DB Series Nitrogen Generator Owner's Manual

Models: DB5-20

Parker

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SAFETY INFORMATION

Do not operate this equipment until the safety information and instructions in this user guide have been read and understood by all personnel concerned.

USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document, and other information from Parker Hannifin Corporation, its subsidiaries or authorized distributors, provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalogue and in any other materials provided from Parker.

To the extent that Parker, its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

This equipment is intended to be operated indoors and is designed to produce high purity nitrogen gas from a supply of clean dry compressed air.

Please refer to the technical specification for pressure, temperature, and compressed air requirements.

Only competent personnel trained, qualified, and approved by Parker Hannifin should perform installation, commissioning, service and repair procedures.

Use of the equipment in a manner not specified within this user guide may result in an unplanned release of pressure, which may cause serious personal injury or damage.

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

Ensure that the equipment is depressurized and electrically isolated, prior to carrying out any of the scheduled maintenance instructions specified within this user guide.

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

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

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

Should you require any technical support or training on this equipment, or any other equipment within the Parker Hannifin range, please contact Parker Hannifin Corporation.

Factory Contact Information:

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IGFGorders@parker.com

For technical support and aftermarket:
GSFsupport@parker.com

For product applications and technical sales:
FAFQuotes@parker.com

MARKINGS AND SYMBOLS

The following markings are used within this manual:

Caution, read the User Guide

Highlights actions or procedures which, if not performed correctly, may lead to personal injury, death or damage to the product.

DISPOSAL OF EQUIPMENT

Disposal of nitrogen generators, their individual components and carbon molecular sieve material should be done in a manner that protects the environment and complies with all applicable Federal, State and local regulation.

1. Description

Parker Balston DB Series Twin Tower Nitrogen Generators operate on the Pressure Swing Adsorption (PSA) process to produce a continuous stream of nitrogen gas from clean dry compressed air.

Pressure Swing Adsorption (PSA) technology uses 2 vessels (or 2 sets of vessels) each filled with carbon molecular sieve (CMS). One bed is “online” and generating nitrogen from the process air, while the other bed is “offline” being regenerated.

Nitrogen is “generated” by taking clean, dry particulate free compressed air and flowing up through the online bed of CMS. Oxygen and other trace gases are preferentially adsorbed by the CMS, allowing nitrogen to pass through.

The “offline” bed of CMS is regenerated by releasing the pressure in one the vessels and venting the waste gases to atmosphere, while the other vessel(s) continues to separate air and deliver a continuous supply of nitrogen.

This process is called pressure swing adsorption because the operating pressure “swings” from atmospheric pressure to line pressure to adsorb oxygen and from line pressure to atmospheric pressure to desorb and release the waste gases.

A nitrogen buffer tank is supplied with the generator to aid in providing a consistent supply of nitrogen with constant flow, pressure, and purity. This is not a nitrogen storage tank.

With the appropriate combination of compressed air purification equipment installed and properly maintained, a PSA nitrogen generator can continuously provide clean, dry nitrogen gas with purities up to 99.999% (10 ppm remaining oxygen content) and dewpoints down to -58˚F atmospheric.

Nitrogen produced by PSA nitrogen generators contains argon which is also inert. Therefore, when mentioning nitrogen purities, the composition of the product gas is determined by the residual oxygen content. For example, 1% oxygen in product gas is equivalent to 100%-1% = 99% (nitrogen + argon).

Each DB 5-20 nitrogen generator is fitted with a high efficiency pre-filter, which removes inlet air particles down to 0.01 micron. This filter is equipped with an automatic float drain in the event that any liquids accumulate within the filter housing.

The pre-filter is present for final filtration of the incoming air only. The air supplied to the system should be clean and dry prior to reaching this filter. Any accumulation of water and/or oil in the pre-filter is an indication of insufficient or poorly maintained compressed air treatment equipment upstream of the generator. This can lead to contamination of the CMS which will result in performance degradation. The CMS cannot be regenerated if contaminated and must be replaced to regain proper performance.

For final filtration, each DB 5-20 generator is equipped with a Parker Balston Grade SA (sterile air) filter which provides filtration efficiency of 99.9999+% at 0.01µm prior to the nitrogen leaving the generator.

1.1 Generator Model Number Identification

Series	
DB	Dual-bed

-

Model	
5	See product specifications below for flow rates
10	
15	
20	

-

O2 Analyzer	
PCT	Purities between 95-99.9%
PPM	Purities between 99.95-99.999%

Extended Cabinet	
EC	Only available for DB-5 and DB-10 units

Wine Series	
W	Only available for PCT units

Example
DB-5-PPM

1.2 Flow Rates

	DB-5		DB-10		DB-15		DB-20	
% Oxygen	Nitrogen Flow (SCFH)	Avg. Air Demand (SCFM)	Nitrogen Flow (SCFH)	Avg. Air Demand (SCFM)	Nitrogen Flow (SCFH)	Avg. Air Demand (SCFM)	Nitrogen Flow (SCFH)	Avg. Air Demand (SCFM)
.001	94	20	189	41	283	61	377	81
.005	150	21	300	42	450	64	600	85
.01	194	22	388	44	583	66	777	88
.05	314	25	629	49	943	74	1258	98
.1	365	26	730	52	1095	78	1460	105
.5	512	28	1024	57	1536	85	2048	114
1	618	30	1235 [5]	59	1853	89	2470	119
2	770	32	1541[6]	63	2311	95	3081	126
3	892	34	1783[6]	68	2675	103	3566	137
4	983	36	1966[6]	72	2949	108	3931	144
5	1065	37	2130[6]	75	3195	112	4260	149

Notes:

1. Nitrogen flow rates are +/- 5% and are based on inlet of 110 psi g (7.6 bar g) and 60-100˚F (15-38˚C).
2. Nitrogen generator purity is pressure, temperature, and flow dependent. Consult factory if operating parameters exceed design conditions.
3. Air consumption numbers are an average. Peak flows may be higher.
4. Some flows and purities may not be available at all outlet pressures.
5. Available at 65 psig outlet pressure.
6. Flow rate available only with the DB-10-PCT-EC (extended cabinet) model.

1.3 Technical Specifications

Model Number[1]	Min. Ambient Temperature	Max. Ambient Temperature	Min. Inlet Temperature	Max. Inlet Temperature	Min. Inlet Pressure	Max. Inlet Pressure	Max. Press. Drop	Nitrogen Dewpoint	Power Supply
DB-5-[*]	40˚F (5˚C)	95˚F (35˚C)	60˚F (16˚C)	105˚F (40˚C)	80 psi g (5.5 bar g)	140 psi g (9.7 bar g)	30 psi d (2 bar d)	-58˚F (-50˚C)	120V-1Ph-60z 300 Watts
DB-10-[*]									
DB-15-[*]									
DB-20-[*]									

Notes:

1. Replace [*] with "PCT" for percent anazlyzer (purities 95-99.9%) or "PPM" for parts per million analyzer (purities 99.95-9.999%)

1.4 Weight and Dimensions

Model Number	DB-5-[*]	DB-10-[*]	DB-5-[*]-EC-[W]	DB-10-[*]-EC-[W]	DB-15-[*]	DB-20-[*]
Dimensions (W x D x H)	28.5" x 34.375" x 79.5" (72cm x 87cm x 202cm)		28.5" x 51.5" x 79.5" (72cm x 131cm x 202cm)			
Shipping Weight	905 lbs (411 kg)	1105 lbs (501 kg)	993 lbs (450 kg)	1193 lbs (541 kg)	1393 lbs (632 kg)	1593 lbs (723 kg)
Inlet/Outlet Port Size	1-1/2" NPT / 1" NPT		1" NPT/ 3/4" NPT			
Nitrogen Buffer Tank	60 Gal. (227 L) 24.0" W x 24.0" D x 52.75" H (61cm x 61cm x 134cm)					

Notes:

1. Weights and dimensions shown for all models are approximate. Parker reserves the right to make changes without notification. Consult factory for general arrangement drawings.

1.5 Product Selection and Correction Factors

Inlet Pressure Correction Factor									
Minimum Inlet Pressure	psi g	70	80	90	100	110	120	130	140
	bar g	4.83	5.5	6.2	6.9	7.6	8.3	9	9.7
	CF	0.55	0.66	0.77	0.88	1.00	1.08	1.13	1.20

To adjust generator performance at inlet pressures other than 110 psi g, use the “CF” multiplier from the table above.

Example: DB-5-PCT @ 99.9% purity, 80°F ambient temperature and 100 psi g inlet pressure.

Rated Flow @ required purity x CF = New flow capacity

365 scfh @ 99.9% x 0.88 = 321 scfh new flow capacity

2. Installation and Commissioning

WARNING

Only competent personnel trained, qualified, and approved by Parker should perform installation, commissioning, service, and repair procedures.

2.1 Receiving and Inspecting the Equipment

On delivery of the equipment, check the system for damage. If there are any signs of damage to the system immediately contact Parker Hannifin Corporation or the authorized distributor that the equipment was purchased/rented through.

2.2 Unpacking

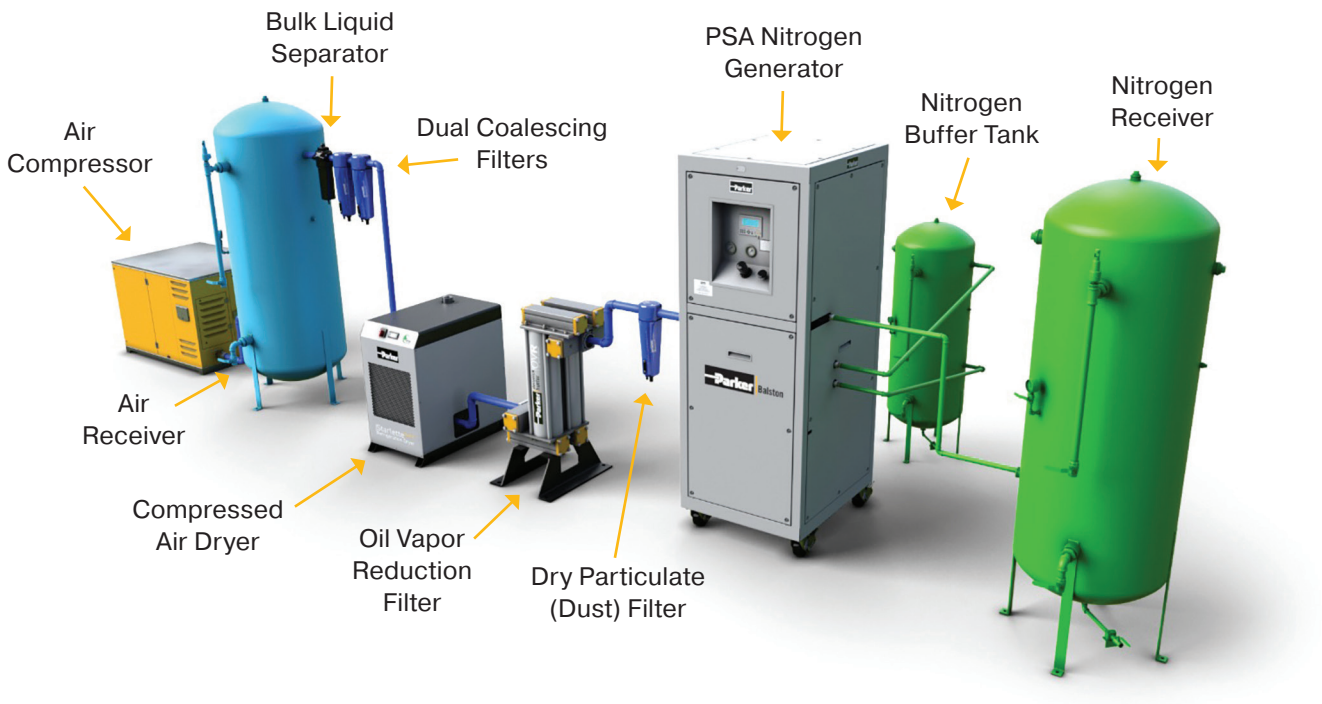
DB 5-20 nitrogen generators are delivered to site in two pieces: (a) nitrogen generator skid and (b) nitrogen buffer tank. The nitrogen generator is shipped in a fully wooden crate. The crate door is designed to be used as a ramp to remove the generator from the crate. The generator arrives with filtration, CMS vessels, controls, instrumentation, silencer and interconnecting piping fully assembled inside a cabinet. Casters are installed underneath the cabinet for ease of transportation. The nitrogen buffer tank (included as standard) is shipped fastened to a pallet with hoses and a pressure relief valve. The installer is responsible for connecting the generator to the buffer tank.

2.3 Recommended System Layout

Ensure to position the unit so that the clean air discharge is directed into an open area free of

> ⚠ Parker recommends installing a 'dry' air receiver downstream of the compressed air treatment equipment to protect them from surges in air demand.
>
> If using an oil lubricated compressor, Parker recommends that an oil vapor reduction filter be installed downstream of the dryer and upstream of the generator.

obstructions and with consideration for personnel safety.



2.4 Inlet Air Quality Requirements

To achieve the maximum performance, reliability and service life, the proper combination of compressed air treatment equipment must be installed upstream of the generator.

Parker recommends that PSA nitrogen gas generators receive inlet air quality in accordance with ISO 8573-1:2010 Class 2 for Particulate, Class 2 for Water and Class 2 for Total Oil. This requires a combination of compressed air filters and a desiccant dryer.

Refrigeration dryers will only provide air in accordance with ISO8573-1:2010 Class 4 or Class 5 for Water. For refrigeration dryer users, an oil vapor removal filter must be installed downstream of the dryer and upstream of the generator. Inlet air quality to the generator must be in accordance with ISO8573-1:2010 Class 2 for Particulate, Class 4 or Class 5 for Water and Class 1 for Total Oil.

Operation outside of these conditions can result in performance degradation and/or permanent failure which may void factory warranty.

The system must be protected with a suitably rated thermal pressure relief valve upstream of the generator.

2.5 General Mechanical Requirements

Familiarize yourself with the local regulations before considering any pipework/hosing installation.

Many of the processes that use nitrogen are of a critical nature. The removal of dirt particulate, oil and water vapor from the gas stream is also essential. Therefore, the pipework system and material that will transfer the nitrogen to its destination should not add any unwanted contamination into the gas stream.

All components used within the system, including pipework and the compressed air treatment equipment, should be suitable for compressed air duty and of a size and construction to handle the maximum pressures involved.

Ensure that all pipework/hosing is adequately supported to prevent damage and leaks in the system. The diameter of the pipes must be sufficient to allow unrestricted inlet air supply to the equipment and outlet nitrogen supply to the application.

All buffer and storage tanks should be fitted with suitable pressure gauges and pressure relief valves.

Parker recommends that ball valves are connected to the buffer vessel ports to allow it to be isolated during maintenance activities.

2.6 Environment

DB 5-20 generators should be installed in an area where the ambient temperature is between 40˚F and 95˚F (4˚C and 35˚C). The environment surrounding the nitrogen generator should be vibration-free, dry, and adequately ventilated. Installation of the unit in an area where the ambient temperature exceeds these temperatures can result in performance degradation and/or permanent failure which may void factory warranty.

