



## O-GEN series PSA Oxygen Generators with OGC controller



Please read the following instructions carefully before installing the product. Trouble free and safe operating of the product can only be guaranteed if recommendations and conditions stated in this manual are respected.

Rev.:2.4



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## 1 General information

### 1.1 Device information

Oxygen generator model:

Serial number:

Year of production:

Commissioning date:

Type of towers:

Left tower serial number:

Right tower serial number:

Please fill in the fields accordingly. Correct information enables proper and efficient maintenance of the device, selection of spare parts and technical support.

### 1.2 Supplier information

Name:

Address:

Telephone/Fax:

E-mail:

### 1.3 Basics

The O-GEN oxygen generators extract the available oxygen in the ambient air from the other gases by applying the Pressure Swing Adsorption (PSA) technology. During the PSA process compressed, cleaned ambient air is led to a molecular sieve bed, which allows the oxygen to pass through as a product gas, but adsorbs other gases. The sieve releases the adsorbed gases to the atmosphere, when the outlet valve is closed and the bed pressure returns to ambient pressure. Subsequently the bed will be purged with oxygen before fresh compressed air will enter for a new production cycle. In order to guarantee a constant product flow O-GEN oxygen generator use two molecular sieve beds, which alternatively switch between the adsorption and the regeneration phase.

### 1.4 Oxygen generators application

Typical applications for the oxygen generators are:

- Pharmaceuticals
- UV-Curing of Coatings
- Food processing
- Fish farms
- Glass production
- Water treatment

The most common oxygen generators are PSA oxygen generators due to their simplicity, reliability and relatively low investment costs.

### 1.5 Adsorption

Adsorption is a process where specific molecules adhere to the surface of a highly porous solid (adsorbent/desiccant) by electrostatic and molecular forces. The adsorbent is normally formed in sphere form beads. Process of adsorption takes place while air flows through column filled with the beads. Rate of adsorption depends on several factors (type of adsorbent, relative humidity, inlet temperature, contact time, face velocity) and therefore adsorption process is usually set/optimized for every individual application.

## 1.6 Appropriate use



O-GEN series oxygen generators are intended for highly efficient preparation of top quality oxygen. This appliance must be used only for the purpose for which it was specifically designed. All other uses are to be considered incorrect.

Warning: internal corrosion can seriously reduce the safety of installation: check it during maintenance.

The manufacturer will under no circumstances be responsible for any damage resulting from improper, incorrect or unreasonable use.

Use genuine spare parts only. Any damage or malfunction caused by the use of non-genuine parts is not covered by Warranty or Product Liability.

## 2 Safety instructions



Improper handling of compressed air systems/equipment and electric installations/equipment may result in a serious injury or death.



Improper handling (transportation, installation, use/operation, maintenance) of O-GEN series oxygen generator may result in serious injury or death. As a result of improper handling damage or reduced performance can occur.



The relevant safety at work and accident prevention regulations, plus operating instructions, shall apply for operating the oxygen generator. The oxygen generator has been designed in accordance with the generally recognized rules of engineering. It complies with the requirements of directive 97/23/EC concerning pressure equipment.



Ensure that installation complies with local laws for operation and routine testing of pressure equipment at the place of installation.



Operator/user of the oxygen generator should make himself familiar with the function, installation and start-up of the unit.

All the safety information is always intended to ensure your personal safety. If you are not experienced in such systems please contact your local representative or manufacturer of the generator for help.

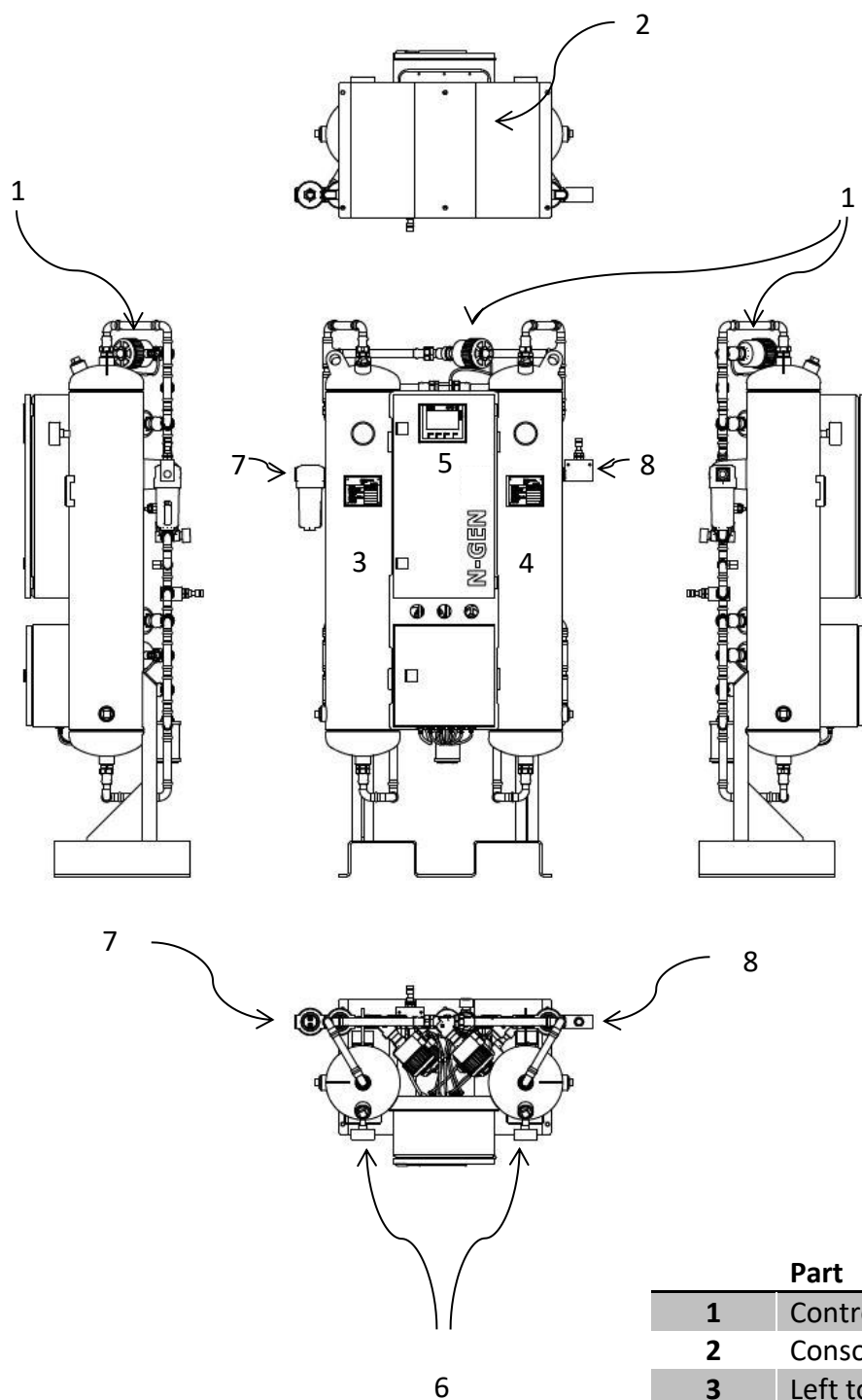
- Before any kind of work on the generator make sure that it is depressurized (in addition to the generator this also refers to the nearest upstream and downstream part of the installation) and disconnected from power supply.
- Do not exceed maximum operating pressure or operating temperature range (see the technical data in this manual or the data sheet).
- The permissible working temperatures and pressures for the oxygen generator add-on parts are given under technical data for those add-ons. Maximum temperature and pressure for assembled system is the lowest of any individual part.
- It is necessary to ensure that the oxygen generator is equipped with the corresponding safety and test devices to prevent the permissible operating parameters from being exceeded.
- Ensure that the oxygen generator is not subject to vibrations that could cause fatigue fractures.
- Oxygen generator is not to be subjected to mechanical stresses.
- The medium used may not have any corrosive components that could attack the materials of the oxygen generator in a way that is not permitted. Do not use the oxygen generator in hazardous areas with potentially explosive atmospheres.
- All installation and maintenance work on the oxygen generator may only be carried out by trained and experienced specialists.
- It is forbidden to carry out any kind of work on the oxygen generator, including welding and constructional changes, etc.
- Depressurize the system before carrying out the installation work.
- Wear respiratory protective equipment when working with the molecular sieve. Molecular sieve is a crumbling material that is producing fine dust which can cause respiratory complications if inhaled in sufficient quantities.
- Ensure that the molecular sieve does not come into contact with the liquid water. Unused molecular sieve in liquid water produces thermal energy that can cause the water to boil and can inflict serious burns.

