



**MATHESON
TRI•GAS**

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Nitrogen generator model N2-Bora

User's manual

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Introduction

Scope of the manual

This manual provides operation and maintenance instructions for model N2-Bora nitrogen generator.

Specifications

Specifications of the nitrogen generator

Nitrogen flow rate STP: Standard temperature and pressure (20°C, 1 bar)	0-500 cc/min at STP 0-750 cc/min at STP 0-1300 cc/min at STP
Max outlet pressure	5 bar (73 psi)
Purity	99.999%+ (O ₂ < 10 ppm)
Weight	18 kg
Input voltage	120 or 240V / 50 or 60Hz
Fuse	4A or 2A
Pressure accuracy	0.1 bar (± 0.5 %)
Microprocessor controlled display	Graphic display, 128 x 64 pixels
Index of protection	IP2x
Operating conditions: - Temperature - Relative humidity	15°C to +40°C 0-80%, non condensing
Over voltage category	II
Pollution degree	2
Sound pressure level	48 dB(A)
Case dimensions	350 x 430 x 230 mm (WxDxH)

Notes on FCC compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING!

Any changes or modifications to this equipment not expressly approved by the manufacturer may void the user's authority to operate the equipment.

Correct use

Nitrogen generator is designed to produce nitrogen for laboratory use. The unit must only be operated for this purpose, according to the specifications and instructions provided in this manual. In particular, the following warnings must be observed at all times:

- Indoor use only
- Never operate the unit in below-zero temperatures.
- Only operate the unit in a room with sufficient ventilation (see "Placing the unit").
- Always unplug the unit from the mains power supply before accessing the internal components for replacement.
- Only the parts described in the "Spare parts list" can be replaced by the user.