Parker recommends that the generator be installed indoors in an environment that protects it from direct sunlight, moisture, and dust. Changes in temperature, humidity, and airborne pollution will affect the environment in which the equipment is operating and may impair the safety and operation. It is the customers' responsibility to ensure that the environmental conditions specified for the equipment are maintained.

Nitrogen is an inert, non-toxic gas. 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. Install the generator in a well-ventilated area and oxygen monitoring equipment.

Due to the nature of operation, there is a possibility of oxygen enrichment surrounding the generator. Ensure that the area is adequately ventilated. Where the risk of oxygen enrichment is high, such as a confined space or poorly ventilated room, the use of oxygen monitoring equipment is advisable.

2.7 Space Requirements

The equipment should be mounted on a flat surface capable as a minimum of supporting its own weight plus the weight of all ancillary parts. There must be adequate space around the equipment to allow airflow and access for maintenance purposes and lifting equipment. It is recommended that a minimum spacing of approximately 4 ft. around all sides of the generator.

2.8 Connecting the Generator & Buffer Tank

Refer to Section 2.3 “Recommended System Component Layout” for the desired system configuration.

Parker supplies a nitrogen buffer tank, hoses, and a pressure relief valve with all DB 5-20 generators. The hosing is to be used to connect the generator and the buffer tank. As noted in Section 2.5 “General Mechanical Requirements,” all buffer and storage tanks should be fitted with suitable pressure gauges and pressure relief valves. The relief valve supplied is to be installed on the buffer tank.

It is recommended that ball valves be installed at each inlet/outlet port on the generator. Additionally, ball valves should be installed at the buffer tank inlet/outlet ports to allow it to be isolated during maintenance activities. Connect the ball valves to the ports using PTFE tape on the threads to provide a leak free seal.

Note:
The right-hand side of the nitrogen generator cabinet has three ports. The lowest two ports must be connected to the Nitrogen storage tank. The top port is the nitrogen outlet.

3. General Operation

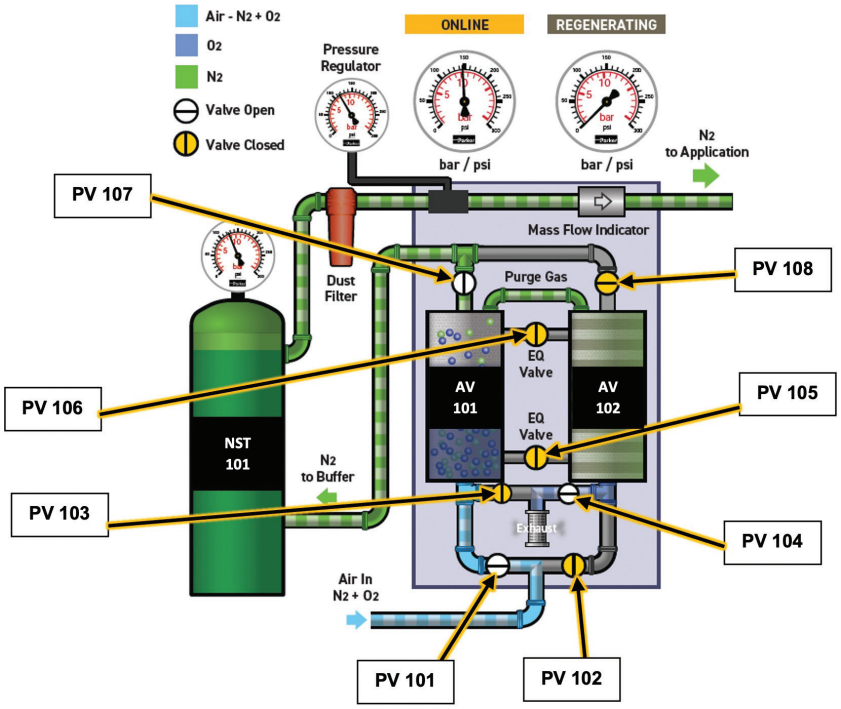
Pressure Swing Adsorption (PSA) technology uses 2 vessels (or 2 sets of vessels) each filled with a bed of carbon molecular sieve (CMS). One bed is “online” and generating nitrogen from the process air, while the other bed is “offline” being regenerated. The sets of vessels and corresponding process valves will switch back and forth between generating and regenerating to produce a constant supply of high quality, high purity nitrogen gas.

Reference the graphical schematic below.

Generating: Clean, dry compressed air, which contains nitrogen, oxygen, argon, and other trace gases, flows into the ‘Air In.’ With inlet valve **(PV 101)** and outlet valve **(PV 107)** open, the compressed air flows into the online adsorption vessel **(AV 101)** and across the carbon molecular sieve (CMS). Oxygen and other trace gases are adsorbed by the CMS, allowing nitrogen to flow through to the nitrogen buffer tank **(NST 101)**. Lastly, the nitrogen gas flows from the buffer tank and back through the generator where it is filtered, through a final sterile air filter, and pressure regulated before going to the application.

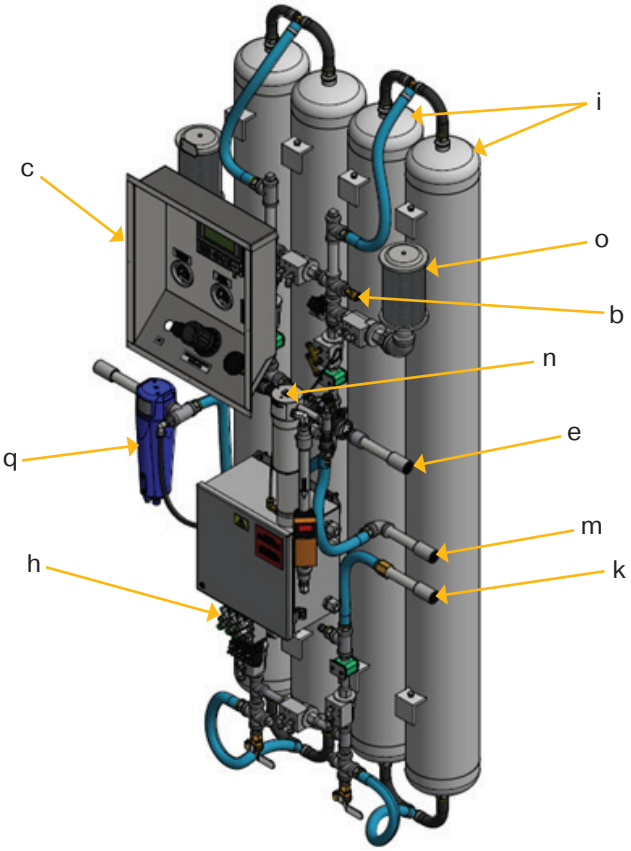
Regenerating: Inlet valve **(PV 102)** and outlet valve **(PV 108)** open are closed, the exhaust valve **(PV 104)** is open, and the offline adsorption vessel(s) **(AV 102)** regenerate. In order to regenerate, the offline bed is exhausted to atmospheric pressure. This releases the oxygen (and other trace gas) molecules from the CMS.

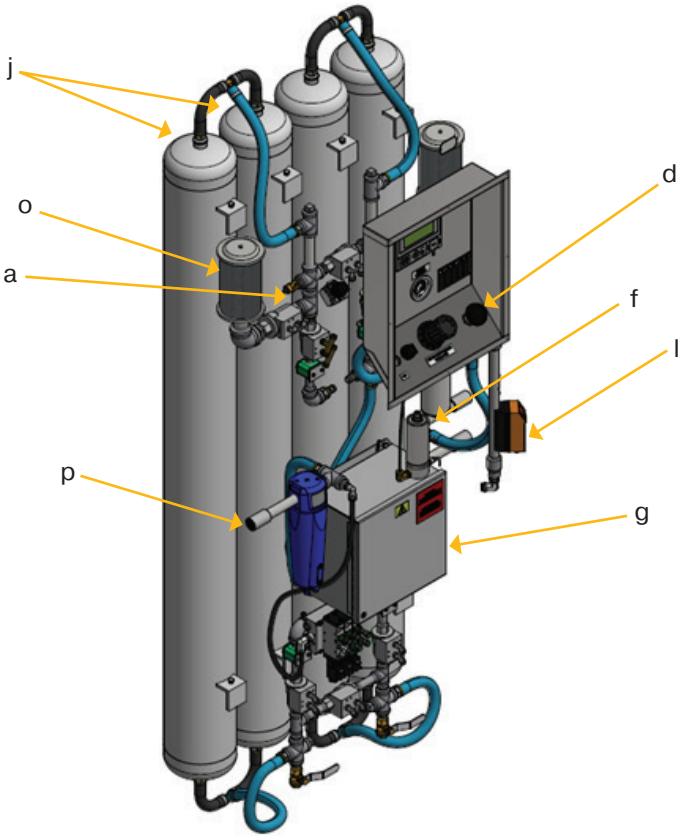
Equalization: Prior to changeover, the adsorption vessels must equalize in pressure. All inlet valves **(PV 101 and PV 102)**, outlet valves **(PV 102 and PV 108)** and exhaust valves **(PV 103 and PV 104)** close. Equalization valves **(PV 105 and PV 106)** open and the adsorption vessels **(AV 101 and AV 102)** equalize in pressure. This minimizes the exhausting of the gas in the online vessel **(AV 101)** during changeover and pre-pressurizes the CMS in the offline vessel **(AV 102)** so that it can adsorb oxygen more efficiently straight away. During equalization no nitrogen is being generated. The nitrogen buffer tank **(NST 101)** is sized to ensure a continuous supply of nitrogen is provided to application at design flow, purity and pressure.

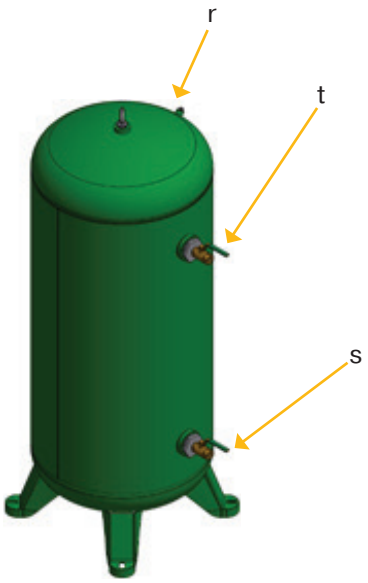


3.1 Equipment Overview

a: Pressure Relief Valve (PSV 102)
b: Pressure Relief Valve (PSV 103)
c: Controls
d: Product Control Valve (PCV 101)
e: Nitrogen Outlet
f: Oxygen Sensor
g: Electrical Control Box
h: Solenoid Pilot Valve (SPV 101-103)
i: Adsorption Vessel (AV 102)
j: Adsorption Vessel (AV 101)
k: Nitrogen Outlet To Buffer Tank Connection (MIV 101)
l: Flow Meter (FE 101)
m: Nitrogen Inlet From Buffer Tank Connection (MIV 102)
n: After Filter (AF 101)
o: Silencer (SIL 101, 102)
p: Air Inlet
q: Inlet Filter (CF 101)
r: Nitrogen Tank (NST 101)
s: Manual Isolation Valve (MIV 101)
t: Manual Isolation Valve (MIV 102)







3.2 Nitrogen Generator Connections

> **WARNING** Reference Section 3.1 “Equipment Overview” for location of connections. All connections must be made prior to startup and should be properly rated for minimum/maximum operating conditions of the system. Only competent personnel trained, qualified, and approved by Parker should perform installation, commissioning, service, and repair procedures.

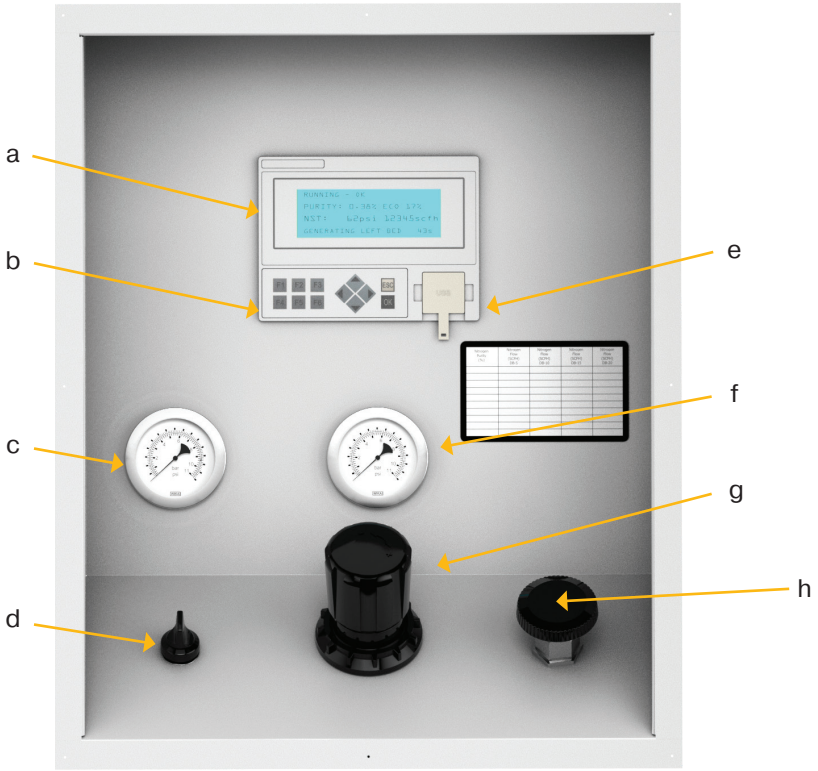
1) **AIR INLET** – Will be marked on the nitrogen generator with a label. Ensure inlet air quality meets guidelines specified in this user manual.
2) **NITROGEN OUTLET** – Connect to product/process requiring nitrogen. It is recommended that a block and vent valve be installed to isolate the nitrogen generator from the process to manually vent nitrogen to atmosphere during initial startup and troubleshooting.
3) **NITROGEN OUTLET TO BUFFER TANK** – Connect generator to manual isolation valve **(MIV 101)** on nitrogen buffer tank **(NST 101)**.
4) **NITROGEN INLET FROM BUFFER TANK** – Connect generator to manual isolation valve **(MIV 102)** on nitrogen buffer tank **(NST 101)**.
5) **POWER SUPPLY** – Use power cable provided. Verify voltage and frequency of power supply matches the nitrogen generator design stated on the serial label.

3.3 Operator Interface Definitions

The cycling of the PSA nitrogen gas generation system is controlled by a programmable logic controller (PLC), which sends electrical signals to solenoid valves. The solenoid valves pneumatically actuate the process valves, which control air and nitrogen flow. The operator interface consists of the following. An overview of the interface is shown in Section 3.4 "Operator Interface Overview."

