Nitrogen Gas Generator

NitroSource® HiFluxx

User Manual

EN Original Language

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker domnick hunter

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1 Introduction

1.1 General

The NitroSource® is a product of Parker. This manual forms an integral part of the product. The manual describes the installation, daily operation and troubleshooting.

Content

Read the manual carefully before the installation and operation of the generator. These instructions must be thoroughly understood before installing and operating this product. Failure to operate this product in accordance with the instructions set forth in this manual and by other safety governing bodies will void the safety certification of this product. If you have any questions or concerns, please call your local representative or the technical services department:
Europe +44 191 402 9000

Condition of change

No changes may be made to the generator as supplied, without the explicit prior written permission of Parker. Non-conformance to this rule, as well as any consequential damage, loss and costs are the responsibility of the owner and the user.

Information

All information in this manual, including additional drawings and technical descriptions, remains the property of Parker and may not be used (otherwise than for the use of this product), copied or published to or for a third party without the explicit prior written permission of Parker.

1.2 Pictograms

The following pictograms are used in this manual and on the generator:

Warning
A warning shows a hazard that can cause death or serious injury. Follow the instructions.

Caution
A caution shows a danger that can cause damage to the equipment. Follow the instructions.

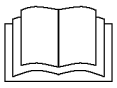
Electricity
High voltage: danger of electric shock.

Warning
Risk for death due to suffocation.

Risk of fire
Oxygen-enriched air leads to an increased risk of fire in the event of contact with inflammable products.

High-pressure risk
Follow the instructions with respect to compressed gases.

Environment
Instructions with respect to the environment.



Read instructions in the manual.

1.3 Use in accordance with purpose

The NitroSource® is intended to produce nitrogen from normal ambient air. The system is based on gas separation membranes. Any different use will not be in conformity with the purpose. Parker will not accept any liability for improper use.

The generator is in compliance with the prevailing directives and standards. Only use this generator in a technically perfect condition, in conformity with the purpose as described above.

1.4 User instructions

Only well-trained personnel are allowed to work on the generator. The user must be aware of hazards related to operating the generator and processes connected to the generator. The user is responsible for the safety of the personnel. All personnel working on the generator must have free access to the applicable manuals.

1.5 Liability

Parker will not accept any liability if:

- The instructions in this manual are ignored.
- Replacement parts are used which are not approved by the manufacturer.
- The generator is operated incorrectly.
- The system is fed with other gases than air.
- The generator is modified without notification and authorisation of Parker.
- Maintenance and repair are not carried out according to the instructions.

2 Health, safety and environmental aspects

2.1 General

Correct use of this nitrogen generator is important for your personal safety and for trouble-free functioning of the generator. Incorrect use can cause damage to the generator or can lead to incorrect gas supply.

Warning:

- **Read this manual before you start the installation and commissioning of the generator. Prevent accidents and damage to the generator.**
- **Contact your supplier if you detect a problem that you cannot solve with this manual.**
- **Use the generator in accordance with its purpose. Refer to §1.3.**
- **Only service-engineers, qualified to work on electric and pneumatic equipment, are allowed to do the installation, maintenance and repairs. Unqualified people are not allowed to repair the equipment. Refer to §1.4. Lift the generator with a forklift. Follow the legislation and instructions for operating the forklift.**
- **Do not tamper or experiment with the equipment. Do not exceed the technical specifications for the generator. Refer to chapter 4.**

2.2 Compressed air

Warning:

- **Make sure that the air pressure cannot exceed 13 bar(g)/190 psi(g).**
- **Make sure that the equipment and the pipeworks are connected correctly for the operating air pressures.**
- **Depressurise the generator and the connected systems before you disconnect parts of the system. The sudden escape of compressed air can cause serious injury or damage. Refer to §7.3.**

2.3 Nitrogen and oxygen

The generator generates nitrogen as a product. Oxygen enriched air is released as waste.

