NANO

Nitrogen generators

GEN2-MAX 5.5K, GEN2-MAX 7.5K, GEN2-MAX 9.5K, GEN2-MAX 12K, GEN2-MAX 15K, GEN2-MAX 17K, GEN2-MAX 20K, GEN2-MAX 25K, GEN2-MAX 31K, GEN2-MAX 39K, GEN2-MAX 50K

Instruction book

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GEN2-MAX 39K, GEN2-MAX 50K

Instruction book

Original instructions

This instruction book is valid for CE as well as non-CE labelled machines. It meets the requirements for instructions specified by the applicable European directives as identified in the Declaration of Conformity.

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Table of contents

1 Safety precautions

1.1 Safety icons

Explanation

Note: Important note

Warning: Warning

Danger: Danger to life

1.2 General safety precautions

Warning:

All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

- The operator must employ safe working practices and observe all related work safety requirements and regulations.

  If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
- Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel.
- Before carrying out any maintenance, repair work, adjustment or any other non-routine checks, stop and depressurize the unit by following the correct stopping procedure. In addition, the power isolating switch must be opened and locked.
- Never play with compressed air or gas. Do not apply an air or gas stream to your skin or direct an air stream at people. Never use compressed air to clean dirt from your clothes. When using the air to clean equipment, do so with extreme caution and wear eye protection.
- Never operate the device below or in excess of its limit ratings.
- No external force may be exerted on any of the pipe connections. The connected pipes must be free of strain.
- The end user is responsible for keeping the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation, but only by authorized, trained, specialized personnel.
- It is not allowed to walk or stand on the unit or on its components.

1.3 Safety precautions during installation

- Install the equipment where the ambient air is cool and as clean as possible. Consult section **Reference conditions and limitations.**
- During installation or any other intervention on the equipment or one of the connected machines, the machines must be stopped, de-energized and the isolating switch opened and

locked before any maintenance or repair. As a further safeguard, persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the start equipment.

- Install the equipment in an area free of flammable fumes, vapours and particles, e.g. paint solvents, that can lead to internal fire or explosion.
- The electrical connections must correspond to the applicable codes. The equipment must be earthed and protected against short circuits by fuses in all phases. A lockable power isolating switch must be installed near the equipment.
- For machines controlled by a central control system, a sign stating "This machine may start without warning" must be affixed near the instrument panel.
- In multiple compressor systems, manual valves must be installed to isolate each compressor. Non-return valves (check valves) must not be relied upon for isolating pressure systems.
- Never remove or tamper with the safety devices.
- If the maximum pressure of the compressor is higher than the design pressure of the connected equipment, a full flow safety valve must be installed between the compressor and the connected equipment, in order to be able to blow off the excessive pressure.

Note:

For precautions applying to the connected equipment consult the relevant instruction book.

1.4 Safety precautions during operation

Warning:

All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

- Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
- Never operate the device in the presence of flammable or toxic fumes, vapours or particles.
- Never operate the device below or in excess of its limit ratings.
- Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out routine checks.
- People staying in environments or rooms where the equipment is operated shall wear adequate personal equipment, such as ear protection and safety goggles.
- Periodically check that:
    - All guards and fasteners are in place and tight
    - All hoses and/or pipes are in good condition, secure and not rubbing
    - There are no leaks
    - All electrical leads are secure and in good order
    - There is no dust coming out the unit after the first 24 running hours. If so, stop the machine and contact your supplier
- Never modify the device in any way. Keep the equipment in original working condition.

Note:

For precautions applying to the connected equipment consult the relevant instruction book.

1.5 Specific safety precautions

The nitrogen generator can be installed in the vicinity of the nitrogen consuming application without the requirement for classification of the surrounding area as hazardous, provided that all necessary measures have been taken to guarantee the maximum safety.

The nitrogen generating unit must be installed and used in observance of the instructions in this booklet. Failure to observe these instructions will render the guarantee null and void and release the manufacturer from all liability for direct or indirect damage or physical injury.

Hoses, pipes and connections used must be of the correct size and must be suitable for the working pressure and purity. Never use frayed, damaged or worn hoses. Fixed piping is recommended, especially for high purities. Connections made to the equipment must be free of strain.

Nitrogen and oxygen are the primary components of air, they are not toxic, but when their concentrations in air are altered, dangerous environments can be created. For an overview of oxygen concentration in air and its corresponding effects, see the table below. The release of nitrogen gas can expel oxygen, leading to a decrease in oxygen levels, whereas a release of oxygen enriched air will allow for oxygen levels to increase. You should therefore never directly inhale the produced gas, and avoid working in the immediate vicinity of the flowing nitrogen. Appropriate ventilation should be foreseen to make sure that oxygen concentration in the room containing the generator will not be lower then 20 vol. %, nor exceed 22 vol. %. It's recommended to install a room oxygen alarm. Consult the installation proposal or your supplier if in doubt.

Normal oxygen concentration in air is approximately 21% by volume. In general, air containing less than 19.5% or more than 23.5% oxygen constitutes a hazardous working environment. Typical symptoms of oxygen deficient atmospheres are listed in the table below. (ref. ANSI Z88.2)

% oxygen at sea level (atmospheric pressure)	**Effects**
>23.5	Increased fire hazard
20.9	Normal
19.0	Some adverse physiological effects occur, but they are unnoticeable.
16.0	Increased pulse and breathing rate. Impaired thinking and attention. Reduced coordination.
14.0	Abnormal fatigue upon exertion. Emotional upset. Faulty coordination. Poor judgment.
12.5	Very poor judgment and coordination. Impaired respiration that may cause permanent heart damage. Nausea and vomiting.
<10	Inability to perform various movements. Loss of consciousness. Convulsions. Death.

As a side product of the gas separation process that occurs in the nitrogen generator, a significant stream of oxygen enriched air will leave the generator via the exhaust outlet.

Areas where it is possible to have an oxygen enriched or deficient atmosphere should be well ventilated or the enriched gas should be directed to the outside atmosphere. Make sure the piping is properly labelled and warning signs indicate the risks. No open flame or smoking are allowed in the vicinity of oxygen vents. If required, warning signs should be posted and special precautions

shall be taken such as installing analyzers with alarms, ensuring a minimum number of air changes per hour, implementing special entry procedures or a combination of these.

Oxygen concentrations higher than 23.5% create greater fire hazards than normal air. Oxygen is not combustible, but it promotes very rapid combustion of flammable materials and some materials that are normally regarded as being relatively non flammable.

When working on or around the generator, always wear a portable oxygen sensor to indicate safe working conditions.

Although a source of ignition energy is always necessary in combination with flammable materials and oxygen, control or elimination of flammables is a precautionary step.

More details about the characteristics of nitrogen or oxygen can be found in the safety data sheet for nitrogen and oxygen, both available as a separate publication (consult your supplier).

1.6 Safety labelling

The following safety label is attached to the nitrogen generator:

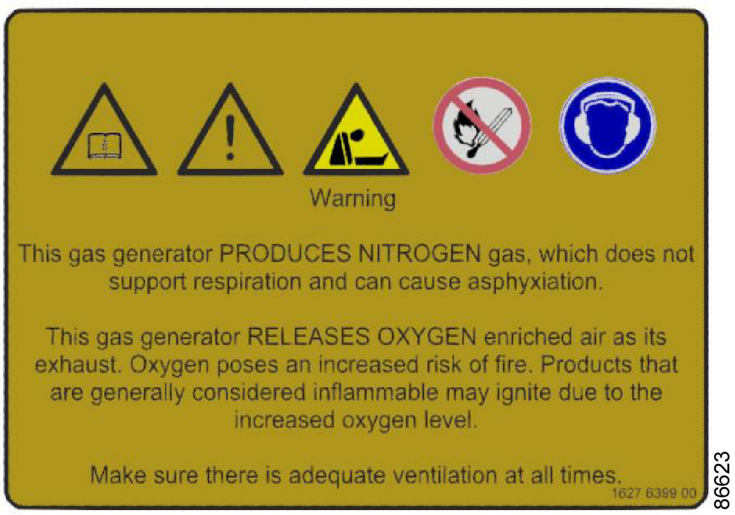


Figure 1: Safety label 1627 6399 00

Translation of the text on the label

Warning:

This gas generator PRODUCES NITROGEN gas, which does not support respiration and can cause asphyxiation.

This gas generator RELEASES OXYGEN enriched air as its exhaust. Oxygen poses an increased risk of fire. Products that are generally considered inflammable may ignite due to the increased oxygen level.

Make sure there is adequate ventilation at all times.

	ISO 7000 - symbol 0419	Read the instruction manual
	ISO 7000 - symbol 0434b	General safety alert symbol
	-	Warning: Risk of asphyxiation
	ISO 7010 - symbol P003	Fire hazard: • No open flame near the generator • Fire, open ignition source and smoking prohibited
	1079 9903 48	Warning: • Generator can start automatically • Read the manual before service or repair • Turn off the power and disconnect the power supply before service or repair • Depressurize before service or repair
	1079 9906 29	Warning: dangerous blow off
	ISO 7010 - symbol M003	Wear ear protection

Table 1: Information on safety labels

1.7 Dismantling and disposal

Dismantling

Once the end of life of the machine is reached, please follow next steps:

1. Stop the machine.
2. Check all safety precautions mentioned in the previous chapters to secure safe handling (e.g. LOTO, cool-down, depressurize, discharge, etc.).
3. Separate the harmful from the safe components (e.g. drain oil from parts containing oil).
4. Refer to the disposal topic below.

Disposal of electrical and electronic appliances (WEEE)

This equipment falls under the provisions of the European Directive 2012/19/EU on waste electrical and electronic appliances (WEEE) and may not be disposed as unsorted waste.

The equipment is labelled in accordance with the European Directive 2012/19/EU with the crossed-out wheelie bin symbol.

At the end of life-time of the electric and electronic equipment (EEE) it must be taken to separate collection.

For more information check with your local waste authority, customer center or distributor.

Disposal of other used material

Used filters or any other used material (e.g. filter bags, filter media, desiccant, lubricants, cleaning rags, machine parts, etc.) must be disposed of in an environmentally friendly and safe manner, and in line with the local recommendations and environmental legislation.

2 Description

2.1 General description

Working principle

GEN2-MAX 5.5K up to GEN2-MAX 50K nitrogen generators are intended to produce nitrogen (N_2) for industrial purposes. They use Pressure Swing Adsorption (PSA) technology to produce nitrogen by passing compressed air through a tank containing adsorbent material.

The adsorbents are chosen on the basis of their adsorption characteristics: the adsorbent has much more affinity for non-product molecules than for the product gas (N_2). This characteristic results in most of the desired molecules (N_2) passing through the bed and remaining in the product stream, while undesired components (product impurities) are captured by the adsorbent.

The PSA process is inherently a batch process, as the adsorbent bed requires periodic desorption. Consequently, PSA systems usually contain two adsorbent tanks (adsorbers) to provide operational continuity. At any time, one of the adsorbers will be delivering product (N_2) by adsorbing undesired components of the air, while the other adsorber is being regenerated by depressurization to atmospheric pressure. When the adsorbing adsorber approaches saturation, a set of valves quickly switches the functions. A product tank downstream of the nitrogen generator ensures that the delivery of nitrogen is continuous.

During the adsorption phase, compressed air flows through the sieve and oxygen molecules are caught while nitrogen molecules pass on due to the different molecular size. The sieve continues to adsorb oxygen until a saturation point is reached. During desorption, the entering air stream is cut off and the oxygen is able to leave the tank at low pressure.

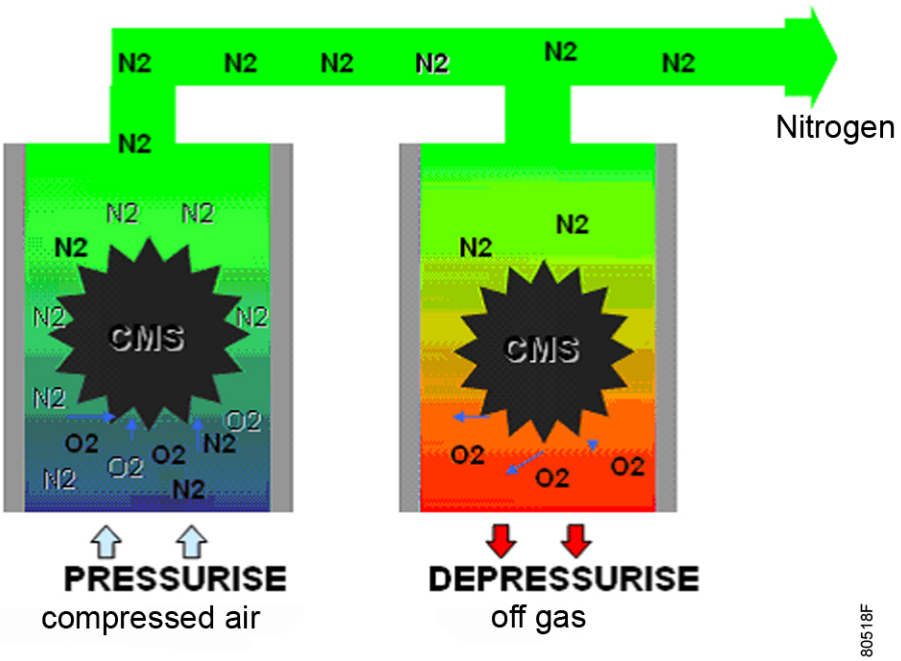


Figure 2: Operating principle of the nitrogen generator

Nitrogen PSA adsorbers contain **Carbon Molecular Sieve (CMS)** material to remove oxygen.