Packing list

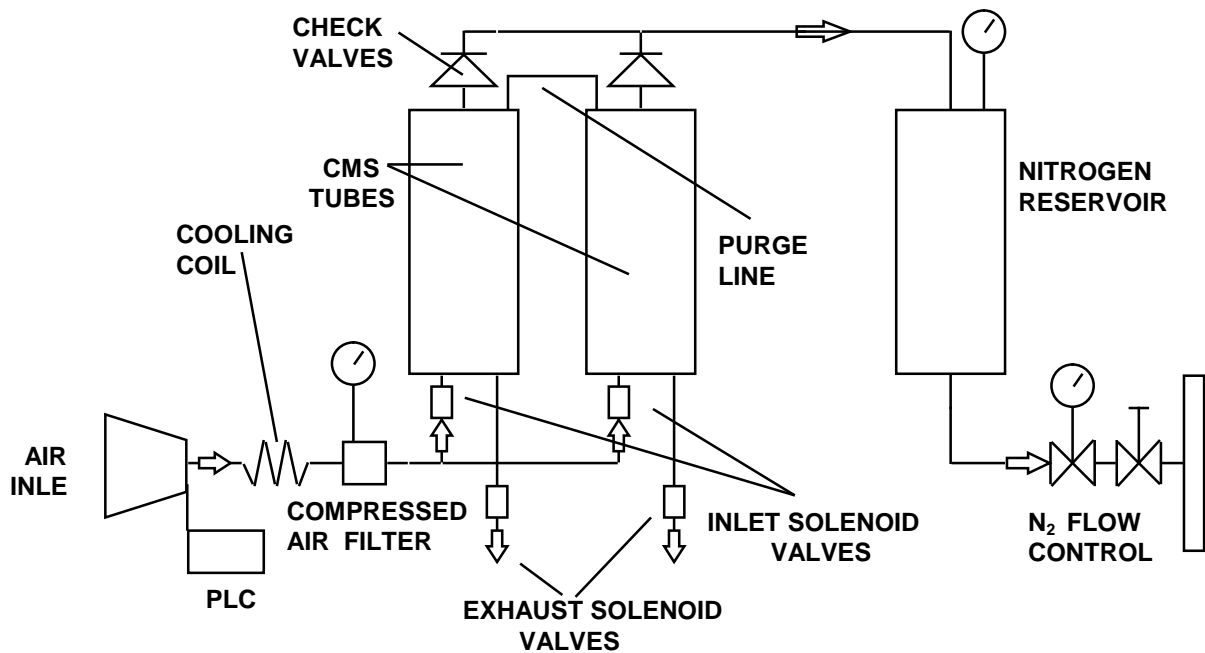
List of items included in the shipment

Quantity	Description
1	Nitrogen generator
1	Instruction manual
1	Power cable

Description

The nitrogen generator produces pure nitrogen through the filtration of compressed air. The key element of the generator is a carbon molecular sieve that is able to separate the nitrogen molecules from the oxygen ones present in the compressed air stream. The two carbon molecular sieve tubes are self regenerating cyclic. Two compressors are an integral part of the generator and their purpose is to compress air up and force it into the tubes containing the carbon molecular sieve.

The generated nitrogen gas is accumulated in a specific reservoir. The internal pressure is controlled by a pressure transducer. The outlet pressure is adjusted with a forward pressure regulator and by default set to 5 bar. The nitrogen then passes through the outlet port at the rear.



Installation

Receiving the generator

All units have been carefully inspected before transport. Visual checks for damage and functional tests should be performed upon receipt. Any damage must be immediately noted and reported. The generator must only be returned according to the shipping instructions provided.

Placing the generator

The nitrogen generator must be placed on a flat, level, vibration-free, shock-free surface. Do not place the generator over a source of heat, as this may cause the device to overheat. The unit should not be in contact with any other objects on any side, and the air inlet must not be blocked. **Leave at least 30 cm of free space at rear for ventilation.** Do not operate the generator in a sealed or unventilated room. Do not operate the generator at below freezing temperatures. Operation is guaranteed at operating temperatures between +15 and +40°C.

WARNING!

Normal precautions for any nitrogen supply should be taken when using the generator. DO NOT use in sealed or unventilated rooms. Nitrogen can cause suffocation.

Symbols used on the generator



Earth symbol:

This symbol marks the earth connections to the chassis of the nitrogen generator.

Gas connections

Pure nitrogen at regulated pressure is available at the nitrogen outlet port at the rear of the generator. This port must be connected to 1/8" tubing using a stainless-steel or copper Swagelok connector. Teflon connectors are not suitable. The pressure at this port is adjusted and shown on the display.

WARNING!

The line from the relief port should never be connected in such a way that back pressure can develop.

Initial start-up

Start N2-Bora

- Switch on the unit.
- Push the START button.
- The unit's compressor will start to run and nitrogen will be produced immediately.
- It will last 30 minutes before the nitrogen produced will reach the stated purity.
- The system is ready for use now.

Operation

The operating status of the unit is shown on the main screen on the graphic display.

The main screen has three options at the bottom, corresponding to the three buttons on the unit, which are used to run the various functions and access the configuration.



- The button on the left is used to start the unit.
- The button on the right is used to stop the unit.

After switching on the generator, the menu is show as above :

Pressure N2
=
xxxx mBar
Started Stop

Where xxxx represents the output pressure read. The range goes from 20 to 9999mBar.

- The button on the centre is used to enter the sub menu.

```

* Set PN2 Alarm
  Running Time
    Settings
  Exit   ↓   Select
  
```

The selected item is marked with a "*" and this can be changed by scrolling the middle key.

Setting the N2 Pressure Alarm

```

Set PN2 Alarm
  1 0 0 0  mBar
  Option  ↓   ↔
  
```

The value of the pressure alarm can be set by scrolling the values by using both ↓ and ↔. Once the value is set, press "Option" button to select either "Save" the value or "Cancel" the whole operation.