Warning:

- **Nitrogen can cause suffocation!**
- **Oxygen-enriched air leads to increased risk of fire in the event of contact with inflammable products. Make sure that there is adequate ventilation at all times!**
- **The generator is not designed for installation in an Ex-classified area.**
- **Do not install the generator in an area where explosive mixtures may occur.**

2.4 Electricity

Warning:

- **Only service-engineers, qualified to work on electric equipment, are allowed to do the installation, maintenance and repairs.**
- **Disconnect the main power supply before you do maintenance or repair.**
- **If a service-engineer has to work on the generator while the electrical power it is connected, the service-engineer must be very careful with respect to the electric hazards.**

2.5 Safety precautions

Warning:

- **Make sure that the ventilation rate is sufficient in the room where the enriched oxygen is ventilated, or vent the enriched air outside.**
- **Only feed the generator with air.**
- **Keep the air feed to the generator clean and free of organic solvent vapors and other contaminants. Do not place the generator in a room where organic solvent vapors may occur in the air.**
- **Keep the ambient temperature between 10℃ /50℉ and 40℃ /104℉.**
- **Adjust the generator to the appropriate nitrogen concentration for your application.**
- **Install the peripheral equipment, piping and nitrogen storage vessels according to standard procedures. Parker cannot take responsibility for this.**

- **Ensure that regular maintenance to the generator is undertaken, to ensure proper and safe operation. Refer to chapter 9.**
- **Make sure that instructions concerning health and safety are compliant with the local legislation and regulations**

2.6 Environmental aspects

The use and maintenance of the generator does not include environmental dangers. Most parts are made of metal and can be disposed in the regular way. The packaging of the generator is 100% recyclable.

According to EC-regulations electrical systems have to be disassembled and recycled at the end of their life. Parker Domnick Hunter can support you in this.

Make sure that instructions concerning health, safety and environment are compliant with the local legislation and regulations.

3 Description of the appliance

3.1 General

The generator separates compressed air into nitrogen and an oxygen enriched air stream. The separation uses membranes. The compressed air is supplied from a central system or from a dedicated compressor.

The nitrogen produced can be connected directly to the application or can be stored in a nitrogen storage vessel. The generator then switches on and off, depending on the nitrogen demand. The generator has a residual oxygen analyzer. This analyzer continuously monitors the quality of the produced nitrogen.

3.2 Separation principle

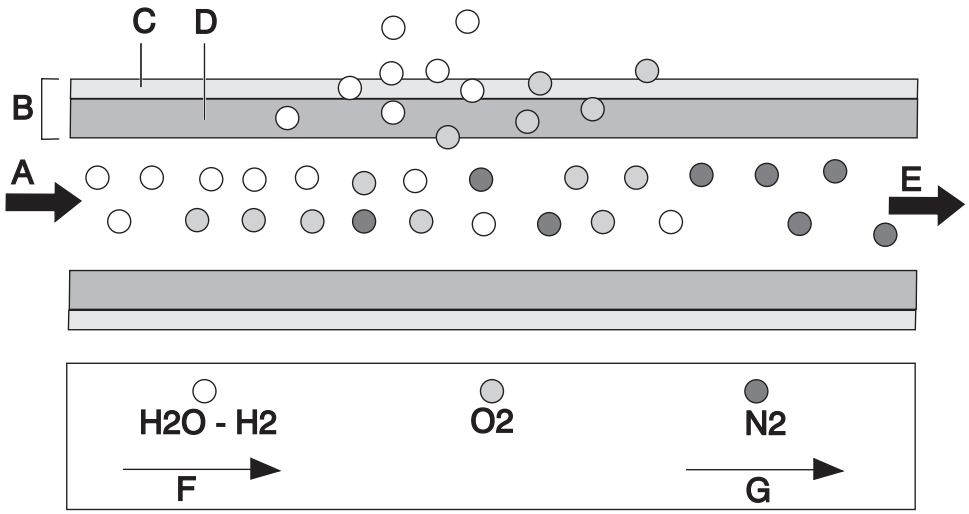


Fig. 3-1: Separation principle

A Pressurised air inlet
B Hollow fibre membrane
C Separation layer
D Support layer
E Nitrogen outlet
F Fast permeation
G Slow permeation

Ambient air contains nitrogen (78.1%), oxygen (20.9%), argon (1%), carbon dioxide, water vapor and traces of other inert gases. Pressurised air (A) is led through hollow fibre membranes (B). The various air components diffuse through the porous wall of the membranes.

The diffusion rate differs for the various gases:

- Oxygen and water vapor have a high diffusion rate and diffuse rapidly through the membrane wall.
- Nitrogen has a low diffusion rate and diffuses slowly through the membrane wall.

Pressurised nitrogen enriched air is released at the outlet of the membranes (E). This air can be lead to a nitrogen storage vessel.