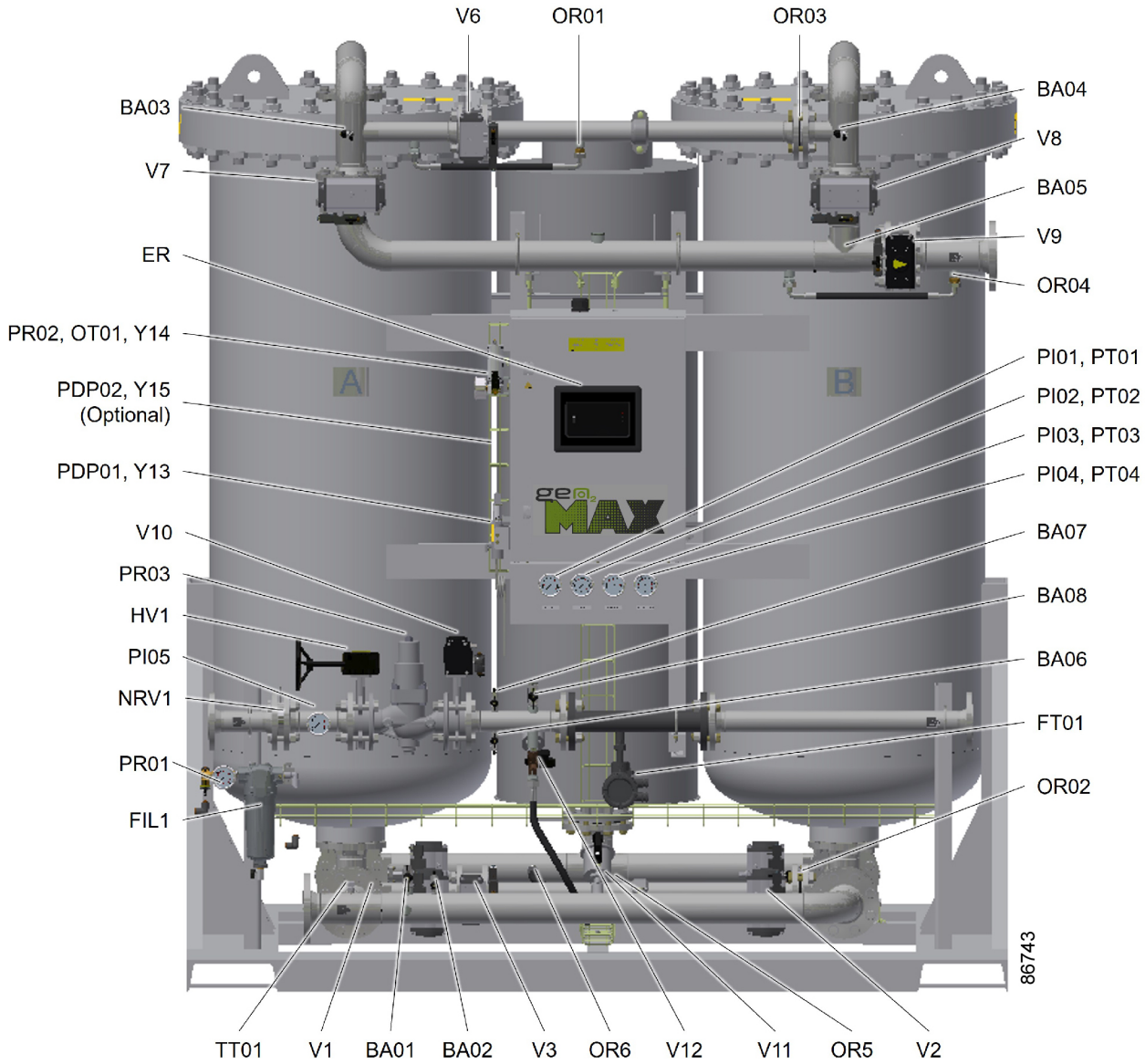
The generator produces nitrogen at a purity level between 95 % and 99.999 % according to the user requirements and the required nitrogen flow and pressure.

The nitrogen flow rate depends on the model size and the required purity.

The nitrogen pressure depends on the pressure of the compressed air at the inlet.

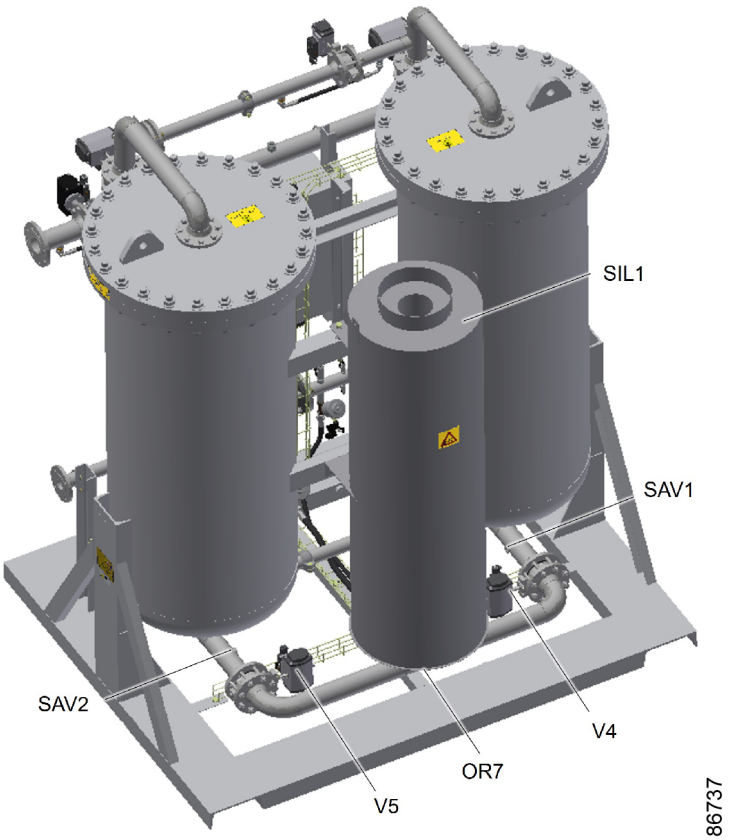
Variant	Nitrogen purity	Residual oxygen concentration
%	95 %	5 %
	96 %	4 %
	97 %	3 %
	98 %	2 %
	99 %	1 %
	99.5 %	0.5 %
	99.9 %	0.1 %
ppm	99.95 %	500 ppm
	99.99 %	100 ppm
	99.995 %	50 ppm
	99.999 %	10 ppm

2.2 Detailed description



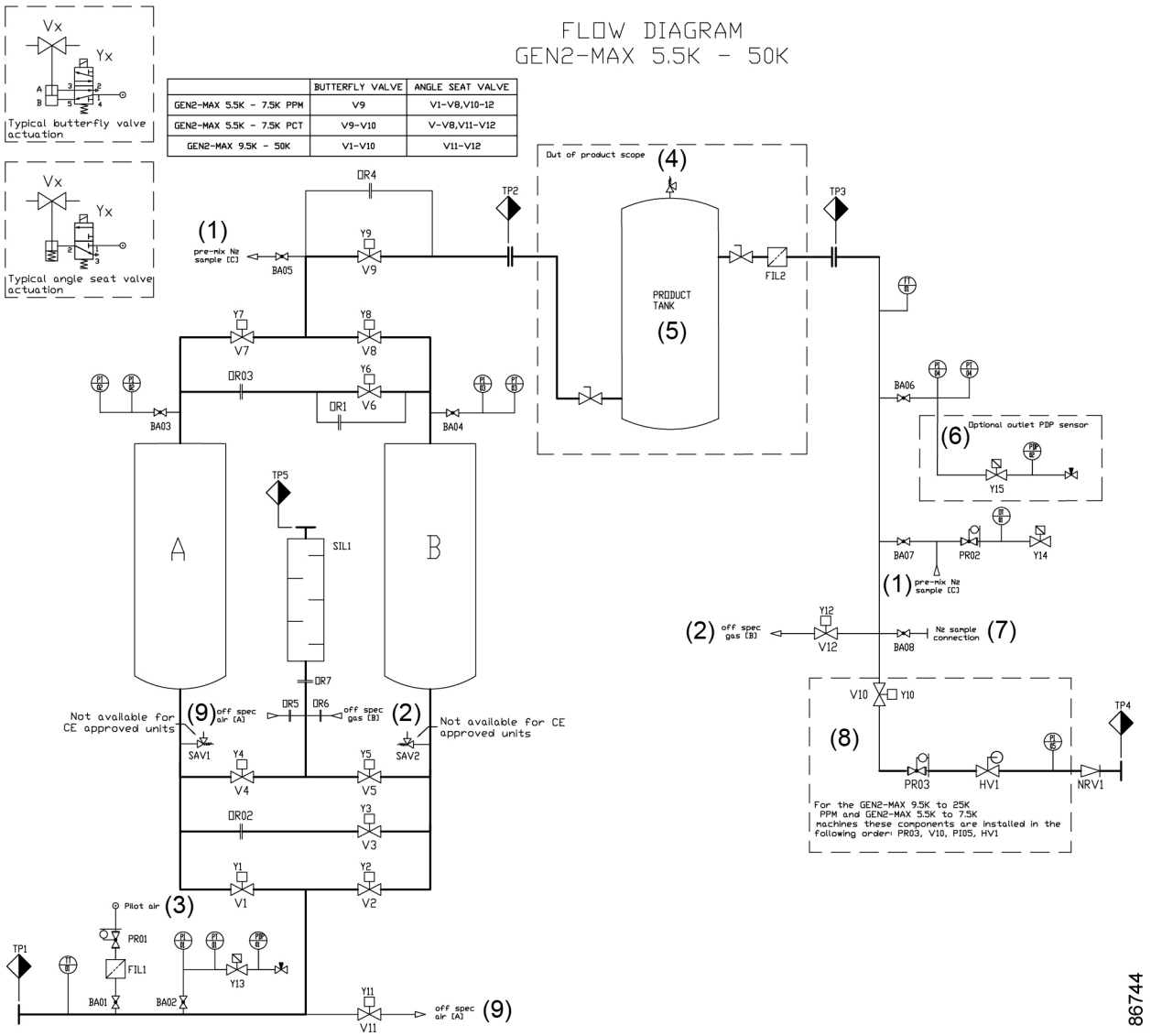
Reference	Description
V1	Inlet transfer valve, adsorber A
V2	Inlet transfer valve, adsorber B
V3	Bottom equalisation valve
V6	Top equalisation valve
V7	Outlet transfer, adsorber A
V8	Outlet transfer, adsorber B
V9	Minimum pressure valve
V10	Consumer valve
V11	Inlet flushing valve
V12	Outlet flushing valve
OR01	Regeneration purge nozzle
OR02	Bottom equalisation nozzle
OR03	Top equalisation nozzle

Reference	Description
OR04	Startup nozzle
OR05	Inlet flushing nozzle
OR06	Outlet flushing nozzle
ER	Elektronikon controller
BA01	Pilot air ball valve
BA02	Inlet pressure ball valve
BA03	Adsorber A presure ball valve
BA04	Adsorber B pressure ball valve
BA05	Pre-mix purity ball valve
BA06	Outlet pressure ball valve
BA07	Nitrogen purity analysis ball valve
BA08	Outlet sample ball valve
PI01	Inlet pressure gauge
PI02	Adsorber A pressure gauge
PI03	Adsorber B pressure gauge
PI04	Outlet pressure gauge
PI05	Consumer pressure gauge
PT01	Inlet pressure transmitter
PT02	Adsorber A pressure transmitter
PT03	Adsorber B pressure transmitter
PT04	Outlet pressure transmitter
FT01	Nitrogen flow transmitter
TT01	Inlet temperature sensor
FIL01	Pilot air filter
PR01	Pilot air pressure regulator
PR02	Nitrogen purity pressure regulator
PR03	Consumer pressure regulator
NRV1	Non return valve
HV1	Manual flow regulating valve
PDP01	Inlet pressure dewpoint
PDP02	Outlet pressure dewpoint (optional)
OTO01	Oxygen analyser
Y13	Inlet PDP sensor 2/2 spool valve
Y14	Purity sensor 2/2 spool valve
Y15	Outlet PDP sensor 2/2 spool valve



Reference	Description
SIL1	Blow off silencer
V4	Blow off valve, adsorber A
V5	Blow off valve, adsorber B
SAV1	Adsorber A, safety valve
SAV2	Adsorber B, safety valve
ORO7	Exhaust nozzle

2.3 Flow diagram



	BUTTERFLY VALVE	ANGLE SEAT VALVE
GEN2-MAX 5.5K - 7.5K PPM	V9	V1-V8,V10-12
GEN2-MAX 5.5K - 7.5K PCT	V9-V10	V-V8,V11-V12
GEN2-MAX 9.5K - 50K	V1-V10	V11-V12

Figure 3: Flow diagram 9829 5007 61

Text on image

Reference	Description
(1)	Pre-mix N2 sample
(2)	Off spec gas [B]
(3)	Pilot air
(4)	Out of product scope
(5)	Product tank
(6)	Optional outlet PDP sensor
(7)	N_2 sample connection
(8)	For the GEN2-MAX 9.5K to 25K PPM and GEN2-MAX 5.5K to 7.5K machines these components are installed in the following order: PR03, V10, PI05, HV1
(9)	Off spec air [A]

Legend & Tie in points

Reference	Description
TP1	Air in
TP2	To product tank
TP3	From product tank
TP4	N_2 outlet
TP5	Waste exhaust
A	Absorber
B	Absorber
SIL1	Blow off silencer
V1	Inlet transfer valve, adsorber A
V2	Inlet transfer valve, adsorber B
V3	Bottom equalization valve
V4	Blow off valve, adsorber A
V5	Blow off valve, adsorber B
V6	Top equalization valve
V7	Outlet transfer valve, adsorber A
V8	Outlet transfer valve, adsorber B
V9	Minimum pressure valve
V10	Consumer valve
V11	Inlet flushing valve
V12	Outlet flushing valve
Y1–Y12	Spool valves monostable
Y13	Inlet PDP sensor 2/2 spool valve
Y14	Purity sensor 2/2 spool valve
Y15	Outlet PDP sensor 2/2 spool valve
BA01	Pilot air ball valve
BA02	Inlet pressure ball valve
BA03	Adsorber A pressure ball valve
BA04	Adsorber B pressure ball valve
BA05	Pre-mix purity ball valve
BA06	Outlet pressure ball valve
BA07	Nitrogen purity analysis ball valve
BA08	Outlet sample ball valve
SAV1	Adsorber A safety valve
SAV2	Adsorber B safety valve
PR01	Pilot air pressure regulator
PR02	Nitrogen purity pressure regulator
PR03	Consumer pressure regulator
HV1	Manual flow regulating valve
NRV1	Non return valve
OR01	Regeneration purge nozzle
OR02	Bottom equalization nozzle
OR03	Top equalization nozzle
OR04	Startup nozzle
OR05	Inlet flushing nozzle
OR06	Outlet flushing nozzle
OR07	Exhaust nozzle
PT01	Inlet pressure transmitter
PT02	Adsorber A pressure transmitter
PT03	Adsorber B pressure transmitter

Reference	Description
PT04	Outlet pressure transmitter
PDP01	Inlet pressure dewpoint
PDP02	Outlet pressure dewpoint (Optional)
TT01	Inlet temperature transmitter
FT01	Nitrogen flow transmitter
OT01	Oxygen analyser
FIL1	Pilot air filter
FIL2	Fine outlet dust filter

2.4 Electric diagram

The electric diagram (9829 5007 60) can be found in the technical documentation, supplied with the unit.

3 Installation

3.1 Dimensions

The dimension drawing can be found on the USB, supplied with the unit.

