Control System - User Guide

GEN_2 i4.0 nitrogen gas generator

revision: REV;2022-041 document: 17-100-0137

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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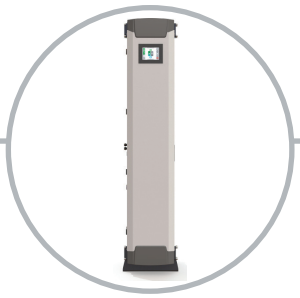

nitrogen gas generator

1.1 general information

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range: GEN_2 i4.0 PSA nitrogen gas generators
models: GEN_2 i4.0 -1110, 2110, 3110, 2130, 3130, 4130, 6130, 8130, 10130 & 12130
doc no: 17-100-0137
issue: 002

1.2 manufacturers details and support

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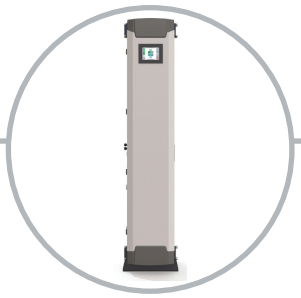
CERTIFIED ISO 9001 UKAS MANAGEMENT SYSTEMS 001

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.

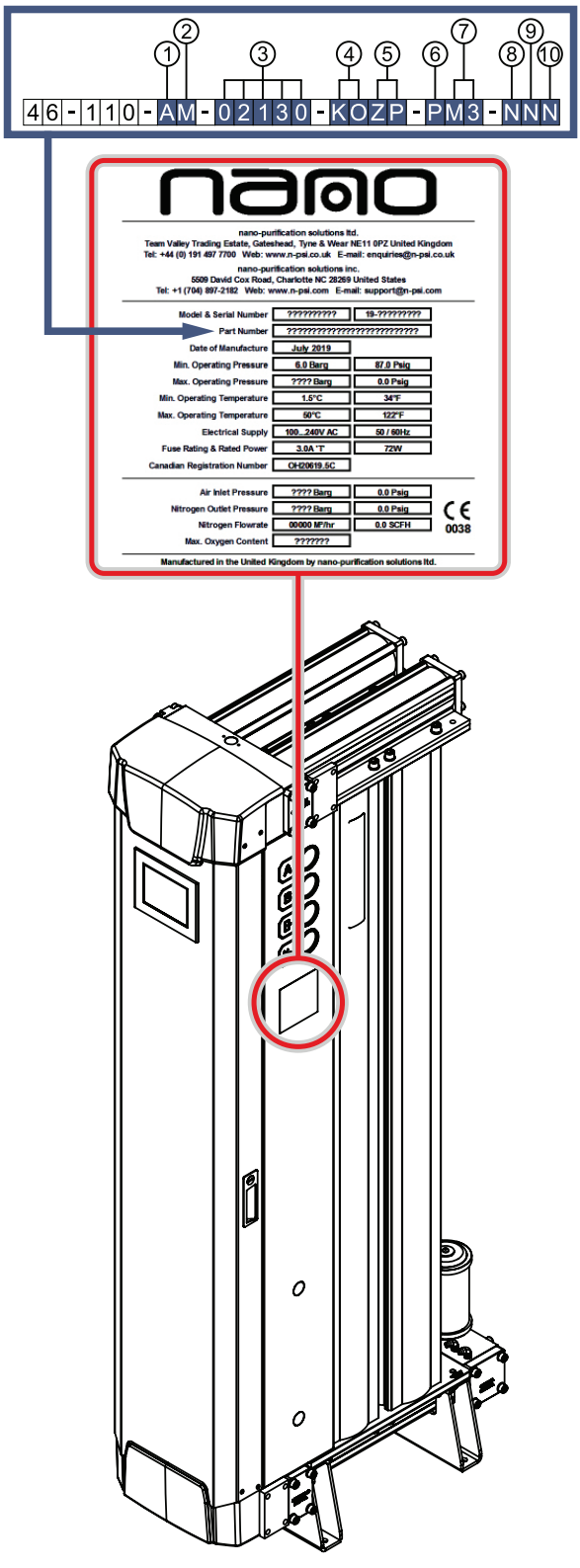
NOTES: *highlight important sections of information where particular care and attention should be paid.*

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.

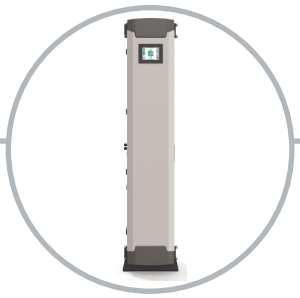


1.3 generator identification

This information can be found on the product rating label as shown.