- At manipulation with adsorbent some amount of adsorbent can stay on the floor. In case of adsorbent on the floor be extremely careful and immediately clean the floor to prevent injuries due to the fall on the slippery surface.
- Ensure that the oxygen generator is installed as specified and without any stresses.
- Use the original spare parts only.
- Use the device for the intended purpose only.
- Centre of gravity is positioned relatively high meaning there is a risk of tilting the oxygen generator, which can cause serious injury or even death.
- For transportation please check and follow local regulations for lifting and transporting heavy objects.
- Do not climb on the oxygen generator.
- Do not use water to extinguish fire on the generator or surrounding objects.
- Wear proper personal safety equipment (earplugs, earmuffs, safety goggles, safety helmet, safety gloves, safety shoes etc.).



### 3 Technical data

#### 3.1 Components



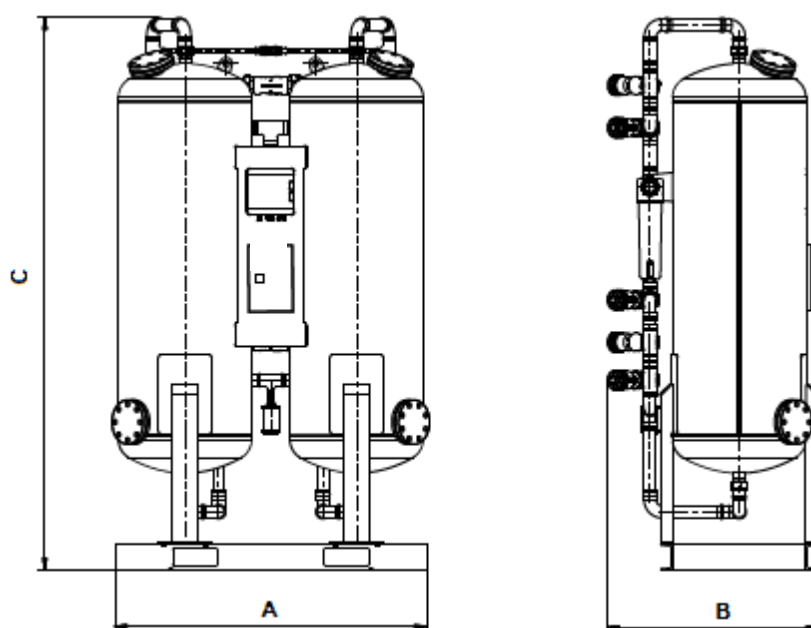
**Note:** The oxygen generator displayed on the pictures of this manual is O-GEN 10 oxygen generator.

Part	
1	Control valves
2	Console
3	Left tower
4	Right tower
5	Electrical cabinet
6	Pressure indicator
7	Inlet
8	Outlet

### 3.2 Physical characteristics

MODEL	CONNECTION [inch]		DIMENSIONS [mm]			WEIGHT [kg]
	IN	OUT	A	B	C	
O-GEN 1	½"	½"	1126	550	1760	191
O-GEN 2	½"	½"	1100	550	1646,6	230
O-GEN 3	½"	½"	1102	550	1779	300
O-GEN 4	½"	½"	1073	550	1942	330
O-GEN 5	½"	½"	1240	760	2068	580
O-GEN 6	½"	½"	1370	760	2081	615
O-GEN 8	½"	½"	1370	760	2092	715
O-GEN 10	1"	½"	1446	760	2140	875
O-GEN 13	2"	½"	1728	860	2204	1175
O-GEN 16	2"	½"	1736	860	2354	1255
O-GEN 20	2"	½"	1801	910	2226	1465
O-GEN 23	2"	½"	1820	1010	2266	1670
O-GEN 29	2"	½"	1932	1010	2269	1935
O-GEN 35	2"	1"	2070	1180	2387	2545
O-GEN 44	2"	1"	2293	1325	2390	3020
O-GEN 50	2"	1"	2603	1425	2496	4085
O-GEN 57	2"	1"	2603	1425	2546	4185
O-GEN 64	2"	1"	2815	1630	2514	4780
O-GEN 75	2"	1"	2603	1425	2546	4600
O-GEN 84	2"	1"	3070	1675	2535	6500
O-GEN 100	DN65	DN40	3100	1690	2885	6850

Inlet temperature range	10 to 55°C	50 to 131°F
Operating pressure	5-6 barg	72,5 - 87 psi
Atmospheric dew-point	<-60°C	<-76°F
Compressed air quality (inlet)	Class 1.4.1 acc. to ISO 8573-1 (0,1um; 3°C; <0,01mg/m3/h)	Compressed air quality (inlet)
Sound level	80dB(A)	Sound level
Filters (inlet + outlet)	Included	Filters (inlet + outlet)



## MATERIALS

Columns, construction, support	Carbon Steel
Column inner protection	/
Column and construction protection	Epoxy powder painted
Valves	Brass, Stainless steel
Adsorbent	Molecular sieve 13X type and inert material
Fittings, screws, plugs	INOX, brass, steel (zinc coated)
Outside protection	Epoxy powder painted

## 3.3 Electrical characteristics

Supply voltage	110–230 V
Supply frequency	50 – 60 Hz
Power consumption	<60 W
Stand-by contact	Normally open voltage free
Protection class (controller)	IP 54

## 4 Description of operation

Oxygen generators are intended for oxygen production from compressed inlet air. In order to reach a desired purity and flow the oxygen generator should be properly dimensioned and constructed.

