Base Load Power Hub (BLPH)

NITROGEN GENERATION PACKAGE U-64000
INSTALLATION, OPERATING AND MAINTENANCE MANUAL
(INCLUDING SITE ERECTION INSTRUCTIONS AND PROCEDURES)

umber: 1724000437-MAC-MAN-00029

Document Class: 2

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
Giuseppe Cavallo	21/01/25

Rev.	Date	Description	Prepared	Reviewed	Approved
01	03/01/2025	Issue for Information (IFI)	GT	MC	TM
00	16/10/2024	Issue for Information (IFI)	GT	MC	TM

COES

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

Revision / Change Log

Rev.	Description
00	Issue for Information (IFI)
01	Issue for Information (IFI)

HOLDS LIST

No.	Description
1	
2	
3	
4	

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

Please insert a dedicated section for PLC (with a dedicated GA for all signals, lamps...)

Table of contents

1 INTRODUCTION 5

1.1 PROJECT OVERVIEW 5

1.1.1 Project Location 5

1.1.2 Project Concept 6

2 DOCUMENT SCOPE 8

2.1 REFERENCES 8

2.2 DEFINITIONS AND ABBREVIATIONS 8

3 SAFETY PRESCRIPTIONS 9

4 PROCEDURE FOR ERECTION AND INSTALLATION OF THE EQUIPMENT 10

5 PROCEDURE FOR PRE-COMMISSIONING 12

6 PROCEDURE FOR COMMISSIONING 13

7 NITROGEN GENERATOR 14

7.1 SAFETY PRESCRIPTIONS 14

7.2 PSA NITROGEN GENERATORS THEORY OF OPERATION 15

7.3 DESCRIPTION OF MAIN COMPONENTS 16

7.3.1 Nitrogen generator 16

7.3.2 AFTER-FILTERS 17

7.4 OPERATING INSTRUCTIONS AND INFORMATION 18

7.4.1 Start-up 18

7.4.2 Stop 19

7.5 MAINTENANCE 20

7.5.1 Six-monthly 20

7.5.2 Yearly activities 21

7.6 TROUBLESHOOTING 23

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

List of Figures

Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map 5
Figure 2 - Wind Park Details 6
Figure 3 – BLPH Concept 7