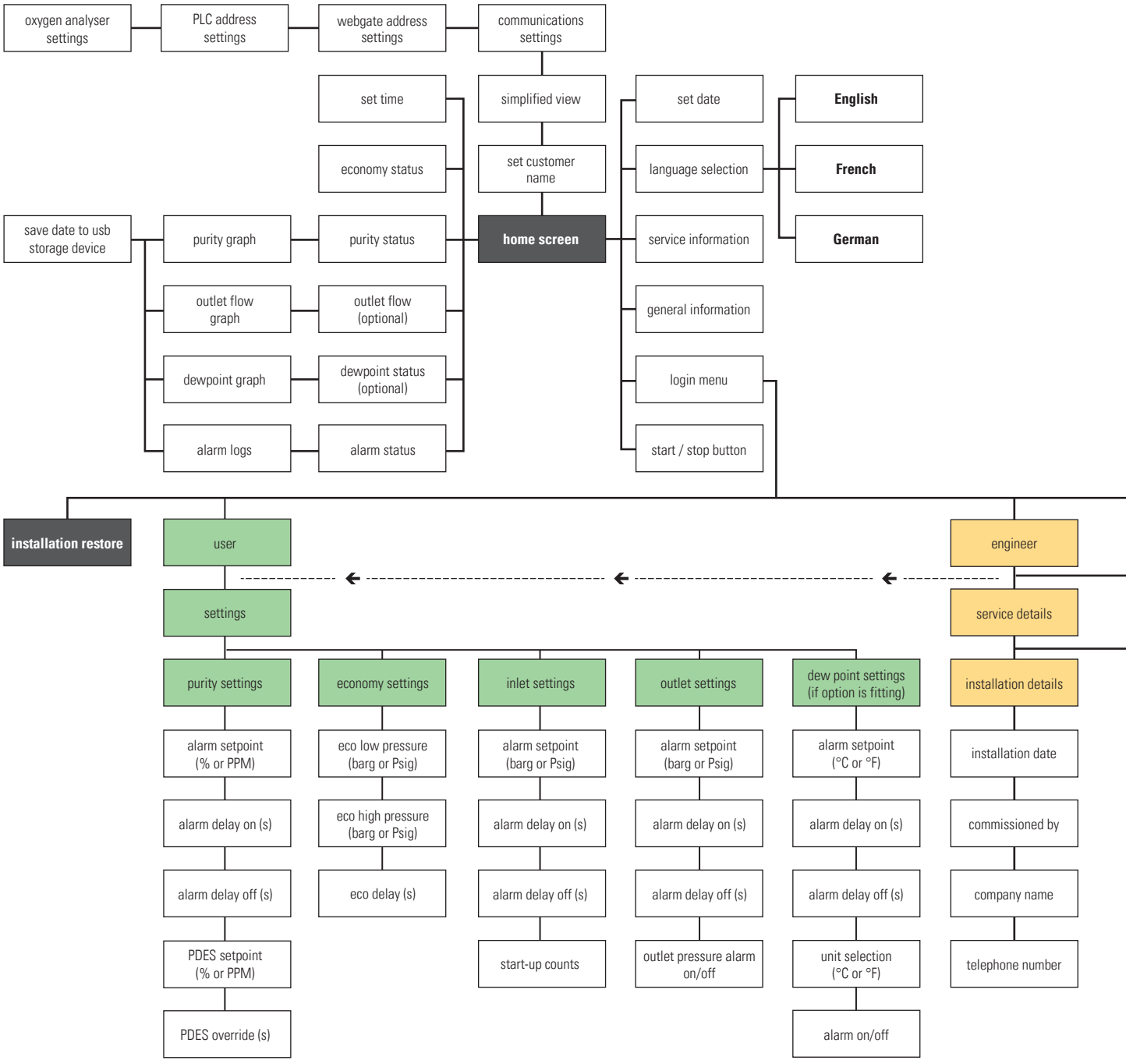


1. Connection		
G		BSP
A		NPT
2. Pressure Rating		
M	0...12barg	0...174psig
S	0...16barg	0...262psig
3. Model Code		
PGN2-S1		1x 110 Column
PGN2-S2		2x 110 Column
PGN2-S3		3x 110 Column
PGN2-L2		2x 130 Column
PGN2-L3		3x 130 Column
PGN2-L4		4x 130 Column
PGN2-L6		6x 130 Column
PGN2-L8		8x 130 Column
PGN2-L10		10x 130 Column
PGN2-L12		12x 130 Column
4. Internal Dryer (option)		
K O		Not Fitted
K A		Fitted
5. Oxygen Purity		
Z C		5% to 0.5%
Z P		1000ppm to 10ppm
6. Purity Dependant Energy Saving Technology (Optional)		
N		Not Fitted
P		Fitted
7. Flow Rating		
M 2	0...60 M^3/hr	0...2119 SCFH
M 3	61...120 M^3/hr	2154...4237 SCFH
M 4	121...300 M^3/hr	4273...10594 SCFH
8. Dewpoint Sensor Technology (Optional)		
N		Not Fitted
I		Inlet Dew-point Monitoring
O		Outlet Dew-point Monitoring
9. Additional Options		
N		Not Fitted
C		Column Pressure Monitoring
F		External Flow Measurement
B		Both
10. Communication Options		
N		Not Fitted
M		Modbus Communication Package
E		Ethernet IP Communication Package