Remark: the default value after flashing the MCU is set to 1000 mBar; setting the PN2 alarm does not require password; the delay is set to approx. six minutes.

Running Time

This submenu shows the total running time and the unit is hours. When 4000 working hours are passed, it's time to replace some consumables, as indicated in the next chapter, "Maintenance".

This data can be reset at any time as follows :

- 1) Switch off the N2 Generator
- 2) Press the left button and maintain it pressed ("Start button")
- 3) Switch on the N2 Generator
- 4) Stop pressing the left button
- 5) Enter "Running time" sub menu
- 6) Enter password (not the default one, but a new one inserted before!)
- 7) Type the "reset" button

Remark: should the password be incorrect when pressing the "Reset" button, "Err" is shown just after the wrong code: if the correct code is set, pressing this key will reset this data and exit this sub menu.

Setting sub menu

Several tasks can set within this sub menu: start option, external remote configuration, switch on/off the buzzer in case of alarm and changing password.

Start Option

Within this sub menu, when "Auto start ON" is set, the N2 Generator will automatically start when switching on the N2 Generator. When "Auto Start OFF" is set, the N2 Generator will be stopped when switching on the Generator.

Remark: this option is disabled if external remote control is enabled. In this case, pressing "start" or "stop" key has no effect; the default setting after flashing the MCU is set to "Auto start ON"; no password is required in this sub menu.

External remote control mode ("Remote Relay Mode")

Three choices are available : "Normally OPEN", "Normally CLOSE" and manual mode.

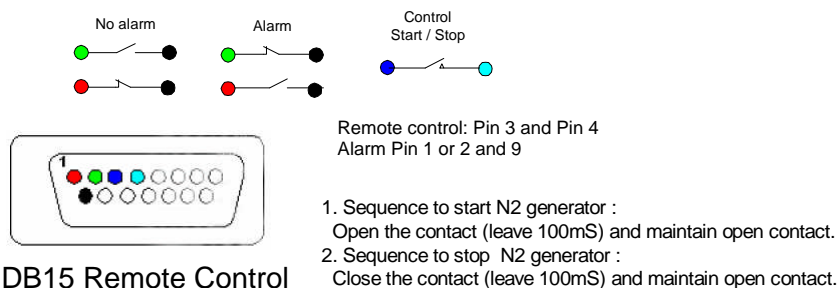
"Normally OPEN": the N2 generator automatically starts when the remote control is opened and it stops when this remote control is closed. The maximum delay time is 2 seconds and the manual mode is disabled.

"Normally CLOSE": the N2 generator automatically starts when the remote control is closed and it stops when this remote control is opened. The maximum delay time is 2 seconds and the manual mode is disabled.

If none of the option above is selected, the manual mode is enabled. This option is set by default after flashing the MCU.

Remark: no password is required in this sub menu.

Pin out DB15 Remote Control



Buzzer alarm

User can set the buzzer in case of alarm. This setting does not require password.

Password setting

The password can be changed within this submenu. User needs to provide the old password before submitting a new one. If user forget the this password, the default one (04122) can be submitted.

Maintenance

With proper care and maintenance, your nitrogen generator should provide you with years of trouble-free operation. There are no adjustments to be made to the generator. The only routine service operations are those described below.

Nonetheless, the generator should be inspected approximately every 3 years. Contact your supplier.

Routine maintenance

The following section describes the maintenance operations required for the correct operation of the nitrogen generator.

Cleaning

The internal components of the nitrogen generator do not need to be cleaned and should not be accessed by the user for cleaning. To clean the outside of the unit, only use a damp cloth (no detergents, acids or aggressive or abrasive substances).

Service kits

- Every 4000 hours the user must replace the filters of the compressor.
- Every 8000 hours the user must replace the filters and the membrane of the compressor.
- Every 24000 hours the user must replace the carbon molecular sieve (CMS).

The specific maintenance kits are available as spare part. These kits include all required parts: they are listed in the "List of spare part".