List of tables

Table 1 - Reference Documents 8
Table 2 - Definitions and Abbreviations 8

List of Attachments

None

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

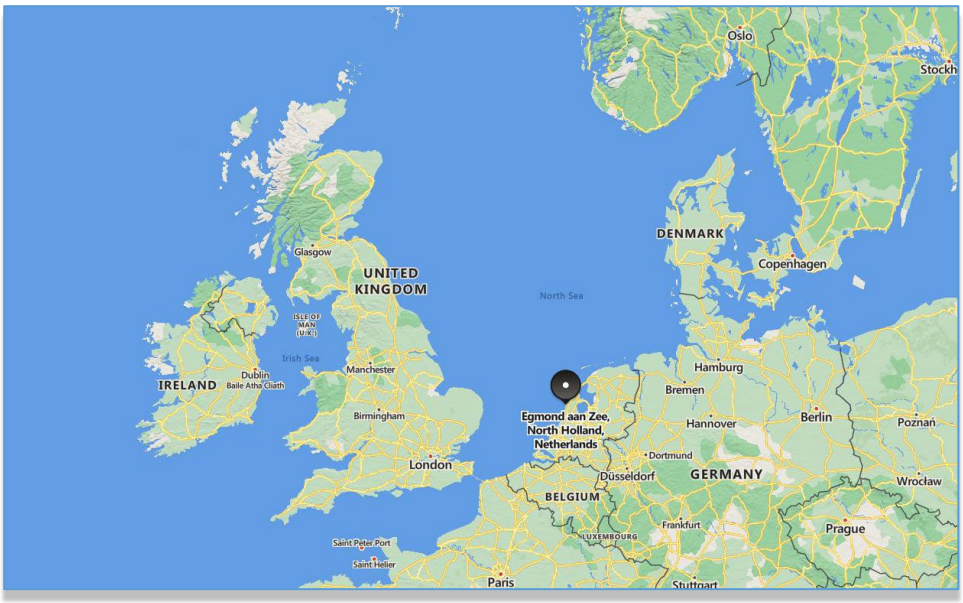


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

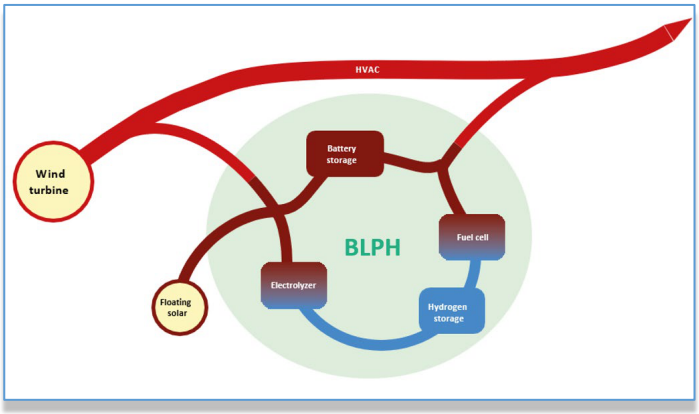


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

2 DOCUMENT SCOPE

This document identifies activities to be carried out for the correct operation of the Nitrogen Generaiton Package.

2.1 REFERENCES

Doc. No.	Description
1724000437-PR-PID-00018	PACKAGE P&ID
1724000437-MAC-DA-00005	CERTIFIED PACKAGE GENERAL ARRANGEMENT AND DIMENSIONAL OUTLINE DRAWINGS (INCLUDING : NAMEPLATE, BASEFRAME, FOUNDATION LOADS, NOZZLES LOADS, NOZZLES LIST, BATTERY LIMITS, CoG)
1724000437-MAC-DG-00009	PACKAGE WIRING DIAGRAM INCLUDING LAYOUT OF PACKAGE CONTROL PANEL

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

3 SAFETY PRESCRIPTIONS

- The operators 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.
- The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
- All responsibility for any damage or injury resulting from neglecting these precautions, or non observance of the normal caution and care required for transportation, installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.
- Before any maintenance, repair work, adjustment or any other non-routine checks, stop the unit, switch off the voltage and depressurize the Nitrogen Generation package, the filters and the interconnecting piping. In addition, the power isolating switch must be opened and locked.
- Never remove or tamper with the safety devices, guards or insulation fitted on the machine
- The equipment must only be lifted using suitable equipment in accordance with the applicable safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment
- Any blanking flanges must be removed before connecting the pipes
- The electrical connections must correspond to the applicable codes. The package must be earthed and protected against short circuits. A lockable power isolating switch must be installed
- Make sure that no tools, loose parts or rags are left in or on the machine.
- Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine.
- Never operate the package below or in excess of its limit ratings.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

4 PROCEDURE FOR ERECTION AND INSTALLATION OF THE EQUIPMENT

4.1 Remove the packing.

4.2 The Nitrogen Generation package is supplied fully installed: no loose components are foreseen.

4.3 Lift the skid baseplate, using an adequate lifting device. Skid baseplate shall be lift by means of lifting lugs welded on the skid baseframe, and placed in its final position, on a properly sized structure, taking care to avoid damages to any installed equipment.
N2 generation package is supplied with all the components already assembled.

WARNING
IT IS NECESSARY TO PROPERLY LEVEL THE BASEPLATES AND TO ASSURE THE CORRECT ALIGNMENT OF MATCHING FLANGES, TO AVOID UNEXPECTED LOADS ON INTERCONNECTING PIPING

4.4 Fix the skid baseplate to the structure by means of the anchor bolts, as shown in the reference drawings.

4.5 Lift the N2 receiver, using an adequate lifting device, by means of the lifting points welded on the vessel. Then place it in its final position, on a properly sized structure.