1) **ON/OFF SWITCH (SS 1)** – Turns the generator cycle on and off.
2) **HUMAN MACHINE INTERFACE (HMI)** – LCD display provides pertinent operations data including running status, oxygen content, nitrogen flow rate, nitrogen pressure, Eco % (time in standby), time cycle (generating / equalization) and run hours.
3) **TACTILE KEYPAD** – Function, navigation, ESC and OK keys for operator input.
4) **USB PORT** – Allows for exporting historical sensor data and alarm log.
5) **OPERATING PRESSURE GAUGE (PI 101)** – Provides operating pressure of online vessel(s).
6) **OUTLET NITROGEN PRESSURE GAUGE (PI 102)** – Provides nitrogen pressure at the outlet of the generator.
7) **OUTLET PRESSURE REGULATOR (PRV 101)** – Allows for on-site adjustment of outlet nitrogen pressure.
8) **PRODUCT CONTROL VALVE (PCV 101)** – Allows for on-site adjustment of outlet nitrogen flow.

3.4 Operator Interface Overview



a: Human Machine Interface (HMI)

b: Tactile Keypad

c: Operating Pressure (PI 101)

d: On/Off Switch (SS 1)

e: USB Port

f: Outlet Pressure (PI 102)

g: Outlet Pressure Regulator (PRV 101)

h: Product (nitrogen flow) control valve (PCV 101)

4. Human Machine Interface (HMI)

OK	Press to • Enter the menus • Select and store settings
ESC	Press to • Exit a setting without storing • Exit a menu
▲ ◀ ▶ ▼	Press to • Scroll through menus • Change settings
F1	Press to • Acknowledge alarms
F2	Press to • Reset alarms
F3	Press for • Main display
F4	Press for • Hour meter display
F5	Press for • Alarm log menu
F6	Press for • Settings menu

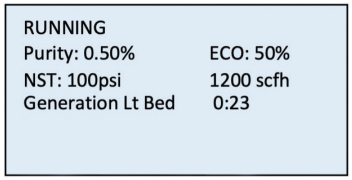
4.1 HMI Backlight

The HMI's back light color will change based on the current state of the generator.

White	Generator is operating normally
Green	Generator is in Eco mode (standby)
Red	Generator is experiencing an alarm condition
Off	Generator is OFF

4.2 Operating Screens

Main Operating Screen



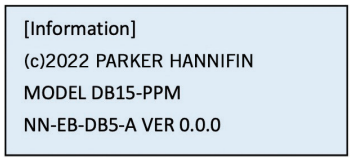
Access by hitting [F3]

- Line 1: Displays operational status*
- Line 2: Oxygen content and Eco Mode % (time in standby)
- Line 3: Inlet pressure and outlet nitrogen flow
- Line 4: Time remaining for generating & regenerating

***Operational Status:**

- RUNNING
- NOT RUNNING
- UNIT IN STANDBY / STANDBY TIMER
- HIGH OXYGEN ALARM
- BAD OXYGEN INPUT ALARM
- BAD FLOW INPUT ALARM
- BAD PRESSURE INPUT ALARM
- MAINTENANCE TIMER
- DATA LOG FAULT
- MEMORY CARD MISSING

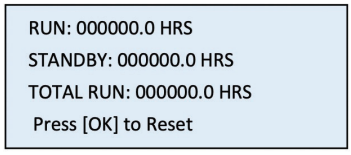
Model Information Screen



Access from the Main Menu [OK]

- Displays controller model and firmware information
- Displays for 5 seconds during power up

Hour Meter Screen



Access by pressing the [F4] key

- Displays current run hours, time in standby, and total run hours
- Run hours and Standby hours can be reset by pressing **[OK]**
- Total run hours cannot be reset

4.3 Main Menu

Main Menu	
[Menus] >Alarm Log Settings Information	**Access by pressing the [OK] key from the Main screen** • Select from the following: - Alarm Log Menu - Settings Menu - Information – Model and firmware information • Use the **UP** and **DOWN** keys to scroll thru the menu items • Press **[OK]** to select or **[ESC]** to return to Main Screen

4.4 Alarm Log Menu and Settings

Alarm Log Menu	
[Alarm Log] >Review Alarm Log Clear Alarm Log Set Time/Date	**Access by pressing the [F5] key** • Select from the following: - Review Alarm Log to scroll through last 30 alarms - Clear Alarm Log to delete alarm history - Set Time/Date to set time and date • Use the **UP** and **DOWN** keys to scroll through menu items • Press **[OK]** to select or **[ESC]** to return to Main Screen

Review Alarm Log	
[Review Alarm Log] 04/12/2021 12:12:00 HIGH OXYGEN [UP] [DN] [ESC]	• Displays description with date and time of alarm • Use **UP** and **DOWN** keys to scroll through Alarm Log • Shows last 30 alarms

Clear Alarm Log	
[Erase Alarm Log] Erase Alarm Log? [ESC] = NO, [OK] = YES	• Select **[OK]** to permanently erase alarms from alarm log

Set Time/Date	
[Set Time/Date] MM/DD/YYYY HH:MM MON 01/02/2016 12:34 [U] [D] [R] [L] [ESC] [OK]	• Set time and date in 24-hour format • Use **LEFT** and **RIGHT** keys to navigate digits • Use **UP** and **DOWN** keys to change values

4.5 Settings Menus

Main Menu	
[SETTINGS] >High Oxygen Alarm Standby Settings Maintenance Timer [SETTINGS] Security Relay 1 Relay 2 [SETTINGS] Data Logging	**Access by pressing [F6] key.** • Select from the following settings: - High Oxygen Alarms - Standby - Maintenance Timer - Security - Relay 1 and 2 - Data Logging • Use the **UP** and **DOWN** keys to scroll thru the menu items. • Press **[OK]** to select or **[ESC]** to return to Main Screen

4.6 High Oxygen Alarm Menu and Settings

High Oxygen Alarm Menu	
[High Oxygen Alarms] >Warning Enable/Disable Warning Setpoint Warning Delay Timer [High Oxygen Alarms] > Alarm Enable/Disable Alarm Setpoint Alarm Delay Timer [High Oxygen Alarms] >Alarm Shutdown	• Use **UP** and **DOWN** keys to scroll through menu items • Press **[OK]** to select or **[ESC]** to return to Settings Menu • Select from the following settings: - Warning enable, setpoint and delay timer - Alarm enable, setpoint, and delay timer - Alarm shutdown – shutdown on High Oxygen Alarm or O2 sensor fault when enabled

High Oxygen Alarm – Enable	
[High O2 Alarm Enable] Enabled >Disabled [U] [D] [ESC] [OK]	• When enabled, high oxygen alarm will occur • Use **UP** and **DOWN** keys to select • Default is **Disabled** • Press **[OK]** to store or **[ESC]** to exit without storing

High Oxygen Alarm – Alarm Threshold	
[High O2 Alarm Setpoint] Alarm SP: 0.50% 0 to 25.0% [U] [D] [ESC] [OK]	• Select oxygen threshold for high oxygen alarm • Use **UP** and **DOWN** keys to adjust • Range depends on oxygen sensor range (percent or ppm) • Default is 0.50% for percent type, or 500 ppm for ppm type • Press **[OK]** to store or **[ESC]** to exit without storing

High Oxygen Alarm – Alarm Delay	
[High O2 Alarm Delay] Delay Time: 10 secs 0 to 10 secs [U] [D] [ESC] [OK]	• Select how long alarm condition must exist before the alarm occurs • Use **UP** and **DOWN** keys to adjust from 0 to 10 minutes • Default is 0 (immediate) • Press **[OK]** to store or **[ESC]** to exit without storing

4.7 Standby Menu and Settings

Note: Standby allows the generator to "sleep" during times of no demand. For the unit to go into Standby, the Standby timer must reach zero. For the Standby timer to start, both Standby Flow and Standby Pressure requirement must be met. If at anytime during the timer countdown the Standby Flow or Standby Pressure requirement is no longer met the timer will reset. The timer restart when both requirements are once again met. For the unit to come out of Standby, either Run Flow or Run Pressure must be met.

Standby Settings Menu	
[Standby Settings] >Delay Timer Run Pressure Standby Pressure [Standby Settings] Run Flow Standby Flow	**Accessed from settings menu. (press [F6])** • Use the **UP** and **DOWN** keys to select from the following: - Delay Timer - Run Pressure - Standby Pressure - Run Flow - Standby Flow • Press **[OK]** to store or **[ESC]** to exit without storing.

Standby Settings – Delay Timer	
[Standby Delay Timer] Time: 10 minutes 1 to 30 mins [U] [D] [ESC] [OK]	**Accessed from settings menu. (press [F6])** • Select how long standby conditions must exist before switching to standby. • Use **UP** and **DOWN** keys to adjust from 1 to 30 minutes • Default is 10 minutes • Press **[OK]** to store or **[ESC]** to exit without storing.

Standby Settings – Run Pressure	
[Run Pressure] Run <=90 psi 0 to 150 psi [U] [D] [ESC] [OK]	**Accessed from settings menu. (press [F6])** • Use **UP** and **DOWN** keys to adjust Run Pressure from 0 to 150 psi • Default is 90 psi • Press **[OK]** to store or **[ESC]** to exit without storing.

Standby Settings – Standby Pressure	
[Standby Pressure] Standby <=100 psi 0 to 150 psi [U] [D] [ESC] [OK]	**Accessed from settings menu. (press [F6])** • Use **UP** and **DOWN** keys to adjust Standby Pressure from 0 to 150 psi • Default is 100 psi • Press **[OK]** to store or **[ESC]** to exit without storing.

Standby Settings – Run Flow	
[Run Flow] Run >=60 scfh 10 to 32000 scfh [U] [D] [ESC] [OK]	**Accessed from settings menu. (press [F6])** • Use **UP** and **DOWN** keys to adjust Run Flow • Default is 60 scfh • Press **[OK]** to store or **[ESC]** to exit without storing.

Standby Settings – Standby Flow	
[Standby Flow] Standby >=50 scfh 10 to 32000 scfh [U] [D] [ESC] [OK]	**Accessed from settings menu. (press [F6])** • Use the **UP** and **DOWN** keys to adjust Standby Flow • Default is 50 scfh • Press **[OK]** to store or **[ESC]** to exit without storing.

4.8 Maintenance Timer Menu and Settings

Maintenance Timer	
[Maintenance Timer] >Set Timer Reset Timer [U] [D] [ESC] [OK]	• Use **UP** and **DOWN** keys to scroll thru the menu items - Set Timer - Reset Timer • Press **[OK]** to select or **[ESC]** to go back to main screen

Maintenance Timer – Timer Setting	
[Timer Setting] Hours: 1000 0 to 8000 [U] [D] [ESC] [OK]	• Timer results in MAINTENANCE TIMER alarm • Use **UP** and **DOWN** keys to adjust maintenance timer in Increments of 100 hours • Default time is 1000 hours • Press **[OK]** to store or **[ESC]** to exit without storing

Maintenance Timer – Reset Timer	
[Reset Timer] Hours Remaining: 1000 Reset Timer? [ESC] = NO, [OK] = YES	• Use to reset maintenance timer after performing required routine maintenance • Press **[OK]** to RESET or **[ESC]** to exit without resetting

4.9 Security Menus and Settings

Note: If you forget the passcode, use passcode 5555 as a recovery password. The default passcode is 0000, which disables setting security. See the menu tree to identify which settings are protected.

Security Settings Menu	
[Security] > Set Passcode Clear Passcode *** NOT PROTECTED ***	• Use **UP** and **DOWN** keys to scroll through menu items • Press **[OK]** to select or **[ESC]** to return to Settings Menu • Note: If you forget the passcode, use passcode 5555 as a recovery password

Security Settings – Set Passcode	
[Set Passcode] ENTER NEW PASSCODE * * * * [U] [D] [R] [L] [ESC] [OK]	• Use **UP**, **DOWN**, **RIGHT**, and **LEFT** keys to set 4-digit passcode • Press **[OK]** to store passcode or **[ESC]** to go back to security menu without storing

Security Settings – Clear Passcode	
[Clear Passcode] ENTER PASSCODE TO CLEAR * * * * [U] [D] [R] [L] [ESC] [OK]	• Passcode can be cleared by entering the passcode or 5555 • Press **[OK]** reset passcode and disable security feature • Press **[ESC]** to go back to security menu

Passcode Protection - Protected Setting Message	
PROTECTED SETTING ENTER PASSCODE TO UNLOCK * * * * [U] [D] [R] [L] [ESC] [OK]	• If a setting is protected, and a passcode has been stored, this message will be displayed asking for the passcode.

4.10 Relay Menus and Settings

NOTE: There are (2) identical relays that can be programmed for multiple functions. The following settings are available for each relay.

Relay Settings Menu	
[Relay 1] >Mode State Enable/Disable [Relay 1] Delay Timer Setpoint	• Use **UP** and **DOWN** keys to scroll through menu items. - Mode - State - Enable/Disable - Delay Time - Setpoint • Press **[OK]** to select or **[ESC]** to exit.

Relay Settings – Mode	
[Relay 1 Mode] ACTIVE WHEN... ANY ALARM OCCURS [U] [D] [ESC] [OK]	• Use **UP** and **DOWN** keys to scroll through relay modes • **Modes:** - ANY ALARM CONDITION OCCURS - SYSTEM RUNNING - OXYGEN >= SETPOINT - OXYGEN <= SETPOINT - FLOW >= SETPOINT - FLOW <= SETPOINT - PRESSURE >= SETPOINT - PRESSURE <= SETPOINT

Relay Settings – Standby Pressure	
[Relay 1 State] >Normally Open Normally Closed [U] [D] [ESC] [OK]	• Relay can be set to open or close when relay condition is satisfied • Use the **UP** and **DOWN** keys to select. • Press **[OK]** to store or **[ESC]** to exit without storing **Note:** When power is removed, relay contacts are open.

Relay 1 Settings – Run Flow	
[Relay 1 Enable/Disable] >Enabled Disabled [U] [D] [ESC] [OK]	• Enables or disable the relay • Use **UP** and **DOWN** keys to select • Press **[OK]** to store or **[ESC]** to exit without storing

Relay 1 Settings – Delay Time	
[Relay 1 Delay Time] Delay Time: 0 minutes 0 to 99 mins [U] [D] [ESC] [OK]	• Set delay time before relay is active • Use **UP** and **DOWN** keys to adjust between 0 and 99 minutes • Default is 0 (immediate) • Press **[OK]** to store or **[ESC]** to exit without storing

Relay 1 Settings – Setpoint	
[Relay 1 Setpoint] Oxygen SP: 0.50% 0.0 to 25.0% [U] [D] [ESC] [OK]	• Set threshold based on relay mode setting • Use the **UP** and **DOWN** keys to adjust setpoint • Press **[OK]** to store or **[ESC]** to exit without storing

4.11 Data Logging Menu and Settings

Data Logging Menu	
[Data Logging Enable] >Enable/Disable Interval	• Use **UP** and **DOWN** keys to scroll thru the menu items • Press **[OK]** to select or **[ESC]** to return to Main Screen

Data Logging – Enable	
[Data Logging Enable] >Enabled Disabled [U] [D] [ESC] [OK]	• Use to enable and disable the data logging • Use **UP** and **DOWN** keys to select **Enabled** or **Disabled** • Default is **Enabled** • Press **[OK]** to store or **[ESC]** to exit without storing **Note:** Requires Optional Micro SD Card.