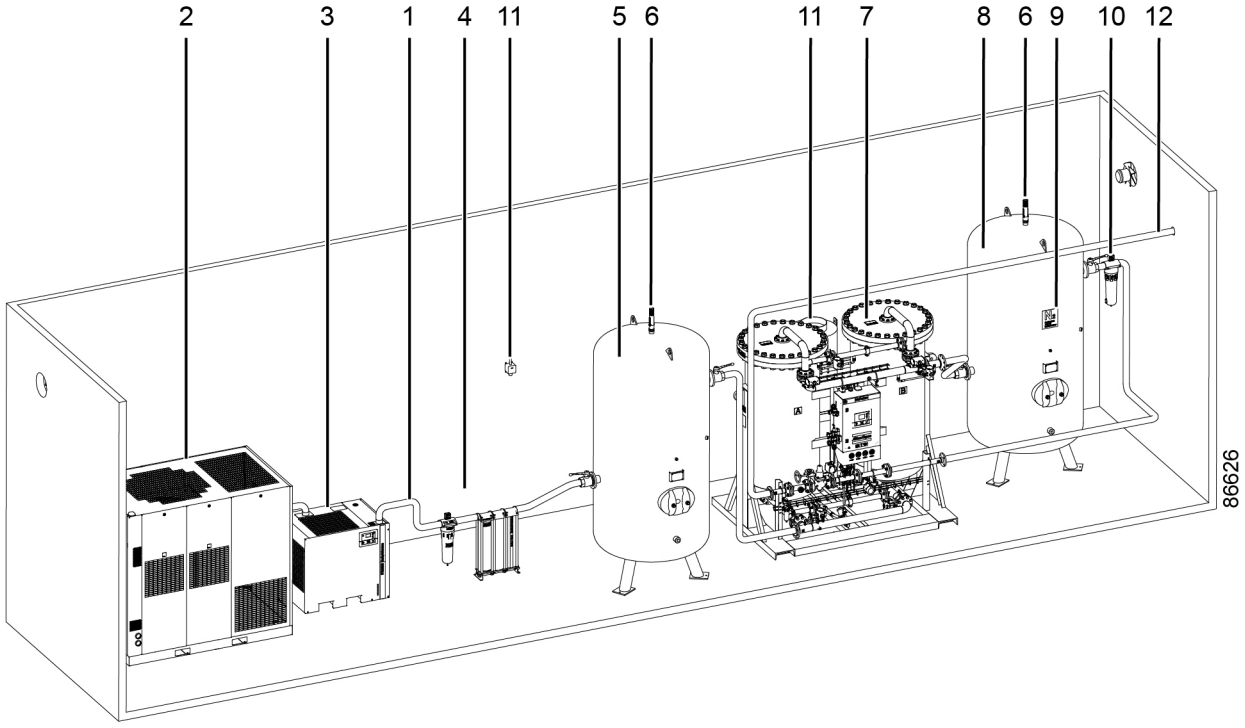
Drawing	Size	Purity variant
9829 5007 62	GEN2-MAX 5.5K	PCT
9829 5007 63	GEN2-MAX 7.5K	PCT
1607 0111 54	GEN2-MAX 9.5K	PCT
1607 0111 55	GEN2-MAX 12K	PCT
1607 0111 56	GEN2-MAX 15K	PCT
1607 0111 57	GEN2-MAX 17K	PCT
1607 0111 58	GEN2-MAX 20K	PCT
1607 0111 59	GEN2-MAX 25K	PCT
1607 0111 60	GEN2-MAX 31K	PCT
1607 0111 61	GEN2-MAX 39K	PCT
1607 0111 62	GEN2-MAX 50K	PCT
9829 5007 64	GEN2-MAX 5.5K	PPM
9829 5007 65	GEN2-MAX 7.5K	PPM
1607 0111 63	GEN2-MAX 9.5K	PPM
1607 0111 64	GEN2-MAX 12K	PPM
1607 0111 65	GEN2-MAX 15K	PPM
1607 0111 66	GEN2-MAX 17K	PPM
1607 0111 67	GEN2-MAX 20K	PPM
1607 0111 68	GEN2-MAX 25K	PPM
1607 0111 69	GEN2-MAX 31K	PPM
1607 0111 70	GEN2-MAX 39K	PPM
1607 0111 71	GEN2-MAX 50K	PPM

Note:

Dimension drawings are subject to change. Please consult your supplier to get the latest versions of the dimension drawings.

3.2 Installation proposal

For a good functionality of the gas generator and for the safety of the installation, it is paramount that the installation does not deviate from the prescribed installation proposal.



Reference	Description
1	Piping
2	Compressor
3	Dryer
4	Inlet filtration
5	Air tank
6	Safety valve
7	Nitrogen generator
8	Product tank
9	Nitrogen label
10	Outlet filtration
11	Waste exhaust
12	Gas outlet

Installation area requirements

- Indoor use is recommended.
- Humidity and dust: to avoid risk of damage to electronic components, install the generator in an environment subject to limited relative humidity and low concentration of dust. The generator must also be protected against water droplets, rain and wind. According to the Low Voltage requirements (EN61010), indoor use is recommended for this unit.
- Temperature: the ambient temperature in the generator installation area must be between 5˚C (41 ˚F) and 50 ˚C (122 ˚F) or between -10°C (14°F) and 50°C (122°F) with the low ambient option. Install the generator away from heat sources. Therefore, also avoid direct exposure to sunlight.
- UV radiation: as the unit is not resistant to UV radiation, protect the unit from direct sunlight.
- Positioning: when selecting the installation area for the generator, take into account minimum clearances required for operation and maintenance. A minimal free space of 1000mm around

the generator is recommended. Consult the Installation proposal drawings further in this chapter. Install the generator on a level floor, suitable for taking its weight

Handling and positioning of the nitrogen generator

The generator must be handled using suitable equipment such as a crane or a forklift truck and only use the designated lifting slots and lugs.

Remove all packing material, taking care not to damage the generator.

Inlet air quality

The properties of the compressed air at the inlet of the nitrogen generator, as well as the minimum pressure and flow rate requirements, play an important role in its performance and lifetime.

The compressed air used should be of a quality that meets ISO 8573-1:2010 class 2-4-1 for the standard machine and 2-3-1 for machines with the low ambient option. Besides that, following components should not exceed the prescribed concentrations:

- CO_2 < 500 ppm
- CO < 1 ppm
- CH_4 < 2ppm
- CH_2H_2 < 0.5ppm
- CnHm < 1ppm
- H_2S < 0.01 ppm
- NH_3 < 1 ppm
- CL_2 < 0.02 ppm
- NO_x < 0.06ppm
- SO_x < 0.04 ppm

Warning:

Using a lower quality of compressed air will cause irreversible damage to the generator. In such case, the manufacturer denies all liability for damages and any costs for repairs will be charged to the client.

Warning:

The installation must be done by trained, authorized personnel only.

In case of any doubt regarding the installation, contact your supplier for advice on the most suitable compressed air system (compressor, dryer, filters, tanks) for the specific application.

To achieve the forementioned air quality, the following air treatment components should be installed after the compressor.

- Compressed air dryer
  - below 5°C (41°F): a dryer type that can provide a PDP of -20°C (-4°F) or lower is required (ISO 8573-1:2010 Class x:3:x). Only possible with the low ambient option.
  - from 5°C (41°F) to 29°C (84°F): a refrigerant dryer can be used to provide a PDP of 3°C (37°F) (ISO 8573-1:2010 Class x:4:x).
  - from 30°C (85°F) and above: a corr refrigerant dryer needs to be sized at max load and max temperature conditions to always provide the required PDP of 3°C (37°F) (ISO 8573-1:2010 Class x:4:x). This could require a stand-alone dryer.
- Filtration

- to achieve the forementioned air quality, a suitable oil coalescing filter must be installed downstream of the dryer.
- in case an oil injected compressor is used, a suitable carbon tower filter must be installed downstream of the oil coalescing filter.

All coalescing filters should be fitted with a drain tube. This drain should not end up in the wastewater. For draining of pure condensate water, an oil/water separator should be installed.

Piping

Consult the dimensions table in the section **Performance data** to select the correct piping diameters.

Place the components of the installation as close to each other as possible to avoid long pipes and excessive pressure drops. Avoid distances exceeding 5 m (16.4 ft) between the various components. In case this length is exceeded, the diameter of the piping needs to be oversized. In the latter case, the maximum pipe length is limited to 10 meters (32.8 ft).

All pipes should be installed stress-free and should be adequately supported.

Note:

Only rigid pipes can be used for nitrogen, as most flexible hoses are permeable for oxygen molecules which can affect the final outlet purity.

The installation must be entirely leak-free in order to produce nitrogen at the requested level.

The pressure rating of all piping between the compressor and the inlet air receiver must be sufficient for the maximum pressure of the compressor. All piping downstream of the air tank must be sufficient for 11 bar(g).

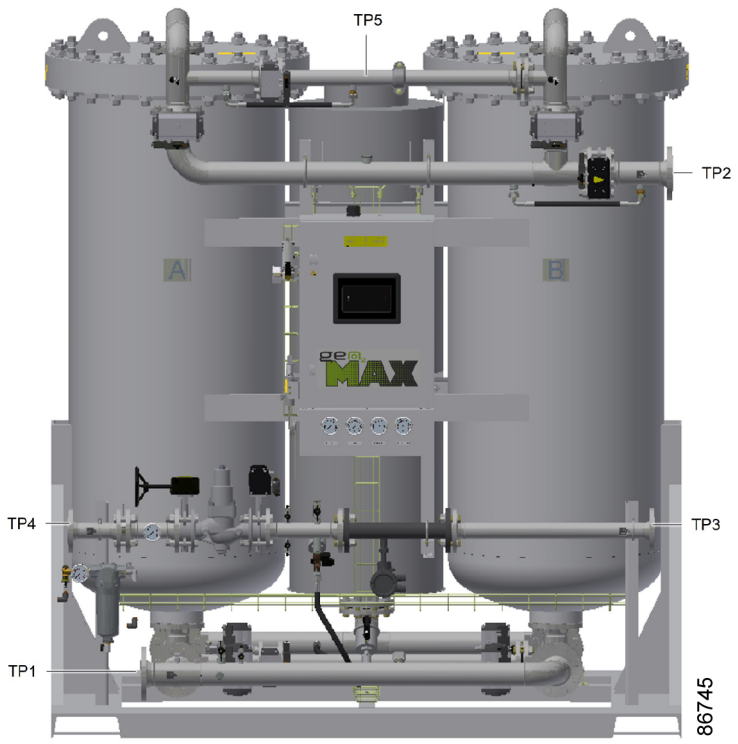


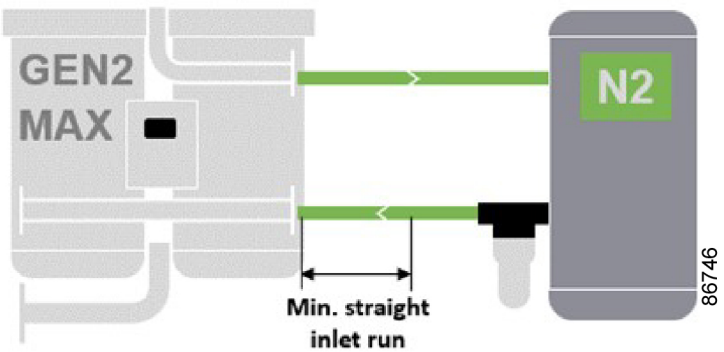
Figure 4: Tie in points

Reference	Description
TP1	Air in
TP2	To product tank
TP3	From product tank
TP4	Gas outlet
TP5	Waste exhaust

For a reliable flow measurement, the flow profile before entering tapping point 3 must be laminar. To obtain a laminar flow profile, the following straight inlet runs upstream of the flow sensor at TP3 must be respected. The distance is measured from the flow sensor and includes the straight pipe installed on the unit.

Disturbance	Minimum straight inlet run
1 x 90° elbow	15 x DN
2 x 90° elbow (in same plane)	20 x DN
2 x 90° elbow (in different planes) or outlet dust filter	35 x DN

Unit size	Straight pipe length installed on unit	
	PPM	*PCT*
GEN2-MAX 5.5-7.5K	190 mm / 7.5 in	650 mm / 25.5 in
GEN2-MAX 9.5-15K	650 mm / 25.5 in	750 mm / 29.5 in
GEN2-MAX 17-25K	700 mm / 27.5 in	1130 mm / 44.5 in
GEN2-MAX 31-50K	750 mm / 29.5 in	1500 mm / 59.0 in



Compressor

The nitrogen generators can be used with oil injected compressors as well as with oil free compressors as long as the correct filters are used to guarantee the required inlet air quality.

The GEN2-MAX K generators utilise a non-continuous process called pressure swing adsorption to produce nitrogen. Hence, the inlet flow is variable. Therefore, the compressor needs to be oversized compared to the average inlet flow. Contact your supplier for advice on the most suitable compressed air system.

To produce nitrogen at a constant purity, a constant inlet pressure is mandatory.

Warning:

If a failure in gas supply (e.g. due to a power failure, the activation of an electrical safety device, or a generator fault) is - even temporarily - not admissible, it can be advisable to

foresee a backup nitrogen source to enable provisional supply of gas (totally or partially automatic).

Parallel installation

In a parallel installation, one or more compressors can be used:

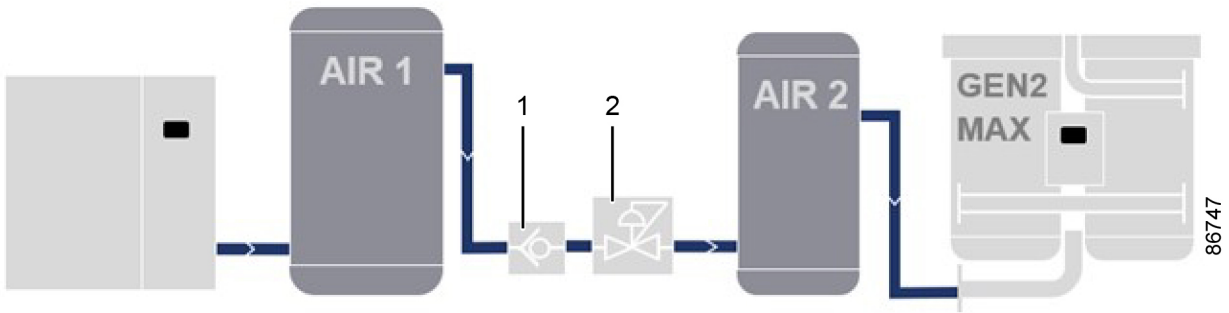
- For redundant operation, a dedicated compressor for each generator is recommended.
- When operating two or more generators in parallel at the same time, one single compressor or common feed air header can be used. In this case the following conditions must be met:
  - Each nitrogen generator should be equipped with a dedicated air tank.
  - Each air tank should be preceded by a check valve.
  - The feed air pressure towards the air tanks should be stable.