WARNING
IT IS NECESSARY TO PROPERLY LEVEL THE VESSEL AND TO ASSURE THE CORRECT ALIGNMENT OF MATCHING FLANGES, TO AVOID UNEXPECTED LOADS ON INTERCONNECTING PIPING

4.6 Fix the receiver to the structure by means of the anchor bolts, as shown in the reference drawings.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

4.7 All the components inside the package are cabled according to the Wiring Diagram, document no. 1724000437-MAC-DG-00009.

Power and signal cables (including earthing connection) should be connected by others to the Local Control Panel according to the previous mentioned wiring diagram, document no. 1724000437-MAC-DG-00009.

WARNINGS

TURN OFF MAIN POWER SUPPLY BEFORE ATTEMPTING TO WIRE THE UNIT

IT IS MANDATORY TO WIRE THE UNIT IN COMPLIANCE WITH THE APPLICABLE ELECTRICAL CODES AND LAWS IN FORCE IN THE COUNTRY OF INSTALLATION

ELECTRICAL CHECKS MAY INVOLVE LIVE CONNECTIONS AND SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL

MAKE SURE THAT CABLES ARE PROPERLY SIZED TO HANDLE THE INSTALLED VOLTAGES.

THE UNIT MUST BE EARTHED AND PROTECTED AGAINST SHORT CIRCUITS. A LOCKABLE POWER ISOLATING SWITCH MUST BE INSTALLED

est or quality check to be performed before package commissioning?
Please include:
Recommendation for storage prior and after erection.
Procedure of preparation of equipment for commissioning/start-up for complete package.
List of mechanical pieces to be installed/erected at site, with indication of dimensions and weights.
List of connection to be performed on site.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

5 PROCEDURE FOR PRE-COMMISSIONING

After the installation on site and the complete assembling of the unit, before starting the equipment, pre-commissioning activity can be achieved, as per following steps.

NOTE

PRE-COMMISSIONING ACTIVITIES CAN BE CARRIED OUT BY CUSTOMER PERSONNEL ON SITE, BUT THE PRESENCE OF COES TECHNICIANS IS ADVISABLE

1. Check that all drain and vent pipes are not obstructed. Clean them, if necessary.
2. Check that all tubing is properly connected and tighten compression fittings, if necessary.
3. Check that all interconnecting flanges are correctly tightened.
4. Check all installed component, with particular care to instruments, to verify that they have not been damaged during the installation.
5. Verify that PSA vessels are properly filled with the adsorbent material.
6. Check that air diffusers are correctly installed into PSA vessels nozzles.
7. Check that inlet and outlet air piping are correctly connected to the nitrogen generation package.
8. Check that vent and drain piping (if any) are correctly connected to the nitrogen generation package.
9. Check that all instruments, solenoid valves and limit switches are properly connected and wired to the local control panel.
10. Check that the position of the filters manual isolation valves is according to the pakcage P&ID, document no. 1724000437-PR-PID-00018
11. ~~Check that all manual vent and drain valves are~~ according to the pakcage P&ID, document no. 1724000437-PR-PID-00018. Package installation is
12. Check that instrument interception valves and manifolds are in proper position.
13. Check that instrument air supply valve is open and that instrument air can be correctly supplied to solenoid valves.
14. Check that the internal of local control panel is clean from sand or dust and that no dew is detected.
15. Check that all terminals inside local control panel are correctly wired according to wiring diagram, document no. 1724000437-MAC-DG-00009.
16. Check that earthing connections of instruments, components and package are properly wired.

6 PROCEDURE FOR COMMISSIONING

After the installation on site and the complete assembling of the unit, before starting the equipment, ~~pre~~ commissioning activity can be achieved, as per following steps.