3.3 Process parameters

The nitrogen production depends on these parameters:

Flow rate

The lower the flow rate of compressed air through the hollow fibre membranes, the more oxygen can move through the membrane wall. As a result the nitrogen produced at the outlet will have a higher purity.
Adjust the purity of the nitrogen with the flow control valve (FCV1).

Temperature

The generator operates optimally at a temperature of about 20-25°C (68°- 77°F).
If the temperature increases, the pressurised air consumption will also increase. Do not place the system in a room where the temperature may rise unnecessarily high.

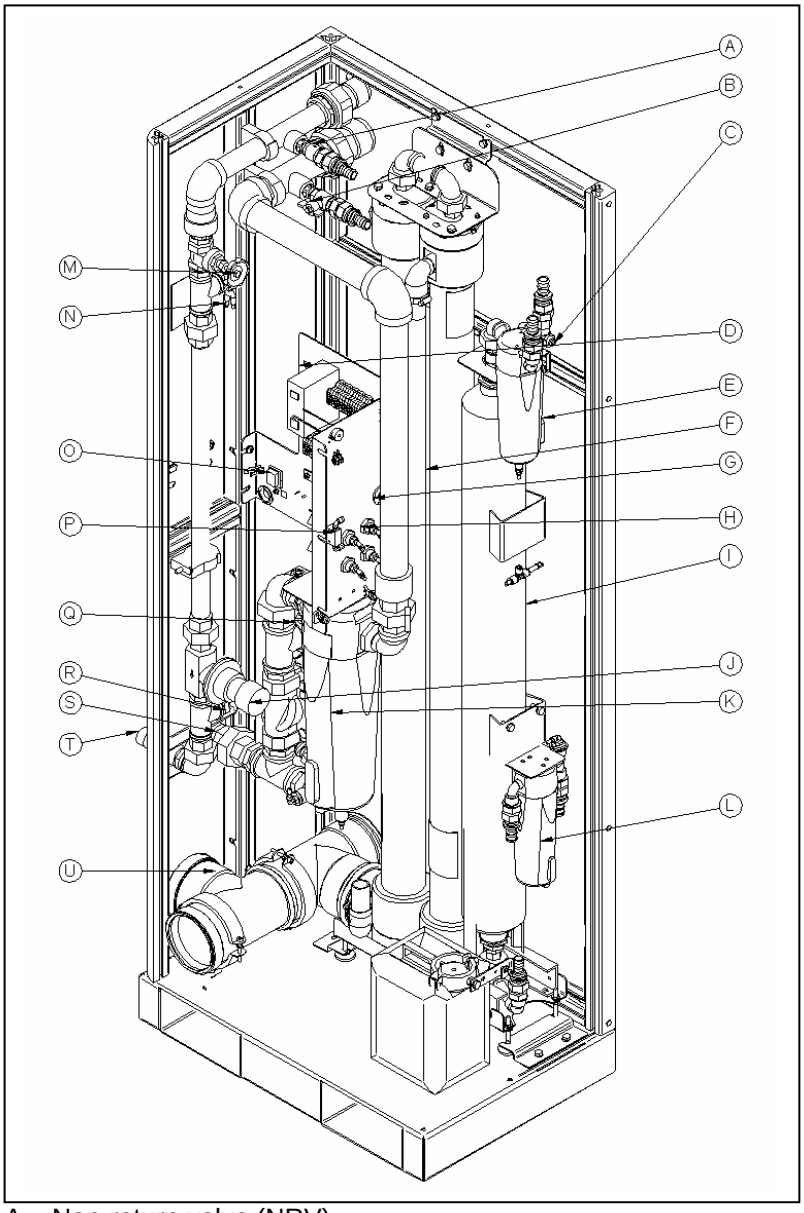
Membrane pressure

A higher membrane pressure will increase the capacity of the generator.

External pressure

There must be atmospheric pressure at the vent outlet. The capacity and the selectivity of the system decrease dramatically if the vent outlet pressure exceeds atmospheric pressure.