During normal operation, the oxygen generator compressed air enters the oxygen generator and passes through the appropriate inlet flow and pressure regulator into a tower, where the process of adsorption is in progress. In the tower the air passes a molecular sieve which bind nitrogen, water vapour and carbon dioxide. Through the process of adsorption, dried clean oxygen leaves the generator through the outlet.

A process of regeneration is underway in the second tower so a small amount of produced oxygen is lead through a nozzle into the tower where the regeneration/desorption is in progress. There oxygen after leaving the nozzle expands and passes the molecular sieve. Through the process of desorption mixture of gases gets released from the molecular sieve. The mixture is then carried by the oxygen through an appropriate release control valve and discharged in the atmosphere.

After a predefined time, the adsorption in the first tower is stopped and the control valves pressurises both towers and starts the adsorption in second tower and regeneration in the first tower.

O-GEN oxygen generators have a factory pre-set adsorption time adjusted to the operating conditions specified by the costumer to ensure the optimal operation. \*

If the compressed air station shuts down, a stand-by signal is received and the generator goes in standby mode closing both inlet and outlet control valves. Also, if the oxygen generator gets disconnected from the power supply, control valves are closed so the air cannot flow through the towers to the outlet. After the start signal is received or power returns the oxygen generator starts with production again.

\* For more information contact your supplier.

## 5 Controller (OGC 1.0)

The O-GEN oxygen generator series controller in combination with tower pressure manometers, pressure sensor, oxygen purity sensor\*, temperature sensor\*, dew-point sensor\* and flow sensor\* enables complete monitoring of the oxygen generator operation. The standard controller includes a PLC with a display interface with buttons and three additional signal lights that enables the technical expert to examine/change states and operating parameters of the system. Typically, information such as operating mode and pressure are displayed on the main screen. Additionally, the controller has different input and output functions. Pressing ↓ and ↑, **OK** or **ESC** in the cabinet PLC allows the operator to move through the menu and see or change setting relevant to proper function of the generator.



*Picture of the electrical cabinet with signal lights*

## 5.1 PLC Status Screen

To access the controller interface, the electrical cabinet housing must be opened. The interface on the PLC block has four buttons and can display the information in six lines. To move through the menu, press the up and down buttons.

The first screen shows the system status. At the start-up of the generator the controller is in initialising mode. This phase lasts just a few seconds.

		I	N	I	T	I	A	L	I	S	I	N	G		

The O-GEN oxygen generator has four states: Standby, Pressure building, Adsorption and Equalization.

When the O-GEN oxygen generator is in the PRESSURE BUILDING MODE it is operating with one inlet and one purge valve in OPEN position, outlet valve is CLOSED.

A	D	S											R	E	G
				5	.	6	5		b	a	r				
			P	-	B	U	I	L	D	I	N	G			
		L	E	F	T		C	O	L	U	M	N			
				0	0	:	0	6	m						

After a predetermined time one of the outlet valves OPENS and the oxygen starts flowing to the oxygen pressure vessel. This is ADSORPTION MODE.

A	D	S											R	E	G
				5	.	6	5		b	a	r				
			A	D	S	O	R	P	T	I	O	N			
					0	0	:	3	0	m					

After the ADSORPTION cycle is finished, the generator switches to EQUALIZATION MODE.

						E	Q	U							
				5	.	6	5		b	a	r				
		E	Q	U	A	L	I	Z	A	T	I	O	N		
					0	0	:	0	2	m					

After trough several operating cycles if oxygen demand is reduced or one or more conditions are not met (page 18), the SWITCHING TO STANDBY screen activates:

S	W	I	T	C	H	I	N	G		T	O		S	T	A	N	D	B	Y
C	o	m	p	r	e	s	s	o	r										
s	i	g	n	a	l	:	O	F	F										
S	y	s	t	e	m														
s	t	a	r	t	:	O	N												

With the screen active and after the cycle finishes, two possible screens can be activated:

1. If oxygen demand is reduced and Standby pressure is reached, the STANDBY PRESSURE REACHED screen becomes active and the adsorption-regeneration cycles are stopped for as long as the Standby pressure doesn't drop below the set pressure hysteresis.

S	T	A	N	D	B	Y		P	R	E	S	S	U	R	E		R	E	A	C	H	E	D
C	o	m	p	r	e	s	s	o	r														
s	i	g	n	a	l	:	O	N															
S	y	s	t	e	m																		
s	t	a	r	t	:	O	N																

2. When one or more of the three conditions below are not met, the O-GEN oxygen generator is in STANDBY mode, the adsorption-regeneration cycles are stopped for as long as the STANDBY screen is active. STANDBY screen (depicted below) is active if compressor signal is not connected to terminal 15 on terminal block (see electrical scheme).

				S	T	A	N	D	B	Y									
C	o	m	p	r	e	s	s	o	r										
s	i	g	n	a	l	:	O	F	F										
S	y	s	t	e	m														
s	t	a	r	t	:	O	N												

- Generator is manually stopped by pressing the Start/stop button on HMI or ESC+↑  
(System start: OFF)

T	o		S	T	O	P		t	h	e					
n	i	t	r	o	g	e	n								
g	e	n	e	r	a	t	o	r		p	r	e	s	s	
E	S	C	+	▲	!										

- If Pressure sensor is not connected between terminals 1 and 14 ("Connect pressure sensor" screen becomes active)

"Connect pressure sensor" screen is depicted below.

C	o	n	n	e	c	t		p	r	e	s	s	u	r	e
s	e	n	s	o	r		t	o		s	t	a	r	t	
t	h	e		g	e	n	e	r	a	t	o	r	!		
S	e	n	s	o	r		v	o	l	t	a	g	e	:	
1	.	6	0	V	!										

Sensor voltage must be higher than 1.8V!

