User Guide

NBM - breathing air module

revision: 2022-291 document: 17-100-0685

www.n-psi.co.uk

about us

Experience.

Our team is comprised of and supported by individuals spanning all disciplines from research & development, engineering & manufacturing, marketing & sales and service & support. Our backgrounds are in air and gas purification and our experience in this field spans a wide range of industries. We combine this knowledge and experience to ensure our products and services are designed and provided to meet the objectives and expectations of you - our Customer.

Customer.

We recognise that our Customers are not only our valuable distribution partners who sell and support our products or the machine builders who depend on them as protection for their equipment. They are the contractors who install them, the manufacturers who use them in their processes and the service people who maintain them. At nano we have developed our products, packaging and support materials to ensure they exceed all of our Customers' expectations.

Service.

At nano we recognise that world-class customer service is the most important component to any successful business. Your business needs to exceed your customers' expectations to stand out from your competitors and our service must positively impact your business so you can be successful in doing so. Our commitment is simple… we will stand behind our products and ensure that our customer service is unrivaled in the industry.

Experience. Customer. Service.

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1. manufacturers detials and support

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ISO 9001
UKAS MANAGEMENT SYSTEMS
001

annotations

CAUTIONS: indicate any situation or operation that may result in potential damage to the product, injury to the user, or render the product unsafe.

NOTES: *highlight important sections of information where particular care and attention should be paid.*

WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

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1.1 general information

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1.2 document introduction

This manual provides factory prescribed installation and maintenance procedures for the B1 breathing air module. The procedures illustrated in this document are only to be performed by authorized personnel. For further information regarding the procedures outlined in this document contact the manufacturer before proceeding. Be sure to read this document carefully before attempting to install or operate the B1 breathing air module. This document should be permanently available at the B1 breathing air module installation site.

1.3 warranty guidelines

All products are supplied with a 2 year manufacturer's warranty from the date of purchase when installed and maintained in accordance with the manufacturers guidelines. Only genuine service parts should be used and no modifications made.

1.4 general safety

No modifications must be made to the product. Any modifications may reduce the operational safety of the product and invalidate the manufacturer's warranty. This could potentially result in damage to the product and serious personal injury.

For your own safety, when carrying out work on this product, all relevant national safety regulations must be complied with relating to pressurized and electrical systems.

Only authorized, competent and trained personnel are permitted to work on this product. This user guide is intended solely for such personnel and is to be used only as a reference; it should not be used to replace conventional training.

1.5 intended use of the product

The Purifier is exclusively intended for the treatment of compressed air, which is free from bulk water, oil and solid matter constituents.

The product should be located within a building and protected. The Purifier must be operated only in accordance with the data on the rating plate. Any operations that do not comply with those stated on the product rating label will render the warranty void.

IMPORTANT: It is essential that the system into which the Purifier is installed is fitted with a pressure limiting/ relief device. This device should be between the compressor and the Purifier. The device must be set to prevent the maximum working pressure from being exceeded.

No modifications must be made to the product. Any modifications may reduce the operational safety of the product and invalidate the manufacturer's warranty. This could potentially result in damage to the product rendering it unfit for its intended purpose and cause serious personal injury.

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1.6 personnel

Only authorized, competent and trained personnel are permitted to work on this product. This user guide is intended solely for such personnel and is to be used only as a reference; it should not be used to replace conventional training.

1.7 safe handling

Please ensure the relevant safe engineering practices and handling procedures are employed when handling, installing and operating this product. Ensure that the equipment is de-pressurized and electrically isolated prior to carrying out any of the scheduled maintenance instructions specified within this user guide.

In no circumstances must a damaged product be used in operation. Using damaged products can lead to irreparable functional faults or cause serious physical harm.

1.8 technical description

The B1 breathing air module is a static machine that utilises proven activated carbon and catalyst technology.