WARNING!

Only qualified personnel should perform service on this product. Any damage done to this product as a result of improper maintenance procedure will void the warranty.

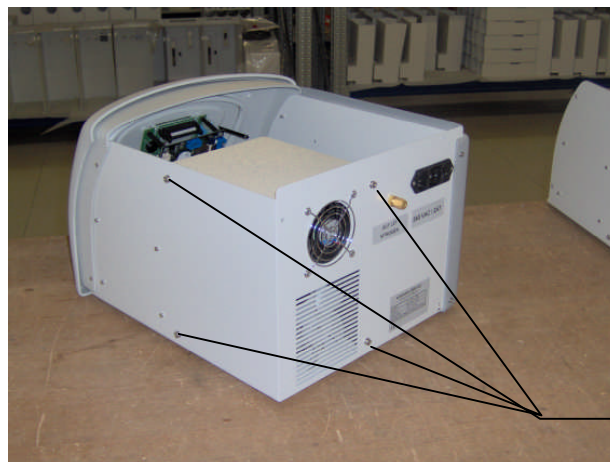
4000 h service kita) *Exchange of the compressor's inlet filters*

- Switch off the instrument and disconnect from the power line
- Open the hood
 - Unscrew the 2 screws on rear of the unit



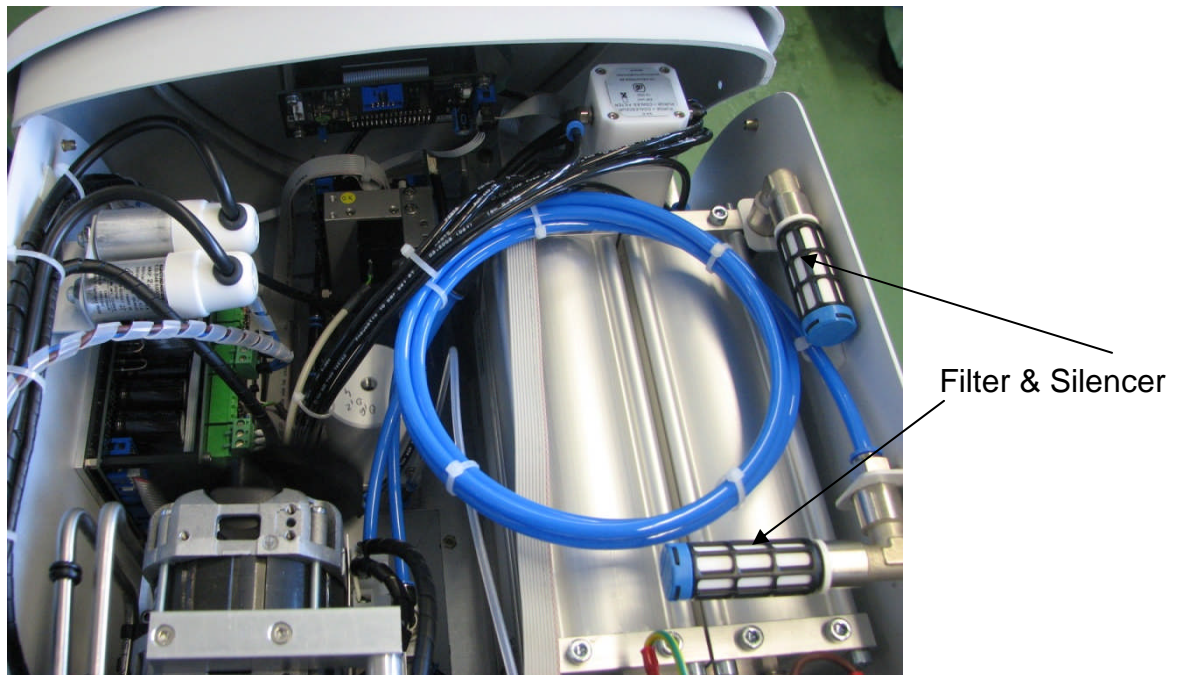
Screws

- Unscrew the 4 screws on right side and on rear of the unit



Screws