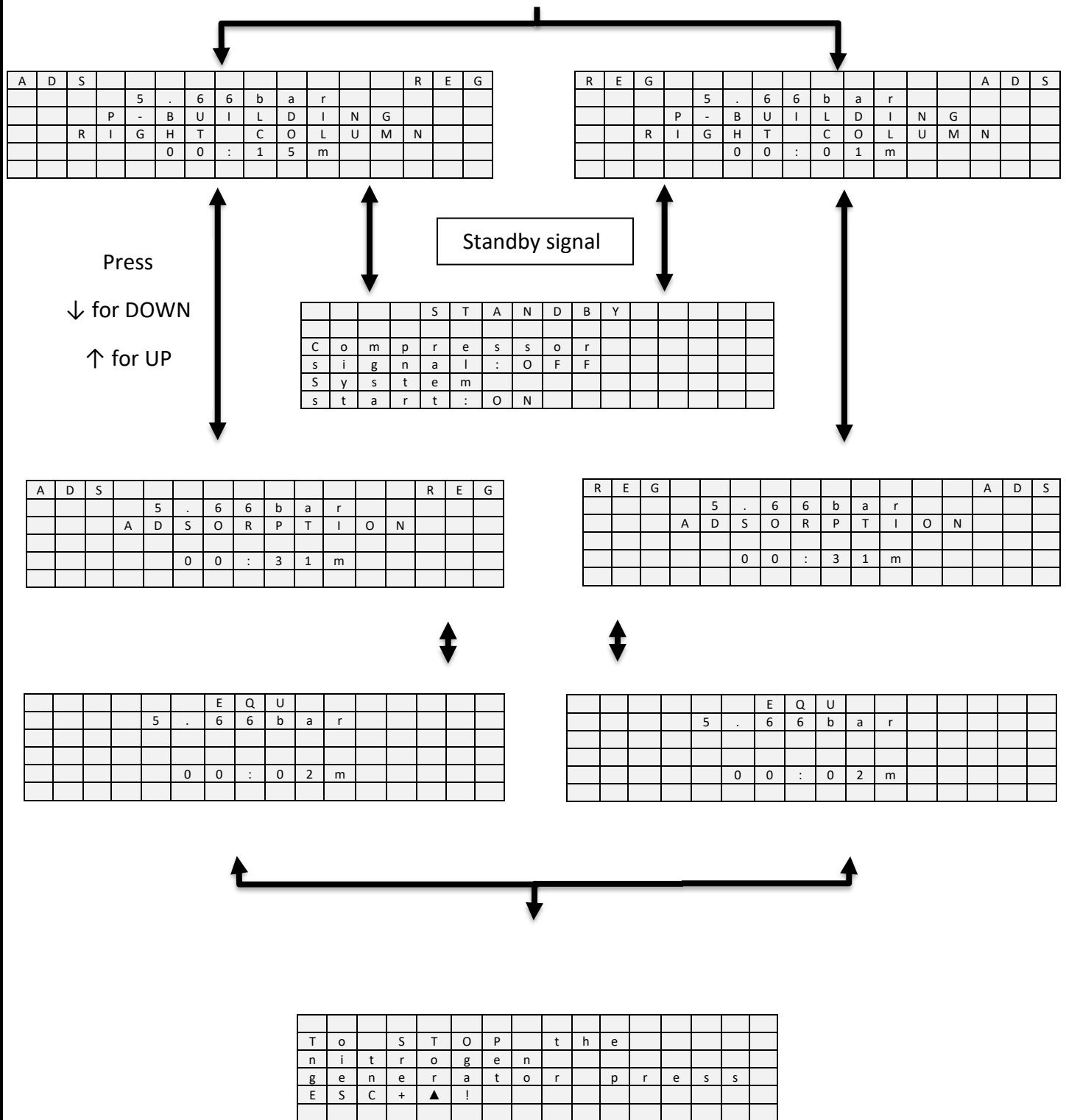
## 5.2 Working hours counter

Working hours and cycles screen displays the total working hours of the oxygen generator and the total number of adsorption-regeneration cycles. One adsorption-regeneration cycle consists of two adsorption-regeneration half-cycles.

W	O	R	K		H	O	U	R	S						
1	2														
C	Y	C	L	E	S										
3	4	4													



## 5.3 LCD Diagram



↓



W	O	R	K		H	O	U	R	S					
1	2													
C	Y	C	L	E	S									
3	4	4												

*						P	U	R	I	T	Y			
						1	0	0	p	p	m			

↓



*														
					D	E	W		P	O	I	N	T	
					-	4	0	°C	d	t				

↓

*							F	L	O	W				
						1	1	0	m	3	/	h		

\*Optional

## 5.4 Data Logging

Siemens LOGO! PLC has the ability to collect data about the generator operation. The logger collects the data every 10 s. The data collected includes:

- Digital inputs
- Digital outputs
- Analog input values

The controller itself has a limited storage capability. To collect the data correctly for extended periods of time it is recommended to use a Micro SD card. After the microSD card has been inserted in the microSD card slot the log data will begin to be logged/recoded on the microSD card.

The collected data can be analysed by removing the Micro SD card from the controller and inserting it into a computer. The data log can be also uploaded to the computer over Ethernet connection.



## 5.5 Remote Access

It is possible to monitor the generator with Siemens LOGO! PLC through the “LOGO! Web server” application via web browser (Internet Explorer, Chrome, Mozilla) or “LOGO! App” mobile application. The mobile application can be downloaded from Siemens webpage and most mobile app stores.

It is recommended that the generator is connected to a work network with a firewall to prevent unauthorized access. The Ethernet/UTP port can be accessed from the inside of the controller housing.

Reserve a static IP address for the generator and set the IP in the controller settings.

Press ↓ until you get to the last screen and then press ESC to enter the settings.

S	t	o	p												
P	r	o	g	r	a	m									>
S	e	t	u	p											>
N	e	t	w	o	r	k									>
D	i	a	g	n	o	s	t	i	c	s					>

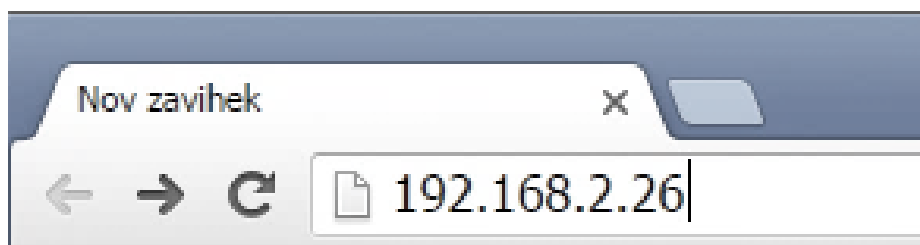
Select **Network** and press **OK**.

I	P		A	d	d	r	e	s	s						


Press **OK**. Set the IP address, Subnet Mask and Gateway. The address below is an example.

I	P		A	d	d	r	e	s	s						
1	9	2	.	1	6	8	.	0	0	2	.	0	2	6	
S	u	b	n	e	t		M	a	s	k					
2	5	5	.	2	5	5	.	2	5	5	.	0	0	0	
G	a	t	e	w	a	y									
1	9	2	.	1	6	8	.	0	0	2	.	0	0	1	

Open your web browser and enter the IP:



Enter the password and you will get access to the controller interface.



Log on

---

Name

Password

Language

☐ Keep me logged on

SIEMENS
LOGO!

Web User  
Log off

- LOGO! System
- LOGO! Variable
- LOGO! BM
- LOGO! TD



## 5.7 Stand-by

O-GEN series oxygen generators must receive a run/standby control signal from a compressor. To implement this the correct terminal has to be connected to the appropriate control signal from the compressor. For this purpose, additional cable glands are available on the electrical cabinet. For the appropriate control voltage levels consult the chart below.

O-GEN STATUS	VOLTAGE LEVEL
STAND-BY MODE	< 5 VDC (logic state 0)
NORMAL OPERATION	> 12 VDC (logic state 1)

If the run/standby signal is received by the compressor controller the status screen changes accordingly. All other screens remain unaffected. The O-GEN oxygen generator series always finishes the regeneration cycle upon receiving the run/standby signal and then go into STANDBY mode.