Connecting to an existing air net

If the GEN2-MAX K is connected to a tank from an existing air net that has other consumers, this existing tank shall be followed by a check valve and a dedicat ed air tank for the GEN2-MAX K.

It is very important that the pressure in the existing air net is stable. If this cannot be guaranteed, it is required to install a check valve followed by a pressure regulator upstream of the air tank.

Example of installation:



Reference	Description
1	Check valve
2	Pressure regulator

This pressure regulator should be set at the lowest working pressure of the existing tank (AIR 1) in order to maintain a constant inlet pressure for the GEN2-MAX K nitrogen generator. See graph below as reference:

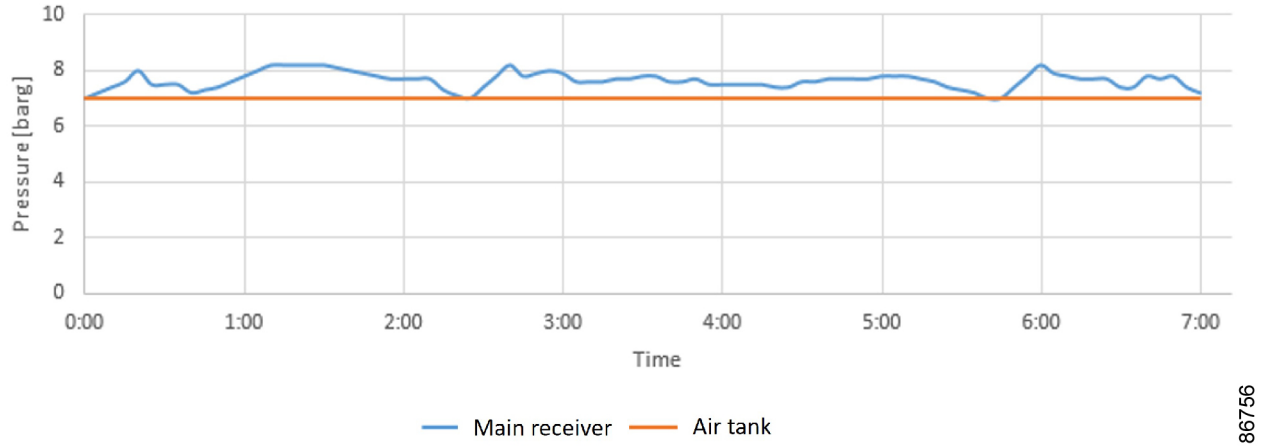


Figure 5: Pressure regulator setting

Safety valve

Warning:

In case the installed compressor has a maximum outlet pressure higher than 11 bar(g), a safety valve must be installed on the inlet air receiver with a relief pressure of maximum 11 bar(g). Size the safety valve to blow off the full flow of all compressors that may be feeding the air receiver.

Product tank

The product tank is used to ensure a stable outlet nitrogen purity and a stable nitrogen pressure. Consult the dimensions table in the section **Performance data** to select the correct product tank size.

If a larger buffer capacity is required, follow the following recommendations:

- The maximum product tank size is one size bigger than the recommended size.

  Note:

  Note that a larger product tank will have longer start-up and flushing times.

  For example:

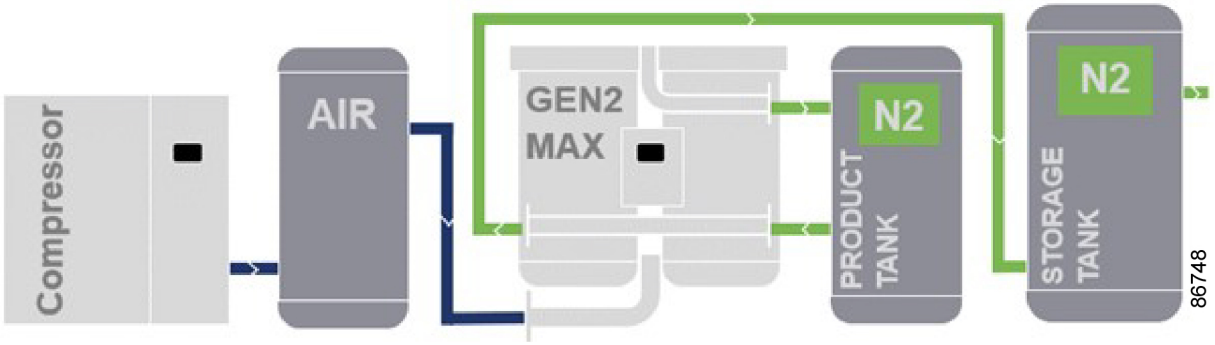
  - GEN2-MAX 15K without extra buffer capacity: 5000L product tank
  - GEN2-MAX 15K with extra buffer capacity: 6000L product tank
- If more buffer capacity is required, a storage tank of any size can be installed at the outlet (TP4), downstream of the generator. This way, the storage tank is always filled with the correct nitrogen purity.

  Note:

  The storage tank should be flushed with nitrogen before commissioning.

When the generator is expected to experience large pressure fluctuations (larger than 2 bar), it is also advised to install a storage tank.

Example of installation:



Nitrogen label

Place the supplied nitrogen labels 1622 5408 03 on the product tank and, if installed, on the storage tank. Make sure that these labels are visually clear.

Outlet filter

A high-efficiency dust filter type must be installed between the product tank and the nitrogen generator.

Exhaust

It is recommended to guide the exhaust of the nitrogen generator outside of the installation room.

Standard ventilation ducting may be used to guide the exhaust gas outdoors. Consult the dimensions table in the section **Performance data**), to select air channel diameters.

The standard channel diameters are sized for a ducting length of 10 meters. If this length is exceeded, the diameter of the channel needs to be oversized, to limit the backpressure during exhaust.

Prevent using short-radius bends. Preferably, do not install a bend directly downstream of the exhaust.

Warning:

- Do not direct the exhaust air towards hot surfaces or heat sources. Increased oxygen levels can increase the risk for fire and explosion hazard.
- Keep the exhaust open at all times. Do not block or make the exhaust pipe opening smaller. This might cause decreased performance of the generator or even cause the muffler to explode.

Ventilation

The ventilation requirements in the machine room depend on if the waste gas is routed outdoors or not.

- Natural ventilation can be sufficient for one air change per hour:
  - Ventilation openings shall have an area > 1/100 of the room’s floor area.
  - Ventilation openings should be placed diagonally opposite to each other.
  - Ventilation openings should not be obstructed.
- Forced ventilation is required for two or more air changes per hour:
  - Contact an authorized specialist for the sizing and installation of the ventilation system.
  - A safety warning in case the ventilation unit fails is required.

Waste gas is not routed outdoors

When the waste gas is not routed outdoors, thorough ventilation of the room is needed to prevent build-up of oxygen causing an increased fire hazard. The ventilation flow into the room must be at least 11 times the full load output flow of the generator at the selected purity.

Waste gas is routed outdoors

When the waste gas is routed outdoors, good ventilation of the room is still required to prevent build-up of nitrogen due to potential leaks in the installation. At least one air change per hour is required.

Warning:

- Make sure the compressor doesn't take in ambient air with increased oxygen content. This could reduce the performance of the generator significantly and might impose a risk of safe operation of the compressor.
- Special consideration to the ventilation of underground rooms, pits, trenches, etc. is to be given. Oxygen is heavier than air and thus tends to accumulate in low lying areas.

3.3 Electrical connections

Electric power supply

Danger:

For safety reasons, the following instructions must be observed strictly.

The electrical installation must comply with current standards, in particular regarding the earthing line.

Recommendations:

- Always connect the earthing line.
- The main socket must be located in an easily accessible position.
- Low voltage fuses on the unit and fuse installation at customer location is specified on the service diagram included in the documentation. Before any service intervention on the unit please make sure that the electrical power is totally disconnected. Therefore, please unplug the unit from the main power supply.

4 Controller

4.1 Controller functions

Figure 6: Vision Touch controller

Introduction

The controller has the following functions:

- Controling the unit
- Protecting the unit
- Monitoring components subject to service
- Automatic restart after voltage failure (ARAVF)

Automatic control of the unit

The controller maintains the automatic operation of the unit based on the required purity settings. It does so by adaptinh the cycle (Variable Cycle Saver) or entering standby during periods without qxygen consumption.

Shutdown

Several sensors are provided on the unit. If one of the measured signals exceeds the programmed shutdown level, the unit will be stopped.

Example: If the inlet pressure exceeds the programmed shutdown level, the unit will be stopped. This will be indicated on the display of the controller.

Warning:

Before remedying, consult the **Safety precautions**.

Before resetting a warning or shutdown message, always solve the problem. Frequently resetting these messages without remedying may damage the unit.

Shutdown warning

A shutdown warning level is a programmable level below the shutdown level.

If one of the measurements exceeds the programmed shutdown warning level, a message will appear on the display and the general alarm LED will light up to warn the operator before the shutdown level is reached.

The message disappears as soon as the warning condition disappears.

When the shutdown warning is shown, press stop button to stop the unit and wait until the unit has stopped; Switch off the voltage, inspect the uni and remedy if necessary. Th warning message will disppear as soon as the warning condition disappears.

Service warning

A number of service operations are grouped as a Service Plan. Each Service Plan has a programmed time interval. If the service timer exceeds a programmed value, this will be indicated on the display to warn the operator to carry out the service actions belonging to that Service Plan.

When the service warning is shown, stop the unit, switch off the voltage and carry out the required service actions.

Automatic restart after voltage failure (ARAVF)

The controller has a built-in function to automatically restart the unit when the voltage is restored after voltage failure.

For units leaving the factory, this function is made inactive. If desired, the function can be activated. Consult your supplier.

Warning:

If the function is activated and provided the controller was in the automatic operation mode, the unit will automatically restart if the supply voltage to the module is restored. The Automatic Restart After Voltage Failure (ARAVF) label shall be glued near to the controller.

4.2 Control panel

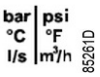
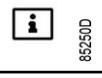
Figure 7: Control panel

Reference	Designation	Function
1	Touch screen	Shows the unit operating condition and several icons to navigate through the menu. The screen can be operated by touch.
2	Warning sign	Flashes in case of a shut-down, is lit in case of a warning condition.
3	Service sign	Lit when service is needed.
4	Operation sign	Lit when the unit is running in automatic operation.
5	Voltage sign	Indicates that the voltage is switched on.
6	Stop button	Stops the unit.
7	Start button	This button starts the unit. The operation sign lights up. The controller is operative.

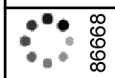
4.3 Icons used

Menu icons

Menu	Icon	Menu	Icon	Menu	Icon
Data		Status			
		Inputs			
		Outputs			
		Counters			
		Auxiliary Equipment Parameters			
Service		Service		Overview	
				Service Plan	
				Service History	
		Service Functions			
		Clean Screen			
Week Timer				Week	
				Remaining Running Time	
Event History		Saved Data			
Machine Settings		Alarms			
		Regulation			
		Control Parameters			
		Auxiliary Equipment Parameters		Internal SmartBox	

Menu	Icon	Menu	Icon	Menu	Icon
		Auto Restart			
Controller Settings		Network Settings		Ethernet Settings	
				CAN Settings	
		Localisation		Language	
				Date/Time	
				Units	
		User Password			
		Help			
		Information			

Status icons

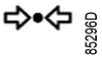
Icon	Description
	Unit running
	Machine Control Mode, LAN
	Automatic Restart After Voltage Failure
	Week Timer Active

System icons

Icon	Description
	Basic User
	Advanced User
	Service User

Icon	Description
	Antenna 25%
	Antenna 50%
	Antenna 75%
	Antenna 100%
	Change between screens (indication)
	Menu
	Reset
	Auto Restart
	Filter(s)

Input icons

Icon	Description
	Pressure
	Temperature
	Special Protection
	Open
	Closed

Note:

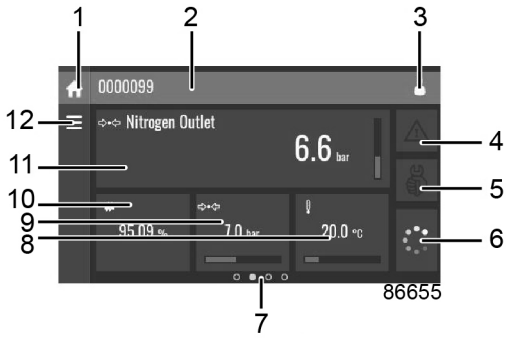
This chapter gives a general survey of available icons. Not all icons mentioned in this chapter are applicable to every machine.

4.4 Main screen

Function

The main screen is the screen that is shown automatically when the voltage is switched on. It is switched off automatically after a few minutes when there is no touch input.

Description



Reference	Designation	Function
1	Home button	The home button is always shown and can be tapped to return to the main screen.
2	Screen information	On the main screen, the screen information bar shows the serial number of the machine. When scrolling through menus, the name of the current menu is shown.
3	Access level button	The access level button is always shown and can be tapped to change the current user access level.
4	Alarm button	The alarm button can be tapped to show the current alarms. If an alarm occurs, the icon on the button will be red.
5	Service button	The service button can be tapped to show the service information.
6	Status	This icon shows the current status of the unit.
7	Page indicator	Indicates which page you currently see. Swipe left or right to go to another screen.
8, 9, 10, 11	These fields can contain a certain value, depending on the type of the unit.	Tap the field to view the type of measurement. This will be shown in the screen information bar. Examples of values shown: • Temperatures • Pressures • Purity level
12	Menu button	The menu button is always shown and can be tapped to go to the menu.

4.5 Quick access screen

Function

The screen is used to directly access some frequently used functions.

Procedure

The quick access screen can be viewed by swiping left, starting from the main screen.

Description

86656

Through this screen, several important settings can be viewed and modified.

Function	Description
Setpoints	Several setpoints can be modified by tapping this icon.
Control mode	The control mode can be changed by tapping this icon. • Local control via start/stop buttons • Remote control via digital input(s) • LAN control via the network. When in remote or LAN control, the start/stop buttons on the controller will not work.
Display language	The display language of the controller can be changed by tapping this icon.
Week timer	Week timers can be set by tapping this icon.
Remaining running time	The remaining running time can be set and modified by tapping this icon.
Internal SmartBox	The reception quality of the internal antenna can be monitored. Each bar represents 25% reception strength. If the four bars are filled, the reception strength is 100%. If only one bar is filled, the reception strength is just 25%.