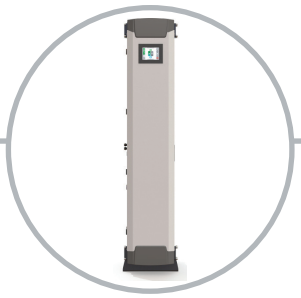


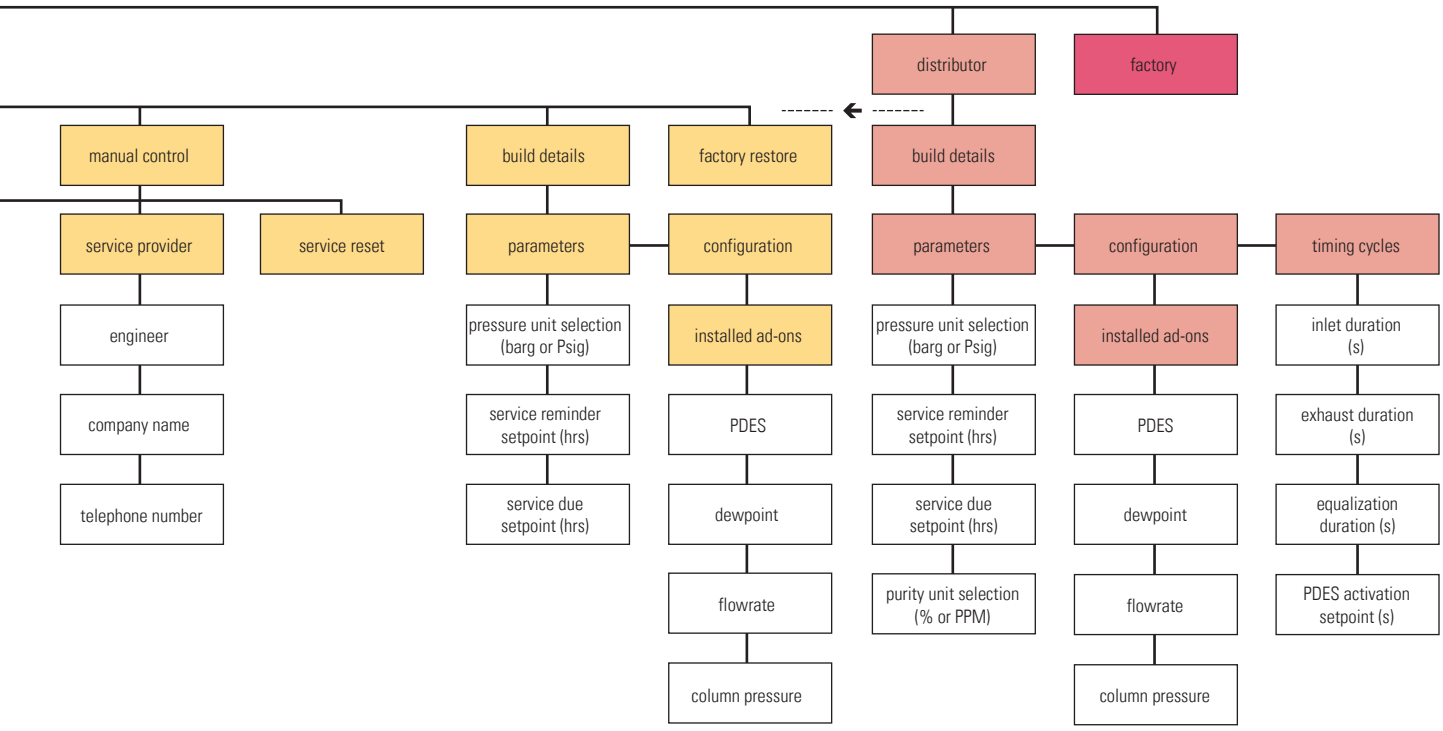
nitrogen gas generator

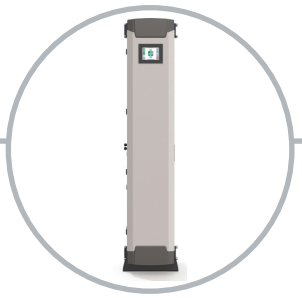
2.0 general information



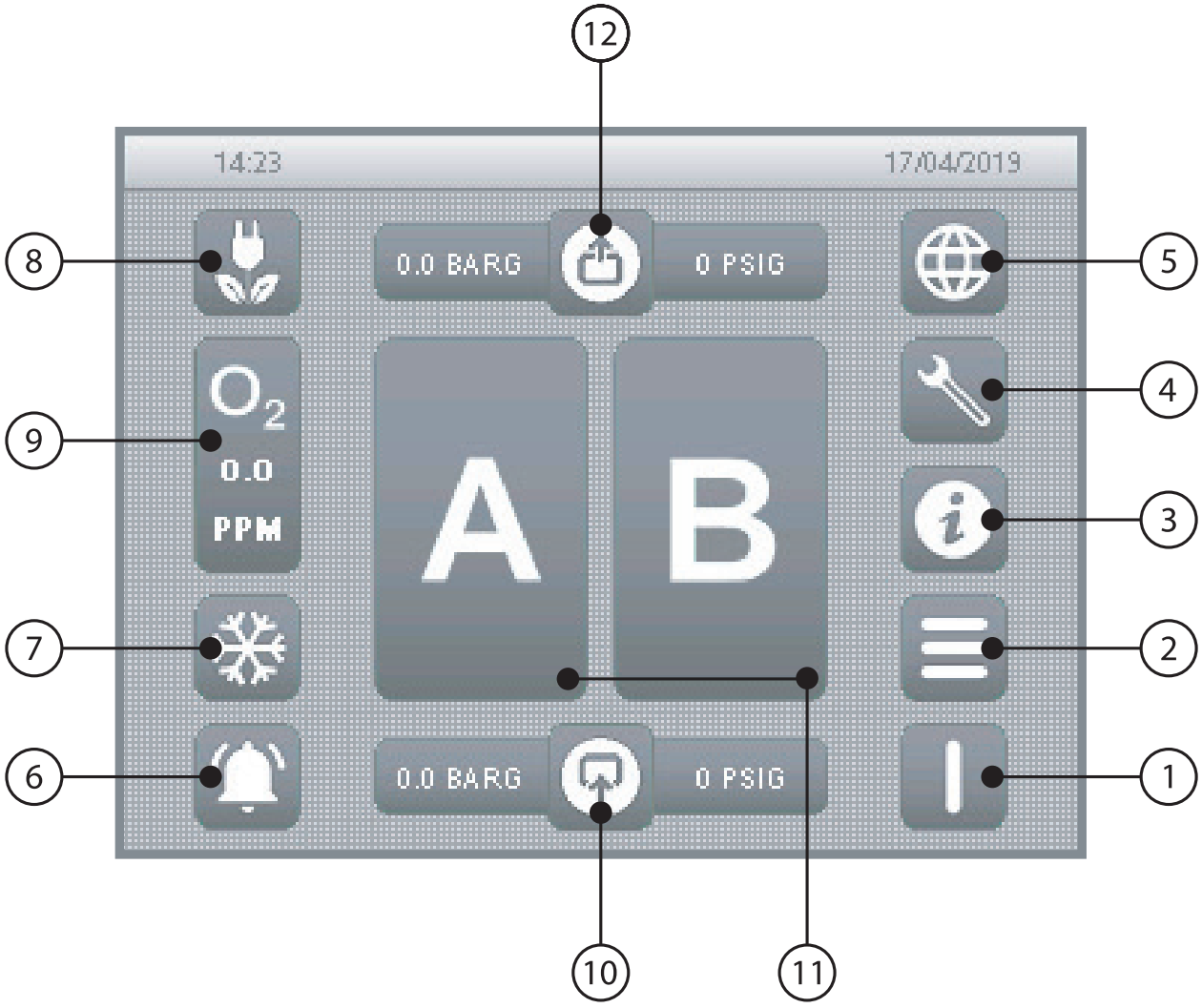
nitrogen gas generator





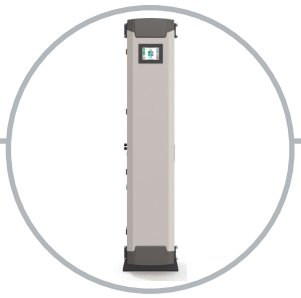


2.1 user interface quick reference



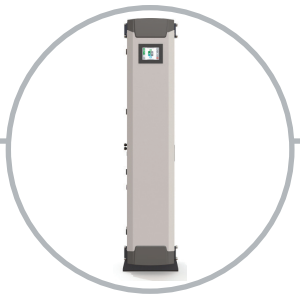
Only authorized, competent and trained personnel are permitted to work on this product. This guide is intended solely for such personnel and is to be used only as a reference; it should not be used to replace conventional training. For further information regarding the procedures outlined in this document contact your supplier. Read this document carefully before attempting to operate the nitrogen generator. This document should be permanently available at the nitrogen generator installation site and be kept in an easily accessible place.

After 10 minutes of inactivity, the generators HMI will enter an energy saving mode where the HMI screen will go black. A green LED will remain lit at all times to indicate the HMI is still fully functional. If at any point the HMI detects human interaction the energy saving mode will deactivate and the screen will revert back to the mains display seen above.



No.	symbol	description
1		**start button;** the generator is ready to start-up.
		stop button; the generator is ready to shutdown.
2		**menu;** access to the generator menu structure.
3		**general information** view the model number, serial number, build date, software version and installation date.
4		**service information;** access total hours, hours run since last service and service provider details.
		service reminder; the generator will require a service soon.
		sevice required the generator requires a service.
5		**language selection;** access to different languages such as french and german.
6		**alarm records;** access alarm and event logs such as low inlet pressure and high purity alarm.
		alarm records; minor alarm is active.
		alarm records; major alarm is active
7		**dew point status;** access to inlet or outlet dew point measurement (optional extra)
		flowrate status; access to external flow meter measurement (optional extra)
8		**economy;** access total hours in economy, percentage savings and total hours in PDES (optional extra)
		economy; the generator is in it's final stage of economy and has shut down.

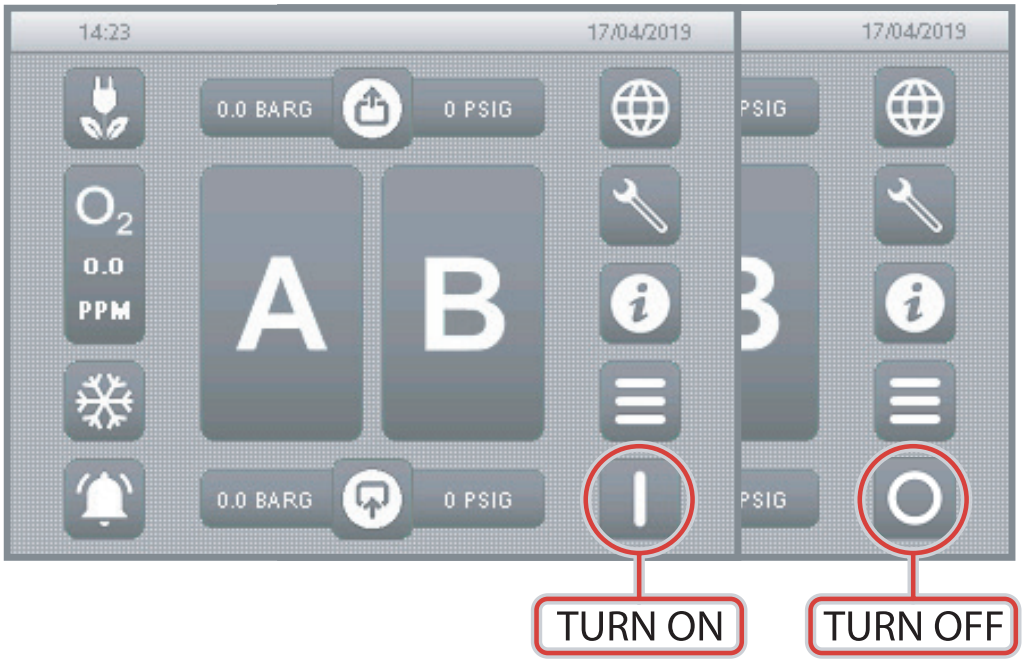
No.	symbol	description
9	O_2	**oxygen content;** when grey, the generator is in standby.
	O_2	**oxygen content;** when amber, the generator is starting up.
	O_2	**oxygen content;** when green, the nitrogen outlet purity is within specification.
	O_2	**oxygen content;** when red, the outlet purity is out of specification.
10		**inlet pressure;** no compressed air is detected at the inlet of the generator.
		inlet pressure; the nitrogen generator is starting up.
		inlet pressure; compressed air is detected at the inlet of the generator.
		inlet pressure; low inlet pressure alarm, insufficient compressed air to run the generator.
11	A	**column status;** when grey. column A and/or B is offline.
	A	**column status;** when amber, column A and B is equalising.
	A	**column status;** when green, column A or B is online and producing gas.
12		**outlet pressure;** the nitrogen outlet valve is closed.
		outlet pressure; the nitrogen outlet valve is open.
		outlet pressure; low outlet pressure alarm.
		remote start/stop; the generator is/has shutdown due to the remote start connection being broken



2.2 start-up procedure

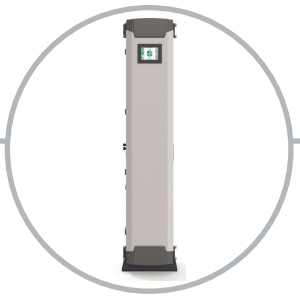
A visual inspection of the installation should be carried out ensuring all connections to and from the nitrogen generator are secure and there is no visible damage to any components.

- Ensure that all isolation valves to and from the nitrogen generator are fully closed before operating.
- Switch on the power to the generator, the control system will carry out an initialization procedure.
- Slowly open the compressed air inlet isolation valve until fully open and check for leaks.
- Locate the 'START' button in the bottom right of the HMI screen and hold down for 3 seconds, the generator will begin it's start-up procedure.
- Once the generator has completed its start-up procedure the compressed air inlet symbol will turn from amber to blue, at this point slowly open the inlet isolation valve of the buffer vessel.
- Once the buffer vessel is within 0.5 barg (7.2 psig) of the compressed air inlet pressure, slowly open the outlet isolation valve of the buffer vessel until fully open. Check all connections to and from the buffer vessel for any leaks as this could affect nitrogen purity.
- Slowly open the nitrogen outlet isolation valve until fully open.
- If the generator is working correctly, the nitrogen outlet button and O2 symbol will turn green to show the purity is within specification and the generator is producing gas. If the generator develops a fault it will raise an alarm and indicate what has caused the alarm by turning the relevant symbol red.



2.3 shutdown procedure

- Fully close the nitrogen outlet isolation valve.
- Locate the 'STOP' button in the bottom right of the HMI screen and hold down for 3 seconds, the generator will begin it's shutdown procedure. At this point the generator will complete it's half cycle and then exhaust both columns until fully de-pressurized.
- The generator will remain in standby until manually re-started. When the generator is in standby mode all symbols will revert to their grey color to symbolize no activity within the system.