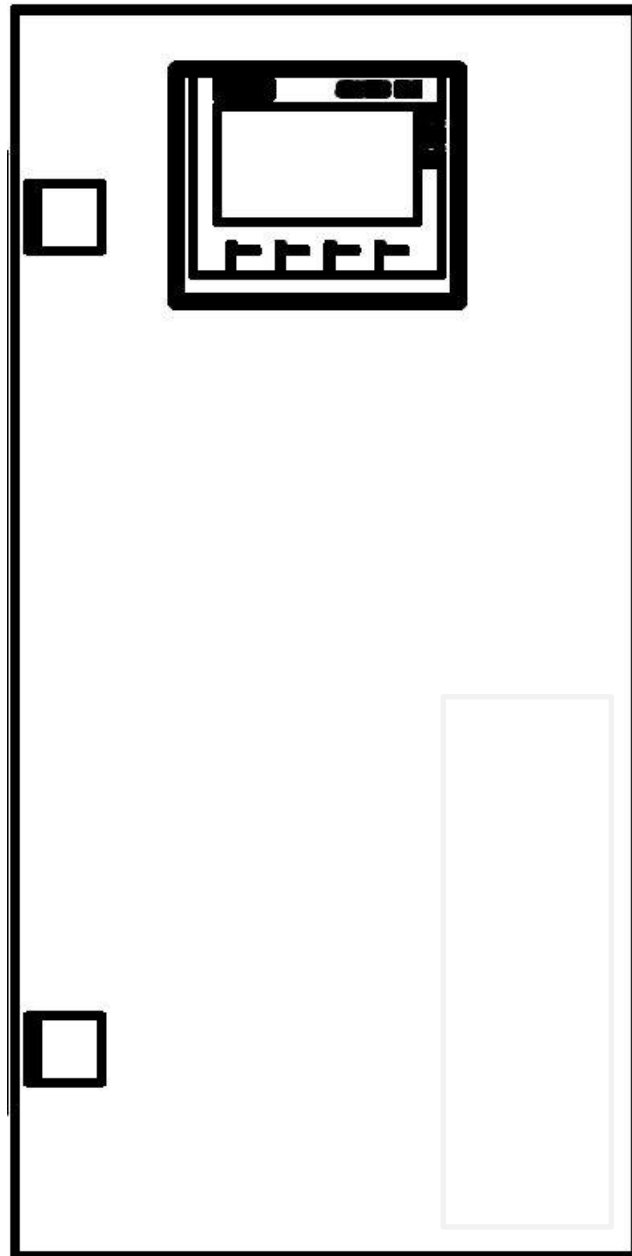
## 5.8 Resetting maintenance hours on OGC 1.0

For resetting service hours on OGC 1.0 you have two options:

- Push and hold button for maintenance [orange button] for five seconds than press OK (green button) on LOGO controller.
- Push and hold right arrow + ESC on LOGO plc for 5 second, then press OK (green button) on LOGO controller.

## 5.9 \*HMI Status Screen (\* OGC 2.0)

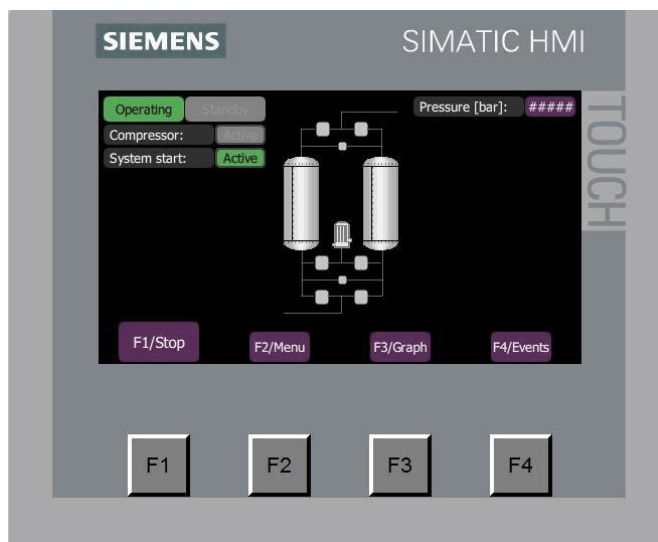
The HMI interface has four buttons (F1-F4) and can display the information on a 4" touch screen display. To move between different screens, press the F2/Menu button on any screen or press dedicated button for Graph and Events. The interface consists of 3 menu screens, a Graph screen and Event screen.



*Picture of the electrical cabinet with HMI*

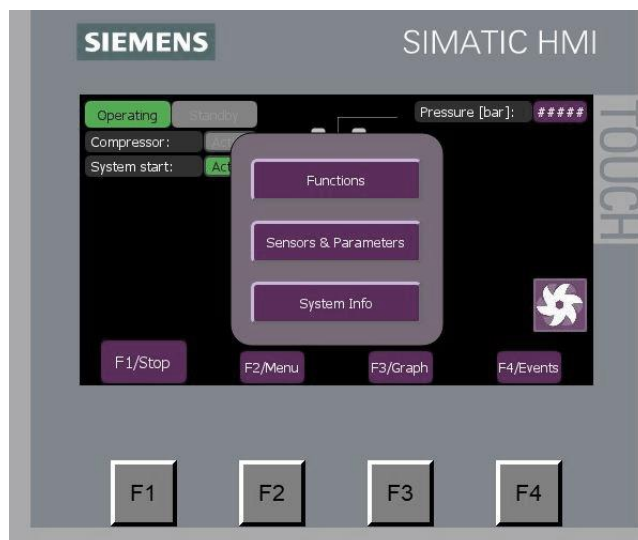
## 5.9.1 Screens

The Main screen shows the system status. At the start-up of the generator the Main screen is activated by default after 5 seconds:



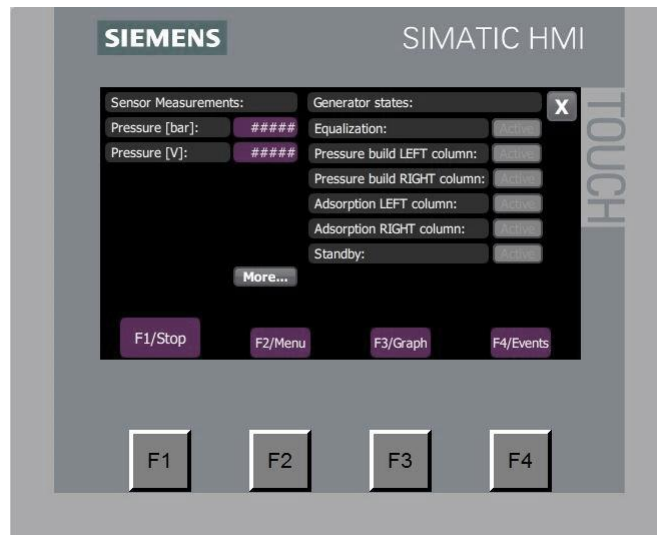
On the upper left corner, it shows the system status – operating or standby mode. In window below it shows if the compressor signal is active and if the system is started or stopped (via F1 button). In next window one of the three states is displayed: Pressure building, Adsorption or Equalization.