4.6 Graphic screen

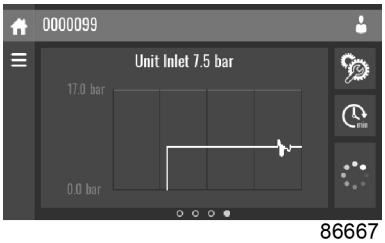
Function

The screen is used to consult the status of the adsorbers and shows the main sensor data.

Procedure

The graphic screen can be viewed by swiping left twice, starting from the main screen.

Description



86667

4.7 Menu screen

Function

This screen is used to display the different menus where settings can be viewed or changed.

Procedure

The menu screen can be viewed by tapping the menu button or by swiping right, starting from the main screen.

Description

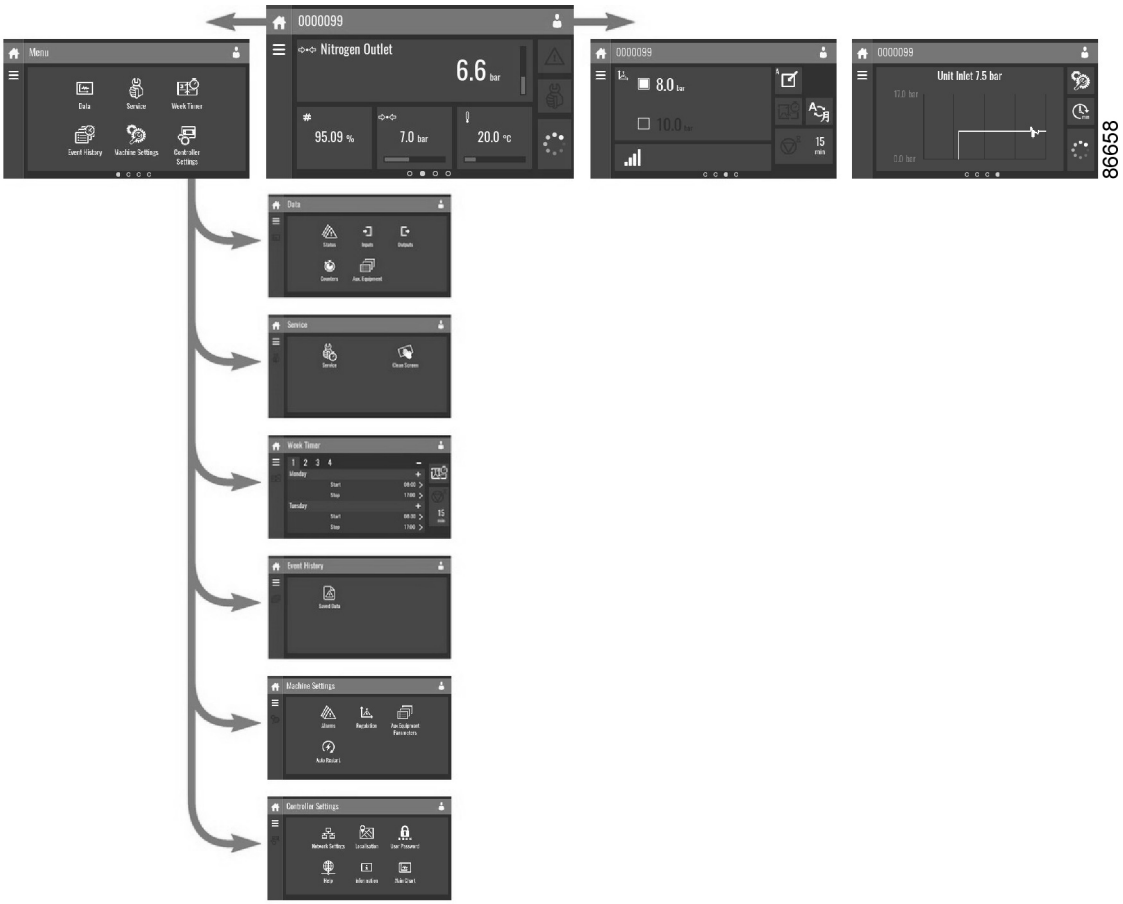
86657

Reference	Designation	Function
(1)	Data	The data menu contains the status of the unit, information about the inputs, outputs and counters. The auxiliary equipment can also be viewed through this menu.
(2)	Service	The service menu contains the service information. The "clean screen" function can be used to clean the touchscreen.
(3)	Week timer	Multiple week timers and a remaining running time can be set through this menu.
(4)	Event history	In case of an alarm, the status information of the unit is saved and can be viewed through this menu.
(5)	Machine settings	Alarms settings, regulation settings and control parameters can be changed through this menu. Auxiliary equipment parameters can also be changed. The automatic restart function can be set through this menu. This function is password-protected.

Reference	Designation	Function
(6)	Controller settings	Network settings, localisation settings and a user password can be set through this menu. There is also a help page available and the controller information can be shown.

Menu structure

Operating the controller can be done by swiping through screens and tapping icons or menu items.



This is the main structure. It can differ depending on the configuration of the unit.

4.8 Data menu

Function

This screen is used to display the following submenus:

- **Status**
- **Inputs**
- **Outputs**
- **Counters**

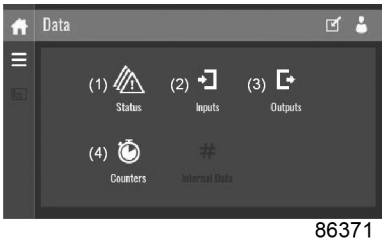
These submenus can be entered by tapping the icons.

Procedure

To enter the **Data** menu screen:

1. Tap the Menu button.
2. Tap the **Data** icon.

Description

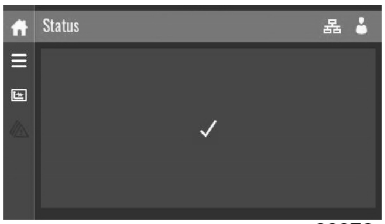


86371

Reference	Designation
(1)	**Status** menu
(2)	**Inputs** menu
(3)	**Outputs** menu
(4)	**Counters** menu

Status menu

Tap the **Status** icon to enter the **Status** menu.



86370

This menu shows the current status of the unit.

If an alarm is active, it can be viewed by tapping the alarm message. To reset an alarm, tap the reset button.

Warning:

Before remedying, consult the **Safety precautions**.

Before resetting a warning or shutdown message, always solve the problem. Frequently resetting these messages without remedying may damage the unit.

Inputs menu

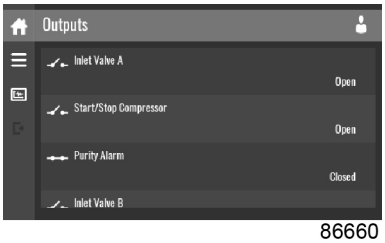
Tap the **Inputs** icon to enter the **Inputs** menu.

86658

This menu shows information about all the inputs.

Outputs menu

Tap the **Outputs** icon to enter the **Outputs** menu.



86660

This menu shows information about all the outputs.

Danger:

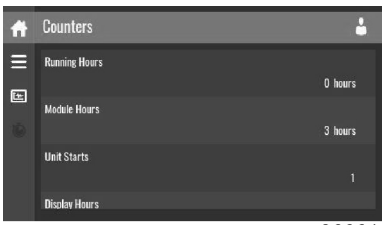
Voltage-free outputs may only be used to control or monitor functional systems. They should **NOT** be used to control, switch or interrupt safety related circuits. Check the maximum allowed load on the label.

Warning:

Stop the unit and switch off the supply before connecting external equipment. Check the **Safety precautions**.

Counters menu

Tap the **Counters** icon to enter the **Counters** menu.



86661

This menu shows an overview of all actual hours and counters of the unit and controller.

4.9 Service menu

Function

This screen is used to display the following submenus:

- **Service**
- **Service Functions** (visible as advanced user)
- **Clean Screen**

These submenus can be entered by tapping the icons.

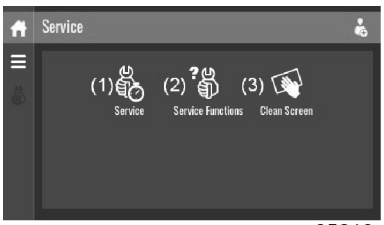
Procedure

To enter the **Service** menu screen:

1. Tap the Menu button.

2. Tap the **Service** icon.

Description



85213

Reference	Designation
(1)	**Service**
(2)	**Service Functions** (only visible as advanced user)
(3)	**Clean Screen**

Service menu

Tap the **Service** icon to enter the **Service** menu.

86662

This menu shows the remaining **Running Hours** and the remaining **Real Time Hours** until the next service. The first row (A) shows the **Running Hours** when the first service is needed (green), the second row shows the **Real Time Hours** (blue)

A service overview can be viewed by tapping icon (1).

The service plan can be viewed by tapping icon (2). Through this menu, the service plan can be modified:

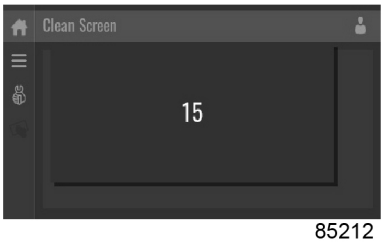
1. Tap the desired service plan. A selection screen will pop up.
2. Change the Running Hours by tapping ‘–’ or ‘+’.
3. Confirm by tapping ‘V’ or decline by tapping ‘X’.

The service history can be viewed by tapping icon (3).

When a service plan interval is reached, a message will appear on the screen. When service has been performed, the service timer can be reset by tapping the reset button (4).

Clean screen

Tap the **Clean Screen** icon to start the 15 seconds countdown to perform cleaning of the touch screen.



85212

The touch screen and the start and stop button become inactive for 15 seconds.

4.10 Week timer menu

Function

This screen is used to set up to 4 different times with each up to 8 settings per day.

The week timers can be activated through this screen.

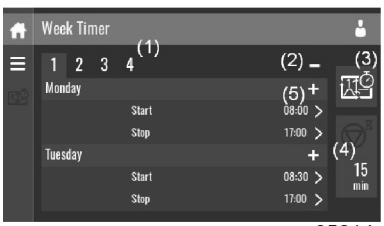
A **Remaining Running Time** can be set from 5 up to 240 minutes.

Procedure

To enter the **Week Timer** menu screen:

1. Tap the Menu button.
2. Tap the **Week Timer** icon.

Description



85214

Reference	Designation	Function
(1)	Add or select week	If less than 4 weeks are programmed, tap the '+' button to add a week.
(2)	Remove week	Tap to remove a programmed week timer.
(3)	Activate week timer	A selection screen pops up. The user can choose the correct week by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.
(4)	Remaining running time	A selection screen pops up. The user can change the remaining time by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.
(5)	Add setting	A selection screen pops up. The user can change the setting by swiping up or down and confirm by tapping 'V' or decline by tapping 'X'.

4.11 Event history menu

Function

This screen is used to display the saved data in case of an alarm.

These submenus can be entered by tapping the icons.

Procedure

To enter the **Event History** menu screen:

1. Tap the Menu button.
2. Tap the **Event History** icon.

Description

85216

Reference	Designation
(1)	Saved Data

Saved data

Tap the **Saved Data** icon to enter the **Saved Data** menu.

Scroll through the items swiping up and down in this list. The event date and time is shown at the right side of the screen.

Press on one of the items in the list for more information reflecting the status of the unit when the shutdown occurred.

4.12 Machine settings menu

Function

This screen is used to display the following submenus:

- **Alarms**
- **Regulation**
- **Control Parameters**

  Only visible if the machine has adaptable parameters.
- **Aux. Equipment Parameters**
- **Auto Restart**

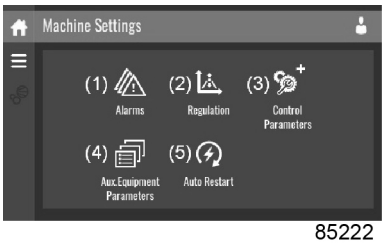
These submenus can be entered by tapping the icons.

Procedure

To enter the **Machine Settings** menu screen:

1. Tap the Menu button.
2. Tap the **Machine Settings** icon.

Description

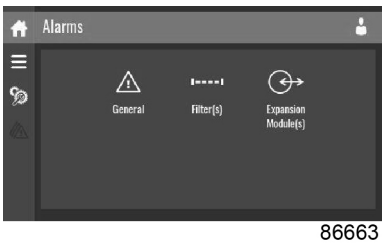


85222

Reference	Designation
(1)	**Alarms** menu
(2)	**Regulation** menu
(3)	**Control Parameters** menu
(4)	**Aux. Equipment Parameters** menu
(5)	**Auto Restart** menu

Alarms menu

Tap the **Alarms** icon to enter the **Alarms** menu.



86663

Alarms are grouped per type.

When pressing on one of the items in the underlying list, the warning and/or shutdown levels are shown for this alarm.

Regulation menu

Tap the **Regulation** icon to enter the **Regulation** menu.

86664

Setpoints can be modified and capacity control can be consulted through this menu.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping ‘V’ or decline by tapping ‘X’.

Purity menu

Tap the **Purity** icon to enter the **Purity** menu.

In this menu, the purity settings are entered.

86669

Minimum purity

The minimum purity that is allowed in the installation. Below this purity, the supply of oxygen will be cut-off and the generator will be flushing the product tank until the minimum purity has been reached.

Purity setpoint

The nominal required purity for the installation. The generator will use this setpoint to regulate the Variable Cycle Saver algorithm, in order to achieve the correct purity at the correct energy consumption in all situations.

Capacity control

Tap the **Capacity control** icon to enter the **Capacity control** menu.

In this menu, you can view the operation of the Variable Cycle Saver.

86362

Generator capacity

The generator capacity shows the amount of flow the generator is able to produce at the current temperature, pressure and purity setpoint.

Consumption level

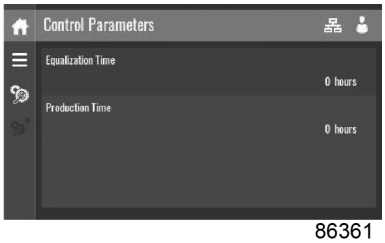
The consumption level is the relative amount of flow that is currently consumed.

Modulation level

The modulation level is the capacity at which the generator is currently running. If the capacity is showing less than 100%, the Variable Cycle Saver is active and less energy is being consumed.

Control parameters menu

Tap the **Control Parameters** icon to enter the **Control Parameters** menu.

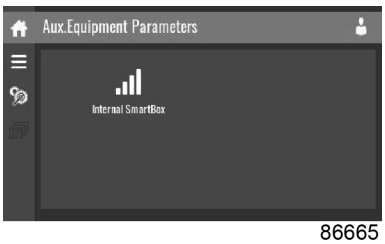


86361

This menu shows information about the cycle times.