- Dry air enters the NBM through the inlet and is directed into the columns.
- Each column contains a densely filled activated carbon and catalyst cartridge.
- Air then passes through the cartridge where any remaining oil or hydrocarbons and toxic gases such as CO, NO_2 and SO_2 will be removed.
- The clean dry air passes out through the final particulate filter (<1micron/ISO8573.1 Class 2).

NOTE: The air entering the NBM should be dried to < -40°C PDP to guarantee the performance from the NBM.

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2. technical specification

	EU & N. American specifications	Canadian specification
required inlet purity	ISO 8573-1 : 2010 class 1.2.1	ISO 8573-1 : 2010 class 1.2.1
minimum operating pressure	80 psig (5.5 barg)	80 psig (5.5 barg)
maximum operating pressure	232 psig (16 barg)	210 psig (15 barg)
minimum inlet temperature	35°F (1.5 °C)	35°F (1.5 °C)
maximum inlet temprature	86°F (30 °C)	86°F (30 °C)

2.1 breathing air standard

impurity	European pharma	CSA Z180.1
*CO2	<500ppm	<500ppm
*CO	<5ppm	<5ppm
SO2	<1ppm	NA
NO2	<2ppm	NA
O2	NA	20-22%
N2 & Rare Gases	NA	78-80%
Water Vapour	ADP -45°C (-49°F) (-23°F) -31°C at 7 bar (100psi)	At a dew point 5°C under the lowest temperature its exposed to during the year.
Oil vapour	<0.01 mg/m³	<1mg/m3
Dirt Particles	NA	<1mg/m3
Odor	Taste and odour free	Taste and odour free
Bacteria	NA	NA
Methane	NA	<10ppm
Volatile non-methane hydrocarbons (VNMH)	NA	<5ppm
Volatile halogenated hydrocarbons	NA	<5ppm

Europe	EN12021
UK	BS4275 : 1997
USA	CGA G7.1-1997 OSHA-Grade D
Canada	CSA Z180.1

***Where excessive levels of CO2 and CO have been identified as the norm, breathing air purifiers should not be used and alternative strategies should be derived from a risk assessment.**
When challenged with 750ppm - CO_2
When challenged with 65ppm - CO

The breathing air module should be preceded by high efficiency filtration and a heatless desiccant dryer regardless of whether an oil or oil free compressor is used. Inlet air should be filtered and dried such that it complies with ISO 8573-1: 2010 quality class 1.2.1.

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2.2 flow rates

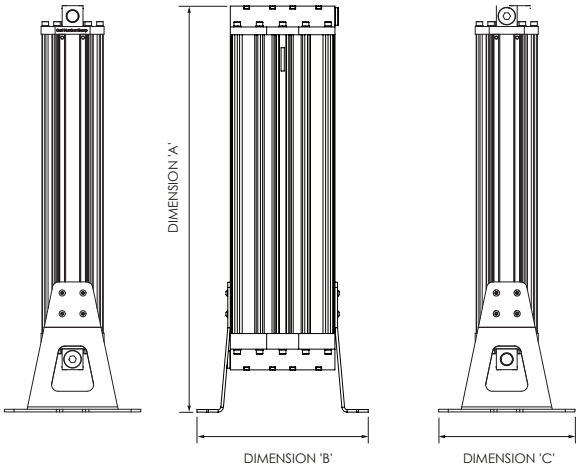
model	inlet flow rate		connection
	Nm3/hr	scfm	inlet & outlet (BSPP or NPT)
NBM - 030	51	30	1/2"
NBM - 120	200	120	1"
NBM - 240	400	240	1"
NBM - 480	800	480	2"
NBM - 720	1200	720	2.5"
NBM - 960	1600	960	2.5"