2.4 economy mode

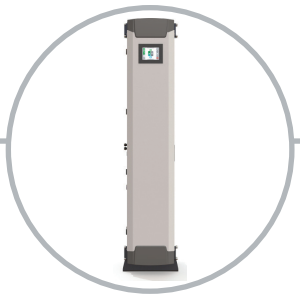
When under normal operation, the generator continuously monitors the nitrogen outlet pressure. When the outlet pressure reaches the pre-determined set-point for 5 minutes, the generator will automatically close the nitrogen outlet valve and stop supplying gas. This first stage is indicated by the solid green economy symbol. If the outlet pressure continues to remain equal to or greater than the pre-determined set-point for an additional 5 minutes, the generator will stop cycling and enter economy mode. This second stage is indicated by the flashing green economy symbol.

When the nitrogen outlet pressure drops below the pre-determined set-point, the generator will instantly begin it's start-up cycle to ensure the CMS is primed before resuming normal operation.

2.5 purity dependent energy saving (PDES)

When fitted, the PDES system adds an additional O_2 analyzer assembly which constantly monitors the oxygen content of the gas stored within the buffer vessel, the purpose of the PDES system is to reduce air consumption and maximize efficiency. The PDES system works along side with the standard O_2 analyzer which monitors the purity of the gas being produced and supplied to the application. Under normal operation, if the oxygen content stored within the buffer vessel and the gas being supplied to the application are within specification, the generator control system will extend the cycle time delaying the column change over. When the PDES function is active the green O_2 symbol will begin to flash indicating the generator is extending the cycle time.

If at any point either the gas stored within the buffer vessel or the gas being supplied to the application falls outside of the required specification, the PDES feature will deactivate and the generator will resume normal operation.



2.6 users & login

1. Installation restore

When selected, this button will ask the user whether they want to restore all settings back to what was previously saved at point of installation. If the user selects yes then all settings will revert back, if the user selects no they will return to the main menu.

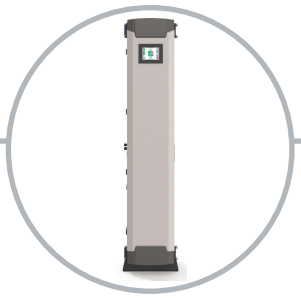
2. User Login (Passcode: 1 2 3 4)

The user login allows access to settings, this will allow you to adjust;

- purity settings
- economy settings
- inlet settings
- outlet settings
- dew-point settings (if option is fitted)

3. Engineer Login (Passcode: contact supplier)

The engineer login allows access to the settings (as described above) as well as the service details, manual control function, build details and a factory restore feature. The service details menu allows the engineer to enter information such as service provider details, telephone number and installation date. The manual control function is to be used as a fault finiding tool in the event of a breakdown, this feature will not work while the nitrogen generator is online. In order to use the manual control function the nitrogen generator must be shutdown and in standby. The factory restore feature allows the engineer to restore all settings back to what was preset by the factory.



4. Distributor Login

The distributor login grants the user access to the settings, service details, manual control function as well as build details. The build details menu will allow the user to adjust parameters and configuration of the nitrogen generator. In the configuration menu the user can activate additonal extras such as PDES and dewpoint (providing the correct equipment has been fitted to the machine). The user will also have access to the communication settings and HMI configuration in the event they need to check the modbus status between the oxygen analyser(s) and the PLC.

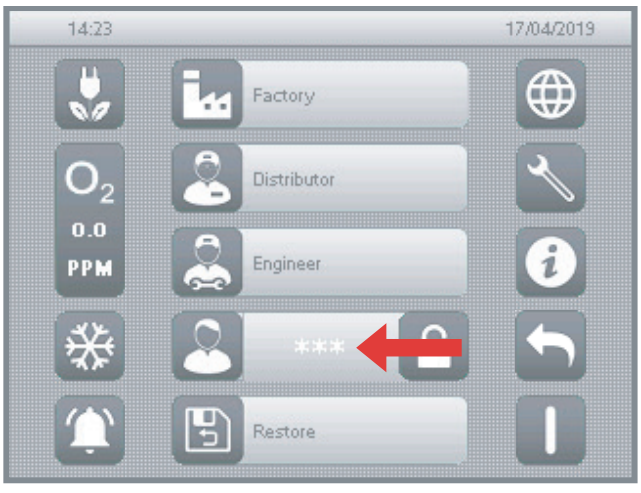
There is a password protected page called 'timing cycles' that will allow the user to adjust certain settings, should you need this password you will have to contact the manufacturer.

5. Factory Login

The factory login is reserved for use of the manufacturer only. Any attempt to gain access to this login is recorded within the machine and may result in loss of warranty.

Consecutive multiple attempts to login without the correct passcode can result in the machine interface becoming locked. In the event of this happening the user will have to contact the manufacturer in order to regain access.

2.7 login process

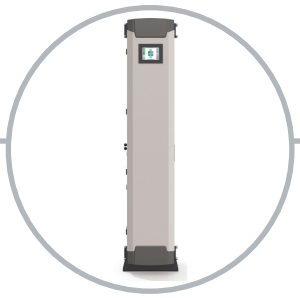


Step 1

When in the main menu, touch the required login, a asterix field will appear with a button containing a padlock.

Note: If you touch the padlock without entering the correct passcode an error will appear.

To enter the passcode you must touch the asterix field which will activate the keyboard.



2.7 login process

Step 2

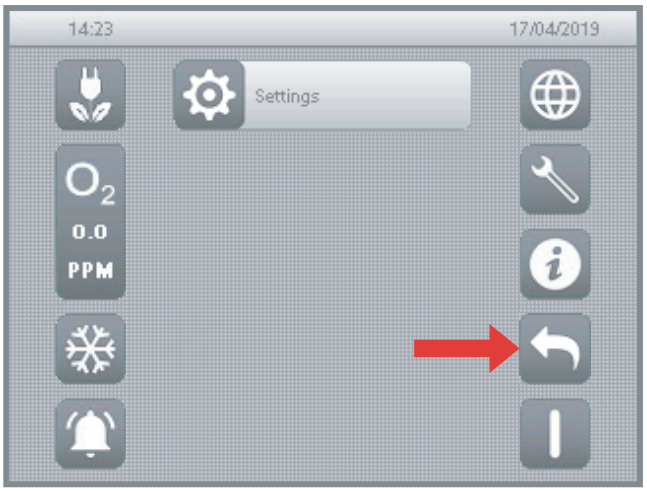
Enter the correct passcode and press enter.

For example when logging into 'User' the passcode is 1 2 3 4. If you enter an incorrect digit you can use the ◁ & ▷ to select the digit and ← to delete the digit.

Step 3

Press on the padlock, if the passcode is correct the page will be directed to the settings page.

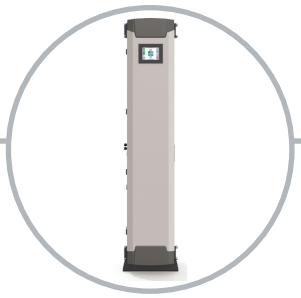
Note: If you touch the padlock without entering the correct passcode an error will appear (see figure 3.0). Consecutive multiple attempts to login without the correct passcode will result in the machine interface becoming locked. In the event of this happening you should contact the manufacturer in order to regain access.