Data Logging – Interval	
[Data Logging Interval] Interval: 5 mins 1 to 60 mins [U] [D] [ESC] [OK]	• Set interval between data readings • Use the **UP** and **DOWN** keys to select **Enabled** or **Disabled** • Default is 5 minutes • Press **[OK]** to store or **[ESC]** to exit without storing

4.12 Factory Settings

Note: Press and hold **[F1]** and **[F6]** for 5 seconds to enable factory settings. Factory settings will be available for 30 minutes after enabling.

Reset Settings	
[Reset Settings] Press [OK] to reset settings to defaults Press [ESC] to return	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Press **[OK]** to reset all settings to factory default values. • Refer to 4.13 defaults table for settings

Flow Sensor Factory Settings	
[Sensor] >Flow at 4mA Flow at 20mA [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Use **UP** and **DOWN** keys to select between minimum (4ma) and maximum (20ma) flow settings • Press **[OK]** to select, **[ESC]** to return to settings

Flow Sensor Factory Settings – 4mA setting	
[Flow at 4mA] Min Flow: 20 scfh -1000 to 1000 scfh [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Set flow rate that coincides with a 4mA output from flow sensor • Default depends on model setting • Press **[OK]** to select, **[ESC]** to exit without saving

Flow Sensor Factory Settings – 20mA setting	
[Flow at 20mA] Max Flow: 2760 scfh 0 to 30000 scfh [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Set flow rate that coincides with in 20ma output from flow sensor • Default depends on model setting. • Press **[OK]** to select, **[ESC]** to exit without saving

Oxygen Sensor	
[Oxygen Sensor] >ppm (0 – 1000) Percent (0 – 25) [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Use **UP** and **DOWN** keys to change the oxygen sensor type (percent or ppm). • Percent = 0 to 25.00%, ppm = 0 to 1000ppm • Press **[OK]** to select, **[ESC]** to exit without saving

Cycle Timer Factory Settings	
[Cycle Timer] >Adsorb Time Equalization Time [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Use **UP** and **DOWN** keys to scroll through the menu items • Press **[OK]** to select or **[ESC]** to return to Main Screen

Cycle Timer Factory Settings – Adsorb Time Set	
[Equalization Time] Time: 40 seconds 30 to 120 seconds [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Set the adsorb time using **UP** and **DOWN** keys • Setting range is 30 to 120 seconds (Default setting depends on model) • Press **[OK]** to select, **[ESC]** to exit without saving

Cycle Timer Factory Settings – Equalization Time Set	
[Equalization Time] Time: 4 seconds 3 to 10 secs [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Set the equalization time using **UP** and **DOWN** keys • Setting range is 3 to 10 seconds (Default setting depends on model) • Press **[OK]** to select, **[ESC]** to exit without saving

Model Select Factory Settings	
[Model Select] DB5-10 [U] [D] [ESC] [OK]	• Enabled by pressing **[F1]** and **[F6]** keys for 5 seconds • Select the model type using **UP** and **DOWN** keys • Press **[OK]** to select, **[ESC]** to exit without saving

4.13 Default Settings Chart

Setting	DB5- 10 PPM	DB5- 10 PCT	DB5-10- EC PPM	DB5-10- EC PCT	DB15- 20 PPM	DB15- 20 PCT
O2 Alarm – Enable/ Disable	Disabled					
O2 Alarm - Setpoint	500	0.5	500	0.5	500	0.5
O2 Alarm – Delay Time	0					
O2 Alarm – Enable/ Disable	Disabled					
O2 Alarm - Setpoint	1000	1	1000	1	1000	1
O2 Alarm – Delay Time	0					
Alarm Shutdown Enable	Disabled					
Standby – Delay Time	10					
Standby – Run Pressure	90					
Standby – Run Flow	60					
Standby – Standby Pressure	100					
Standby – Standby Flow	50					
Maintenance Timer	1000					
Relay 1 – Mode (select one)	System Running					
Relay 1 – Enable	Disabled					
Relay 1 – State	Normally Open					
Relay 1 – Delay Time	0					
Relay 1 – Setpoint	0					
Relay 2 – Mode (select one)	System Running					
Relay 2 – Enable	Disabled					
Relay 2 – State	Normally Open					
Relay 2 – Delay Time	0					
Relay 2 – Setpoint	0					
Data Logging – Enable	Disabled					
Data Logging – Interval	5					
Alarm Shutdown Enable	Disabled					
Adsorb Time	40					
Equalization Time	4					
Flow Meter – flow at 4mA	0					
Flow Meter – flow at 20mA	2385		7946		7946	
Pressure Sensor Range	200					
Pressure Sensor Offset	0					
O2 Sensor Range	1000 PPM	25%	1000 PPM	25%	1000 PPM	25%

4.14 Alarm Popup Screens

Warning - High Oxygen Content	
* WARNING * HIGH OXYGEN <F1> Ack. <F2> Reset	• Oxygen content is higher than programmed threshold • Manually reset by pressing **[F2]** • Automatically reset when O2 drops 2% below threshold • Alarm can be disabled from the Oxygen Menu

Alarm – High Oxygen Content	
* ALARM * HIGH OXYGEN <F1> Ack. <F2> Reset	• Oxygen content is higher than programmed threshold • Manually reset by pressing **[F2]** • If alarm shutdown setting is disabled, the alarm is automatically reset when O2 drops 2% below threshold • Alarm can be disabled from the Oxygen Menu

Alarm – Bad Oxygen Sensor Input Fault	
* ALARM * OXYGEN SENSOR INPUT FAULT <F1> Ack. <F2> Reset	• Oxygen sensor input is not working correctly • Verify proper wiring of sensor and check sensor is not shorted • Alarm must be manually reset by pressing **[F2]** • Alarm cannot be disabled

Alarm – Bad Flow Sensor Input Fault	
* ALARM * FLOW SENSOR INPUT FAULT <F1> Ack. <F2> Reset	• Flow sensor input is not working correctly • Verify proper wiring of sensor and check sensor is not shorted • Alarm must be manually reset by pressing **[F2]** • Alarm cannot be disabled.

Alarm – Bad Pressure Sensor Input Fault	
* ALARM * PRESSURE SENSOR INPUT FAULT <F1> Ack. <F2> Reset	• Pressure sensor input is not working correctly • Verify proper wiring of sensor and check sensor is not shorted • Alarm must be manually reset by pressing **[F2]** • Alarm cannot be disabled

5. Communications

Ethernet Communications – DB 5-20 generators come standard with an Ethernet Modbus TCP/IP interface located along the bottom edge of the controller. The port comes preconfigured in DHCP mode. The MAC address is located on the front of the controller located inside the control box and can be used to map the controller to a static IP address within the DHCP server. Modbus-RTU is available using a separate gateway device.

5.1 MODBUS Register Map

Register Address	Description
00001	Unit is running
00002	Unit in Standby
00003	Unit left tower is generating
00004	Unit right tower is generating
00005	Unit tower pressures are equalizing
00006	Relay #1 contacts are closed
00007	Relay #2 contacts are closed
00008	Oxygen Probe range. 0 = 0.01 to 25.00 percent. 1 = 0 to 1000 ppm
00009	Unit has shut-down due to an alarm
00010	High Oxygen Alarm
00011	High Oxygen Warning
00012	Oxygen Sensor input fault alarm
00013	Flow sensor input fault alarm
00014	Pressure sensor input fault alarm
30001	Oxygen Purity See register 00008 for sensor range 0 = 0 to 2500, Divide by 100 to calculate percentage 1 = 0 to 1000 ppm
30002	NST Flow – range depends on model
30003	NST Pressure – 0 to 200 psi

5.2 Configuring Static IP Address

A static IP address can be configured by accessing the low-level system menus of the PLC.

1. From main screen, press **OK** and **ESC** button simultaneously to exit to the PLC's system menus.
2. Switch from RUN mode to PROGRAM mode
   a. Select "Mode Switch" and hit **OK**
   b. Select the **UP** or **DOWN** key to change to "PROG"
   c. Hit **OK** to select
3. Go to ADVANCED > ENET CFG > IP Address Settings
   a. Use **UP** key to go to "Advanced Settings" and select **OK**
   b. Use **UP** key to go to "IP Address Settings" and select **OK**
   c. Use **Arrow keys** to set the following:
      i. Change ENET Mode to Static
      ii. Set IP Address
      iii. Set Subnet Mask
      iv. Set Gateway Address if required.
   d. Select "Save Settings" *****IMPORTANT! Do not skip this step*****
4. Verify Settings
   a. Use **UP** key to go to "Advanced Settings" and select **OK**
   b. Use **UP** key to go to "ENET CFG" and select **OK**
   c. Select "ENET Status" to verify the new settings
5. Switch back to RUN mode *****IMPORTANT! Do not skip this step*****
6. Turn power off then back on using power switch located below on bottom of control box

5.3 RS232 or RS485 Communications

If the dryer must be connected to an RS485 network or RS232 port, use a Modbus Gateway device, such as Parker's part number SW2400-MOD (sold separately).

5.4 Configuring SW2400-MOD MODBUS-TCP to MODBUS-RTU Option

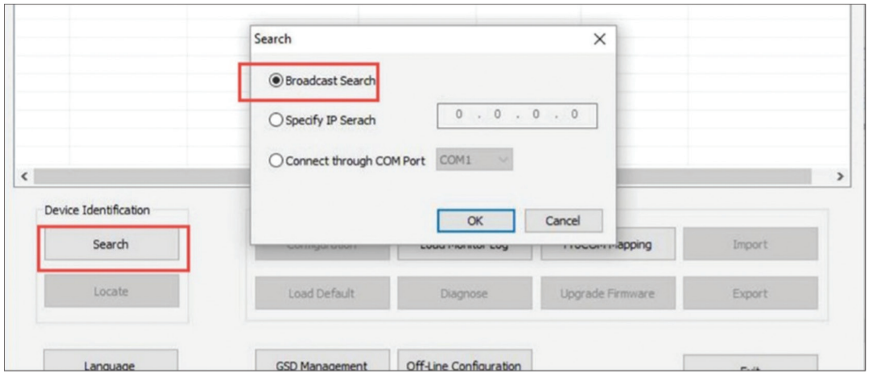
Before proceeding, set the IP settings in the dryer to the following:

Refer to CONFIGURING STATIC IP ADDRESS

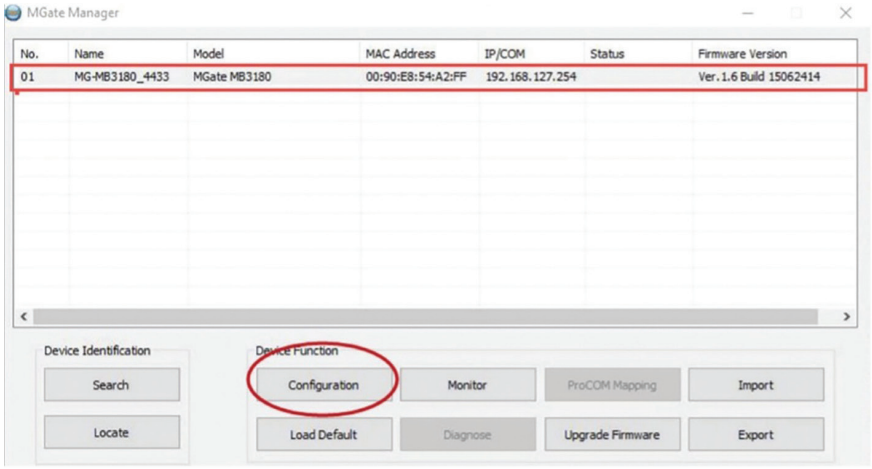
Mode: STATIC
IP Address: 192.168.1.200
Subnet Mask: 255.255.255.0
Gateway: 0.0.0.0
DNS: 0.0.0.0

The software that comes with the gateway is used to change the configuration

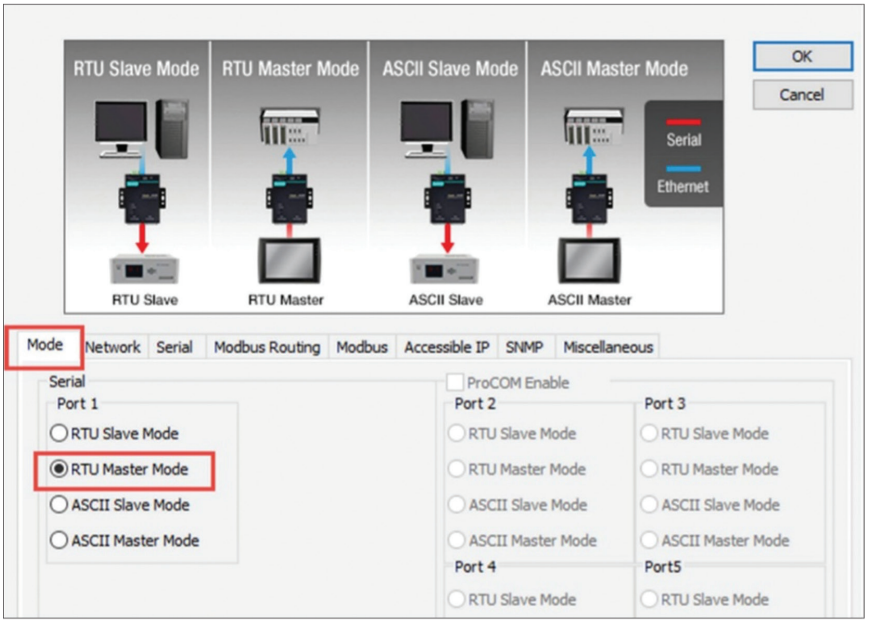
1. Install the MGate Manager software included on the CD that came with the gateway
2. Connect the Gateway to Ethernet and power up the device
3. Select Search and choose Broadcast Search to find the device on the network



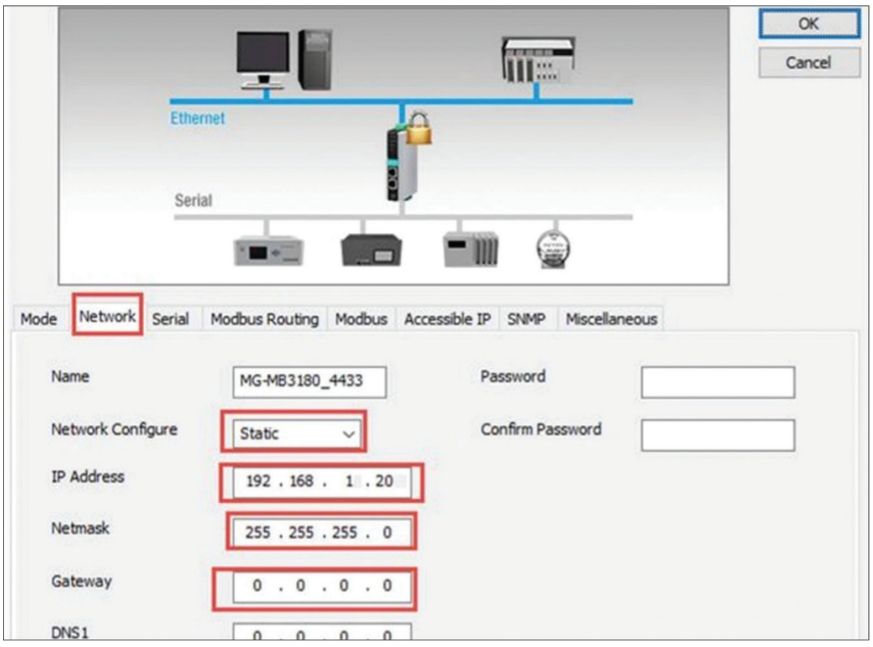
4. Highlight the device and select Configuration