2.3 correction factors

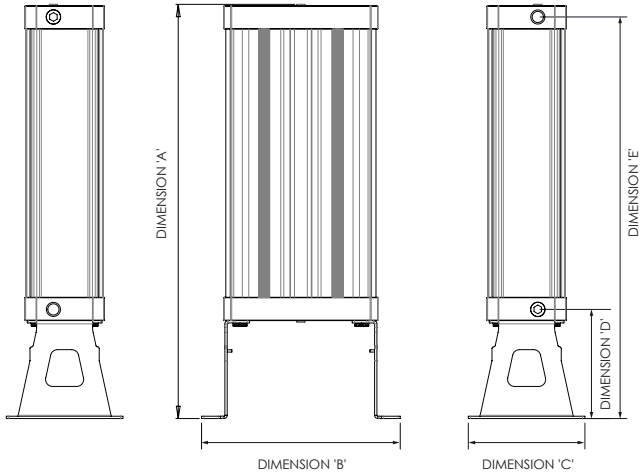
inlet air pressure	barg	5.5	6	7	8	9	10	11	12	13	14	15	16
	psig	80	87	102	116	131	145	160	174	189	203	218	232
correction factor		0.89	0.92	1	1.07	1.13	1.20	1.25	1.31	1.36	1.41	1.46	1.51

2.4 product dimensions

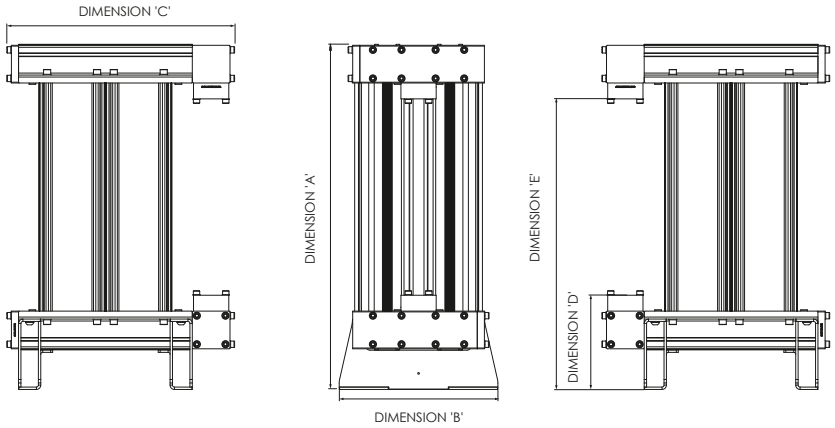
NBM-030



NBM-120; NBM-240



NBM-480; NBM-720; NBM-960



model	dimension										approx. weight	
	A		B		C		D		E			
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	kg	lbs
NBM - 030	865	34	263	10.3	210	9.8	81	3.19	609	24	12.8	28
NBM - 120	705	27.7	426	16.7	250	9.8	147.5	5.8	587.5	2.1	40	88
NBM - 240	885	34.8							767.5	30.2	50	110
NBM - 480	870	34.25	400	15.75	574	22.6	237.5	9.35	732.5	28.83	103	227
NBM - 720					742	29.2					142	313
NBM - 960					910	35.8					180	397