Auxiliary equipment parameters menu

Tap the **Aux. Equipment Parameters** icon to enter the **Aux. Equipment Parameters** menu.



86665

This menu shows an overview of all the auxiliary equipment fitted.

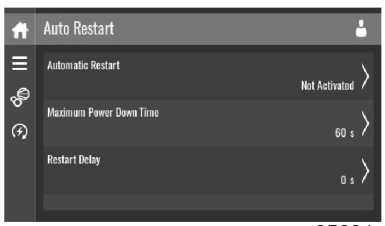
Through this menu, the parameters of the auxiliary equipment can be changed.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Auto restart menu

Tap the **Auto Restart** icon to enter the **Auto Restart** menu.



85221

Through this menu, the automatic restart can be activated. The activation is password protected.

The automatic restart settings can also be changed.

Enter a password

When tapping a password protected item, a selection screen pops up. The user can enter the password by swiping up or down to select the desired number. Once the 4 digits are entered, the user can confirm by tapping 'V' or decline by tapping 'X'.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

4.13 Controller settings menu

Function

This screen is used to display the following submenus:

- **Network Settings**
- **Localisation**
- **User Password**
- **Help**
- **Information**
- **Main Chart**

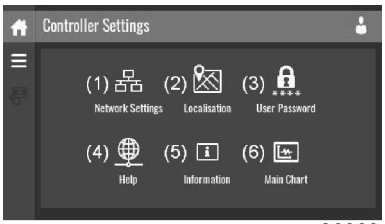
These submenus can be entered by tapping the icons.

Procedure

To enter the **Controller Settings** menu screen:

1. Tap the Menu button.
2. Tap the **Controller Settings** icon.

Description

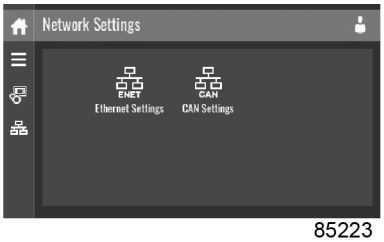


86666

Reference	Designation
(1)	**Network Settings** menu
(2)	**Localisation** menu
(3)	**User Password** menu
(4)	**Help** menu
(5)	**Information** menu
(6)	**Main chart**

Network settings menu

Tap the **Network Settings** icon to enter the **Network Settings** menu.



85223

Ethernet Settings

The list of **Ethernet Settings** is shown. When ethernet is turned off, the settings can be modified.

CAN Settings

The list of **CAN Settings** is shown. When CAN is turned off, the settings can be modified.

Modify a setting

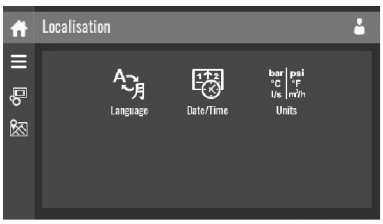
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping 'V' or decline by tapping 'X'.

Localisation menu

Tap the **Localisation** icon to enter the **Localisation** menu.



85224

Language

The language setting of the controller can be modified through this menu.

Date/Time

The date and time settings of the controller can be modified through this menu.

Units

The units displayed can be modified through this menu.

Modify a setting

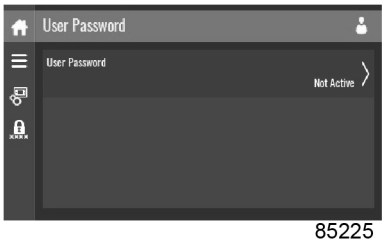
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping 'V' or decline by tapping 'X'.

User password menu

Tap the **User Password** icon to enter the **User Password** menu.



85225

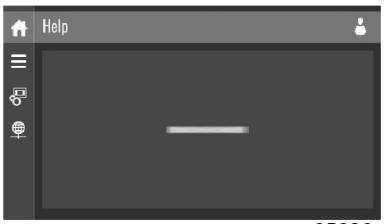
The user password can be activated or deactivated through this menu. Enter and confirm a user password to activate, repeat to deactivate.

Enter a password

When tapping a password protected item, a selection screen pops up. The user can enter the password by swiping up or down to select the desired number. Once the 4 digits are entered, the user can confirm by tapping ‘V’ or decline by tapping ‘X’.

Help menu

Tap the **Help** icon to enter the **Help** menu.



85226

This menu can show a link to the web page of your supplier, a helpdesk phone number or other helpful information.

Information menu

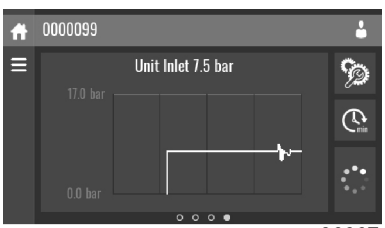
Tap the **Information** icon to enter the **Information** menu.

85227

This menu shows information about the controller.

Main chart

Tap the **Main chart** icon to enter the **Main chart** menu.



86667

This menu shows a configurable chart displaying real-time data.

4.14 Access level

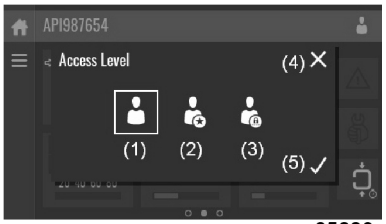
Function

Through this pop-up screen, the access level settings can be viewed or changed.

Procedure

The **Access Level** screen can be viewed or changed by tapping the **Access Level** button at the upper right corner of the screen.

Description



85229

Reference	Designation	Function
(1)	User	A basic set of parameters is visualized, no password required.
(2)	Service	A basic set of parameters can be modified, no password required.
(3)	Full	This access level is not accessible to end users.
(4)	Decline	Tap to decline the selected user level.
(5)	Confirm	Tap to confirm the selected user level.

Service access level

85230

Tap the **Service** access level icon (1) and confirm (2).

The screen information bar (1) now shows the current status of the unit instead of the machine serial number.

The Received Signal Strength Indicator (RSSI) value is now shown in the Internal SmartBox menu. See section **Quick access screen**.

In the service menu, an extra menu item is now available. See section **Service menu**.

4.15 Web server

All controllers have a built-in web server that allows direct connection to the company network or to a dedicated PC via a local area network (LAN). This allows to consult certain data and settings via a PC instead of the display of the controller.

Getting started

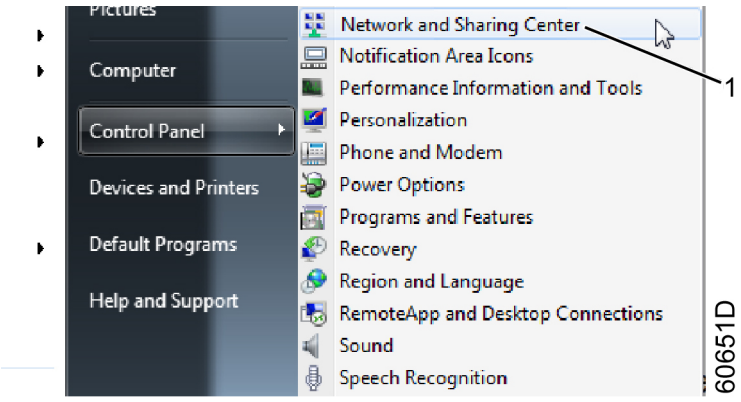
Make sure you are logged in as administrator.

- Use the internal network card from your computer or a USB to LAN adapter.

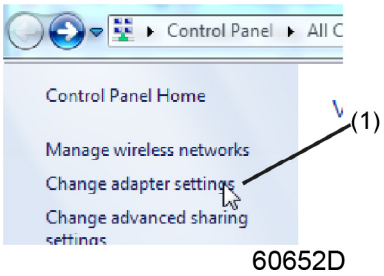
- Use a UTP cable (CAT 5e) to connect to the controller (see picture below).

Configuration of the network card

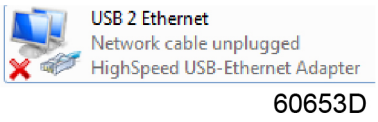
- Go to Network and Sharing Center (1).



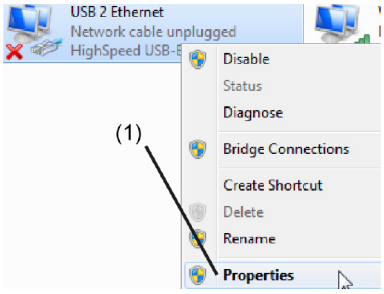
- Click on Change adapter settings (1).



- Select the Local Area Connection, which is connected to the controller.

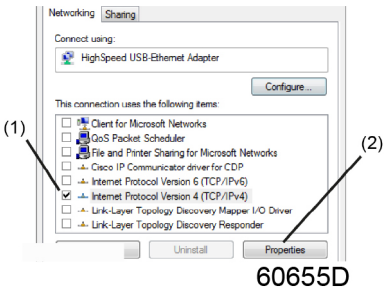


- Click with the right button and select Properties (1).



60654D

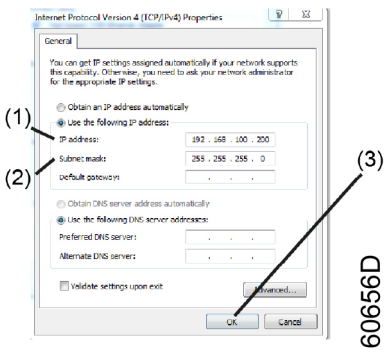
- Use the check box Internet Protocol version +4 (TCP/IPv4) (1) (see picture). To avoid conflicts, uncheck other properties if they are checked. After selecting TCP/IPv4, click on the Properties button (2) to change the settings.



60655D

- Use the following settings
  - IP Address 192.168.100.200(1)
  - Subnetmask 255.255.255.0(2)

  Click OK (3) and close network connections.

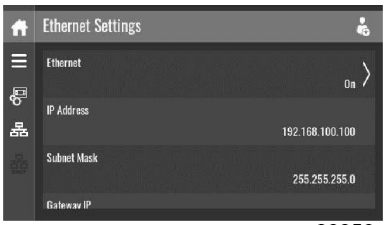


60656D

Configure a company network (LAN) connection

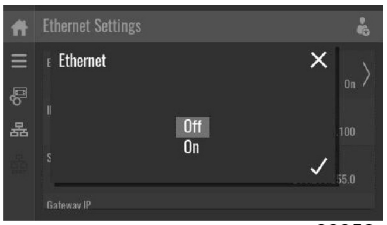
- Ask your IT department to generate a fixed IP address in your company's network. That IP address will be excluded from the DNS server, so it will be reserved for the controller. Also get the correct Gateway and Subnet mask settings. For example:
  - IP = 10.25.43.200
  - Gateway = 10.25.42.250
  - Subnet mask = 255.255.254.0
- Connect the controller to the company's network (LAN) by using a UTP cable (min. CAT 5e).

- Adapt the network settings in the controller.
  - Put the controller in advanced mode by navigating to **Menu** > **Controller settings** > **Network settings** > **Ethernet settings**.



86359

  - Switch off the ethernet communication to allow the editing of the settings.



86358

  - Adapt IP adress
  - Adapt Gateway IP
  - Adapt Subnetmask
  - Switch on the Ethernet communication
  - Wait a few minutes so the controller can be connected to the LAN network.

Configuration of the web server

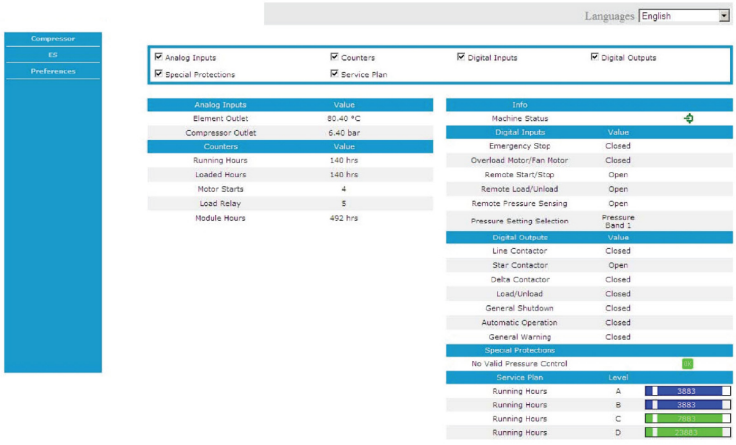
The internal web server is designed and tested for Microsoft® Internet Explorer. Also Opera, Mozilla Firefox, Safari and Chrome should work.

Viewing the controller data

Note:

All screen shots are indicative. The number of displayed fields depends on the selected options.

- Open your browser and type the IP address of the controller you want to view in your browser (in this example http://192.168.100.100). The interface opens.



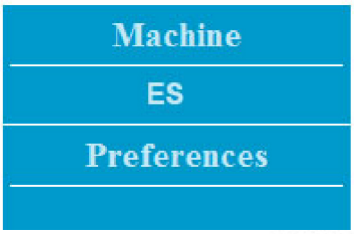
81520D

Navigation and options

- • The banner shows the unit type and the language selector. In this example, three languages are available on the controller.

81521D

- • On the left side of the interface, you can find the navigation menu. If a license for ESi is foreseen, the menu contains 3 buttons:



83810D

  - Machine: shows all generator settings.
  - ES: shows the ESi status (if a license is provided).
  - Preferences: allows to change temperature and pressure unit.

5 Operating instructions

5.1 Starting

Start-up procedure

For the designation of the components, see section **Flow diagram**.

1. Make sure all ball valves between the generator and the receivers are opened and the ball valve after the compressor is closed.
2. Make sure the following ball valves inside the generator are closed: BA05 and BA08.
3. Make sure the following ball valves inside the generator are opened: BA01, BA02, BA03, BA04, BA06, BA07.
4. If using a refrigerant dryer, make sure it is not running in energy efficient mode. This mode can cause an increase of outlet dew point and a shutdown of the generator as a consequence.
5. Switch on the refrigerant dryer 10 minutes in advance of the compressor (if applicable).

   In case of inlet temperatures below 5°C: Switch on an adsorption dryer well before starting the generator. Make sure the PDP of the adsorption dryer is below -20°C before starting the generator.
6. Start the compressor.
7. Slowly open the valve after the compressor so the compressor can slowly fill the air receiver with dry compressed air. Opening the valve too fast can increase the dewpoint after the dryer. This will require the generator to flush the air receiver which extends the start-up procedure.
8. Enter the required nitrogen purity in the controller by navigating to **Menu** > **Machine settings** > **Regulation** > **Purity**. The controller will use this setting to tune its capacity to the consumed nitrogen flow (Variable Cycle Saver feature).
9. Enter the minimum required nitrogen purity in the controller by navigating to **Menu** > **Machine settings** > **Regulation** > **Purity**. The generator will stop supplying nitrogen to the outlet when the purity drops below this setting and will start flushing the product tank to increase the outlet purity.
10. Make sure the pilot air pressure regulator PR01 is set to a pressure between 5 and 6 barg (73 - 90 psi).