5. Select RTU Master Mode



6. Configure Network as follows:



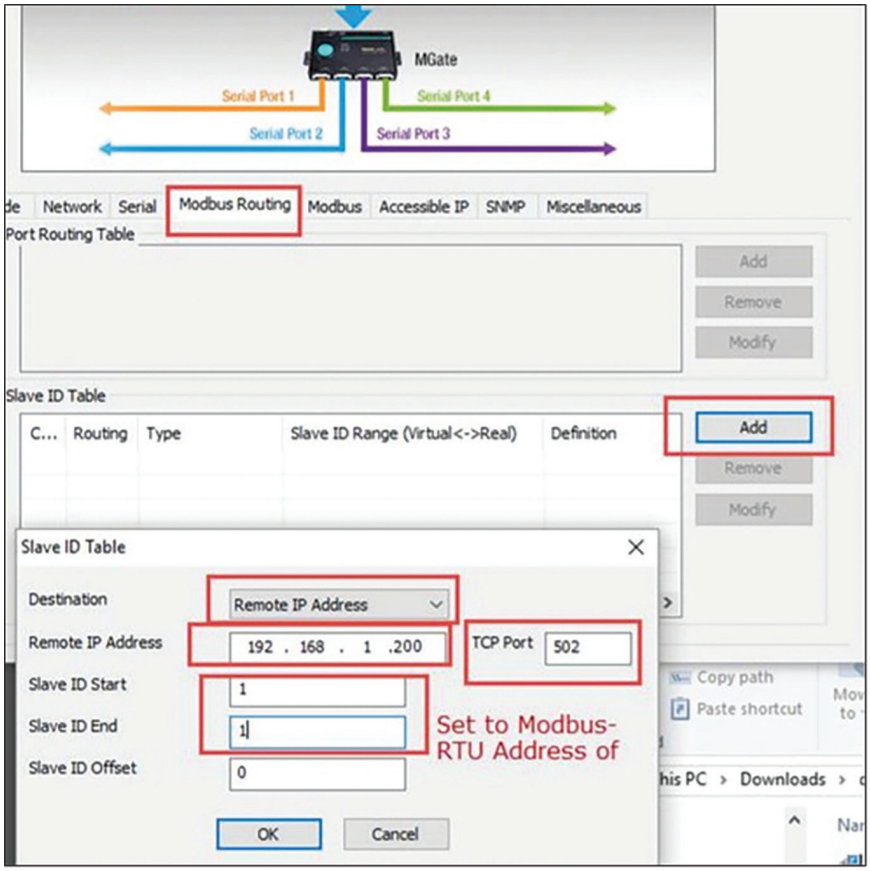
7. Modbus Routing

Example shows settings for a generator which has been assigned a slave address of 1.

Set the Slave ID Start and Slave ID End settings to the slave address that your network administrator has assigned to the generator on your MODBUS-RTU network.

Both settings must be the same.

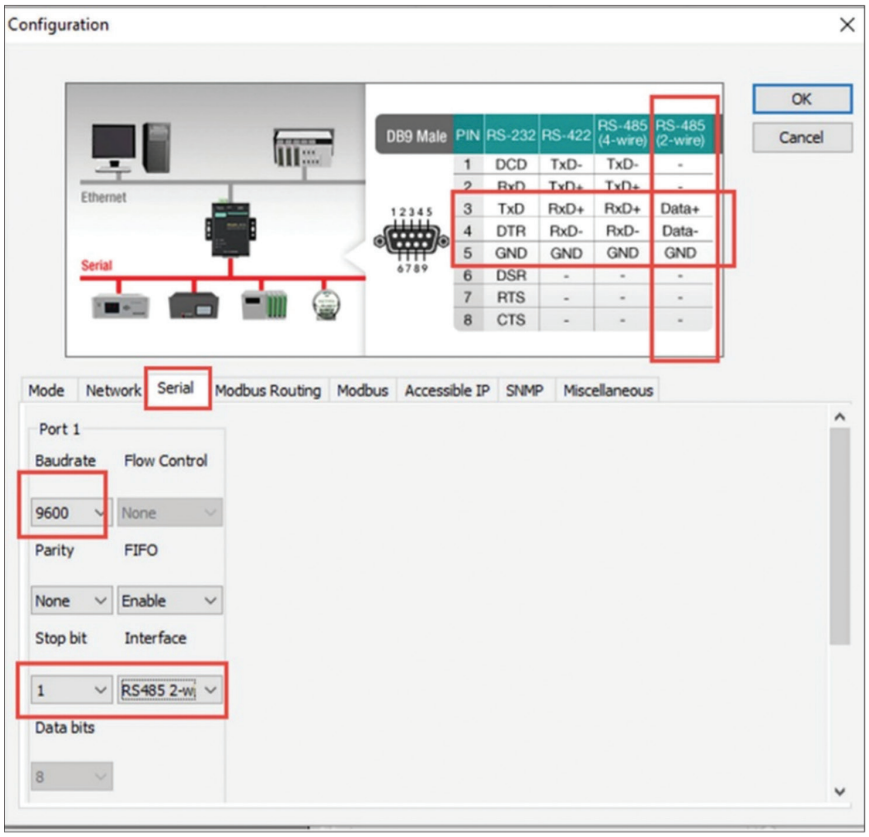
All pieces of equipment on the network must have their own unique address.



8. Serial Port Configuration - Set the serial port settings to match your RS485 network

No further settings are required to the device gateway

Note: Once working, use the EXPORT and IMPORT keys on the initial configuration screen to save your settings to easily replicate them on another generator on the network (don't forget to select a unique slave address for each dryer)



6. Startup and Shutdown

> **WARNING**
>
> Only competent personnel trained, qualified, and approved by Parker should perform installation, commissioning, service, and repair procedures.

> **WARNING**
>
> Nitrogen is an inert, non-toxic gas. 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. Install the generator in a well-ventilated area and oxygen monitoring equipment.

> **WARNING**
>
> Due to the nature of operation, there is a possibility of oxygen enrichment surrounding the generator. Ensure that the area is adequately ventilated. Where the risk of oxygen enrichment is high, such as a confined space or poorly ventilated room, the use of oxygen monitoring equipment is advisable.

6.1 Pre-Startup Procedure

ENSURE ALL INFORMATION UNDER SECTION 2 "INSTALLATION AND COMMISSIONING" IN THIS USER MANUAL HAS BEEN READ IN FULL AND COMPLETED BEFORE STARTUP.

Following proper installation of the generator, make sure all shipping plugs found on manual drain valves (MDVs) and outlet ports of relief valves (PSVs) have been removed. Check to make sure the generator's pre and final filter elements are properly installed.

Verify that all piping/hosing connections to and from the generator are secure. If using hosing, install hose safety whip checks.

Follow the compressor manufacturer’s instructions for proper installation, startup and operation of the compressor. Set the compressor to unload at 125 psig and load at 110-115 psig.

For new startups, follow instruction in Section 6.2 "Initial Startup." If re-starting a generator where high purity nitrogen is already stored in the nitrogen buffer tank (NST 101), follow instructions in Section 6.3 "Normal Startup."

IMPORTANT! DB units require approximately two hours of run time to achieve rated purity. Time to reach purity may take longer for higher purity requirements. Nitrogen generated during this startup period should be vented to atmosphere to avoid contaminating downstream processes. It is recommended that a manual block and vent valve be installed at the nitrogen outlet to allow for nitrogen purging during startup.

6.2 Initial Startup

> **WARNING** Startup should only be performed once the generator has been properly installed, according to this user guide, and Section 6.1 “Pre-Startup Procedure” has been reviewed

REFER TO FLOW SCHEMATICS SECTION OF THIS MANUAL FOR ADDITIONAL DETAIL.

1. Verify the “O/I” switch is in the “O” position.
2. Plug the generator’s power cord into a properly protected 120 VAC, 1-phase, 60 Hz power source.
3. Close the following valves:
   a. Manual drain valve on nitrogen buffer tank
   b. Manual ball valves **(MBV 101, MBV 102)** used for system de-pressurization
   c. Manual block valve (customer supplied and installed)
4. Open the following valves:
   a. Manual isolation valve **(MIV 101)** – nitrogen outlet from generator to buffer tank
   b. Manual isolation valve **(MIV 102)** – nitrogen outlet from buffer tank to generator
   c. Manual vent valve (customer supplied and installed)
5. Once the compressed air system is pressurized, gradually open the manual isolation valve at generator inlet to slowly pressurize the generator and nitrogen buffer tank.

****IMPORTANT: FAILURE TO GRADUALLY OPEN INLET VALVE COULD DAMAGE THE GENERATOR.****

6. Turn the “O/I” switch is in the “I” position. The generator will begin to cycle.
7. Once there is sufficient pressure, adjust the outlet pressure regulator **(PRV 101)** until the gauge indicates the desired setting.
8. Open the nitrogen outlet product control valve **(PCV 101)** to vent the off-spec nitrogen to atmosphere. Set the outlet flow to one-half of the designed flow rate based on the desired purity. Refer to nitrogen flow table in Section 1.2 “Flow Rates.”

****IMPORTANT: ENSURE THE NITROGEN IS VENTED TO A SAFE LOCATION WHERE THERE IS ADEQUATE VENTILATION.****

9. Verify outlet pressure reading. Adjust using the outlet pressure regulator **(PRV 101)** if necessary.
10. Once the oxygen content is at acceptable levels, re-adjust the nitrogen outlet product control valve **(PCV 101)** to full flow rate (based on the desired purity) show in flow tables.
11. Gradually close manual vent valve (customer supplied and installed) to discontinue venting nitrogen to atmosphere.
12. Gradually open manual block valve (customer supplied and installed) to allow flow to downstream product or production processes.
13. Verify outlet pressure reading. Adjust using the outlet pressure regulator **(PRV 101)** if necessary.

6.3 Normal Startup

> **WARNING** Startup should only be performed once the generator has been properly installed, according to this user guide, and Section 6.1 “Pre-Startup Procedure” has been reviewed

REFER TO FLOW SCHEMATICS SECTION OF THIS MANUAL FOR ADDITIONAL DETAIL.

1. Ensure the nitrogen outlet product control valve **(PCV 101)** is closed
2. Close the manual block valve (customer supplied and installed)
3. Open the manual vent valve (customer supplied and installed)
4. Once the compressed air system is pressurized, gradually open the manual isolation valve at generator inlet (supplied by customer) to slowly pressurize the generator.

****IMPORTANT: FAILURE TO GRADUALLY OPEN INLET VALVE COULD DAMAGE THE GENERATOR.****

5. Once the generator is pressurized, gradually open the manual isolation valves connecting the generator to and from the buffer tank **(MIV 101 and MIV 102)**.
6. Turn the “O/I” switch is in the “I” position. The generator will begin to cycle.
7. Once there is sufficient pressure, adjust the outlet pressure regulator **(PRV 101)** until the gauge indicates the desired setting.
8. Open the nitrogen outlet product control valve **(PCV 101)** to vent the off-spec nitrogen to atmosphere. Set the outlet flow to one-half of the designed flow rate based on the desired purity. Refer to nitrogen flow table in Section 1.2 “Flow Rates.”

****IMPORTANT: ENSURE THE NITROGEN IS VENTED TO A SAFE LOCATION WHERE THERE IS ADEQUATE VENTILATION.****

9. Verify outlet pressure reading. Adjust using the outlet pressure regulator **(PRV 101)** if necessary.
10. Once the oxygen content is at acceptable levels, re-adjust the nitrogen outlet product control valve **(PCV 101)** to full flow rate (based on the desired purity) show in flow tables.
11. Gradually close manual vent valve (customer supplied and installed) to discontinue venting nitrogen to atmosphere.
12. Gradually open manual block valve (customer supplied and installed) to allow flow to downstream product or production processes.
13. Verify outlet pressure reading. Adjust using the outlet pressure regulator **(PRV 101)** if necessary.

6.4 System Adjustment

Once the generator has been energized and pressurized, set the outlet flow and pressure of nitrogen required for the application. Set the flow parameters as follows:

1. **Pressure** – Turn the outlet pressure regulator until the outlet pressure gauge displays the desired outlet pressure.
2. **Flow** – Turn the flow control valve until the desired flow reading is displayed on the HMI display. Flow rates at various purity levels are shown on page 7 of this manual. Exceeding stated maximum flow capacity will worsen the purity of nitrogen generated (higher O2 content).

6.5 Shutdown

1. Close the nitrogen outlet product control valve **(PCV 101)**.
2. Turn the “O/I” switch to the “O” position.
3. Close manual isolation valves **(MIV 101, MIV 102)** on the nitrogen tank.
4. Slowly open the manual drain valve on the after-filter to allow full depressurization of the nitrogen generator.
5. Verify all pressure is removed from equipment and power is disconnected before servicing or uninstalling.

If preparing for storage or extended downtime, make sure the system is properly depressurized. Check pre-filter to ensure there is no presence of liquid condensate. Keep environment around the generator clean, dry above freezing temperatures.

7. Service & Preventative Maintenance

> **WARNING** Only competent personnel trained, qualified, and approved by Parker should perform installation, commissioning, service, and repair procedures.

7.1 Service Intervals

DB Series Nitrogen generators are equipped with an hour meter, which is activated when the system is running. The hour meter is to be used as a guide for sustaining service intervals. If service intervals are stated in both months & hours, the system should be serviced based on whichever comes first.