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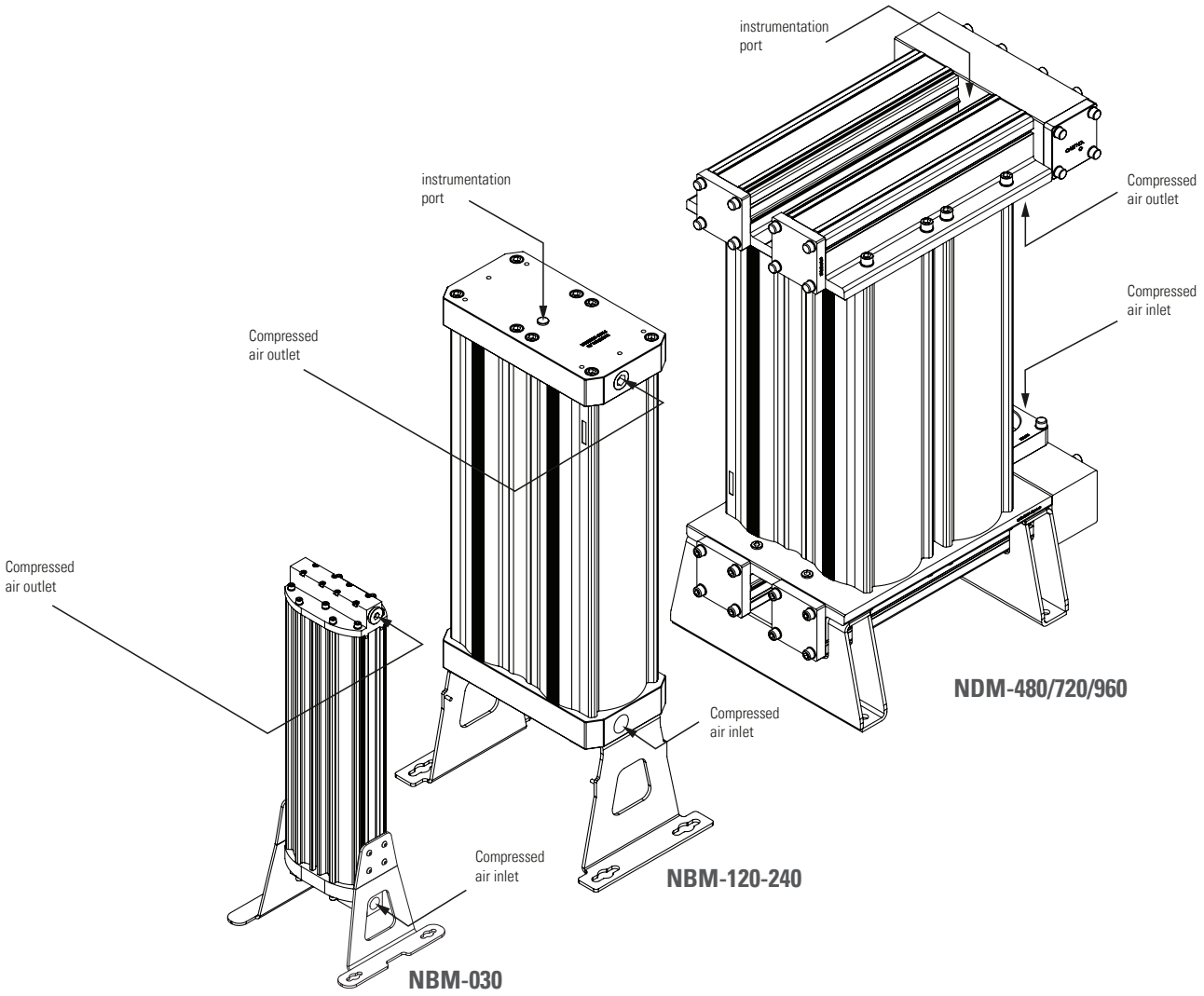