Step 4

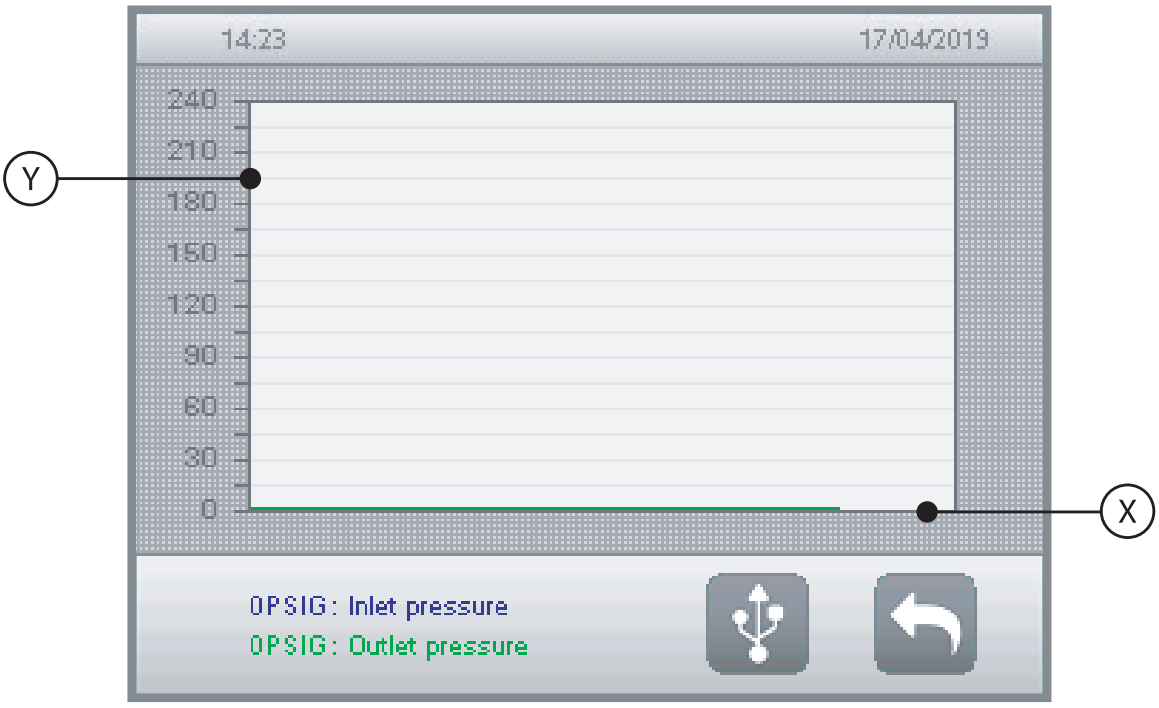
Once you are finished press the back button until you have returned back to the home screen.

Note: If there is no activity detected within 5 minutes the interface will automatically log you out and return you to the home screen.



2.8 graphs & data

While using the generator interface you will find various pages with graphical data that is continuously being recorded to the internal storage device, for instance the nitrogen outlet purity graph can be accessed by touching the purity status button (as seen in figure 1.0, symbol no. 8). Each graph records it's data every 3 seconds where it is then stored to the internal memory and can be retrieved remotley via the webgate control, USB mass storage download or simply by removing the SD card in the HMI.

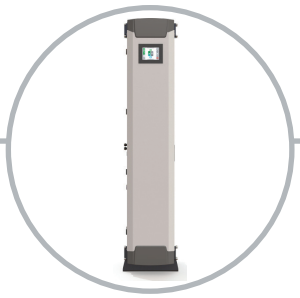


All graphs are layed out in the same way where the X axis represents time and the Y axis represents the unit in which you are measuring such as purity (% or PPM), pressure (barg or psig) and dewpoint (°C or °F). In the bottom left of the page you will see the live readings where they continuously update every ms, although the graph only shows data every 3 seconds the program itself is monitoring every ms ensuring quick reaction times in the event of a positive or negative outcome.

If the internal storage device is removed, a small amount of data will be stored within the HMI before any consecutive data is lost. As soon as the storage device is reinstalled data will continue to be stored to the device.

If at any point you need access to the stored data then there are three procedures you can carry out;

- retrieve the stored data from the storage device
- insert a USB storage device and download data
- download data to PC via WEBGATE protocol



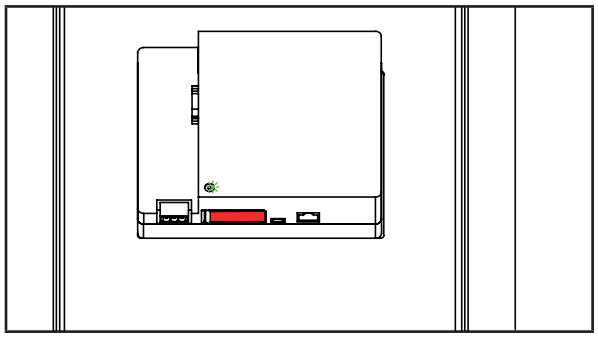
nitrogen gas generator

Option 1: retrieval of data from storage device

This procedure can be carried out at any time, the generator does not need to be shutdown or stopped in any way.

Step 1

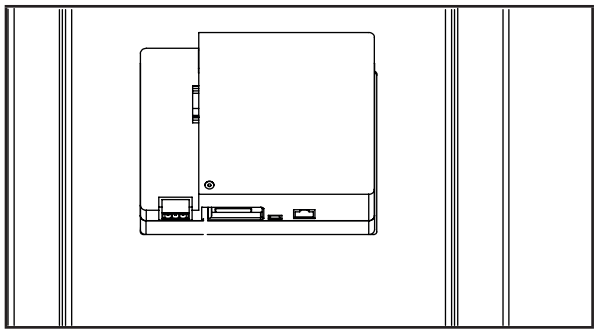
In order to gain access to the internal storage device, the user must first open the nitrogen generator door and face the back of the HMI.



Step 2

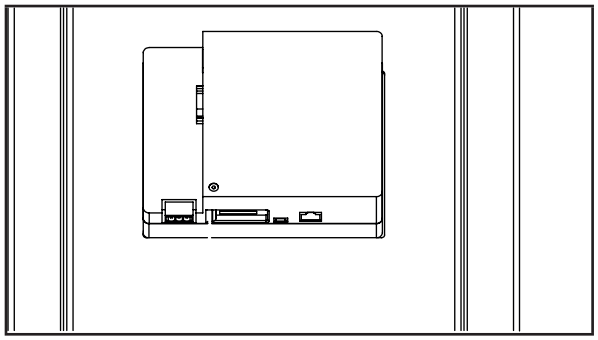
Under the HMI there will be a black cover with the words 'BATTERY / SD CARD' written on it. This is where the internal storage device (SD card) is stored.

Note: Just above the SD card slot there is a green LED, this is to indicate that a sufficient storage device is fitted and that it is working correctly.



Step 3

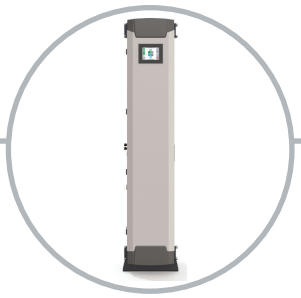
Swing open the black cover and you will see the bottom of the SD card. Do not touch the battery casing, the HMI can become corrupted if the battery is not removed correctly.



Step 4

Push the SD card up into the HMI and it will spring out allowing you to remove it from the housing. The HMI will conitue to operate as normal but no data will be saved.

Note: Once the SD card has been removed you will notice the green LED will have gone out indicating there is no internal storage device.

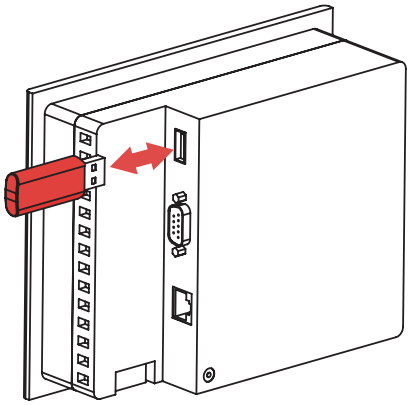


Option 2: download data to USB storage device

This procedure can be carried out at any time, the generator does not need to be shutdown or stopped in any way.

Step 1

In order to gain access to the internal storage device, the user must first open the nitrogen generator door and face the back of the HMI.



Step 2

Locate the USB port in the top left of the HMI and insert your USB storage device.