3.4 Parts



A Non-return valve (NRV)
B Ball valve (V2)
C Flow control valve (FCV2)
D Fuses (not visible)
E Fine filter (F2)
F Hollow fibre membrane
G Oxygen sensor
H Pressure transmitters (P1-P4)
I Carbon Adsorber (C)
J Back pressure control valve (PCV1)
K Coarse filter (F1)
L Dust filter (F3)
M Flow control valve (FCV1)
N Sample flow connection 1
O Power switch
P Sample flow control valve (FCV3)
Q Temperature transmitter (not visible)
R Sample flow connection 2 (not visible)
S Compressed air inlet
T Product outlet
U Oxygen enriched air outlet

3.5 Process diagram

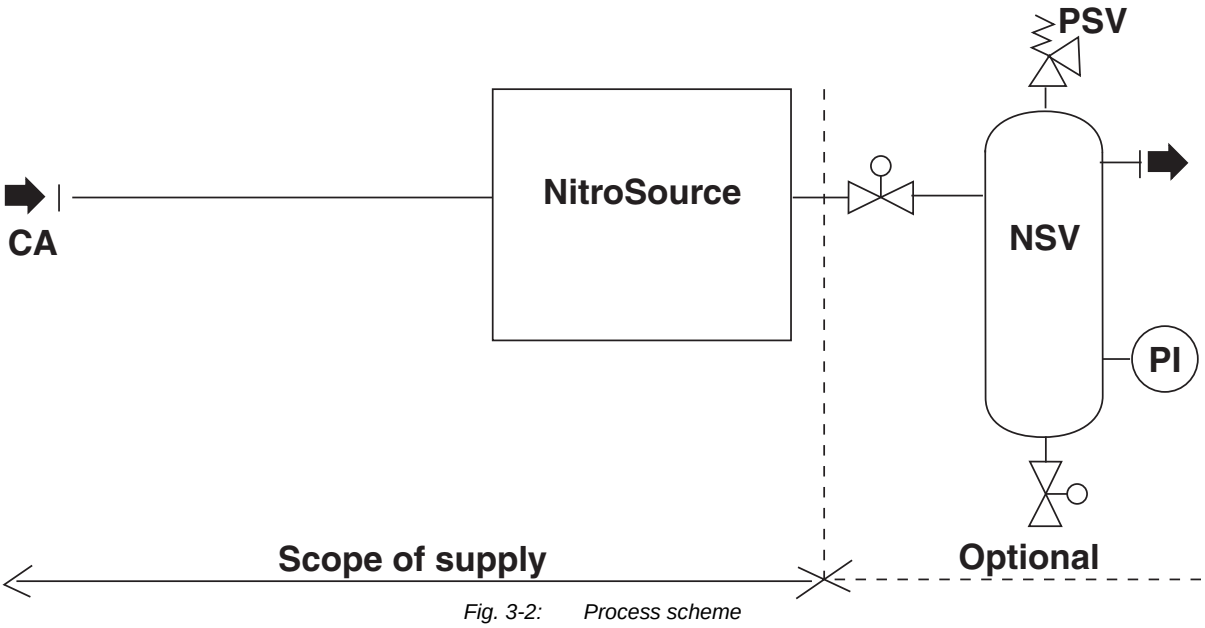
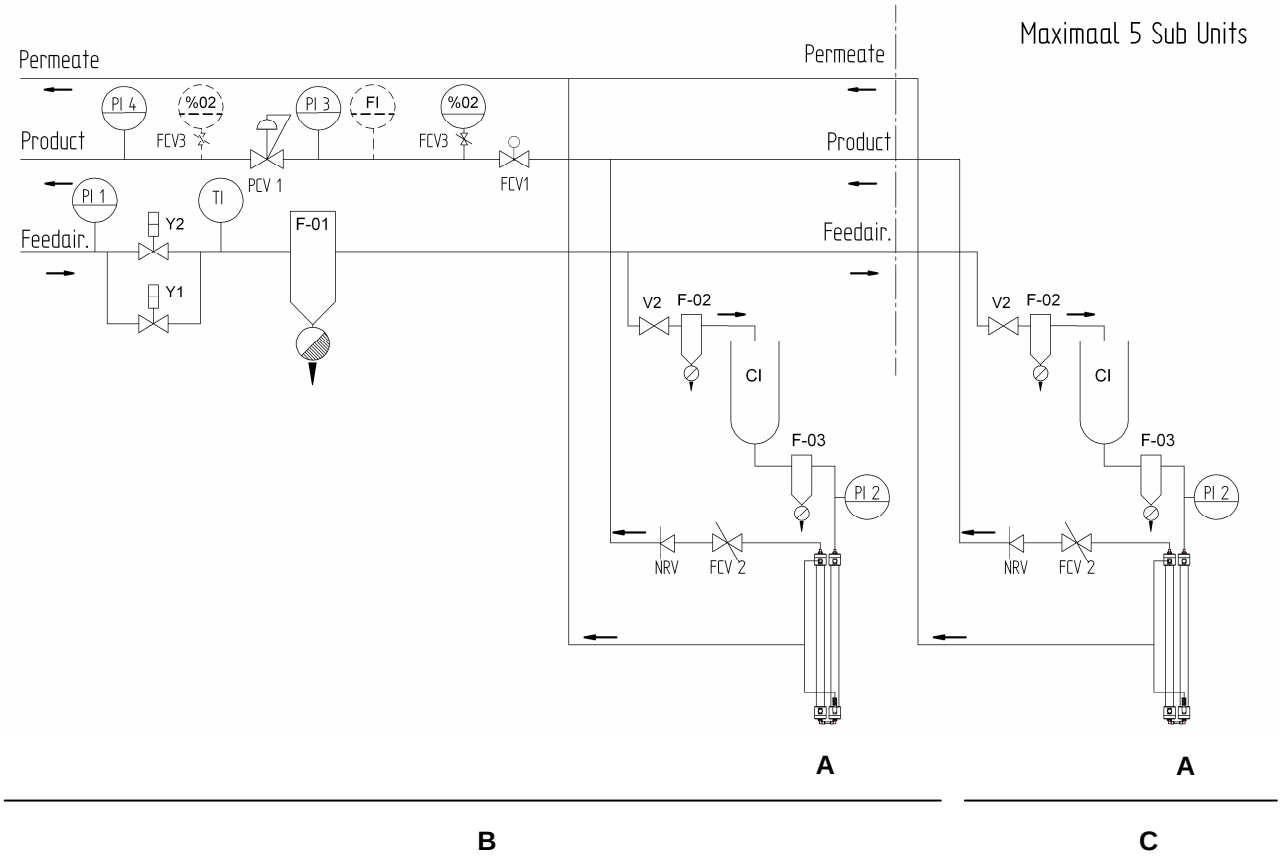