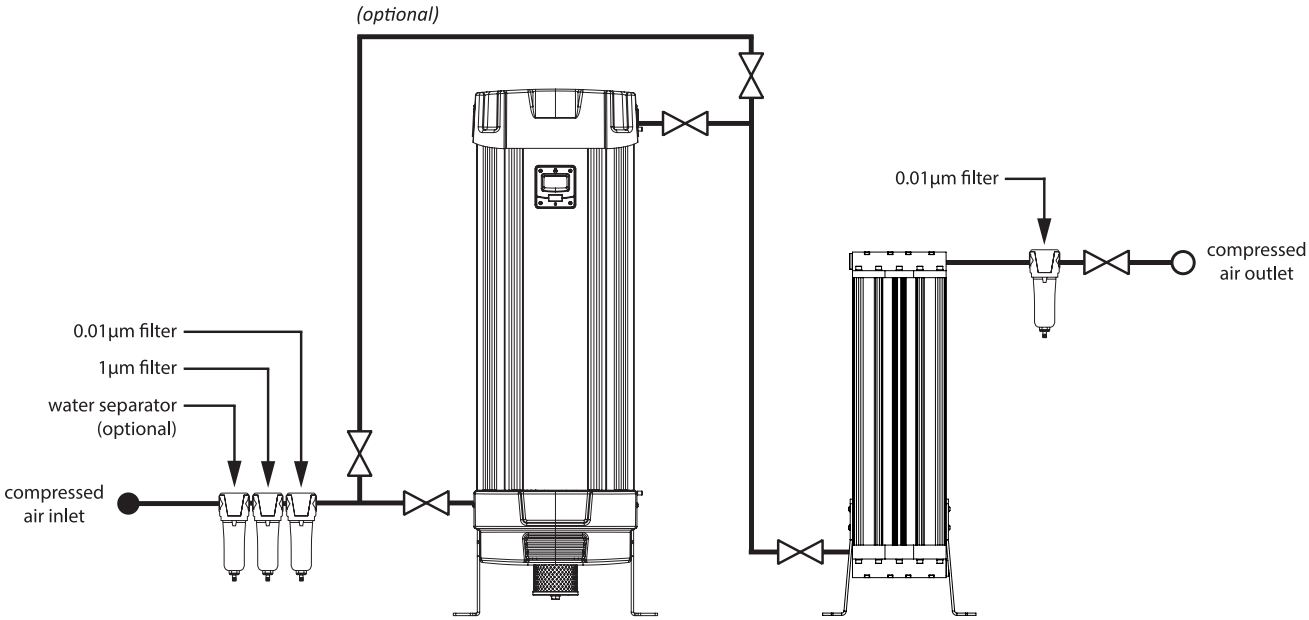
2.5 product overview