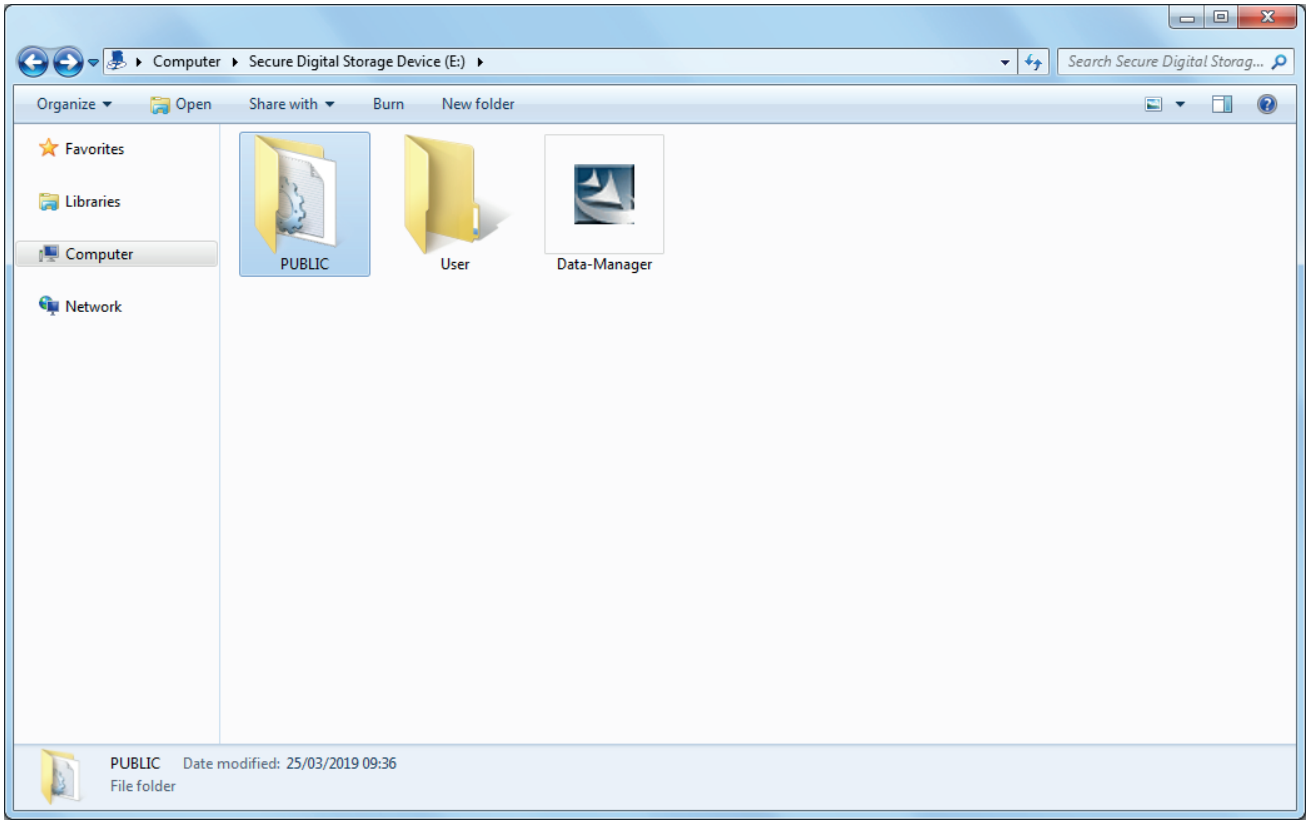
Note: It is recommended that the USB storage device (2.0 or 3.0) has a memory capacity of 32GB or greater.

Step 3

Go to the user interface and access any graph or alarm record. At the bottom right of the screen you will see a USB symbol, touch the button and you will be redirected to the download page.

Step 4

You will be asked if you want to copy the data to a USB storage device, select yes. When the data is being copied to the USB storage device the status bar will say 'BUSY' only once it reverts back to 'READY' can you remove the USB device from the back of the HMI.



Step 5

Plug the SD card or USB storage device into your PC or laptop, when prompted select 'Open folder to view files'. Once the folder opens you will see three icons Public, user and data-manager. Open data manager and follow the installation wizard instructions until the application is fully installed.

If you wish to access any of the alarm logs then follow the path below;

PUBLIC > PROJECTS > PSA_NITROGEN_GAS_GENERATOR > DATA > ALARM > ALARMGROUP1

All alarm logs are easily accessible and can be opened immediately with the use of Microsoft Excel as these files are CSV. file format. Every 12 hours the HMI saves a copy of the alarm logs to the internal storage device, when you look at the list of files in the *'ALARMGROUP1'* folder you will notice every file has a similar reference.

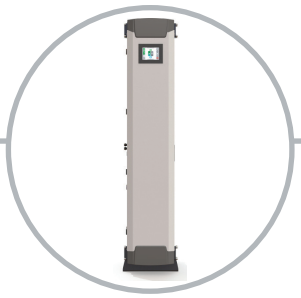
Example: AH160419000011

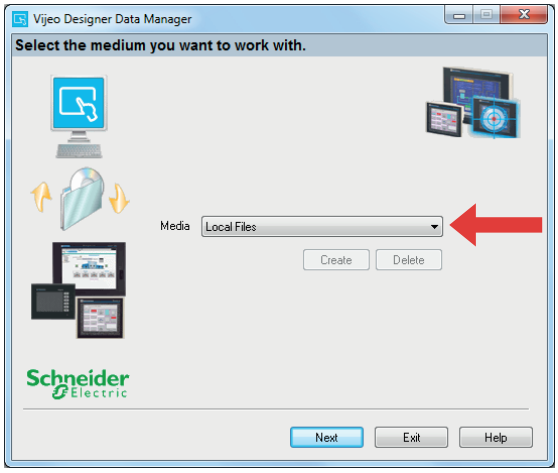
The first two numbers **[16]** represent the day.
The following two numbers **[04]** represent the month.
The next two numbers **[19]** represent the year.
The remaining numbers represent the file number **[000001, 000002, 000003, etc].**

If you wish to access any of the graphical data then follow the path below;

PUBLIC > PROJECTS > PSA_NITROGEN_GAS_GENERATOR > DATA > LOG

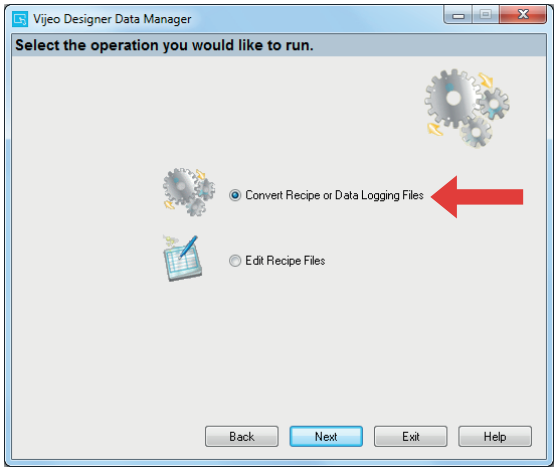
The graphical data is stored as a DAT. file format which means you must convert the file before you can gain access to it. In order to convert it you must have installed the data manager application as advised above.





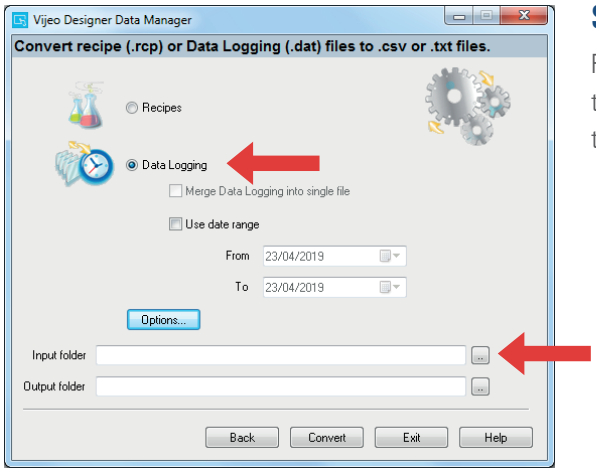
Step 6

Open the data manager application. Once openselect 'Local Files' from the drop down menu and select 'Next'.



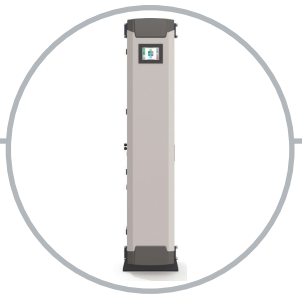
Step 7

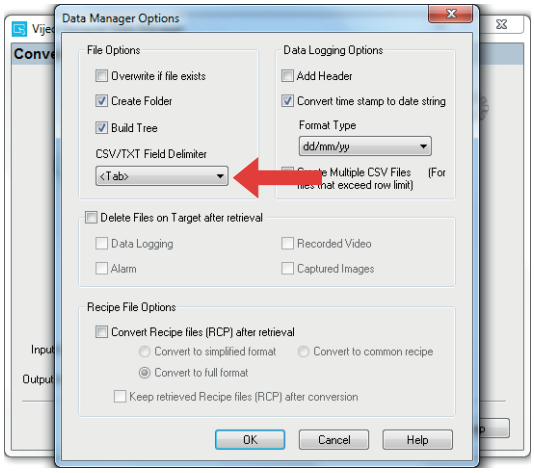
Select 'Convert Recipe or Data Logging Files' and then select 'Next'.