NOTE

COMMISSIONING ACTIVITIES CAN BE CARRIED OUT BY CUSTOMER PERSONNEL ON SITE, BUT THE PRESENCE OF COES TECHNICIANS IS ADVISABLE

1. Check from DCS that the feedback from electric limit switches installed on pneumatic actuated valves is in compliance with valves failure position.
2. Check from DCS that all the transmitters installed of the nitrogen generation package are correctly wired and the measured values are coherent with the actual conditions.
3. Pressurize the nitrogen generation package up to 2 barg with dry air through inlet terminal point and verify that no leakages at flanged connections are detected. During pressurization for leak check, all actuated valves must stay in their fail position, while all manual valves must be open, except the valves downstream after-filters, which must be closed.
4. Slowly pressurize the nitrogen generation package to normal operating pressure with dry air through inlet terminal, without process nitrogen flow, and verify that no leakages at flanged connections are detected. During pressurization for leak check, all actuated valves must stay in their fail position, while all manual valves must be open, except the valves downstream after-filters, which must be closed.

WARNING

IT IS NOT ALLOWED TO PROCEED WITH MANUAL OPEN/CLOSE OF ACTUATED VALVES IF THE SYSTEM IS TOTALLY OR PARTIALLY PRESSURIZED, BECAUSE OF POTENTIAL DAMAGES TO ADSORBENT MATERIAL AND POSSIBLE SOURCE OF HIGH NOISE LEVEL.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

7 NITROGEN GENERATOR

7.1 SAFETY PRESCRIPTIONS

WARNING

ACCIDENTAL NITROGEN BREATHING CAN CAUSE LOW OXYGEN LEVELS IN THE BLOOD AND MAY LEAD TO UNCONSCIOUSNESS AND TO DEATH IN ONLY A FEW BREATHS, WITHOUT ANY SYMPTOM.

ALL NITROGEN VENTS MUST ALWAYS BE ROUTED TO SAFE LOCATION.

I. Use the package properly, within rated pressure and temperature limits stated on name plate.

II. Before servicing any valve, fitting or component it is mandatory to depressurize the package completely and to disconnect power supply by means of a manual circuit breaker on feeding line (by others), except for spare equipment items.

III. To insulate the supply voltage, an adequate insulating switch must be fitted on the feeding line.

IV. Nitrogen generator package can work only in ventilated safe area.

V. Assembly and disassembly of any valve, fitting or component of nitrogen generation package must be performed by experienced technicians only.

VI. While PSA is working do not allow unauthorized person near the package, never place any kind of object on PSA, never remove any component.

VII. Never obstruct safety valves exhaust.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

7.2 PSA NITROGEN GENERATORS THEORY OF OPERATION

Nitrogen production from air using PSA technology is based on the capability of a special adsorbent, named Carbon Molecular Sieve (CMS), to adsorb oxygen at an higher rate than nitrogen or other gases. If air is send through a CMS bed and is kept in contact with CMS only for short period the difference in adsorption rate will result in a significant removal of oxygen from air and will allow to collect high purity nitrogen from outlet side.

After this period the CMS will start to significantly adsorb also nitrogen and therefore it will no more remove oxygen from air; therefore it is necessary to stop flow through adsorbent bed before reaching this point and regenerate the bed.

Bed regeneration is accomplished by depressurisation to atmospheric pressure; in order to obtain a continuous production of high purity nitrogen two adsorbers, that operate cyclically and alternatively between adsorption and regeneration and a nitrogen buffer drum is provided.

Production capacity and purity are dependant on feed flow-rate, pressure, temperature, and on selected cycle; high pressure and low temperature may result in higher purity and higher product capacity, temperature higher than design or feed pressure lower than design will have a negative impact on product specification, with consequent out of spec nitrogen.

The operating cycle is automatic and is controlled by a PLC.

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

7.3 DESCRIPTION OF MAIN COMPONENTS

7.3.1 Nitrogen generator

The nitrogen generator package is provided with no.2 towers PSA type nitrogen generator, C-64001A and C-6400B.

Normally, one tower is in the production phase, while the other tower is regenerating.

Dry air enters the generator and is conveyed to production tower by inlet 2-way valve 64-XV-051 or 64-XV-052, it flows on the active bed, releasing oxygen, and exits from outlet 2-way valve 64-XV-056 or 64-XV-057.