On the right upper corner several different sensor values displayed – this depends on connected / enabled sensors. If the F2 / Menu button is pressed, a dialogue shows up and you can choose from three options – Functions, Sensor & Parameters and System info.

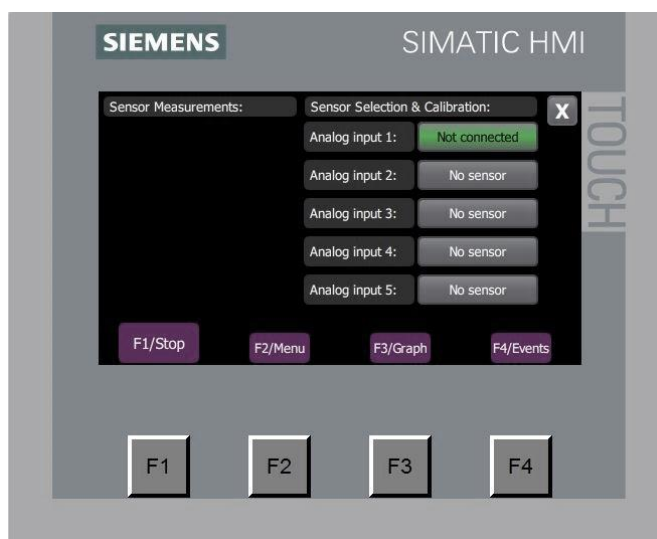




The picture below shows Sensors & Parameter screen:



On the left we have sensor values in predefined units (% , Nm<sup>3</sup>/h, ...) and sensor voltage output. On the right we see in what state the generator is in a specific moment. If the “More...” button is pressed, the following screen is displayed



Under the section Sensor Measurements are still displayed predefined sensor values and voltages. On this screen under Sensor Selection & Calibration you can see and select what type of sensors are connected. Also, there is a sensor calibration option (see screen below), where you can adjust sensor values. This option is only available to authorized personnel. With the correct access password it is possible to set the pressure hysteresis for standby operation, located under Analog input 1 (see picture below). For higher level adjustments please consult the Service manual.



The picture below shows the Info screen:



It consists of three sections:

- System Info
- System Date and Time and
- Information about installed software.

System Date and Time shows the current date and time and how many cycles the generator went through since start. Installed software is for knowing if the installed software is the latest.

### 5.8.2 Access management

There are three levels of access and three different passwords for:

- Monitor
- Operator and
- Factory.

The first two are costumer related, Factory is only for our service department. For password related question please contact our R&D department.

### 5.9.3 Resetting maintenance hours on OGC 2.0

If it is OGC 2.0 (HMI visualisation) you have two options:

- Click on service button, then click on OK (green button) on LOGO plc
- Push and hold right arrow + ESC on LOGO plc for 5 seconds and then press OK (green button) on LOGO plc

## 6 Efficiency considerations

Efficiency of the oxygen generator is primarily dependant on the length of the adsorption cycle time (see **Description of operation**) and the nozzle dimensions.

To ensure the most efficient and economical operation of the oxygen generator O-GEN series generators are supplied in a wide selection of pre-set controller modes and nozzles that correspond to the varying operating conditions specified by the costumers.

Nozzle dimensions and adsorption cycle time are determined by physical characteristics of the adsorption and desorption processes in given operating conditions. If you want to use the oxygen generator in a different system configuration or the operating conditions have changed, it is recommended that you contact your supplier for the technical counselling.

It is helpful if you can provide the following information:

- Operating pressure
- Volumetric flow
- Ambient temperature
- Inlet compressed air temperature
- Inlet compressed air dew point

## 7 Transportation

The oxygen generator should be delivered wrapped in protective foil and covered with wooden panels. Safety signs regarding shipping are either painted on the cover or attached printed on a sticker.

It is important not to stack items on top of the wooden crate since it only serves to protective purposes.

Lifting lugs on tanks (columns) are only for handling of the tank, if they are detached from the generator. The generator shouldn't be lifted by the lifting lugs on columns or by the pipes but rather by the skid. Lifting should be done by a trained operator.



- Transportation should be done by appropriately qualified personnel.
- For transportation please check and follow local regulations for lifting and transportation of heavy cargo.
- Provide adequate lifting and transportation equipment.
- Centre of gravity in a vertical position is positioned relatively high resulting in a heightened risk of toppling the dryer due to tilting, which can cause serious injury or even death.
- In case where the generator is firmly attached to the standard pallet it can be lifted by a forklift.



**Do not under any circumstance use generator piping installation for lifting or stabilizing purpose.**

Oxygen generator could be damaged during transportation. Putting a damaged oxygen generator into operation can result in injury or death! Check the oxygen generator for any visible damage after removing the packaging. If the oxygen generator is damaged contact the transportation contractor and supplier. A damaged oxygen generator should not be put into operation!

**Omega Air is not liable for losses or damages caused during shipment.**

Check all fittings and connections for leakages. During transportation, connections may have become unfixed and need to be retightened. Therefore, the customer must realize the retightening.

## 8 Storage

The purpose of the following procedures is to ensure protection against corrosive or other damage during storage time. If equipment is stored in an inappropriate environment, it should be left to stabilize after it is moved to an environment which is appropriate. Otherwise, there is a risk of condense and a potential failure of the equipment.

To prevent damage to the oxygen generator during storage make sure that the following requirements are fulfilled:

- Generator can only be stored at a dry and clean indoor location.
- During storage ambient temperature must not exceed 1.5°C – 66°C range. For other storage temperatures please contact the manufacturer.
- Make sure that the inlet and the outlet to the generator are closed with a plug.

In case you intend to store the oxygen generator, which has been in operation follow the procedure specified below:

- Close the outlet valve.
- Leave the oxygen generator operate for a while (few cycles).
- Close the inlet valve.
- Decommission the dryer.
- Depressurize the dryer. The dryer should get fully depressurized in one cycle.
- Disconnect the dryer from electric power supply.
- Disconnect the dryer from piping installation.
- Close inlet and outlet of the dryer with plugs.
- Use appropriate cover to protect the dryer from the dust.

## 9 Installation

### 9.1 Initial inspection

Oxygen generator could be damaged during transportation. Putting a damaged oxygen generator into operation can result in injury or death! Check the oxygen generator for any visible damage after removing the packaging. If the oxygen generator is damaged contact the transportation contractor and supplier. Damaged oxygen generator should not be put into operation!

### 9.2 General installation requirements

O-GEN series oxygen generator is designed to be installed in a place that meets the following requirements:

- Indoor installation (clean and dry)
- Non aggressive atmosphere
- Well ventilated
- Ambient temperature 5°C to 45°C
- Non explosive environment (Standard version DOES NOT COMPLY WITH ATEX)
- Vibration free installation (refers to floor and piping)

Compressed air which is supplied to the O-GEN series needs to meet the following minimum requirements:

- Filtration grade: Class 1.4.1 as per ISO 8573-1:2010
- Temperature: min. +5°C / max + 40 °C
- Free from aggressive substances

Feed air quality is essential for correct functioning of your O-GEN oxygen generator series. Please ensure filter cartridges replacement according to the intervals indicated in the maintenance table.