Step 8

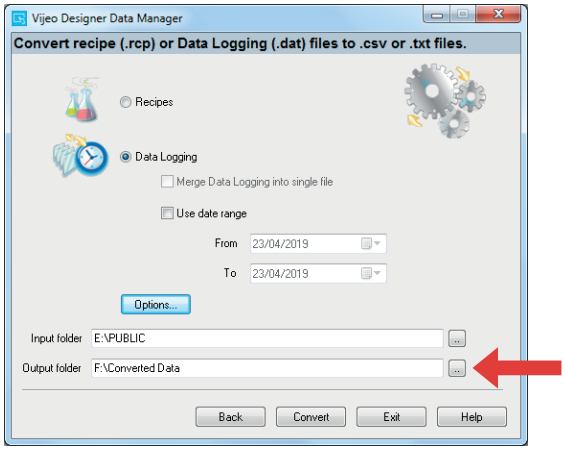
First make sure 'Data Logging' is chosen as theuser option then move down to the 'Input Folder'and locate the SD Card or USB storage device. Select the 'Public' folder and press OK.





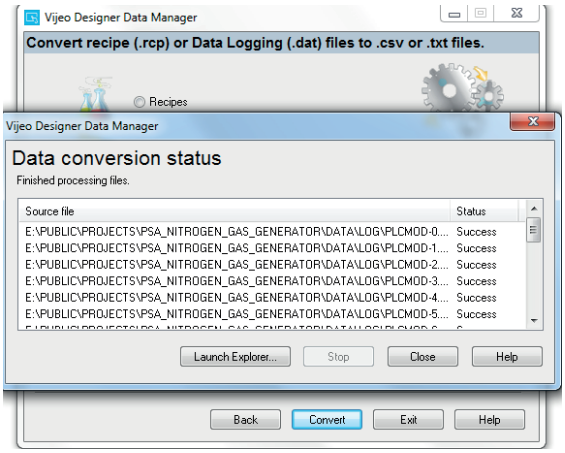
Step 9

Open the options menu, under 'File Options >CSV/TXT Field Delimiter' use the drop down and select '<Tab>'. Once complete select ok.



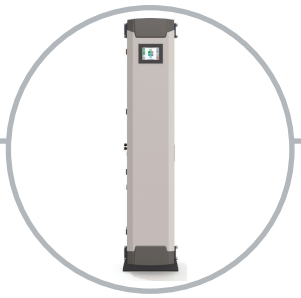
Step 10

Move down to the 'Output Folder' and select where you want the converted data to be saved.



Step11

Select convert, an additional window will appear displaying each folder containing the relevant data. To the right of the folder location is a status column, this will inform you whether the data has successfully converted or not. Once all files are complete you can use the 'Launch Explorer' button which will take you to the location where all the data is ready to view. You can then open the data using Microsoft Excel.



2.9 webgate remote monitoring and control

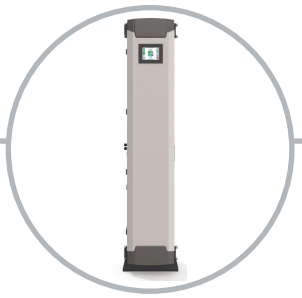
Every nitrogen generator has the capability to be remotely monitored and controlled through a web portal. This may offer advantages when the generator is installed in an unaccessible area or in a remote location. Once you access the Webgate portal you can change user languages, remotely monitor or control the nitrogen generator as well as being able to extract data such as alarm logs and data logging files.

In order to access the webgate feature there must be a hard wired connection from the nitrogen generator to your local network. This can be achieved by installing a CAT 6 (or greater) RJ45 Ethernet cable into the bottom of the HMI and routing to a local network point. Once the connection has been established you will then have to configure the HMI's Webgate address;

Every nitrogen generator has a pre-installed Webgate Address, speak to your IT department prior to changing the IP Address, Subnet Mask and Default Gateway.

Step 1

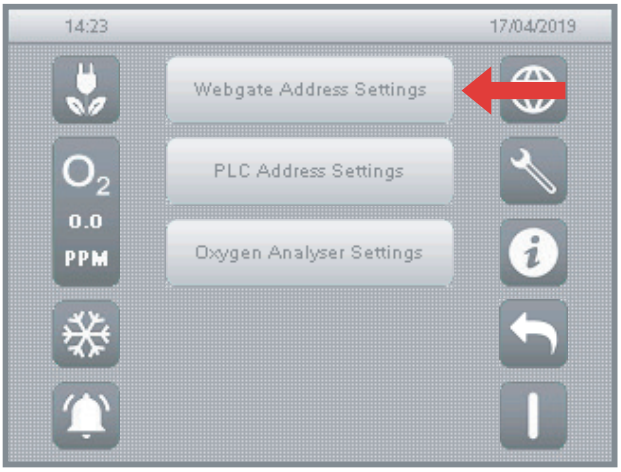
Locate and hold down the centre banner above the outlet pressure symbol for 2 seconds.



nitrogen gas generator

Step 2

Select communication settings.



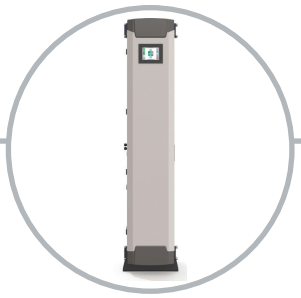
Step 3

Select Webgate Address settings.

Step 4

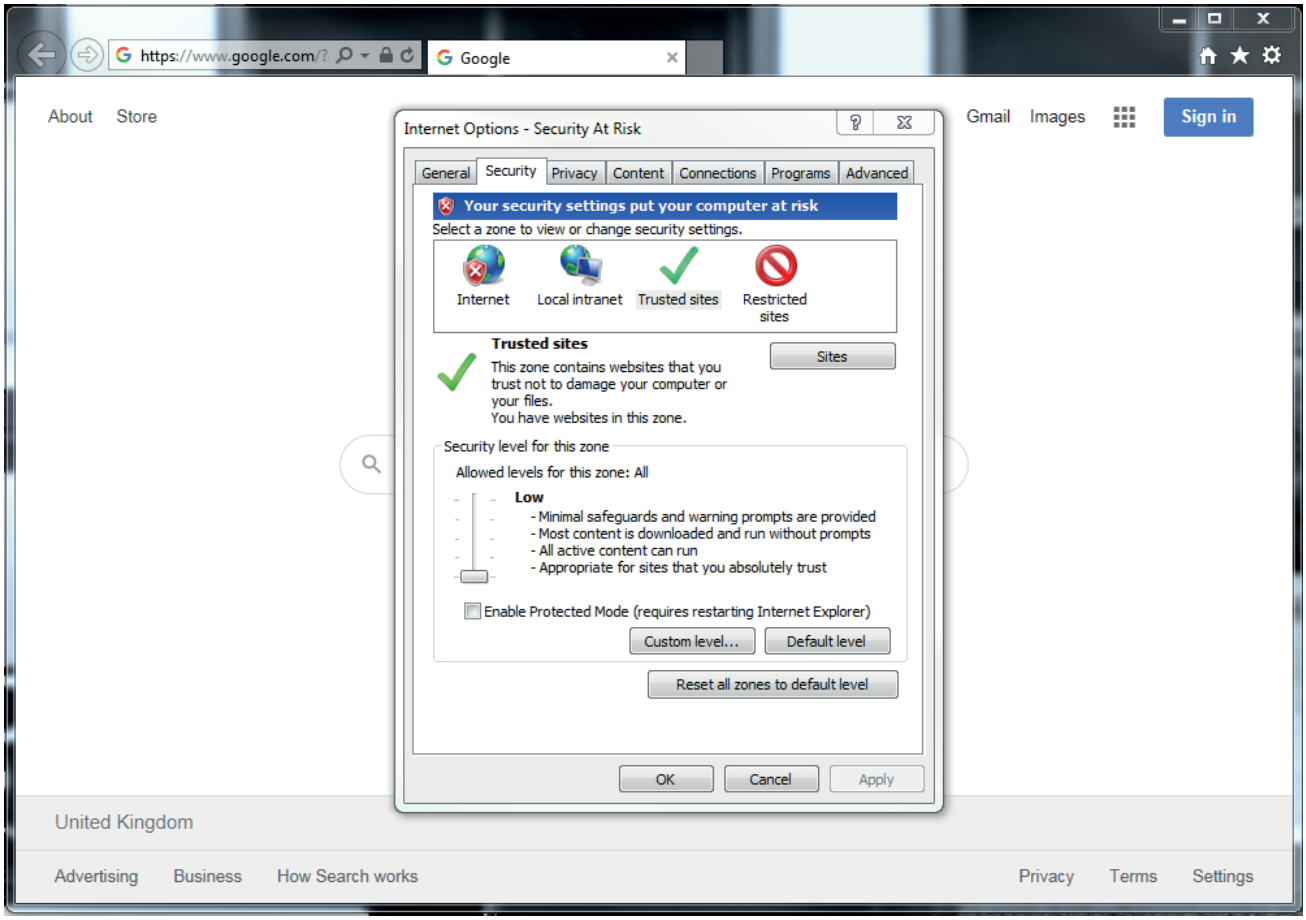
Now you can enter your own IP Address, Subnet Mask and Default Gateway and update the communication settings.