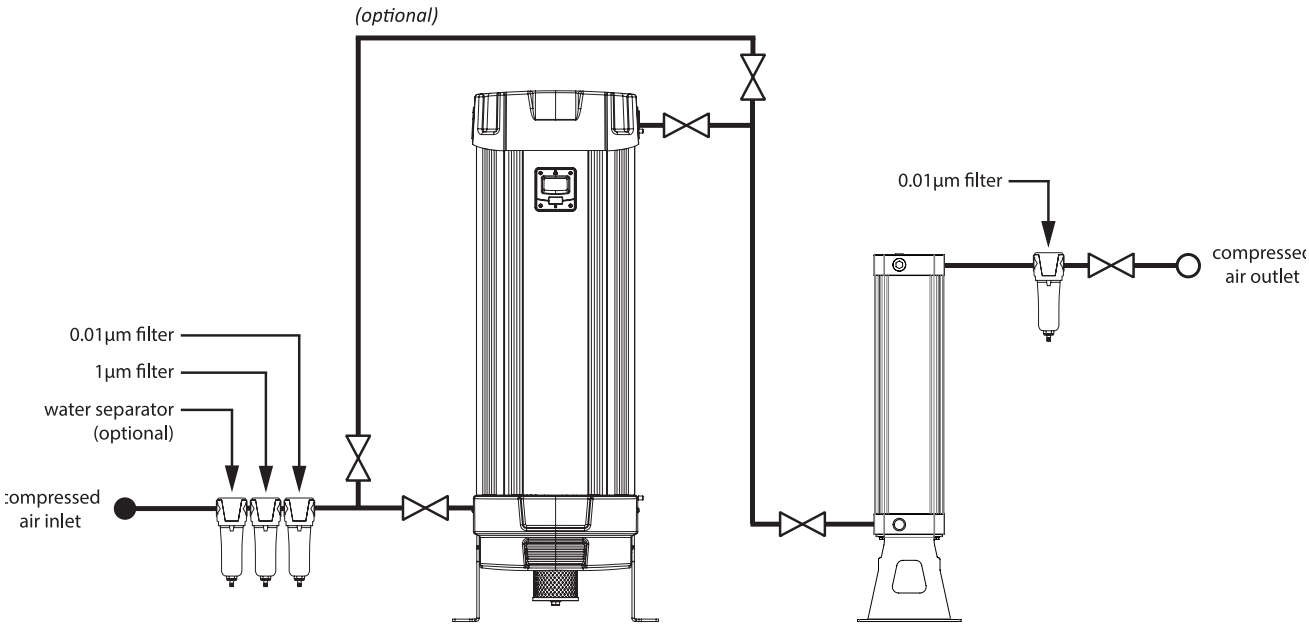


IMPORTANT: Do not remove the blanking plugs from the instrumentation ports when product is pressurized. Ensure the system is isolated from the compressed air and fully depressurized before remove this blank.

2.6 site location



IMPORTANT: It is essential that the system into which this is installed is fitted with a pressure limited / relief device. This device should be installed between the compressor and the dryer.



IMPORTANT: It is essential that the system into which this is installed is fitted with a pressure limited / relief device. This device should be installed between the compressor and the dryer.

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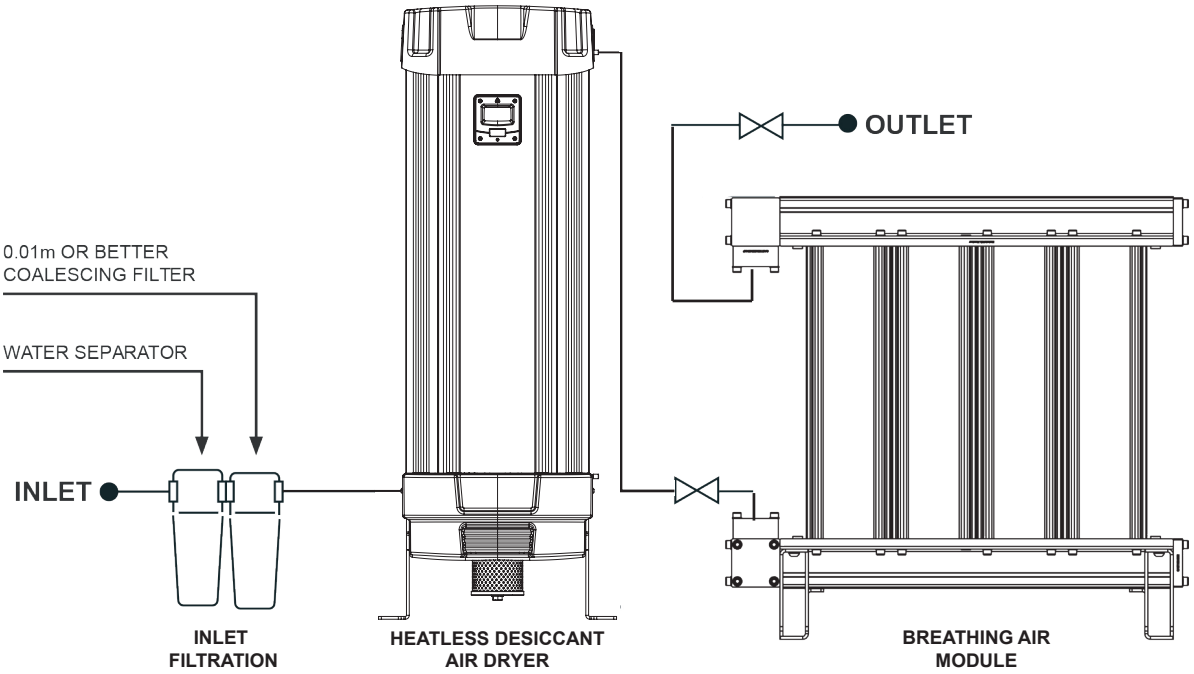

IMPORTANT: It is essential that the system into which the Module is installed is fitted with a pressure limiting/relief device. This device should be between the compressor and the Purifier. The device must be set to prevent the maximum working pressure of the product from being exceeded.