Component	Operation	Daily	Weekly	Monthly	6 Months	12 Months	60 Months
Filter Drains	Check for proper drain operation						
Switching Valves	Check condition. Rebuild and replace wear parts as needed.						
Pilot Valves	Check condition. Rebuild and replace wear parts as needed.						
Complete Assembly	Check for air leaks (when installed and during operation).						
Pre/After Filters	Replace filter elements						
Oxygen Sensor	Replace oxygen sensor						

 Check

 Serivce

7.2 Spare Parts

	Model		
	P&ID Drawing Number	DB-5-[*] DB-10-[*]	DB-5-[*]-EC-[W] DB-10-[*]-EC-[W] DB-15-[*], DB-20-[*]
		DB-5-10-PPM-PCT-FD	DB-15-20-PPM-PCT-FD
Filter Elements	**Part ID**	**Part Number**	**Part Number**
Pre-Filter	CF101	2/100-18-BX	2/200-35-BX
Final Filter	AF 101	2/100-12-SA	2/200-176-SA
Pilot Valve Repair Kit	**Part ID**	**Part Number**	**Part Number**
Solenoid Coil	SPV 101-103	P2FCB453	P2FCB453
Manifold O-Rings	SPV 101-103	P2LBXK84P	P2LBXK84P
Pilot Valve Repair Kit	SPV 101-103	P2LBXSK1	P2LBXSK1
Valve Repair Kits	**Part ID**	**Part Number**	**Part Number**
Inlet, Equalization and Product Valve Repair Kit	PV 101-102, PV 105-108	RKVA037VV	RKVA100VV
Exhaust Valve Repair Kit	PV 103-104	RKVA050VV	RKVA100VV
Oxygen Sensor	**Part ID**	**Part Number**	**Part Number**
PPM Sensor	AIA 101	02-661	02-661
% Sensor	AIA 101	02-662	02-662

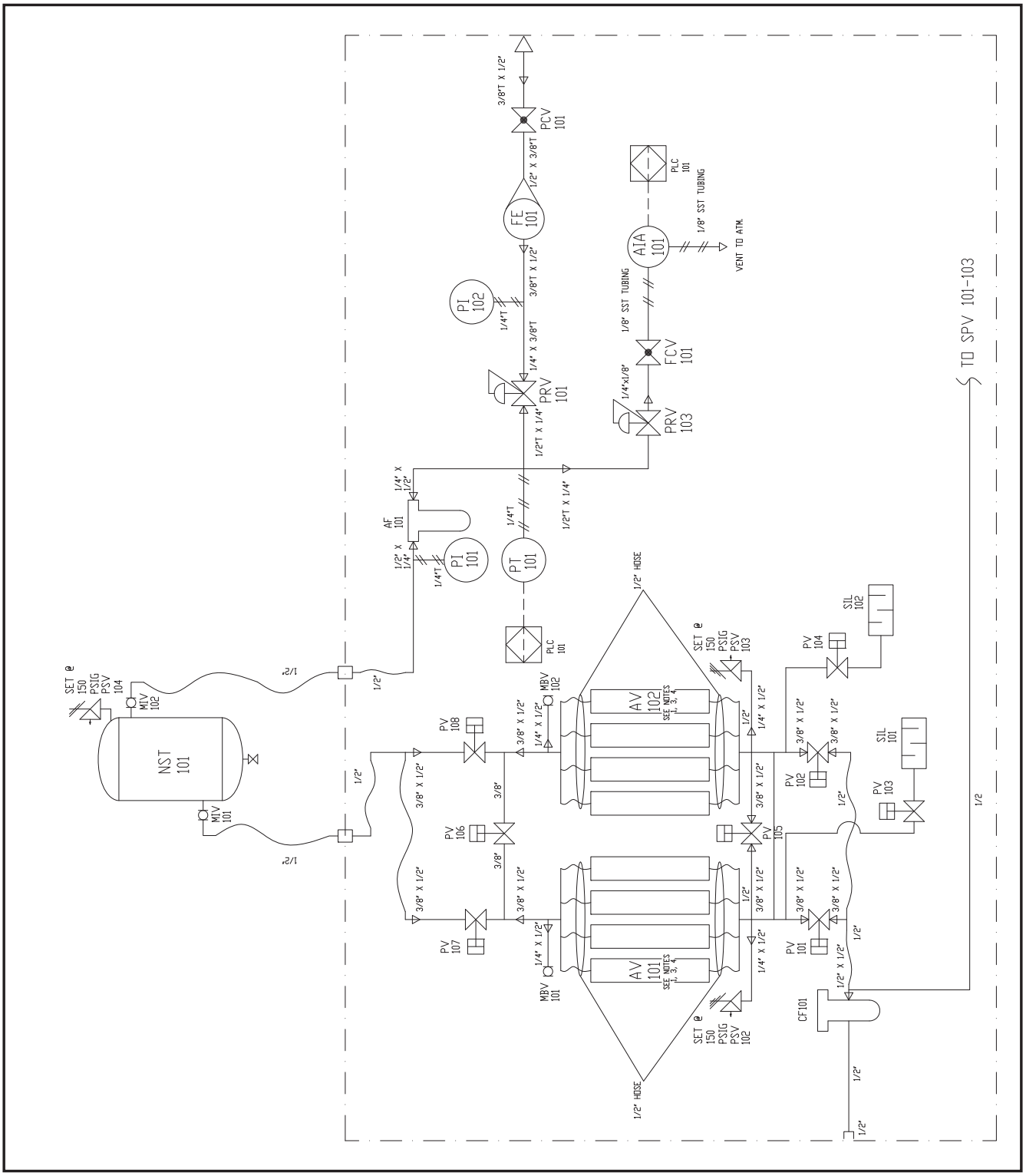
7.3 Maintenance Kits

Kit Description	Kit Contents	Model	
		DB-5-[*] DB-10-[*]	DB-5-[*]-EC-[W] DB-10-[*]-EC-[W] DB-15-[*], DB-20-[*]
		Part Number	Part Number
12-month kit with % or PPM analyzer	Replacement elements and valve repair kits	MK12.DB5-10	MK12.DB15-20
60-month kit with % analyzer	Replacement elements, valve repair kits and replacement O2 sensor	MK60.DB5-10-PCT	MK60.DB15-20-PCT
60-month kit with PPM analyzer	Replacement elements, valve repair kits and replacement O2 sensor	MK60.DB5-10-PPM	MK60.DB15-20-PPM

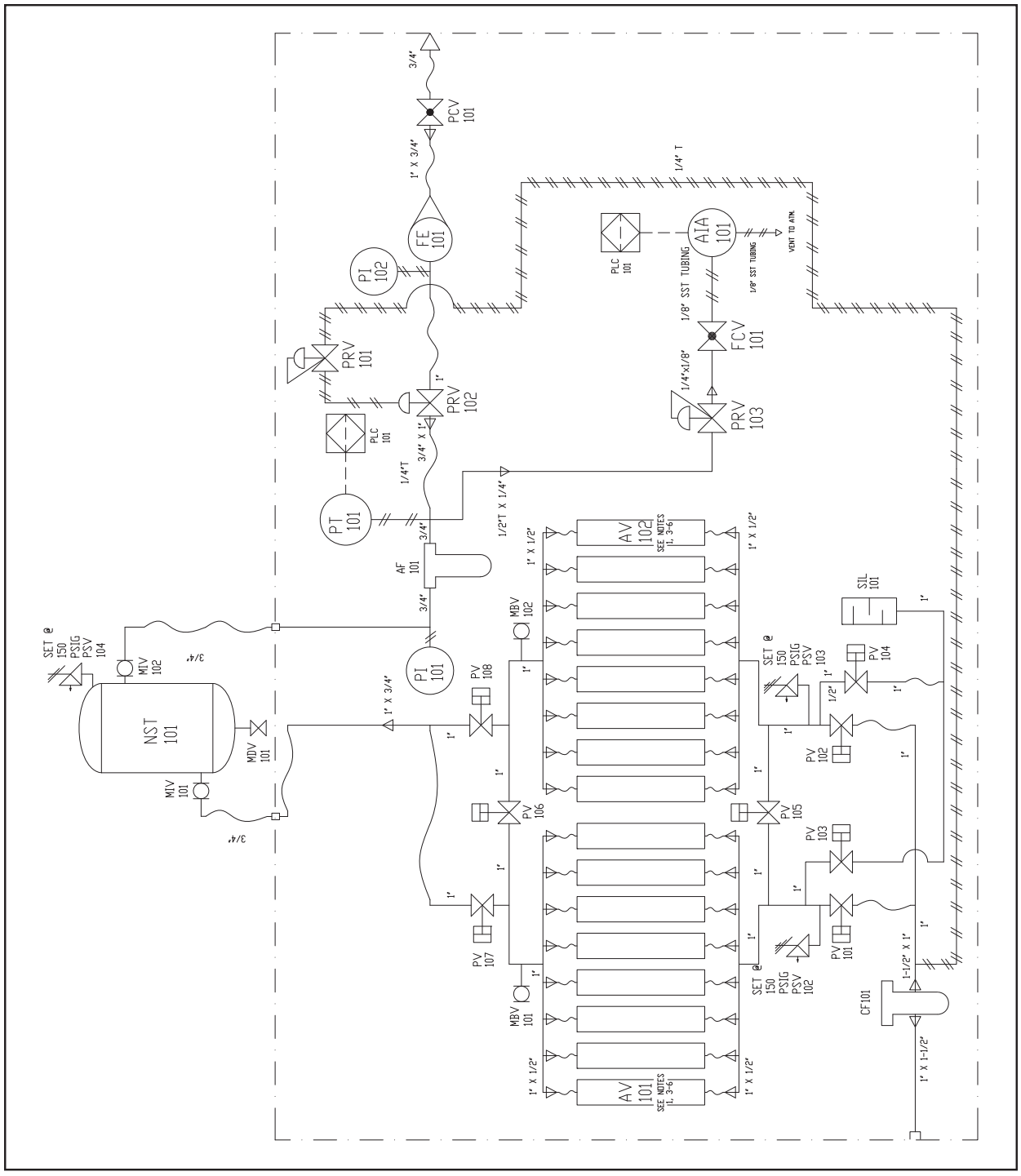
8. Troubleshooting

Possible Cause	Symptom				
	Loss of Outlet Pressure	Loss of Outlet Flow	Purity Lower Than Specified Operating Conditions	Air Leak Through Drain of Pre-Filter	Oxygen Analyzer Value Varies from Expected Value
Ensure product control valve (PCV 101) is adjusted properly	X	X			
Ensure inlet pressure is between 70-140 psig	X	X	X	X	
Check system for leaks	X	X	X		
Check that system is turned on		X			
Check setting of flow rate compared to the nitrogen flow tables			X		
Ensure inlet air pressure has not varied from original reading			X		
Verify inlet air temperature and dewpoint are within specifications			X		
Oxygen sensor calibration loss			X		
Not enough back pressure on drain seal				X	
Debris inside filter bowl holding drain open				X	
System flow exceeding specified flow at given purity					X
Sample line leaking					X
Oxygen sensor has reached end of life					