The regenerating tower is depressurized to atmospheric pressure, opening 2-way discharge valve 64-XV-053 or 64-XV-054, to release oxygen through discharge valve and silencer.

A small percentage of nitrogen is drawn downstream the production tower through 2-way valve 64-XV-055 and it is expanded at atmospheric pressure inside regenerating tower.

This nitrogen flow runs through the tower in a counter-current direction, it attracts the residual oxygen present on the active bed and is then vented to atmosphere through discharge valve and silencer.

Afterwards, discharge valve, inlet valve and outlet valve are closed and both vessels are brought to the same pressure through 2-way valve 64-XV-055, for the subsequent change-over phase.

The generator is provided with internal connection for instrument air through valve BLPH-MV-802.

The manual valves installed in the nitrogen generation package are provided with locking devices: they shall be kept in Open or Close position as shown in the package P&ID, document no. 1724000437-PR-PID-00018.

WARNINGS

INSTRUMENT AIR CIRCUIT MUST BE PROPERLY PRESSURIZED
BEFORE SWITCHING THE GENERATOR ON

THE CONTROL PLC CAN'T KNOW THE POSITION OF MANUAL ISOLATION VALVES INSTALLED ON THE PROCESS LINE. ALWAYS CHEK THEIR POSITION TO ASSURE THAT THERE IS THE FLOW OF AIR THROUGH WHEN THE GENERATOR IS SWITCHED ON

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

7.3.2 AFTER-FILTERS

The nitrogen generator package is provided with no.2 after-filters, item S-64001A/B, installed in parallel configuration.
The package can operate with only one filtering line in operation, but it is possible to use both filters at the same time.
Each filter is provided with a manual drain valve.
The filtering group is provided with a differential pressure transmitter, item 64-PDIT-056: it is advisable to replace the cartridges of the filters when measured pressure drop reaches 0.5 bar.

WARNINGS

REPLACE CARTRIDGE WHEN MEASURED PRESSURE DROP REACHES 0.5 bar,
TO AVOID THE COLLAPSE OF THE CARTRIDGE

INSTALLED CARTRIDGES ARE NOT CLEANABLE TYPE. ALWAYS REPLACE THEM WHEN EXHAUST

7.3.3 MAIN DATA

The nitrogen generator package is designed for the following performances:

- Outlet N2 purity: 97%
- Outlet N2 package flowrate: 50 Nm^3/h
- Outlet N2 package pressure: 8.1 barg

with the inlet conditions as follows:

- Inlet dry air flowrate: 125 Nm^3/h
- Inlet dry air pressure: 9 barg

7.4 OPERATING INSTRUCTIONS AND INFORMATION

7.4.1 Start-up

WARNINGS

INSTRUMENT AIR CIRCUIT MUST BE PROPERLY PRESSURIZED
BEFORE SWITCHING THE GENERATOR ON

Local start-up

a) Place the switch on nitrogen generation package local control panel in "Local" position and verify that lamps 64-XL-001 and 64-XL-002 are switched on

b) Verify that instrument air is available for pneumatic actuated valves, according to commissioning procedure.

c) Press the START push-button 64-HS-001 on local control panel to start the generator: the PLC will start its operation and the different electric components will get enabled as described in the functional description. Verify that PSA RUNNING lamp 64-XL-003 is switched on.

d) Make sure the generator operating cycle is properly carried out and that no alarm condition is highlighted.

e) After the correct start-up, until the measured oxygen level is greater than design value, the nitrogen flow is automatically vented to atmosphere.

f) When the measured oxygen level is lower than set value, the nitrogen flow is automatically provided to the users.

Remote start-up

a) Place the switch on local control panel on ''REMOTE' position and verify the LOCAL/REMOTE STATUS PROFIBUS signal.

b) Give the REMOTE START impulsive command to start the generator: the PLC will start its operation and the different electric components will get enabled. Verify that PSA RUNNING lamp is switched on.

c) Make sure the generator operating cycle is properly carried out and that no alarm condition is highlighted.

d) After the correct start-up, until the measured oxygen level is greater than design value, the nitrogen flow is automatically vented to atmosphere.

e) When the measured oxygen level is lower than set value, the nitrogen flow is automatically provided to the users.