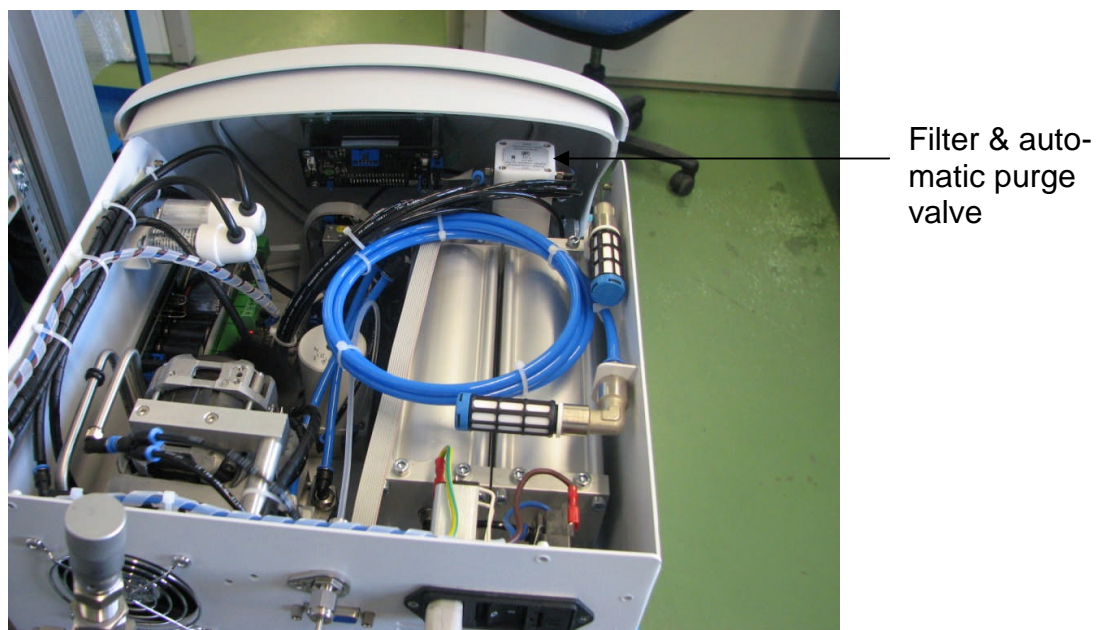
- Exchange the filtering media & Silencer



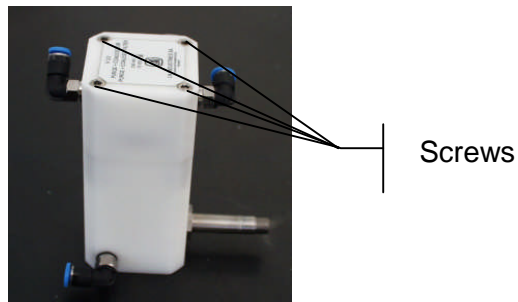
- Reassemble in reverse order.

b) *Exchange of the automatic purge filtering media*

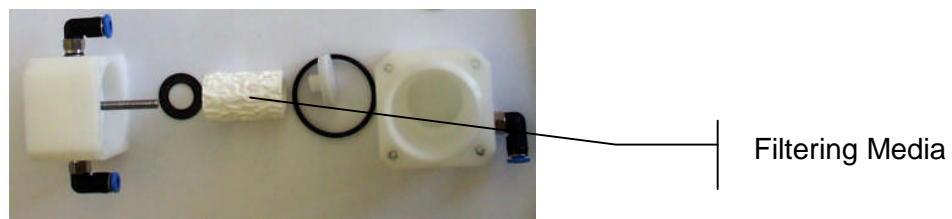
- Switch off the instrument and disconnect from the power line
- Open the instrument
- Disconnect the 2 tubes fixed at the top of the automatic purge (quick connect fittings)



- Unscrew the 4 screws on top of the automatic purge



- Exchange the filtering media (white cylinder)



- Reassemble in reverse order.