9. Flow Schematics

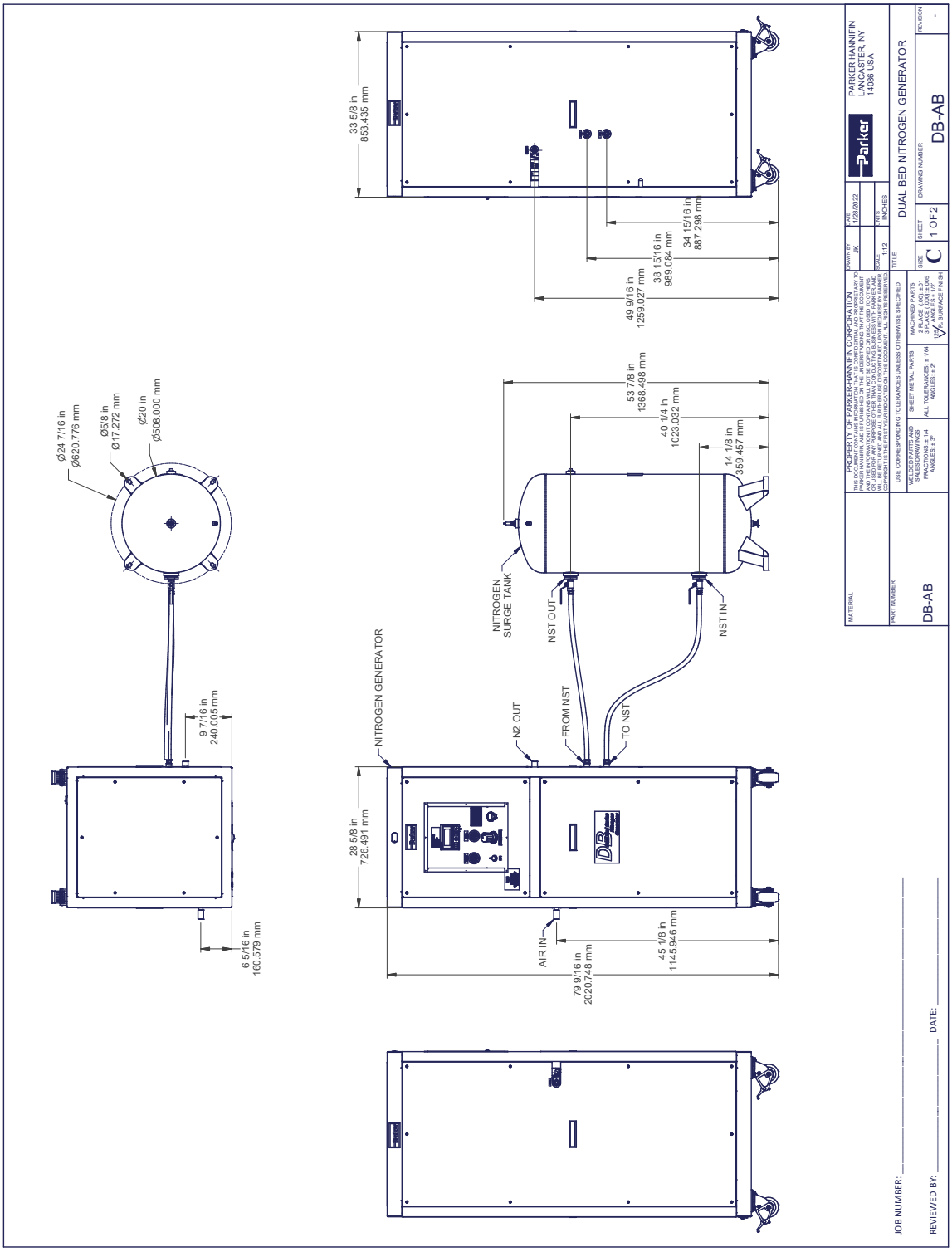


DB-5-10-PPM-PCT-FD

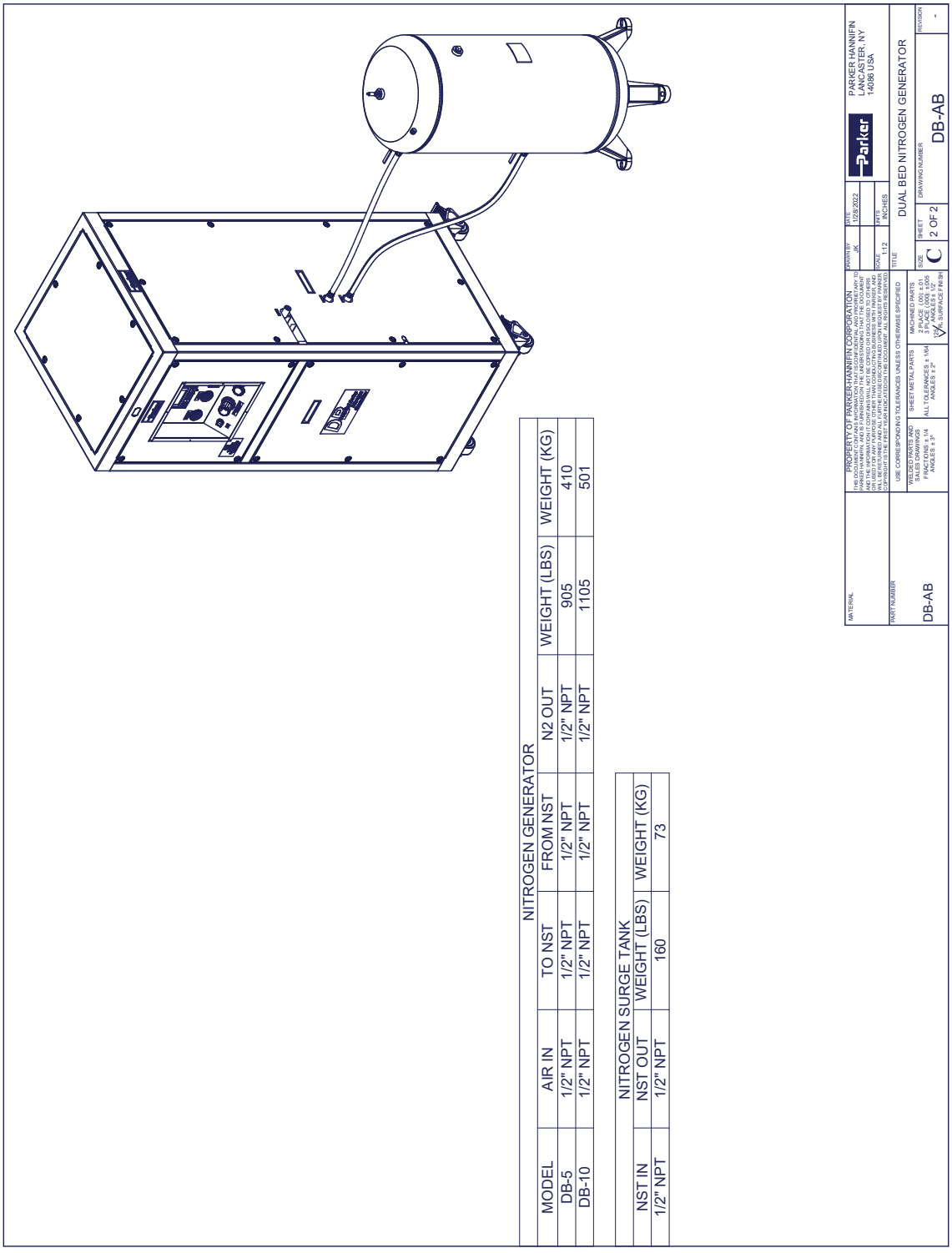


DB-15-20-PPM-PCT-FD

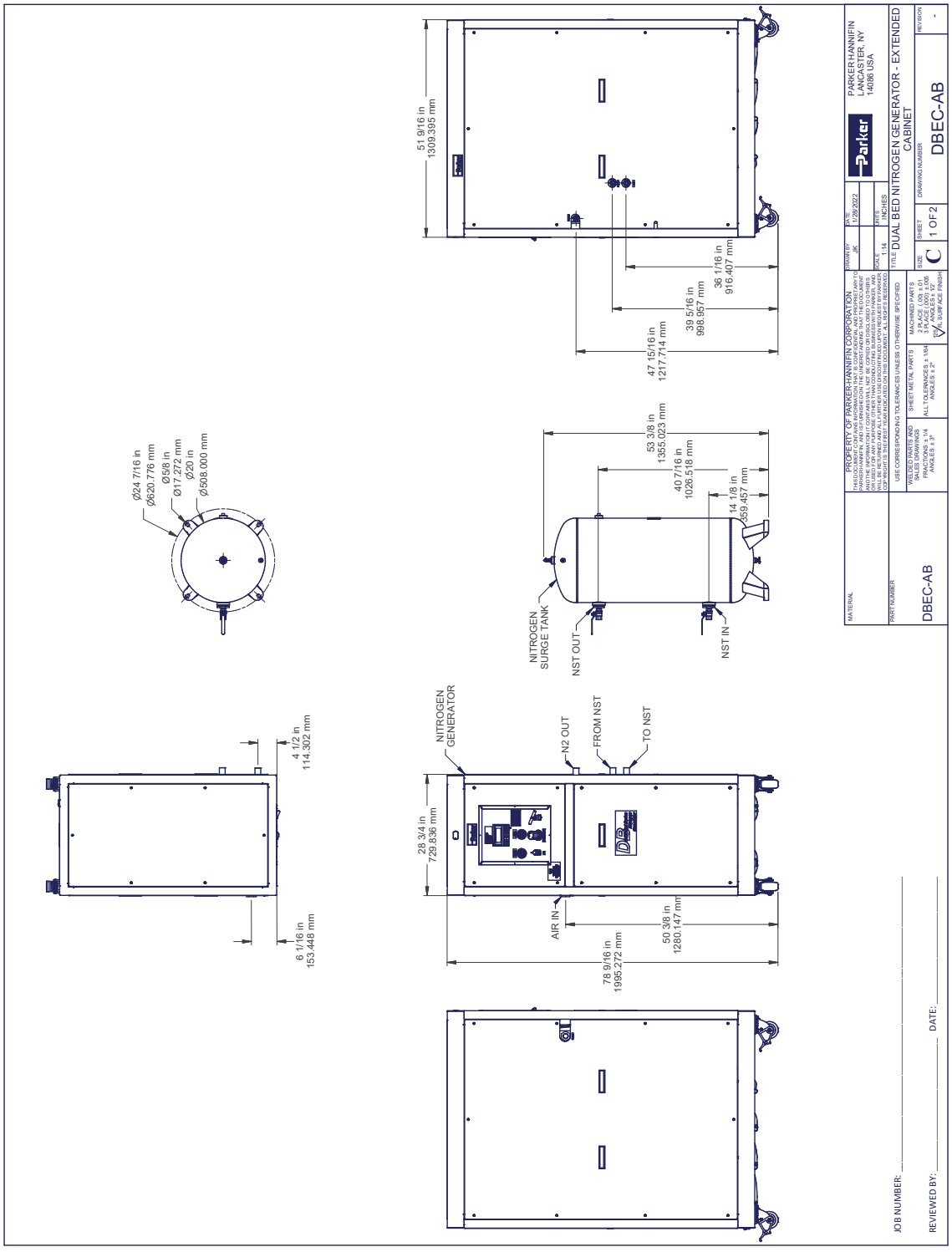
10. General Arrangement Drawings



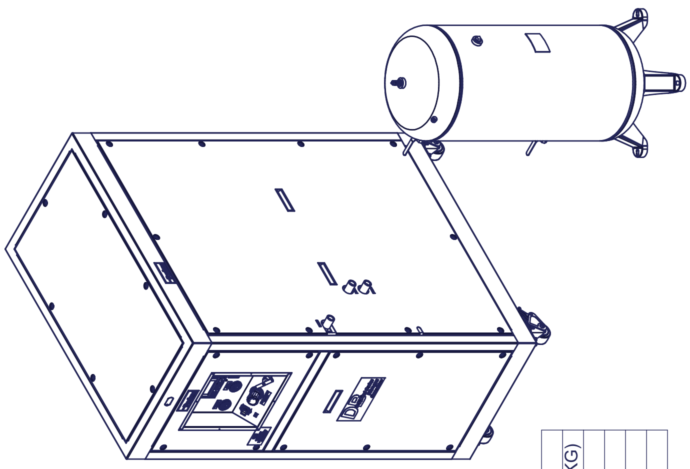
DB-AB


NITROGEN GENERATOR
MODEL | AIR IN | TO NST | FROM NST | N2 OUT | WEIGHT (LBS) | WEIGHT (KG)
DB-5 | 1/2" NPT | 1/2" NPT | 1/2" NPT | 1/2" NPT | 905 | 410
DB-10 | 1/2" NPT | 1/2" NPT | 1/2" NPT | 1/2" NPT | 1105 | 501
NITROGEN SURGE TANK
NST IN | NST OUT | WEIGHT (LBS) | WEIGHT (KG)
1/2" NPT | 1/2" NPT | 160 | 73
PROPERTY OF PARKER-HANNIFIN CORPORATION
PARKER HANNIFIN
LANCASTER, NY
14086 USA
DRAWN BY JK
DATE 1/28/2022
SCALE 1:12
PART INCHES
TITLE
DUAL BED NITROGEN GENERATOR
SIZE C
SHEET 2 OF 2
DRAWING NUMBER
DB-AB
REVISION -
MATERIAL
DB-AB
PART NUMBER

DB-AB


51 9/16 in
1309.395 mm
36 1/16 in
916.407 mm
39 5/16 in
998.957 mm
47 15/16 in
1217.714 mm
Ø24 7/16 in
Ø620.776 mm
Ø5/8 in
Ø17.272 mm
Ø20 in
Ø508.000 mm
53 3/8 in
1355.023 mm
40 7/16 in
1026.518 mm
14 1/8 in
359.457 mm
NITROGEN
SURGE TANK
NST OUT
NST IN
4 1/2 in
114.302 mm
6 1/16 in
153.448 mm
NITROGEN
GENERATOR
N2 OUT
FROM NST
TO NST
28 3/4 in
729.836 mm
AIR IN
50 3/8 in
1280.147 mm
78 9/16 in
1995.272 mm
PROPERTY OF PARKER-HANNIFIN CORPORATION
DRAWN BY: JK
DATE: 1/28/2022
SCALE: 1:14
UNIT: INCHES
SIZE: C
SHEET: 1 OF 2
TITLE: DUAL BED NITROGEN GENERATOR - EXTENDED CABINET
DRAWING NUMBER: DBEC-AB
REVISION: -
PARKER HANNIFIN
LANCASTER, NY
14086 USA
MATERIAL
PART NUMBER
DBEC-AB
USE CORRESPONDING TOLERANCES UNLESS OTHERWISE SPECIFIED
WELDED PARTS AND SALES DRAWINGS
FRACTIONS ± 1/4
ANGLES ± 5°
SHEET METAL PARTS
ALL TOLERANCES ± 1/64
ANGLES ± 2°
MACHINED PARTS
2 PLACE (.XX) ± .010
3 PLACE (.XXX) ± .005
ANGLES ± 1°
63 SURFACE FINISH
JOB NUMBER:
REVIEWED BY:
DATE:

DBEC-AB



NITROGEN GENERATOR

MODEL	AIR IN	TO NST	FROM NST	N2 OUT	WEIGHT (LBS)	WEIGHT (KG)
DB-5-EC	1" NPT	1" NPT	1" NPT	1" NPT	993	450
DB-10-EC	1" NPT	1" NPT	1" NPT	1" NPT	1193	541
DB-15	1" NPT	1" NPT	1" NPT	1" NPT	1393	632
DB-20	1" NPT	1" NPT	1" NPT	1" NPT	1593	723

NITROGEN SURGE TANK

NST IN	NST OUT	WEIGHT (LBS)	WEIGHT (KG)
3/4" NPT	3/4" NPT	160	73

MATERIAL

PART NUMBER DBEC-AB

USE CORRESPONDING TOLERANCES UNLESS OTHERWISE SPECIFIED

WELDED PARTS AND SALES DRAWINGS	SHEET METAL PARTS	MACHINED PARTS
FRACTIONS: ± 1/4 ANGLES: ± 3°	ALL TOLERANCES: ± 1/64 ANGLES: ± 2°	2 PLACE (.00): ±.01 3 PLACE (.000): ±.005 ANGLES ± 1/2° 125 Ra SURFACE FINISH

DRAWN BY JK | DATE 1/28/2022 | SCALE 1:14 | UNITS INCHES

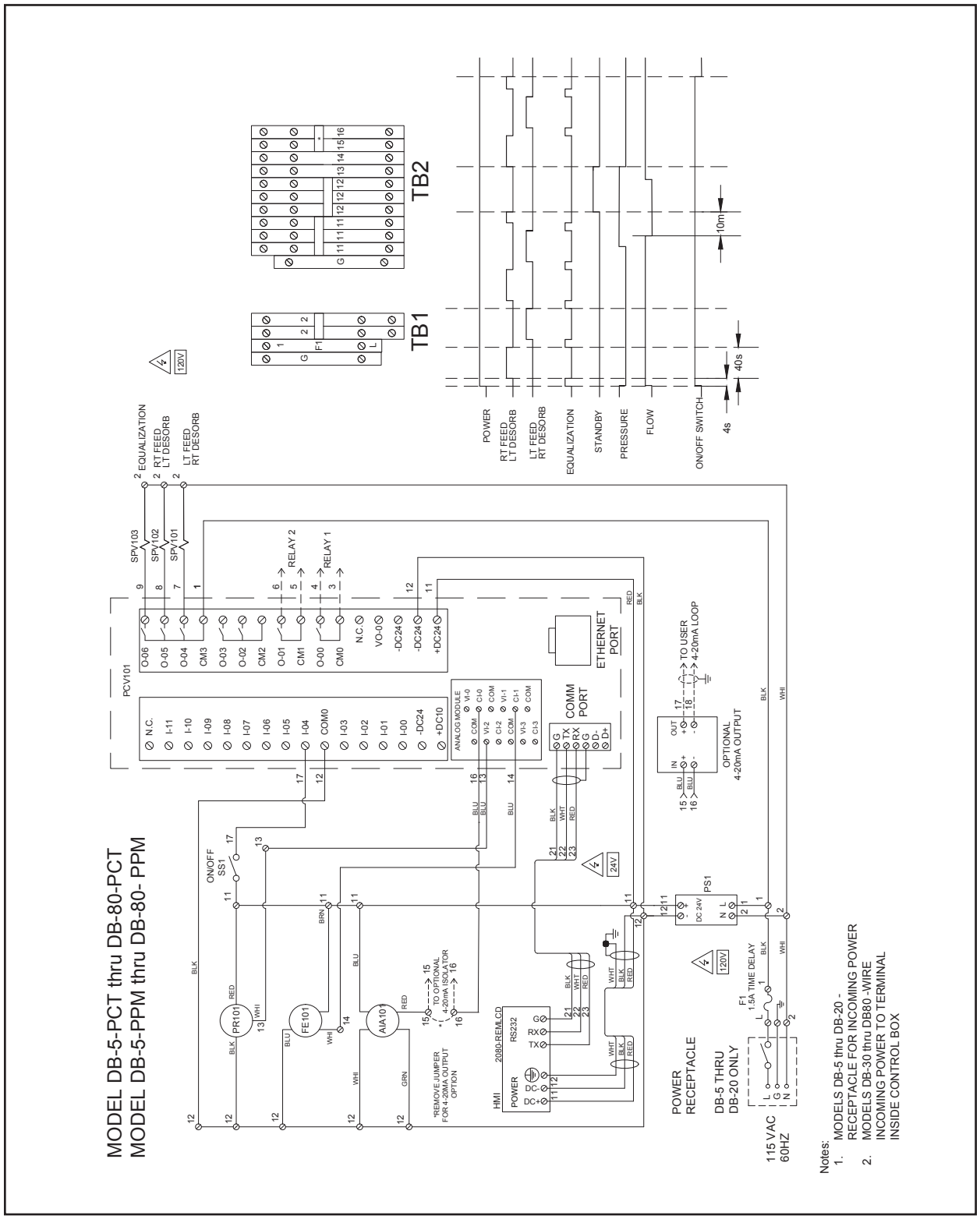
PARKER HANNIFIN
LANCASTER, NY
14086 USA

TITLE DUAL BED NITROGEN GENERATOR - EXTENDED CABINET

SIZE C | SHEET 2 OF 2 | DRAWING NUMBER DBEC-AB | REVISION -

DBEC-AB

11. Electrical Schematic



2000MDB-A

12. Carbon Molecular Sieve SDS

GN UC H
Safety Data Sheet

Issued: 10/20/2020
Supersedes: 03/02/2020
Version: 4.0

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1. Product identifier

Product name	: GN UC H
Product form	: Substance
CAS No	: 7440-44-0
Product code	: 28010
Synonyms	: Activated carbon; Steam activated carbon

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	: Adsorbent

1.3. Details of the supplier of the safety data sheet

Calgon Carbon Corporation
P.O. Box 717
Pittsburgh, PA 15230
412-787-6700

1.4. Emergency telephone number

Emergency number	: CHEMTREC (24 HRS): 1-800-424-9300

SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture

GHS-US classification

Combustible Dust

Not classified as a simple asphyxiant. Product does not displace oxygen in the ambient atmosphere, but slowly adsorbs oxygen from a confined space when wet. Under conditions of anticipated and recommended use, product does not pose an asphyxiation hazard.