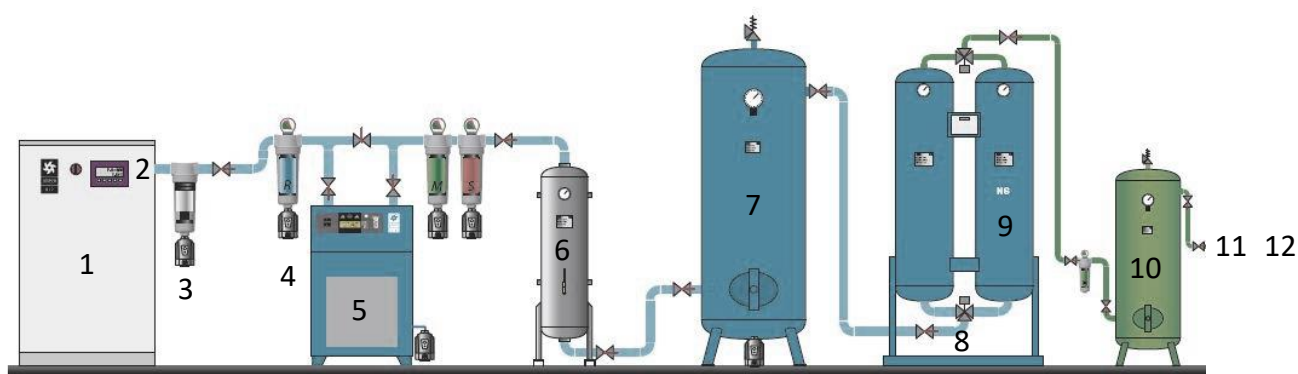
Manufacturer recommends use of oil free air compressor to ensure maximum quality of delivered compressed air. If use of oil free compressor is not possible, an oil lubricated air compressor may be used. The oil content in compressed air should not exceed 0,01 mg/m<sup>3</sup>. In this case the use of activated carbon filter or even better activated carbon tower is necessary.

### 9.3 Installation layout

Below is the most common installation layout for oxygen generator. The scheme specified bellow is not obligatory but only provided as an example. Different arrangement of certain components is always possible.

1. Compressor
2. Aftercooler
3. Cyclone separator with Automatic condensate drain
4. Pre-filter (e.g. 3  $\mu\text{m}$ )
5. Refrigeration dryer
6. Active carbon tower
7. Pressure vessel
8. Fine filter (e.g. 0,1  $\mu\text{m}$ )
9. Oxygen generator
10. Oxygen pressure vessel with pressure sensor
11. Outlet with flow regulator
12. End user

Suggested layout:





## 9.4 Installation

- Oxygen generator should be installed in such a way that it is protected from environmental influences (compressor station).
- Well ventilated.
- Ambient temperature between 5°C and 45°C.
- Install the generator in the area where people are normally not present because of noise emissions.
- Make sure that the oxygen generator is protected against vibrations and other mechanical stress.
- Oxygen generator should stand firmly on the horizontal surface. The inclination of the unit must not exceed  $\pm 5^\circ$ . If system is not installed correctly it could not be working properly. Best way to achieve this requirement is by screwing the oxygen generator to such a surface through the appropriate openings on consoles.
- It is recommended to include shut-off valve with removable coupling at the air inlet and outlet for easier maintenance.
- Additionally check that upstream from the generator sufficient air treatment is provided (e.g. aftercooler, cyclone separator, filter, condensate drains ...).
- Remove caps/plugs from the inlet and the outlet of the generator.
- Connect the air supply to the inlet of the generator.
- Connect the downstream piping line to the outlet of the filter.
- Connect the pressure sensor to appropriate electrical terminals and to the oxygen vessel.
- Connect sensor tube from oxygen vessel to O2 SENSOR IN in the pneumatic cabinet.
- Connect voltage free signal from air compressor.
- Connection to electric power should be done by a qualified expert. Make sure the voltage and the frequency on the mains correspond to the data on the type plate of the generator. ( $\pm 5\%$  tolerance is acceptable for voltage)
- Connect electric cable to power terminals. It is obligatory to provide connection to the ground terminal.
- After the installation or maintenance, the O-GEN oxygen generator must be checked for leakage.
- Regulate the operating pressure so it matches with the specified operating pressure value.
- During normal operation loud noise (depending on the generator size up to 75 dB) can be generated. Persons responsible for installation and the end user are responsible for correct installation of the generator in order to prevent excessive noise emissions to the work environment. The installer and the operator are also responsible to install the proper safety signs at the installation site.
- Remove any packaging and other material which could obstruct the normal operation of the generator.

In case an air compressor, dryer and generator are included scope in supply, please consult the separate user manuals of this equipment for the dimensioning of sufficient forced ventilation system in order to avoid an excessive heat accumulation in the installation room.

## 10 Commissioning

### 10.1 Start-up

After the installation the O-GEN series start-up procedure can be initiated.

Follow the start-up procedure:

- Visually re-check the installation.
- Re-check the valves in pneumatic cabinet (some of them could be forced), unforce them.
- Make certain that the shut-off inlet valve is opened (installation recommended).
- Make certain that the shut-off outlet valve is opened (installation recommended).
- Listen for any leaking sound / perform gas leakage test with leak-detection soap.
- Make certain the oxygen vessel outlet valve is closed.
- Turn on the electrical power source (main switch) or simply plug in the O-GEN generator.
- Generator should start producing oxygen.
- After reaching target oxygen pressure, vent the vessel to 4 bar (assure the place is well ventilated).
- Repeat previous step around five times!
- Open oxygen outlet vessel valve.
- Pre-set purity is reached after continuous operation at working conditions and nominal flow in a couple of hours.

Purge gas from O-GEN oxygen generator contains increased oxygen concentration. Installation site must be sufficiently ventilated and air exchange rate must be at least four times the overall consumption of the O-GEN oxygen generator.

## 11 Decommissioning

To decommission O-GEN oxygen generator follow the decommissioning procedure:

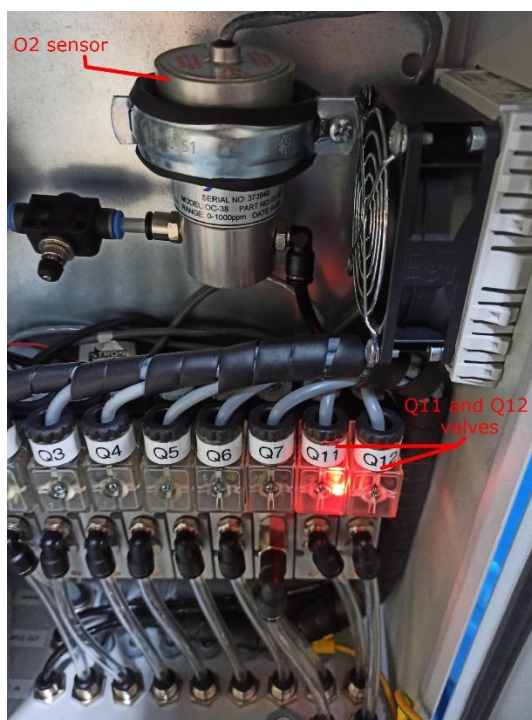
- Close shut-off outlet valve from the generator.
- Disconnect the compressor signal from the electrical cabinet.
- Wait for the generator to go into Standby.
- Proceed with the depressurization.
- Make sure that the generator is depressurized by inspecting the manometers on the upper side.
- If there is still pressure present repeat depressurization step.
- Close the shut-off inlet valve to the generator.
- Disconnect the generator from electric power supply.
- To protect the adsorbent during storage, seal the inlet and the outlet of the generator.