7.4.2 Stop

WARNING

WHEN THE GENERATOR IS STOPPED, THERE IS NO FLOW OF NITROGEN TO USERS

Local stop

a) Press the STOP push-button 64-HS-002 on local control panel to stop the generator. Verify that PSA RUNNING lamp 64-XL-003 is switched off.

b) Cut power supply to the local control panel and verify that lamps 64-XL-001 and 64-XL-002 are switched off.

Remote stop

a) Valid only if the switch on local control panel is on "REMOTE" position.

b) Give the REMOTE STOP impulsive command to stop the PSA operating cycle. Verify that PSA RUNNING lamp 64-XL-003 is switched off.

c) Cut power supply to the local control panel and verify that lamps 64-XL-001 and 64-XL-002 are switched off.

7.5 MAINTENANCE

WARNINGS

DEPRESSURIZE THE PSA COMPLETELY BEFORE SERVICING ANY VALVE, FITTING OR COMPONENT UNDER PRESSURE.

NO MAINTENANCE ACTIVITIES ARE ALLOWED ON ELECTRICAL LIVE CONNECTIONS

REMARKS

A CORRECT MAINTENANCE PROGRAM IS NECESSARY TO ASSURE PROPER WORKING OF NITROGEN GENERATORS: GUARANTEED CONDITIONS ARE SUBORDINATED TO EXECUTION OF MAINTENANCE OPERATIONS.

"check": pleas add more information about this procedure. please insert molecular sieve mds

7.5.1 Six-monthly

1. Replace the cartridge of the after-filters.

Put on line the stand-by filter opening the upstream manual/automated valves and downstream manual valves and isolate the filter to be maintained closing the upstream and downstream manual valves

Depressurize the filter to be maintained opening the manual drain valve and open it to replace the cartridge

2. In order to guarantee the achievement of the process performances, it is recommended to check the level of the carbon molecular sieve in both towers of the nitrogen generators and fill it, if necessary, as per following steps.

- switch the unit off and depressurize the system, then open the DN150 filling nozzle fitted on top head of generator towers
- verify the level of carbon molecular sieve, which should completely fill the nozzle
- add the necessary carbon molecular sieve to completely fill the nozzle, if necessary
- close the blind flange of the DN150 filling nozzle, replacing the gasket, if necessary

WARNING

IT IS MANDATORY TO OPERATE THE NITROGEN GENERATOR WITH BOTH TOWERS COMPLETELY FILLED WITH CARBON MOLECULAR SIEVE

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

7.5.2 Yearly activities

Proceed to the full servicing of process valves, as per following steps:

- switch the unit off and depressurize the system, then dismount all the pneumatic actuated valves
- replace the gaskets of the pneumatic actuated valves, as per dedicated manual
- check the status of the balls of pneumatic actuated valves: replace them as per dedicated manual, if necessary.

please insert the perforamance parameters that shall be check to provide the replace of cms.
It means...please reformulate the sentence in this way:
- Coes recomend yearly cms replace, in any case cms became unavoidable when the following change in perfomance parameter had been advised:

Replace the carbon molecular sieve in both towers of the nitrogen generators, as per following steps:

- switch the unit off and depressurize the system, than open the DN150 filling nozzle fitted on top head of generator towers
- open the DN80 emptying nozzle fitted on bottom head of generator towers
- discharge all the carbon molecular sieve contained in the generator towers
- open the DN100 nozzle fitted on bottom head of generator towers and remove the lower piping
- check the internal diffuser fitter between the lower piping and the generator towers: replace the stainless steel mesh if necessary
- install the lower piping and close the DN100 nozzle fitted on bottom head of generator towers replacing the gasket, if necessary
- open the DN100 nozzle fitted on shell of generator towers and remove the upper piping
- check the internal diffuser fitter on the upper piping: replace the stainless steel mesh if necessary
- install the upper piping and close the DN100 nozzle fitted on shell of generator towers replacing the gasket, if necessary
- add the necessary carbon molecular sieve to completely fill the towers, up to the DN150 filling nozzle fitted on top head of generator towers
- close the blind flange of the DN150 filling nozzle, replacing the gasket, if necessary
- switch the unit on and pressurize the system, then let the nitrogen generator work for 30 minutes
- switch the unit off and depressurize the system, then open the DN150 filling nozzle fitted on top head of generator towers
- verify the level of carbon molecular sieve, which should completely fill the nozzle