2.2. Label elements

GHS-US labeling

Signal word (GHS-US)	: **Warning**
Hazard statements (GHS-US)	: May form combustible dust concentrations in air.

2.3. Other hazards

Other hazards not contributing to the classification	: Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

2.4. Unknown acute toxicity (GHS-US)

No data available

SECTION 3: Composition/Information on Ingredients

3.1. Substance

Name	Product identifier	%
Activated carbon	(CAS No) 7440-44-0	< 100

3.2. Mixture

Not applicable

SECTION 4: First Aid Measures

4.1. Description of first aid measures

First-aid measures general	: If exposed or concerned, get medical attention/advice. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use. Never give anything to an unconscious person.
First-aid measures after inhalation	: IF INHALED: Remove to fresh air and keep at rest in a comfortable position for breathing.
First-aid measures after skin contact	: IF ON SKIN (or clothing): Remove affected clothing and wash all exposed skin with water for at least 15 minutes.
First-aid measures after eye contact	: IF IN EYES: Immediately flush with plenty of water for at least 15 minutes. Remove contact lenses if present and easy to do so. Continue rinsing.

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First-aid measures after ingestion : IF SWALLOWED: Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center or medical professional. Get medical attention if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : Not expected to present a significant hazard under anticipated conditions of normal use. Dust may cause irritation to the respiratory system.

Symptoms/injuries after skin contact : Dust may cause irritation.

Symptoms/injuries after eye contact : Dust may cause irritation and redness.

Symptoms/injuries after ingestion : Not expected to present a significant hazard under anticipated conditions of normal use.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available.

SECTION 5: Firefighting Measures

5.1. Extinguishing media

Suitable extinguishing media : Water spray. Carbon dioxide. Dry chemical. Foam. Sand.

Unsuitable extinguishing media : None known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Dust may be combustible under specific conditions. May be ignited by heat, sparks or flames.

Explosion hazard : Dust may form explosive mixture in air.

Reactivity : No dangerous reactions known under normal conditions of use. Carbon oxides may be emitted upon combustion of material.

5.3. Advice for firefighters

Firefighting instructions : Wear NIOSH-approved self-contained breathing apparatus suitable for the surrounding fire. Use water spray or fog for cooling exposed containers. Evacuate area.

SECTION 6: Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate area. Keep upwind. Ventilate area. Spill should be handled by trained clean-up crews properly equipped with respiratory equipment and full chemical protective gear (see Section 8).

6.1.1. For non-emergency personnel

No additional information available.

6.1.2. For emergency responders

No additional information available.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Avoid release to the environment. Product is not soluble, but can cause particulate emission if discharged into waterways. Dike all entrances to sewers and drains to avoid introducing material to waterways. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment : Sweep or shovel spills into appropriate container for disposal. Minimize generation of dust.

Methods for cleaning up : Sweep or shovel spills into appropriate container for disposal. Minimize generation of dust. Dispose of material in compliance with local, state, and federal regulations.

6.4. Reference to other sections

No additional information available.

SECTION 7: Handling and Storage

7.1. Precautions for safe handling

Precautions for safe handling : Avoid dust formation. Avoid contact with skin, eyes and clothing. Do not handle until all safety precautions have been read and understood. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Keep away from sources of ignition - No smoking.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container tightly closed in a cool, dry, and well-ventilated place. Keep away from ignition sources.

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SECTION 8: Exposure Controls/Personal Protection

8.1. Control parameters

Activated carbon (7440-44-0)*	
OSHA PEL (TWA) (mg/m³)	≤ 5 (Respirable Fraction) ≤ 15 (Total Dust)

*Exposure limits are for inert or nuisance dust. No specific exposure limits have been established for this activated carbon product by OSHA or ACGIH.

8.2. Exposure controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment with flammable materials. Ensure adequate ventilation, especially in confined areas. Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

Personal protective equipment : Gloves. Safety glasses. Protective clothing. Under insufficient ventilation conditions wear respiratory protection.

Hand protection : Gloves should be classified under Standard EN 374 or ASTM F1296. Suggested glove materials are: Neoprene, Nitrile/butadiene rubber, Polyethylene, Ethyl vinyl alcohol laminate, PVC or vinyl. Suitable gloves for this specific application can be recommended by the glove supplier.

Eye protection : Use eye protection suitable to the environment. Avoid direct contact with eyes.

Skin and body protection : Wear long sleeves, and chemically impervious PPE/coveralls to minimize bodily exposure.

Respiratory protection : Use NIOSH-approved dust/particulate respirator. Where vapor, mist, or dust exceed PELs or other applicable OELs, use NIOSH-approved respiratory protective equipment.

SECTION 9: Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical state	: Solid
Appearance	: Granular, powder, or pelletized substance
Color	: Black
Odor	: Odorless
Odor threshold	: No data available
pH	: No data available
Relative evaporation rate (butylacetate=1)	: Not applicable
Melting point	: Not applicable
Freezing point	: Not applicable
Boiling point	: Not applicable
Flash point	: No data available
Auto-ignition temperature	: > 325 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: > 325 °C
Vapor pressure	: Not applicable
Relative vapor density at 20 °C	: Not applicable
Apparent density	: 0.3 - 0.75 g/cc
Solubility	: Insoluble
Log Pow	: Not applicable
Log Kow	: Not applicable
Viscosity, kinematic	: Not applicable
Viscosity, dynamic	: Not applicable
Explosive properties	: No data available
Oxidising properties	: No data available
Explosive limits	: No data available

9.2. Other information

No additional information available.

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SECTION 10: Stability and Reactivity

10.1. Reactivity

No dangerous reactions known under normal conditions of use.

10.2. Chemical stability

Stable under use and storage conditions as recommended in section 7.

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

Avoid dust formation. Heat. Ignition sources. Exposure to high concentrations of organic compounds may cause bed temperature to rise.

10.5. Incompatible materials

Alkali metals. Strong oxidizing agents.

10.6. Hazardous decomposition products

Carbon monoxide (CO), carbon dioxide (CO_2).

SECTION 11: Toxicological Information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Activated carbon (7440-44-0)	
LD_{50} oral rat	> 2000 mg/kg

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Not classified
Respiratory or skin sensitisation : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified

Silica: crystalline, quartz (14808-60-7)	
IARC group	1 - Carcinogenic to humans
The International Agency for Research on Cancer (IARC) has classified "silica dust, crystalline, in the form of quartz or cristobalite" as carcinogenic to humans (group 1). However these warnings refer to crystalline silica dusts and do not apply to solid activated carbon containing crystalline silica as a naturally occuring, bound impurity. As such, we have not classified this product as a carcinogen in accordance with the US OSHA Hazard Communication Standard (29 CFR §1910.1200) but recommmend that users avoid inhalation of product in a dust form.	

Reproductive toxicity : Not classified
Specific target organ toxicity (single exposure) : Not classified
Specific target organ toxicity (repeated exposure) : Not classified
Aspiration hazard : Not classified
Symptoms/injuries after inhalation : Not expected to present a significant hazard under anticipated conditions of normal use.
Symptoms/injuries after skin contact : Dust may cause irritation of the skin.
Symptoms/injuries after eye contact : Dust may cause irritation and redness.
Symptoms/injuries after ingestion : Not expected to present a significant hazard under anticipated conditions of normal use.

SECTION 12: Ecological Information

12.1. Toxicity

No additional information available.

12.2. Persistence and degradability

No additional information available.

12.3. Bioaccumulative potential

No additional information available.

12.4. Mobility in soil

No additional information available.

12.5. Other adverse effects

No additional information available.

SECTION 13: Disposal Considerations

13.1. Waste treatment methods

Waste treatment and disposal methods	:	Vacuum or shovel material into a closed container. Dispose in a safe manner in accordance with local/national regulations. Do not allow the product to be released into the environment.
Additional information	:	Activated carbon is an adsorbent media; hazard classification is generally determined by the adsorbate. Consult U.S. EPA guidelines listed in 40 CFR 261.3 for more information on hazardous waste disposal.

SECTION 14: Transport Information

14.1. In accordance with DOT

Not classified as hazardous for domestic land transport.

UN-No.(DOT)	:	None on finished product
DOT NA no.	:	None on finished product
Proper Shipping Name (DOT)	:	Not regulated
Department of Transportation (DOT) Hazard Classes	:	None on finished product
Hazard labels (DOT)	:	None on finished product
Packing group (DOT)	:	None on finished product
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	None on finished product

14.2. Transport by sea

Not classified as hazardous for water transport.

IMO / IMDG

UN/NA Identification Number	: None on finished product
UN- Proper Shipping Name	: Not regulated
Transport Hazard Class	: None on finished product

14.3. Air transport

Not classified as hazardous for air transport.

ICAO / IATA

UN/NA No	: None on finished product
UN- Proper Shipping Name	: Not regulated
Transport Hazard Class	: None on finished product
Packing Group	: None on finished product
Marine Pollutant	: None on finished product

14.4. Additional information

Other information	:	Under the UN classification for activated carbon, all activated carbons have been identified as a class 4.2 product. However, this product type or an equivalent has been tested according to the *United Nations Transport of Dangerous Goods* test protocol for a "self-heating substance" (*United Nations Transportation of Dangerous Goods, Manual of Tests and Criteria, Part III, Test N.4 - Test Method for Self Heating Substances)* and it has been specifically determined that this product type or an equivalent does not meet the definition of a self-heating substance (class 4.2). This information is applicable to the steam activated carbon product described in this document.

SECTION 15: Regulatory Information

15.1. US Federal regulations

GN UC H
All chemical substances in this product are listed as "Active" in the EPA (Environmental Protection Agency) "TSCA Inventory Notification (Active-Inactive) Requirements Rule" ("the Final Rule"). as of February 2019 or are otherwise exempt.

SARA Section 311/312 Hazard Classes	Physical hazard - Combustible dust

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Cobalt (7440-48-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	0.1 %

15.2. International regulations

No additional information available.

15.3. US State regulations

California Proposition 65

WARNING: This product can expose you to chemicals including Silica: crystalline, quartz, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Component	Carcinogenicity	Developmental toxicity	Reproductive toxicity male	Reproductive toxicity female	No significant risk level (NSRL)	Maximum allowable dose level (MADL)
Silica: crystalline, quartz (14808-60-7)	X					
Titanium dioxide (13463-67-7)	X				Not available	
Cobalt (7440-48-4)	X					

Component	State or local regulations
Aluminum oxide (1344-28-1)	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
Calcium sulfate (7778-18-9)	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List
Silica: crystalline, quartz (14808-60-7)	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List
Titanium dioxide (13463-67-7)	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List
Cobalt (7440-48-4)	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Massachusetts - Right To Know List

SECTION 16: Other Information

Indication of changes : Revision 4.0

Revision Date : 10/20/2020

Other information : Author: ADK

For internal use only : PR #1

Prepared according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

NFPA health hazard : 0 - Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 1 - Must be preheated before ignition can occur.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

HMIS III Rating

Health : 0

Flammability : 1

Physical : 0

GN UC H

Product Code: 28010

Safety Data Sheet

Personal Protection :

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. The information is this document applies to this specific material as supplied. It may not be valid if product is used in combination with other materials. It is the user's responsibility to determine the suitability and completeness of this information for their particular use. While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Calgon Carbon Corporation makes no warranty with respect to the same, and disclaims all liability for reliance thereon.

Notes

Notes

Notes

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

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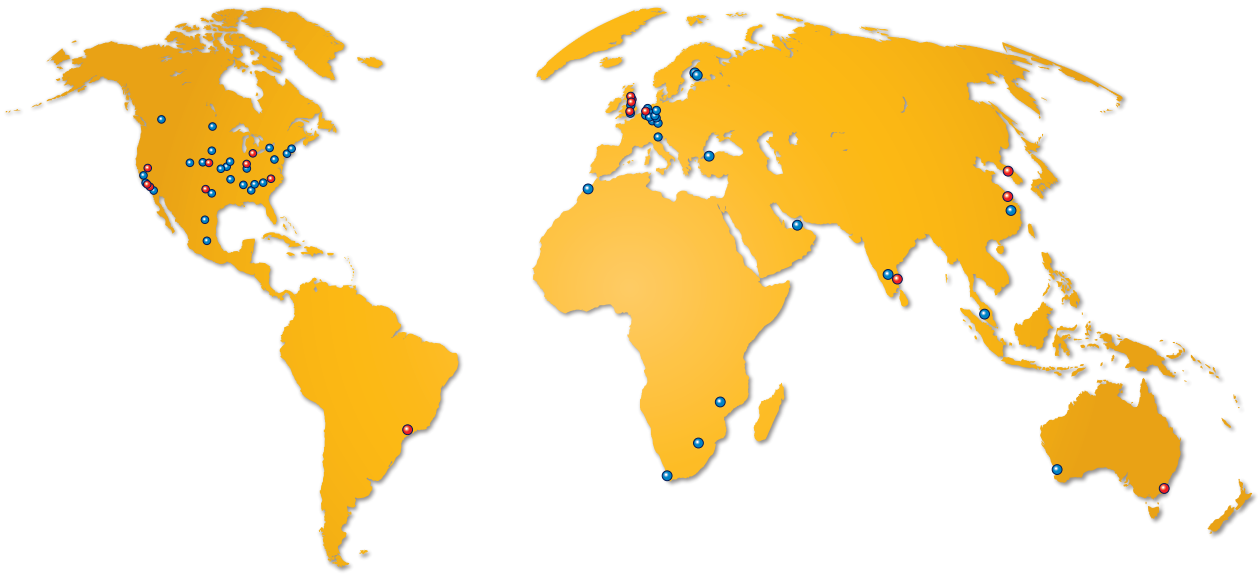

PKR_IOM_DB5-20_082022
TI-DB5-20-AB Rev -

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