8000 h service kit

a) Exchange of the compressor's inlet filter

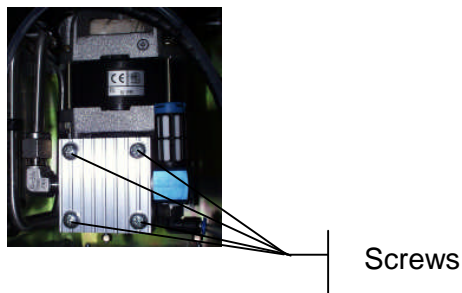
See 4000 h service kit

b) Exchange of the automatic purge filtering media

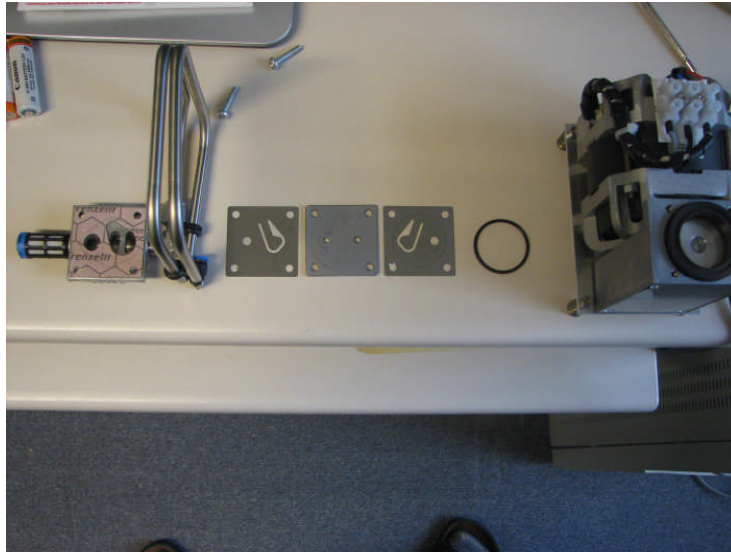
See 4000 h service kit

c) Exchange of the membrane in the inside of each compressor

- Switch off the instrument and disconnect from the power line
- Open the instrument
- Unscrew the 4 screws on top of the pump



- Replace the seals and membranes



Top view.
Parts were
turned over 180 °
CC

Attention: be very carefully to note the original position of the various parts.

- Reassemble in reverse order. Tighten screws a little at the time and crossover until tight.

Start the generator and test for proper operation

Returning the unit

In the event of any faults or damage, first notify the agent or distributor who supplied the unit. Please also provide full details of the problem, including the model and serial number. Instructions will then be provided for the service or the return of the unit. If the one year warranty has expired, or the fault is due to misuse of the unit, all repair and shipping costs are to be paid by the customer. All other costs are borne by the customer, except as otherwise expressly agreed upon.

WARNING!

*If the unit has to be transported, make sure to use suitable packaging.
The unit should be transported in an upright position; this warning should be reported on
the outside of the packaging.*

Spare parts list

The table below provides a list and description of the spare parts of the nitrogen generator.

List of spare parts – N2-Bora

p/n	DESCRIPTION
NB-404	4000 h service kit for N2-BORA-500 (filters)
NB-405	4000 h service kit for N2-BORA -750/ICP (filters)
NB-401	8000 h service kit for N2-BORA-500 (filters + compressor kit)
NB-402	8000 h service kit for N2-BORA-750/ICP (filters + compressor kit)
NB-408	24000 h CMS tubing kit complete

IMPORTANT!

The manufacturer reserves the right to change or modify its products without prior notice.