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

- add the necessary carbon molecular sieve to completely fill the nozzle
- close the blind flange of the DN150 filling nozzle, replacing the gasket, if necessary

WARNING

IT IS MANDATORY TO OPERATE THE NITROGEN GENERATOR WITH BOTH TOWERS COMPLETELY FILLED WITH CARBON MOLECULAR SIEVE

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

7.6 TROUBLESHOOTING

WARNINGS

DEPRESSURIZE THE NITROGEN GENERATION PACKAGE COMPLETELY

BEFORE SERVICING ANY VALVE, FITTING OR COMPONENT UNDER PRESSURE.

NO MAINTENANCE ACTIVITIES ARE ALLOWED ON ELECTRICAL LIVE CONNECTIONS

	PROBLEM	POSSIBLE CAUSE	SUGGESTD SOLUTION
1	High oxygen content of nitrogen	Inlet air water content is higher than expected	Check the correct operation of nitrogen generation package
		Operating parameters out of design range	Adjust user nitrogen consumption to avoid too low pressure and/or too high flow through the generator
		Active material has not been correctly regenerated	Proceed with the regeneration of carbon molecular sieve, keeping the manual valves upstream after-filters closed
		Regeneration phase is not completely achieved	Verify that during operation of generator, there is a suitable flow of air vented through the silencer. No instrument is available to check the vent flow, therefore a manual inspection is recommended.
		Active material is damaged	Replace carbon molecular sieve in both generator towers
		Active material is exhaust	Replace carbon molecular sieve in both generator towers
		Generator by-pass is open	Close by-pass valve (if installed by others)
		Failure on generator operating cycle	Check the correct operation of actuated valves

	PROBLEM	POSSIBLE CAUSE	SUGGESTD SOLUTION
2	Failure of actuated valve	No instrument air pressure to pneumatic actuator	Open instrument air root valves
		Failure of solenoid valve	Replace solenoid valve
		Failure of limit switch	Adjust or replace limit switch
		Failure of pneumatic actuator	Check the pneumatic actuator, service it and replace it, if necessary
		Failure of valve	Check the valve, service it and replace it, if necessary

	PROBLEM	POSSIBLE CAUSE	SUGGESTD SOLUTION
3	Low pressure on nitrogen	Too high flow of instrument air or nitrogen to users	Adjust user nitrogen consumption
		Too low air flow from compressor	See dedicated manual
		Too high air consumption for regeneration of dryer installed upstream nitrogen generator package	Adjust dryer phases times
		Too high pressure drop across dryer installed upstream nitrogen generator package	Change desiccant material in instrument air dryer package
		Too high pressure drop across after-filters	Replace the after-filters cartridge

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

	PROBLEM	POSSIBLE CAUSE	SUGGESTD SOLUTION
4	High pressure drop across after-filters	Too high nitrogen flow across filter	Adjust user nitrogen consumption to avoid too high flow
		Too low nitrogen pressure at filter inlet	Adjust user nitrogen consumption to avoid too low pressure
		Cartridge saturated with dust	Replace the cartridge

	PROBLEM	POSSIBLE CAUSE	SUGGESTD SOLUTION
5	Dust content in nitrogen	Dust created by generator during normal operation	Replace the after-filters cartridge
		Active material is damaged	Replace carbon molecular sieve in both generator towers

REMARKS

TO AVOID POSSIBLE DAMAGES AND INCORRECT OPERATION OF THE DRYING UNIT,

USE ONLY ORIGINAL COES SPARE PARTS

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy