filter Cartridge Replacement

The only preparation needed to service the filters is turning off the air supply to the generator and depressurizing the receiving tank and filter housings. To depressurize the filter housings, turn off the compressed air supply to the generator and allow the generator to cycle until the inlet pressure gauge reads zero. This should only take 10 minutes (1-2 generator cycles). Turn off power to generator, and depressurize the receiver by making sure the outlet valve and downstream flow controller are open to the atmosphere.

The coalescing and particulate filters and the disposable filter units in the nitrogen generator are easily accessible when the lower service panel is removed (see Figure 5). These filters should be changed on an annual basis to maintain efficient operation of the system. The filter cartridge in the coalescing prefilter assembly is removed by turning the bowl of the filter assembly, 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 (P/N 100-12-BXE) and reassemble the housing in the reverse order. To ensure consistent product performance and reliability, use only genuine Balston replacement parts and filter cartridges.

The particulate filter and is easily removed from the housing by unscrewing the filter bowl from the filter head (no tools required). Insert the new filter cartridge (P/N 050-05-BXE) and reassemble the filter housing.

To change the disposable filter units (DFU), grab the collar of the fitting on the DFU, push the collar into the fitting while pulling the DFU in the opposite direction.

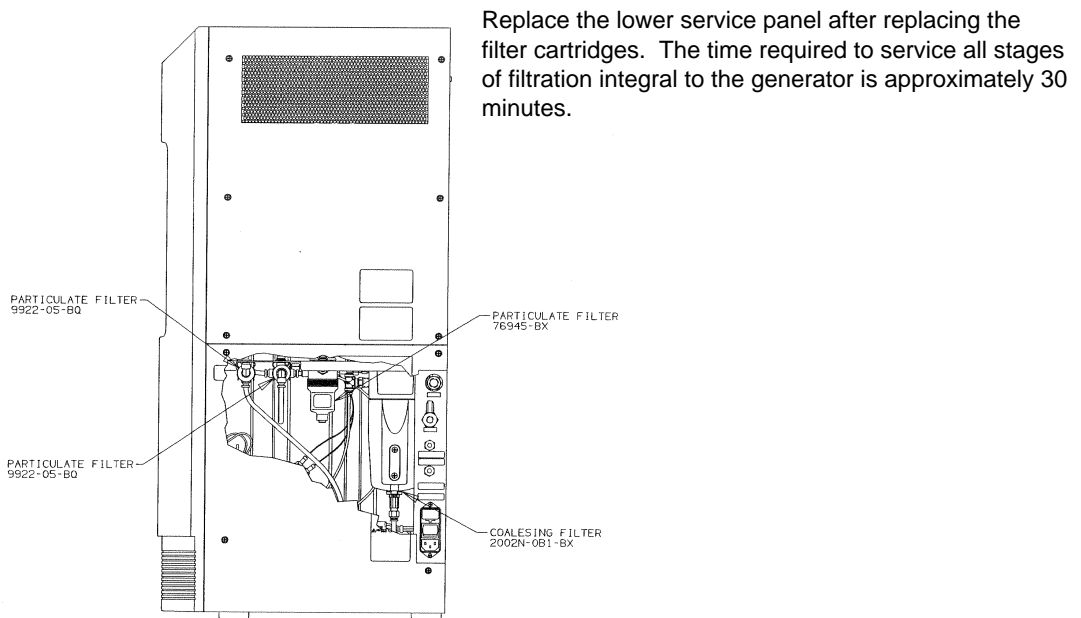


Figure 5 - Maintenance Items

Fuse Replacement



Occasionally, one or both of the fuses in the nitrogen generator may burn out. The fuses are located in the power receptacle on the side of the generator. **Before servicing the fuses, turn the generator off and disconnect the power cord from both the power supply and the generator power receptacle.**



To access the fuses, use a small screwdriver to remove the fuse holder located in the power receptacle of the generator. In the nitrogen generator, both the phase and neutral are fused separately. As a result of this configuration, both the phase and neutral are fused separately. **Replace either one or both fuses as necessary and reassemble. To maintain the safety and performance integrity of the product, use only fuses of the size and type detailed in the specifications section of this bulletin.**



This equipment has fuses in both neutral and phase lines. Use care when servicing.