Note: Every nitrogen generator is preprogrammed to use Port 8000 for all web server based features.



Step 5

Now the nitrogen generator Webgate feature is setup and connected to your local network you must setup the PC which will be used to monitor/control the generator. First you must use a PC with Internet Explorer Version 6.0 or greater (32 Bit Only). If you are using Windows 8 or 10 you can use the search tool to find the pre-installed Internet Explorer 32 Bit program.

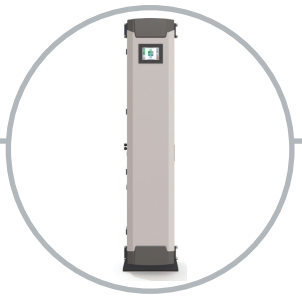


- Open internet explorer > tools > internet options
- On the security tab, select 'custom level'
- Ensure the following settings are set to 'Enable'

  Active X Controls and Plug-ins > *Allow Scriptlets*
  Automatic prompting for Active X controls
  Download signed Active X controls
  Run Active X controls and plug-ins
  Once complete select OK

- Ensure the 'Enable protected mode' is not selected
- Move across to the privacy tab and set the level to 'Low'
- Press Apply and OK.
- Once complete shutdown internet explorer.

For the next step you will be required to download and install new programs. You may have to consult your IT department for permission to do so otherwise if the programs can not be downloaded the Webgate feature cant be utilised.



nitrogen gas generator

Restart internet explorer and enter the IP address into the search bar, for example; **http://192.168.1.140:8000.**

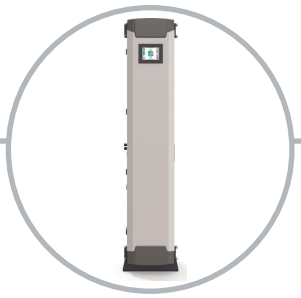
Providing the IP Address is correct you will be re-directed to the generator Webgate webpage. On the hompage you can select the operating languange from the list of languages on the left of the page, when one is selected the page will refresh.

Along the top of the page you have a number of selection, first being the *'Monitoring'* tab which direct you to another page where you can choose to remotely monitor and control the generator in the same frame or in a new window.

Diagnostics allows you to view the project details, ethernet settings and memory capacity.

Maintenance allows you to search and download data files relating to pressure, purity, dewpoint (if fitted) and flow (if fitted).

The Webgate feature has a inactivity time out so if the monitoring feature does not detect any use for 60 minutes then you will be logged out. only one Webgate page can be opened per nitrogen generator so multiple connections cant be accessed.



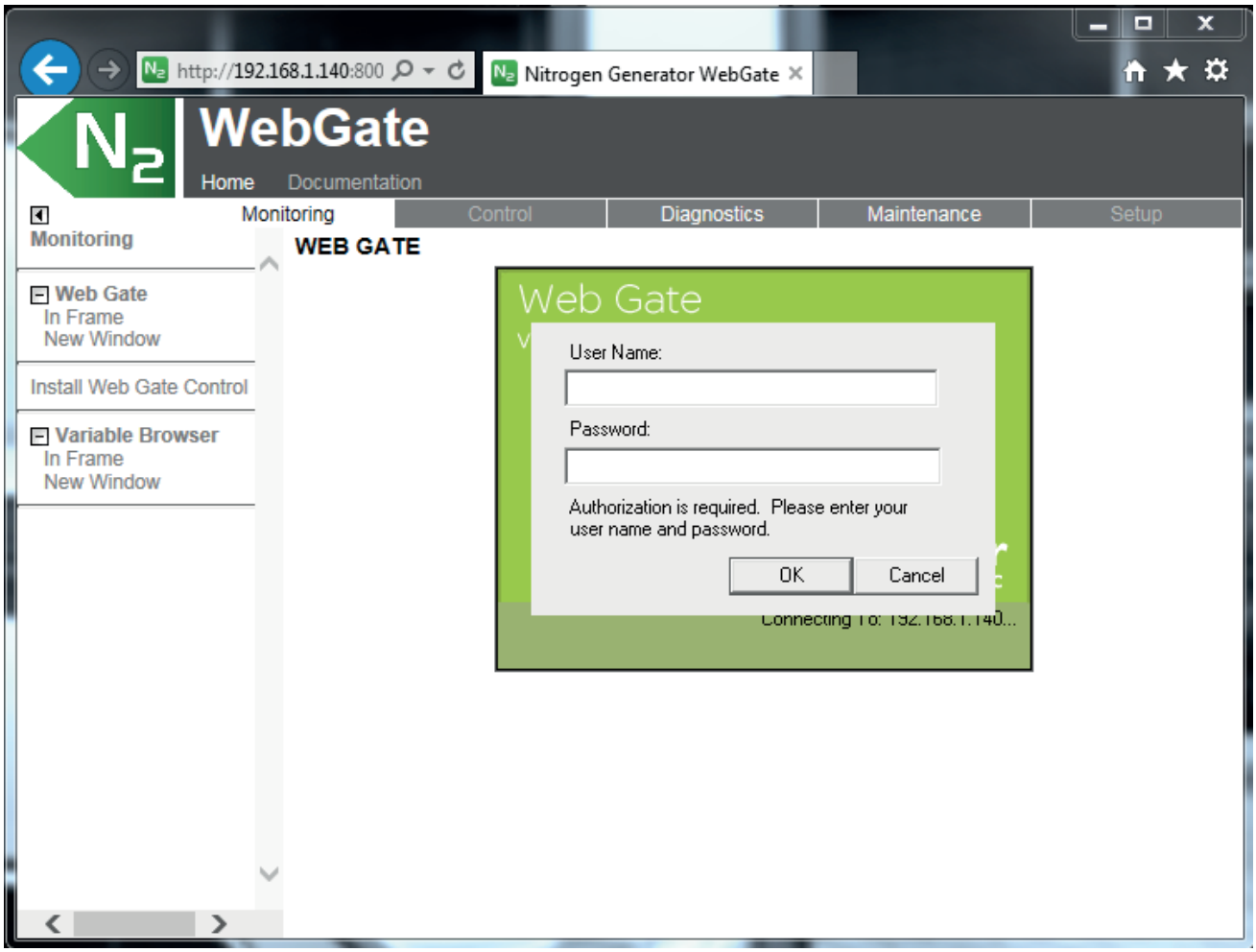
When trying to access the monitoring feature you will be required to install 'Vijeo Web Gate Active X control'. Click on the text and follow the instructions on the screen and in the Web Gate Installer. Once installed a prompt will appear asking permission for the Vijeo Web Gate Control Module add on, select Allow.

When installed correctly, refresh the webpage and continue back to the monitoring tab. Select in frame or new window, providing everything has been carried out correctly you will see a grey square illustrating WebGate while attempting to connect to the desired IP address. You will be required to enter a username and password in order to access the feature;

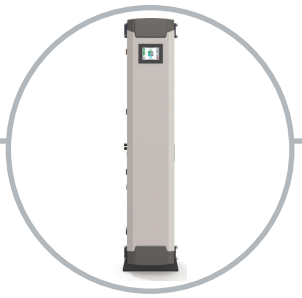
User Name: User
Password: 29032011

The user name and password are case sensitive so be sure to copy them exactly.

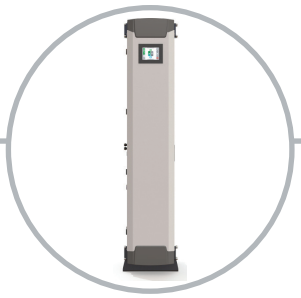
Once entered press OK and you will then see an exact replication of the generators interface. from here you can change settings, monitor the generators performance and start or shutdown the generator.



On windows 10 operating system, on the desktop, right click and select display settings. Ensure the Scale & Layout is set to 100% otherwise the Webgate interface will not display the generator interface correctly.



3.0 notes



notes

Experience. Customer. Service.

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