When selecting an installation site for the unit, ensure the following conditions are met:

- Installation site should be located indoors on a flat protected from the weather and other harmful conditions.
- The installation site should be level and able to support the weight of the product.
- Ensure sufficient space around the product, to allow access for operation and maintenance.

2.7 risk assessment

Prior to the installation a thorough risk assessment of the entire installation should be conducted by a competent person. Points listed below should be considered but should not be considered an exhaustive:

- Compressor type
- Pre-Filtration and Dryer suitability
- Condition of compressor/oil used if applicable
- Temperature and humidity
- Potential source of excessive contaminants e.g. toxic gases
- Use of a dedicated breathing air line if possible
- Purification equipment
- Alarm options
- Compliance to relevant regulations for pressured systems
- Comprehensive operator training
- Maintenance requirements

The risk assessment should be carried out by competent personnel and checked and approved by a qualified engineer.

2.8 module operation

- Connect all pipe work, in line with the system layout on page 12.
- Ensure the inlet operating pressure parameters are correct (refer to specification on page 7).
- Ensure the inlet air temperature is correct (refer to specification on page 7).
- Slowly open the inlet valve until fully open and allow purifier to pressurize.
- Open the outlet valve to deliver breathable air.

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3. maintenance

Maintenance operations should only be conducted once the system has been shut down and is fully depressurized. All operations should be carried out by authorized and suitably trained personnel

- All connections must be removed with care, paying particular attention to the areas that become pressurized.
- All seals removed during maintenance operations must be replaced with new seals.
- Only certified and approved replacement parts should be used.
- Check all connections and sealing faces for cleanliness and secure seating prior to assembly.
- Ensure all components are re-fitted to the product before operation.
- Check all connection and sealing faces for any leakage, if any found resolve and check again.
- Ensure the unit is left operating in a safe working condition after completion of maintenance

3.1 cleaning

Clean the equipment with a damp cloth only and avoid excessive moisture around any electrical connections. If required a mild detergant can be used. Do not use abrasives/solvents as these may cause damage.

3.2 daily checks

- Check the unit for any signs of external damage.
- Remove any loose dust or dirt from the unit, clean all surfaces that appear to have attracted unwanted contaminants.
- Ensure the unit is operating within the specification.
- Always check all connections for any leaks.
- Ensure all loose parts are removed or secured to the unit before operation.

3.3 sampling

A sample of compressed breathing air produced and delivered by the compressed breathing air system must be collected and analyzed every 6 months (or as specified by the authority having jurisdiction) by an accredited lab. When the testing shows unacceptable levels of contaminants, the system must be taken out of service and reinspected.

- Additional testing at regular intervals is recommended.
- Re-testing the system is recommended when any major overhaul or extensive repairs have been carried out.

Any noticeable odor must be analyzed.

3.4 service schedule and breakdown

service	year 1 (12 months)	year 2 (24 months)	year 3 (36 months)	year 4 (48 months)	year 5 (60 months)	year 6 (72 months)	year 7 (84 months)	year 8 (96 months)
A	✓	✓	✓	✓	✓	✓	✓	✓

Service A - Every 1 year (12 months)
Replace activated carbon
Replace top manifold gasket seals

3.5 service kits and spares

model	service A	quantity
NBM - 030	NBMSK - 030	-
NBM - 120	NBMSK - 120	1
NBM - 240	NBMSK - 240	1
NBM - 480	NBMSK - 240	2
NBM - 720	NBMSK - 240	3
NBM - 960	NBMSK - 240	4

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4. trouble shooting

problem	problem caused	solution
Poor performance	Insufficient inlet pressure	Inlet pressure min 80 psig (5.5 barg). If not adjust inlet pressure settings.
	Moist or contaminated bed	Eliminate the cause of contamination. Replace purification cartridges – do not re-use.
	Too high air consumption	Ensure the performance of the purifier matches the required system air consumption.
	Excessive inlet air temperature	Check against technical specification..
product does not cycle	Outlet flow stops	Check inlet air supply.