Ordering Information

	1st Stage	Final Filter	3rd Stage	Second Stage
Replacement Filter Cartridge P/N	100-12-BXE	050-05-BXE	9922-05-BQ	9922-05-BQ
Change Frequency	1 year	1 year	1 year	2 years
Parker Balston HPN2-2000 Prefilter Maintenance Kit (P/N MKHPN22000)				

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

System Specifications

CSA Certification Standard	CSA 22.2 No. 1010.1-92 (IEC 1010)
IEC 1010 Installation Category	Category II
IEC 1010 Pollution Degree	Degree 2
O ₂ Concentration	< 100 ppm
H ₂ O Concentration	≤ 2 ppm
CO ₂ Concentration	< 1 ppm
Hydrocarbon Concentration	same as inlet concentration
Ar Concentration	0.9%
Inlet Connection	1/4" NPT (female)
Outlet Connection	1/8" NPT (female)
Compressed Air Consumption	1.5 SCFM (43 lpm)
Min/Max Inlet Air Pressure	75 psig/125 psig (5.1 barg/8.6 barg)
Recommended Inlet Air Temperature	78°F (26°C)
Altitude	2000 m
Max. Ambient Relative Humidity	80%
Ambient Operating Temperature	60°F to 100°F (16°C to 38°C)
Electrical Requirements	120 VAC/60, 230 VAC 50/60 Hz, 25 Watts
Dimensions	12"w X 16"d X 35"h (31cm X 41cm X 89cm)
Shipping Weight	110 lbs. (50 kg)
Fuse Type (120 VAC Model)	1 amp, Type T, 120 V
(230 VAC Model)	1 amp, Type T, 230 V

Optional Accessories

	Part Number
Prefilter	2002N-1B1-DX
Pressure Regulator	72-130-V883

Notes

- The Parker Balston Nitrogen Generator was designed to meet the specifications listed when operated in a manner consistent with the recommendations presented in this manual. If these operating specifications are not met, then inferior product performance and shortened product life may result.
- The nitrogen generator should be run continuously to optimize the performance and reliability of the unit.
- The Parker Balston Nitrogen Generator installation should be thoroughly checked for leaks after any service activity has been performed on the system in particular or its installation on the whole. Any leak could significantly reduce the purity of the outlet nitrogen stream.
- The Parker Balston Nitrogen Generator will not operate to specifications with an inlet air pressure less than 75 psig (5.1 barg). A pressure regulator must be installed upstream from the generator to maintain an air supply pressure of 75 psig to 125 psig (5.1 barg to 8.6 barg).

Cautions



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.

Troubleshooting and Service

Troubleshooting

Symptom	Course of Action
High oxygen content in outlet nitrogen	<p>Check inlet pressure and outlet flow rate.</p> <p>Check fittings between system and point of use for leaks.</p> <p>Check fittings between generator and receiver for leaks.</p>
Low pressure at nitrogen outlet	<p>Check inlet air pressure.</p> <p>Check system for leaks.</p> <p>Check flow rate at system outlet.</p> <p>Replace final filter.</p>
No outlet flow/pressure	<p>Check power supply.</p> <p>Check inlet pressure.</p> <p>Check 3 way valve; air should exhaust from the silencer every 2 minutes.</p>

Don't Forget To:

- Complete and mail your registration card.
- Keep your product certification in a safe place.
- Call the Technical Services Department at **800-343-4048**, 8 AM to 5 PM Eastern Time with any questions. For locations outside North America, please contact your local representative.

Serial Numbers

The serial number for the unit is located at the bottom corner of the side panel, opposite the power receptacle. 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.