    For the GEN2-MAX 5.5-7.5K models running at 9 barg (130 psi) inlet pressure or higher, increase the pilot air pressure to 7 barg (101 psi)
11. Check the inlet dew point on the controller display. If this value exceeds the inlet dewpoint setpoint, the air receiver needs to be flushed until a value below the setpoint is reached. The flushing of the inlet receiver will be done automatically by the generator. During this time, the generator is in standby. For standard generators the setpoint is 6°C. For the low ambient version, the setpoint is -20°C.
12. Start the generator by pushing the start button on the controller. The generator will now start automatically. During "startup" the product tank is filled through restriction orifice OR04 until the pressure difference between the air tank and product tank is less than the delta pressure setting . During "flushing" the product tank is flushed through orifice OR06 until the purity in the vessel is equal to the minimum purity setting as entered in step 8. Flushing can take up to 2 hours for “PCT” generators and up to 6 hours for "PPM" generators. After flushing, the generator is ready for nitrogen production.

13. Regulate the outlet nitrogen pressure with pressure regulator PR03 to the requested nitrogen pressure.
14. Make sure the outlet flow measured by FT01 does not exceed the nominal flow of the nitrogen generator. Regulate the flow by controlling HV1. Exceeding the nominal flow will cause the purity to drop. If the purity drops below the minimum purity setting, the outlet flow is cut off to enable flushing of the nitrogen receiver. The nominal flow is continuously calculated by the generator and can be found by navigating to **Menu** > **Machine settings** > **Regulation** > **Capacity control**. More flow means lower nitrogen purity, less flow means higher nitrogen purity. The purity in the nitrogen receiver can be read on the main screen.
15. Set the time and date by navigating to **Menu** > **Controller settings** > **Localisation** > **Date/ Time**.
16. Set the required warning and shutdown levels in the Alarms menu (navigating to **Menu** > **Machine settings** > **Alarms**).
17. Adjust the compressor pressure if necessary: the compressor should be running continuously in order to ensure a stable inlet pressure. If the compressor enters unload during the cycle, increase the pressure setpoint, respecting the limits of operation.

5.2 During operation

Manual operation mode

In manual mode, the generator runs at normal timer based operation, independently from the detected flow rate.

Automatic operation mode

In automatic mode, the generator will apply capacity control in 5 stages:

Nitrogen consumption level compared to nominal generator capacity	Capacity control
100 %	Normal operation
Less than 80 %	Cycle time modulation stage 1
Less than 60 %	Cycle time modulation stage 2
Less than 40 %	Cycle time modulation stage 3
Less than 1 %	Standby

Inlet PDP protection

As standard, the GEN2-MAX K is equipped with an inlet PDP protection feature. When the inlet air PDP exceeds the flushing setpoint, the PSA cycle is automatically shut down and an inlet flushing cycle is started. For the standard units the flushing setpoint is 5°C (41°F), units with the low ambient option installed have a setpoint of -20°C (-4°F). During this cycle, the inlet flushing valve V11 allows a small flow of air through OR05 to the silencer, which will reduce the load on the dryer and allows the inlet air receiver to be dried until the required dewpoint is achieved.

Variable cycle saver

GEN2-MAX K generators are equipped with the Variable Cycle Saver (VCS) feature. This feature enables the controller to modulate the capacity (and thus the required amount of compressed air) depending on the consumed nitrogen flow.

The capacity is controlled by varying the cycle times. A lower capacity means longer cycle times, a higher capacity means shorter cycle times. By doing this, the outlet purity can be maintained constant and as a consequence less compressed air will be used (energy saving up to 70%).

The feature also enables a generator which has been sized for high temperature to use less energy when it is colder than the temperature for which the generator is sized.

Overflow protection

To protect the generator from being overloaded, the adsorbers are protected by the minimum pressure valve V9 (see section **Flow diagram**).

During normal operation, i.e. when the pressure difference between the air receiver and nitrogen receiver is less than the **Delta Pressure** setting, the minimum pressure valve is open.

If the nitrogen demand would become too high,, the pressure difference will increase and when it is higher than the **Delta Pressure** setting, minimum pressure valve V9 will close. At this stage, the flow is restricted by startup nozzle OR04 as long as the pressure difference between the air receiver and the nitrogen receiver is larger than the **Delta Pressure** setting. To recover from this state, the outlet flow must be restricted to the nominal flow of the generator or less. When the pressure difference becomes smaller than the **Delta Pressure** setting, the generator will wait 10 minutes before opening minimum pressure valve V9.

Guaranteed purity

To protect the installation from low purity that could harm its process, the GEN2-MAX K is equipped with a guaranteed purity control. The minimum purity that is allowed in the installation can be set in the controller **Menu** > **Machine settings** > **Regulation** > **Purity**.

If the purity in the nitrogen receiver becomes lower than the **Minimum Purity** setting, the flow to the installation is cut off by closing consumer valve V10. At the same time, outlet flushing valve V12 is opened to flush the nitrogen receiver with a flow, controlled by flushing nozzle OR06. This way, the purity in the nitrogen receiver is recovered as fast as possible. Once the measured purity is better than the **Minimum Purity** setting, flushing valve V12 will close and consumer valve V10 will open.

Changing the purity

Before changing the purity level of the generator, make sure which variant of nitrogen generator has been installed:

Variant	Nitrogen purity	Residual oxygen concentration
%	95 %	5 %
	96 %	4 %
	97 %	3 %
	98 %	2 %
	99 %	1 %
	99.5 %	0.5 %
	99.9 %	0.1 %
ppm	99.95 %	500 ppm
	99.99 %	100 ppm
	99.995 %	50 ppm
	99.999 %	10 ppm

The % variant has an oxygen sensor with a measurement range from 0 % to 25% oxygen level.

The ppm variant has an oxygen sensor with a measurement range from 0 ppm to 1000 ppm oxygen level.

Both variants are optimized in cycle times, purge flow and nozzle sizes to deliver maximum performance at the desired purity.

To change the desired outlet purity, navigate to **Menu** > **Machine settings** > **Regulation** > **Purity**. Based on this setting, the generator will adapt its capacity control and apply cycle time modulation when necessary. When changing the purity setting, the **Minimum Purity** setting also needs to be changed. Based on this setting, the generator will only allow nitrogen with a better purity than the **Minimum Purity** setting to be sent to the installation.

Standby mode

When the nitrogen consumption stops, the generator will enter standby mode automatically. All sensors remain powered to sense any changes to the output flow, nitrogen purity and pressure levels. When the sensors detect that there is a leak or the flow restarts, the generator will start producing nitrogen instantaneously.

5.3 Stopping

To stop the generator for longer periods, press the stop button on the controller. The generator will finish its current cycle and vent both adsorber vessels.

Only stop the compressor and dryer after the generator has vented both adsorber vessels.

If the installation is to be started up shortly after (e.g. after a weekend), it is advised not to use this function. Instead, stop the consumption of nitrogen which will turn the generator in stand-by mode automatically. This enables a start-up time of less than one minute, compared to up to one hour if the unit is completely stopped.

5.4 Checking the display

Check the display regularly for readings and messages.

5.5 Taking out of operation

Procedure

1. Stop the generator and close the air inlet and nitrogen outlet valve.
2. Depressurize the generator as described in section **Depressurize the generator**.

   Switch off the voltage and disconnect the generator from the mains.
3. Close the ball valves towards the generator and depressurize the air and nitrogen connections.

6 Maintenance

6.1 General

User maintenance is restricted to visual inspections. Do not attempt to modify or repair the apparatus.

All maintenance and repairs shall be carried out by authorized trained personnel.

6.2 Maintenance schedule

General

To maintain the generator efficiency and to reduce the risks of faults, strictly observe the recommended maintenance schedule.

The following table specifies the frequency of the recommended maintenance operations, expressed in operating hours of the generator:

Programmed service interventions

GEN2-MAX 5.5-50K

Frequency	Service plan	Activity
Daily		Check the controller for information on the purity, alarms and service messages.
Every 4000h of operation or every 6 months (1)	A	• Check fitted connections in and around the unit for potential leaks • Check for damaged wiring or loose connections • Replace the in- and outlet filter cartridges • Replace the activated carbon filter
Every 8000h of operation or every year (1)	B	Replace the inlet dew point sensor and outlet dew point sensor (optional)
Every 16000h of operation or every 2 years (1)	C	Replace the built-in pilot air filter cartridge.
Every 40000h of operation or every 5 years (1)	D	• Replace the oxygen sensor • Replace the bellows on GEN2-MAX 31-50K

GEN2-MAX 5.5-7.5K

Frequency	Service plan	Activity
Every 8000h of operation or every year (1)	B	Replace the actuators of the pneumatic valves V3 and V6.
Every 16000h of operation or every 2 years (1)	C	Replace the actuators of the pneumatic valves V1, V2, V4, V5, V7 and V8

GEN2-MAX 9.5-50K

Frequency	Service plan	Activity
Every 16000h of operation or every 2 years (1)	C	Replace the pneumatic valves V3 and V6
Every 32000h of operation or every 4 years (1)	E	Replace the pneumatic valves V1, V2, V4, V5, V7 and V8

(1): whichever comes first.

After maintenance activities, the service counter will be reset by the service specialist.

Note:

Proper and timely maintenance is extremely important to safeguard the lifetime of the molecular sieves bed. The manufacturer cannot take any responsibility for improper functioning of the generator if maintenance is not done as prescribed. In this respect, regular maintenance of all equipment upstream of the generator, including but not limited to the compressor and the filter package used is of extreme importance. For maintenance instructions of this equipment, please be referred to the instruction manual of the equipment involved.

7 Optional equipment

7.1 Outlet pressure dew point

An outlet pressure dew point sensor (PDP02) is available as an extra measure to monitor the dew point of the consumed nitrogen. This feature is especially useful if the nitrogen dew point is a critical parameter in the process where the nitrogen is used.

Note that the outlet dew point of a nitrogen generator is not stable and can make large variations depending on operating conditions. The highest outlet dew point will be -40 °C PDP, but this can drop down to -70 °C in some cases.

7.2 External oxygen analyser

An external oxygen analyser is available for the means of monitoring the oxygen level in the room where the nitrogen generator is installed.

If the storage tank is located in another room, it's recommended to install a second external oxygen analyser near the storage tank.

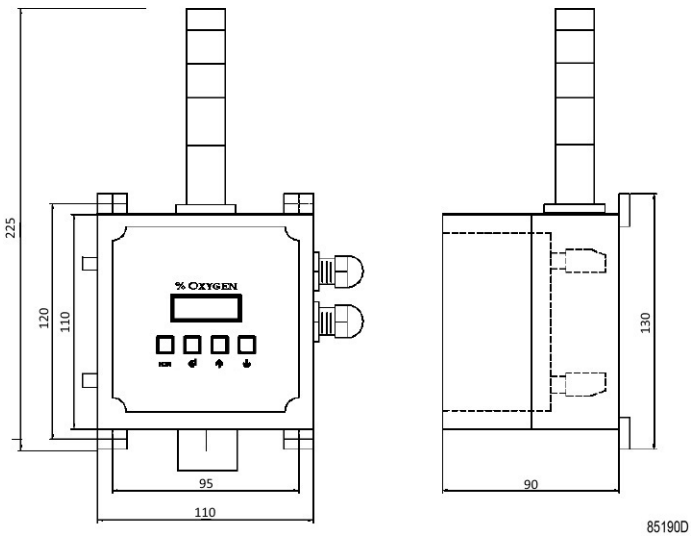


Figure 8: General arrangement

Note that adequate ventilation of the machine room is always necessary and ducting the exhaust of the generator outside is highly recommended.

8 Trouble shooting

Low purity warning

When the nitrogen concentration in the nitrogen receiver becomes lower than the Minimum Purity setting, the generator will start flushing the nitrogen receiver and show a low purity alarm. At this point, no nitrogen is available at the outlet of the generator.

Check the following possible causes:

- Check that the nitrogen purity ball valve BA07 is in open position and nitrogen sample ball valve BA05 is in closed position.
- Make sure the generator is in running mode.
- Check the reading of the pressure on sample pressure regulating valve PR02. This should read 2 bar (29 psi).
- Variations in operating conditions, such as flow, pressure and temperature can have a large impact on the outlet purity. To check whether the generator's capacity at the current operating conditions is exceeded or not, check the Consumption Level reading by navigating to **Menu** > **Machine settings** > **Regulation** > **Capacity Control**. When the consumption level is higher than 100%, it means that the generator has less capacity than requested. In this case, the nitrogen consumption is too high and the amount of nitrogen flow at the outlet needs to be reduced. If this is not an option, increasing capacity on a particular nitrogen generator can be done by:
  - Decreasing the purity setting to a lower purity
  - Increasing the inlet pressure
  - Decreasing the ambient temperature if the current temperature is higher than 20 °C.
- Inlet pressure should remain constant at all times. This is a direct cause of compressor sizing. If the compressor is running at full load over a complete cycle, the compressor is sized too small. If this is the case, lower the pressure setpoint of the compressor. If the compressor is oversized, then it would run in unload during one or more complete cycles. In this case, increase the pressure setting of the compressor so it's capacity is matched to that of the nitrogen generator. Alternatively, a pressure regulator should be installed before the air receiver in order to have a constant inlet pressure during multiple cycles.
- Make sure the exhaust opening is not blocked.
- In case of a load/unload compressor, make sure that the load/unload period is shorter that two minutes. Do this by lowering the pressure band of the compressor and oversizing of the inlet air receiver.
- If the exhaust is connected to outdoors, make sure the exhaust line is sized correctly. Refer to section **Installation proposal** for details.
- Consult your supplier.

High dryer pressure dew point

The inlet pressure dew point of a standard nitrogen generator should be 3 °C and may not exceed 5 °C. With the low ambient option, the inlet pressure dew point requirement is further reduced to -20°C. GEN2-MAX K nitrogen generators are equipped as standard with an inlet dew point monitoring sensor, which monitors the dew point of the incoming air.

A high dew point can be caused by an overload of the dryer, which can occur during startup. When using a refrigerant dryer, this can be prevented by switching on the dryer before the compressor. When the compressor is switched on, the outlet flow of the compressor should be reduced by

means of choking with a ball valve. This causes the produced compressed air to have enough time to pass the dryer and fill the air receiver with the correct quality of inlet air.

If the air receiver has been filled with air that has a high dew point, the air receiver will be purged automatically by the generator. As a consequence, the dewpoint of the air receiver will drop to the required level for operation.