## 12 Additional equipment

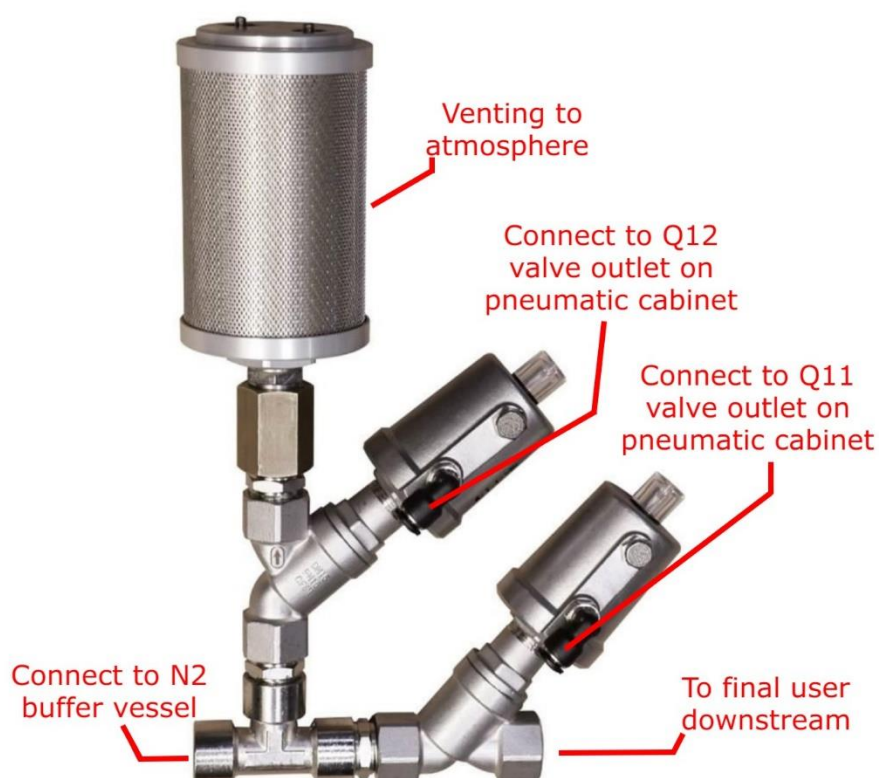
### Purity control kit

To maintain constant N<sub>2</sub> purity downstream, additional purity control kit can be purchased. For purity kit to function, O<sub>2</sub> sensor kit is obligatory, plus two extra control valves in pneumatic cabinet.

Purity control kit must be mounted on N<sub>2</sub> buffer vessel and connect to downstream piping. It functions, based on product purity data from O<sub>2</sub> sensor kit (obligatory!).



If product gas purity is too poor, logic controller will open Q12 valve to vent gas to atmosphere via muffler. When target product gas purity is reached, logic controller closes Q12 valve and opens Q11 to let product flow downstream to final user.



If room where purity kit is mounted is poorly ventilated, small or for any other reason venting product to surrounding atmosphere is not possible, muffler can be removed and gas led outside via additional piping.

Contact your supplier for additional equipment details.

## 13 Maintenance

The control valves, solenoid valves, carbon molecular sieve, filter elements and oxygen sensors are subject to wear and need to be replaced according to the service intervals specified bellow.

PART	MAINTENANCE	1 day	1 month	1 year	2 years	4 years	6 years
Generator operation	INSPECTION	x					
Complete generator	VISUAL INSPECTION		x				
Pre/After filter element	REPLACE			x			
Expansion silencer	REPLACE			x			
Valves*	REPLACE					x	
Adsorbent**	REPLACE						x
Oxygen sensor (optional)	CALIBRATION/REPLACE				x		

\*Refers to moving parts and sealing.

\*\*For stable operation replacement of adsorbent is required after every 6 years of operation. However due to inappropriate use or unexpected inlet/operating conditions adsorbent can be damaged sooner and in this case replacement is required sooner.



**It is necessary to wear respiratory protective equipment when working with the adsorbent. Adsorbent is a crumbling material that is producing fine dust which can cause respiratory complications if inhaled in sufficient quantities.**

Life time of the generator is limited by pressure equipment. Minimum life time of the generator according to the strictest criteria is more the seven years. Owner of the generators must comply with local legislation for pressure equipment. Typically, this means regular checks by authorized inspectors. For more informations about regular inspections please check local regulation.

Life time of the pressure equipment on the generator is limited with allowable stress reversal at transient pressure.

Transient pressure $\Delta P$ (bar)	Allowable stress reversal (number of the cycles)	Life time at non-stop operation (years)
5	3.000.000	11,4
6	2.000.000	7,6

Number of stress reversal is possible to check on PLC or on HMI interface. To check on PLC go with the arrow up or down to the timers and working hours. More informations is possible to find under chapter 5.2. To check number of the stress reversal on interface go to System info screen and check number of cycles. Please check chapter 5.8.1

In order to maintain the system efficiency, optimal performance, best oxygen quality and safety these additional rules of proper maintenance should be followed:

- Disconnect the oxygen generator from the compressed air system and the electrical power before conducting any maintenance.
- Make certain that the oxygen generator is depressurised before conducting any maintenance. You can check this by inspecting the pressure indicators at the top of the oxygen generator.
- The damaged components are to be replaced by the new ones. If a marked degree of damage is found, the entire oxygen generator should to be replaced.
- Carry out a check for leaks once the maintenance work has been finished.
- While servicing the oxygen generator it is recommended that you remove any residual condensate or particles on the oxygen generator parts before reassembling the oxygen generator.

Contact your supplier to order service kits:

KIT	KIT DESCRIPTION
6 months or 2000 working hours replacement kit	filter elements S filter elements R expansion silencer
1 year silencer replacement kit	2 x purge exhaust silencer
2 year replacement kit	oxygen sensor
4 years replacement kit	8 x replacement control valves
6 years replacement kit	carbon SORBEO MS10A molecular sieve

## 14 Warranty exclusion

The warranty shall be void if:

- The operating instructions were not followed with respect to initial commissioning and maintenance.
- The unit was not operated properly and appropriately.
- The unit was operated when it was clearly defective.
- Non-original spare parts or replacement parts were used.
- The unit was not operated within the permissible technical parameters.
- Unauthorised constructional changes were made to the unit or if parts of the unit that may not be opened were dismantled.

## 15 Maintenance record

TYPE OF MAINTENANCE	DATE	SIGNATURE	NOTES
Commissioned			



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