Reference to known Fault:

Opening the inlet valve too quickly
Valve should be opened slowly allowing the pressure to build up gradually.

Inlet/outlet head pipe
Diameter too small.
Pipe work unsupported.
Inlet pipe work from low point in system, allowing water to collect and enter the Purifier.

Additional Items
Use of unauthorized components.
Untrained / non-authorized maintenance / installation personnel used.
Increase in air consumption without relation to the flow capacity of the Purifier.
Purging the Purifier with cleaning agents that could damage the components or the purification bed.

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4.1 commissioning report

End User:	Distributor:
	Contact:
	Phone:
	E-mail:

Contact name and position for the qualified user	Breathing Air Model:	Serial Number:	Compressor Make & Model:

Contact:	Start-Up Date:	Date:	Location:
Phone:			

E-mail:	Start-up Technician:	Technician Company:	Technician Phone:

Installation Details			Operating Details	☑		Operating Notes
Environment			Ambient Temp		°F/°C	
Receiver			Inlet Air Temp		°F/°C	
Inlet Flow Rate		scfm	Inlet Air Pressure		psig	
Filter Size			Outlet Pressure		psig	
Filter Grades			Dew Point Delivered/Witnessed	☐	°F/°C	
Compressor Type			Carbon Monoxide (CO) Monitor Installed?	☐		
Oil Type			CO Monitor Visible by User?	☐		
Piping Type			CO Monitor Audible By User?	☐		
Electrical			Is Compressor Dedicated to Breathing Air?	☐		
Compressor Intake Location			Air quality Tested Before Installation?	☐		
Local / Remote Control			Air Quality Tested After Installation?	☐		
Drain Valves Size & Type			Air Quality Test Report Attached?	☐		
Inlet / Outlet Pipe Size			Air Quality Test Report Posted?	☐		
Dew Point Meter			User Guide Posted on Site?	☐		
Check for Damage			Maintenance Items on Site?	☐		

Comments	Has this unit been installed according to manufacturers recommendations, passed a third party air quality test, and deemed suitable for operating by the installer? YES or NO.		

Start-up Check List	**Yes/No**
Has the product been received in good condition?	
Has the user received and reviewed the User Guide?	
Has the user carried out the recommended Risk Assesment?	
Is the product installed and operational?	
Are there spare parts on site?	
Has a daily check procedure been established?	
Does the user require any assistance from nano-purification solutions?	

Engineer:		**Date:**		**I certify all of the above information to be true?**	**Yes/No**

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4.2 quality statement

All responsibility regarding quality of breathing air lies with the user. Compliance with any federal, state, provincial or local regulations are the sole responsibility of the user. All nano breathing air products meet or exceed the standards set forth in CGA Grade D

specifications for air quality as set forth by OSHA (USA) and CSA Z180.1 (Canada).

When the breathing air equipment is used in accordance with the instructions as set forth by nano-purification solutions, the breathing air system meets or exceeds all breathing air standards currently in force. The user is responsible for installation and compliance with any localized regulations and should be up to date on any and all changes which may have occurred to specifications.

The air compressor needs to be located in a safe and clean ambient location and the location should be tested periodically to ensure the compressor is ingesting and compressing air suitable for downstream treatment by the breathing air system. The compressed air breathing system outlet quality should be tested at initial start-up and put on a preventative maintenance schedule of testing. If conditions or location of the breathing air system is to change, outlet breathing air should be retested and validated prior to use. Proper preventative maintenance of the system should be documented and maintained based on recommended maintenance of the manufacturer.

Grade-D (USA) or CSA Z180.1 testing (Canada) should be carried out and documented. These tests should analyze at a minimum: Carbon Monoxide, Oxygen, Carbon Dioxide, Water content, Hydrocarbon content and total particulate level. The actual allowable levels are clearly documented in the Technical Specification section.

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notes

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