Alarm - Failed To Pressurize

This alarm is triggered when adsorber A or B failed to build up pressure. In normal working conditions, the pressure inside an adsorber vessel should rise to the inlet pressure during the production state. If this does not happen, the process of producing nitrogen has to be halted.

Check the following possible causes:

- Make sure the inlet air pressure is higher than 5 bar (72 psi).
- Make sure the pilot air pressure regulator PR01 is regulated to the correct pressure.
- Check if pneumatic valves are actuating by checking the position indicators of the valves.
- Contact your supplier.

Alarm - Failed To Blow Off Vessel A (or Vessel B)

This alarm is triggered when adsorber A (or B) failed to depressurize. In normal working conditions, the pressure inside an adsorber vessel should lower to the atmospheric pressure during the regeneration state. If this does not happen, the process of producing nitrogen has to be halted.

Check the following possible causes:

- Make sure the pilot air pressure regulator PR01 is regulated to the correct pressure.
- Make sure the exhaust opening is not blocked.
- If the exhaust is connected to outdoors, make sure the exhaust line is sized correctly. Refer to section **Installation proposal** for details.
- Check if pneumatic valves are actuating by checking the position indicators of the valves.
- Consult your authorized supplier.

Alarm - High working pressure

This alarm is activated when the inlet pressure exceeds 10 bar (145 psi). This Is the maximum design pressure of the generator.

Reduce the inlet pressure.

Alarm - Low Working Pressure

This alarm is activated when the inlet pressure drops below 5 bar (72 psi). This is the minimum working pressure of the generator.

Increase the inlet pressure.

Alarm - High Inlet temperature

This alarm is activated when the inlet temperature exceeds 50 °C (122 °F). This is the maximum inlet temperature of the generator.

Make sure that the inlet temperature does not exceed 50 °C (122 °F).

Alarm - Low Inlet temperature

This alarm is activated when the inlet temperature drops below 5°C (41°C) or below -10°C (14°F) for machines with the low ambient option.

Make sure the inlet temperature does not go below the minimum value.

No outlet pressure

The GEN2-MAX K nitrogen generator features protections against overflow and regulations for guaranteed purity. Because of these features, it is able to shut off the pressure to the outlet by control valves.

If no pressure is available at the outlet, check the protection conditions of the generator:

- Is the generator started up properly? This can be checked by comparing the pressure of the air tank to the pressure of the product tank. The difference in pressure should be less than 0.5 bar (7.25 psi).
- Make sure the nitrogen receiver is able to build up pressure by checking that there are no restrictions in the piping between the generator “to product tank” connection and the product tank. Double check that the connection diameter is corresponding to the installation proposal.
- Check the purity of the produced nitrogen. This parameter is displayed on the main screen. This parameter should be higher than the Minimum Purity setting before pressure will be available on the outlet.

9 Technical data

9.1 Reference conditions

Air pressure at generator inlet	7 bar	102 psi
Ambient temperature (air inlet temperature)	20 °C	68 °F
Air inlet quality	Class [2-4-1] acc. ISO 8573-1:2010	

9.2 Limitations for operation

Inlet air quality (standard)	Class [2-4-1] acc. ISO 8573-1:2010	
Inlet air quality (low ambient option)	Class [2-3-1] acc. ISO 8573-1:2010	
Compressed air inlet pressure, maximal	10 bar	145 psi
Compressed air inlet pressure, minimal	5 bar	72 psi
Compressed air temperature, maximal	50 °C	122 °F
Compressed air temperature, minimal (standard)	5 °C	41 °F
Compressed air temperature, minimal (low ambient option)	-10 °C	14 °F

9.3 Performance data

Outlet flow rate at reference conditions Nm^3/h

If the feed air pressure or temperature deviates from reference conditions, the performance of the nitrogen generator will have to be corrected.

Purity	**GEN2-MAX 5.5K**	**GEN2-MAX 7.5K**	**GEN2-MAX 9.5K**	**GEN2-MAX 12K**	**GEN2-MAX 15K**
95 %	313	393	518	669	820
96 %	284	356	468	605	741
97 %	255	320	420	543	665
98 %	225	283	363	470	575
99 %	184	231	298	385	471
99.500 %	157	198	252	325	398
99.900 %	116	146	180	232	284
99.950 %	88	111	138	178	218
99.990 %	69	86	105	136	167
99.995 %	60	75	94	121	149
99.999 %	46	58	68	87	107

Purity	GEN2-MAX 17K	GEN2-MAX 20K	GEN2-MAX 25K	GEN2-MAX 31K	GEN2-MAX 39K	GEN2-MAX 50K
95 %	970	1187	1421	1780	2258	2871
96 %	876	1073	1284	1608	2040	2594
97 %	787	963	1152	1444	1831	2329
98 %	680	833	997	1249	1584	2014
99 %	557	682	816	1023	1298	1650
99.500 %	471	577	690	865	1097	1395
99.900 %	337	412	493	618	784	996
99.950 %	258	315	377	473	600	762
99.990 %	197	242	289	362	459	584
99.995 %	176	215	258	323	410	521
99.999 %	127	155	186	232	295	375

Flow reference conditions: 20°C, 1000mbar, 0% relative humidity. During testing of the units, the rejection limit is + or – 5 % of the nominal nitrogen flow.

Dimensions and weight

		GEN2-MAX 5.5K	GEN2-MAX 7.5K	GEN2-MAX 9.5K	GEN2-MAX 12K	GEN2-MAX 15K
Width	mm	1830	1830	2296	2380	2496
Length	mm	1700	1700	1846	1846	1846
Height	mm	2055	2370	2620	2633	2620
Weigth	ton	2.4	2.6	3.3	3.9	4.9
Air tank fixed speed / product tank	l	2000	3000	3000	4000	5000
Air tank VSD	l	2000	2000	3000	3000	4000

		GEN2-MAX 17K	GEN2-MAX 20K	GEN2-MAX 25K	GEN2-MAX 31K	GEN2-MAX 39K	GEN2-MAX 50K
Width	mm	2703	2788	2880	3684	3773	3860
Length	mm	2100	2100	2300	3121	3121	3121
Height	mm	3028	3022	3025	3987	4211	4423
Weigth	ton	5.6	6.4	7.3	8.7	10.1	12.3
Air tank fixed speed / product tank	l	6000	8000	10000	12000	16000	20000
Air tank VSD	l	5000	6000	8000	10000	12000	16000

Mechanical connections

		GEN2-MAX 5.5K	GEN2-MAX 7.5K	GEN2-MAX 9.5K	GEN2-MAX 12K	GEN2-MAX 15K
Air inlet	DN	50		80		
	inch	2		3		
To product tank	DN	50		80		
	inch	2		3		
From product tank PCT	DN	40		50		
	inch	1 1/2		2		
From product tank PPM	DN	25		40		
	inch	1		1 1/2		
N2 outlet PCT	DN	50				
	inch	2				
N_2 outlet PPM	DN	25		50		
	inch	1		2		
Waste exhaust	mm	315				

		GEN2-MAX 17K	GEN2-MAX 20K	GEN2-MAX 25K	GEN2-MAX 31K	GEN2-MAX 39K	GEN2-MAX 50K
Air inlet	DN	100			150		
	inch	4			6		
To product tank	DN	80			100		
	inch	3			4		
From product tank PCT	DN	80			100		
	inch	3			4		
From product tank PPM	DN	40			50		
	inch	1 1/2			2		
N2 outlet PCT	DN	80			100		
	inch	3			4		
N_2 outlet PPM	DN	50					
	inch	2					
Waste exhaust	mm	400			600		

9.4 Correction factors

If the inlet pressure and/or ambient temperature differ from the reference data, the nominal performance figures need to be corrected

As a general rule, higher pressures increase the capacity while higher temperatures reduce the capacity. Consult your supplier for more details.

10 Pressure Equipment Directives

Components subject to Pressure Equipment Directive 2014/68/EU

Parts of article 4.3 of PED 2014/68/EU are subject to Sound Engineering Practice (SEP).

Parts of category I according to PED 2014/68/EU are integrated into the machine and fall under the exclusion of article I, section 3.6.

The following tables A and B contain the necessary information for the inspection of all pressure equipment of category I according Pressure Equipment Directive 2014/68/EU and all pressure equipment according the Simple Pressure Vessel Directive 2014/29/EU.

Design criteria for pressure equipment:

Type	Medium	Design pressure [bar]	Vessel volume [L]	PED category
GEN2-MAX 5.5K	AIR	11	460	IV
GEN2-MAX 7.5K	AIR	11	570	IV
GEN2-MAX 9.5K	AIR	11	698	IV
GEN2-MAX 12K	AIR	11	872	IV
GEN2-MAX 15K	AIR	11	1115	IV
GEN2-MAX 17K	AIR	11	1245	IV
GEN2-MAX 20K	AIR	11	1540	IV
GEN2-MAX 25K	AIR	11	1983	IV
GEN2-MAX 31K	AIR	11	2480	IV
GEN2-MAX 39K	AIR	11	3158	IV
GEN2-MAX 50K	AIR	11	3950	IV

Table 2: Table A

Type	Min. design temperature [°C]	Max. design temperature [°C]	Numer of cycles (1)	Wall thickness [mm] (2)
GEN2-MAX 5.5K	-20	80	5,000,000	8
GEN2-MAX 7.5K	-20	80	5,000,000	8
GEN2-MAX 9.5K	-10	80	5,000,000	8
GEN2-MAX 12K	-10	80	5,000,000	8
GEN2-MAX 15K	-10	80	5,000,000	10
GEN2-MAX 17K	-10	80	5,000,000	10
GEN2-MAX 20K	-10	80	5,000,000	10
GEN2-MAX 25K	-10	80	5,000,000	10
GEN2-MAX 31K	-20	80	5,000,000	8
GEN2-MAX 39K	-20	80	5,000,000	10
GEN2-MAX 50K	-20	80	5,000,000	10

Table 3: Table B

(1): The number of cycles refers to the number of cycles from 0 bar(g) to maximum pressure

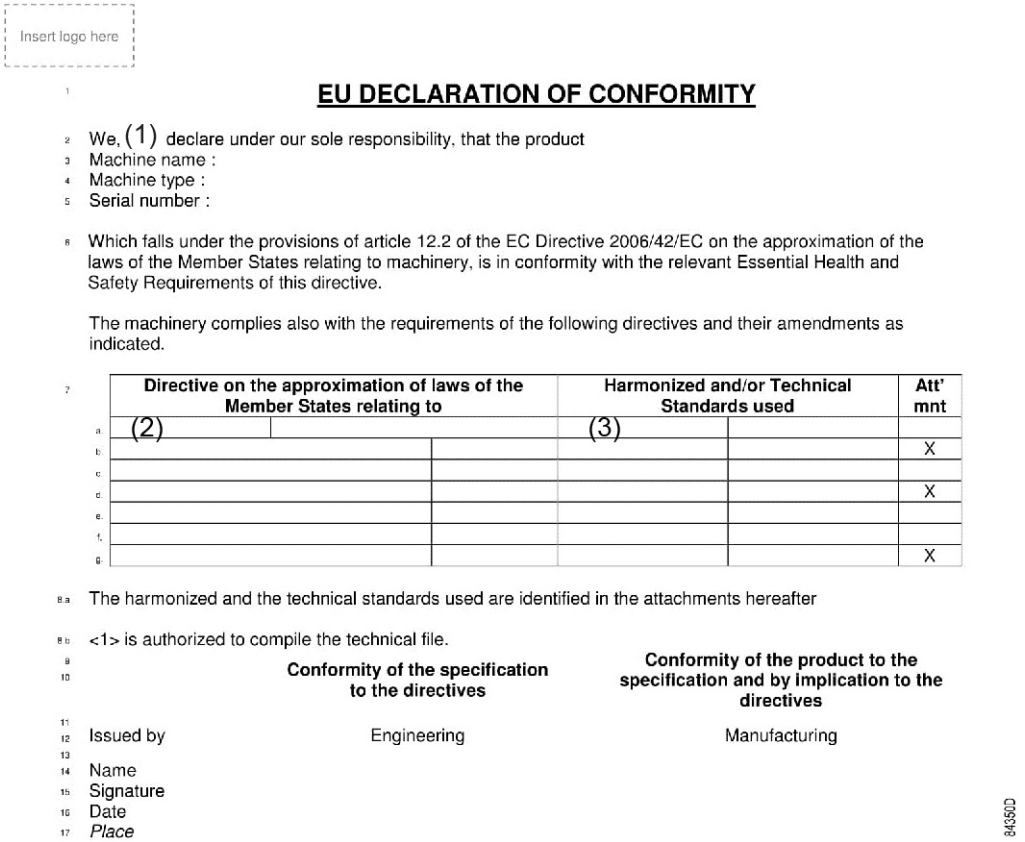
(2): The minimum wall thickness refers to the minimum required thickness according design calculations.

Recommendation of the manufacturer for the re-inspection time

Following actions are to be executed by authorised service personnel, unless stated differently in the applicable legislation. The stated time interval has as reference the day of start-up of the unit.

- Every 6 months: visual check of the vessel (tank) material on the outside (exposed) for traces of strong corrosion. Consult the service department of your supplier if necessary.
- Further re-inspection of the pressurized components should be carried out according to the local regulations. Contact your Notified Body for more information.

11 Declaration of conformity



Insert logo here

EU DECLARATION OF CONFORMITY

We, (1) declare under our sole responsibility, that the product
Machine name :
Machine type :
Serial number :

Which falls under the provisions of article 12.2 of the EC Directive 2006/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with the relevant Essential Health and Safety Requirements of this directive.

The machinery complies also with the requirements of the following directives and their amendments as indicated.

	Directive on the approximation of laws of the Member States relating to		Harmonized and/or Technical Standards used		Att' mnt
a.	(2)		(3)		
b.					X
c.					
d.					X
e.					
f.					
g.					X

The harmonized and the technical standards used are identified in the attachments hereafter

<1> is authorized to compile the technical file.

	Conformity of the specification to the directives	Conformity of the product to the specification and by implication to the directives
Issued by	Engineering	Manufacturing
Name		
Signature		
Date		
Place		

843500

Figure 9: Typical example of a Declaration of Conformity document

(1)	Contact address: C. ARIA C. S.R.L. Via Soastene 34 Brendola (VI) CAP 36040 Italy
(2)	Applicable directives
(3)	Standards used

On the Declaration of Conformity / Declaration by the Manufacturer, the harmonized and/or other standards that have been used for the design are shown and/or referred to.

The Declaration of Conformity / Declaration by the Manufacturer is part of the documentation that is supplied with this device.

Experience. Customer. Service.

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