Fig. 3-2: Process scheme

3.6 Process scheme



A	Hollow fibre membranes
B	Main unit
C	Sub-unit (max. 5 sub-units)
PI	Pressure transmitters
TI	Temperature transmitter
Y1, Y2	Solenoid valves
F1, F2	Coalescing filters
V2	Ball valve
CI	Carbon adsorber
F3	Dust filter
FCV2	Balance valve
NRV	Non-return-valve
FCV1	Flow control valve
FCV3	Sample flow control valve
QI	Oxygen analyzer
FI	Flow transmitter (optional)
PCV 1	Back pressure control valve

4 Technical specifications

4.1 General

Delivery pressure	
Maximum delivery pressure	Inlet pressure minus pressure drop (2 bar(g) /29 psi(g) at 97% purity)

Compressed air	
Maximum feed pressure	13 bar(g)/190 psi(g)
Compressed air temperature range	10℃ to 40 ℃ / 50 ℉ to 104℉
Residual oil content	< 3.0 mg/m^3
Pressure dew point	< 5℃ / < 41℉

Ambient conditions	
Temperature	10℃ to 40℃ / 50℉ to 104℉
Noise level	Less than 45 dB(A)

Dimensions and connections	
Dimensions main unit (H x W x D)	1928 x 725 x 490 mm / 77” x 29” x 20”
Dimensions sub-unit (H x W x D)	1928 x 725 x 270 mm / 77” x 29” x 11”
Net weight main unit	180 kg / 400 lbs
Net weight sub-unit	95 kg / 209 lbs
Connections	inlet: G 1¼" female / 1 ½ “ npt male outlet: G 1" female / 1” npt male vent: 110 mm / 4.4”

Electrical data	
Voltage/frequency	90-250 VAC/50-60Hz
Power consumption	30 W
Fuse	T 3.15A 250V
Output signals	2-10 Volt
Input signals	Refer to Table 5-1

Parts	
NitroSource® (main unit depending on size ordered with connected sub-units)	1x NitroSource® main unit 1x Manual 1x replacement dust filter
NitroSource® sub-unit (when ordered separately from a main-unit	1x NitroSource® sub-unit 1x replacement dust filter Extensions for feed, product and oxygen-enriched air vent piping 2 brackets 8 bolts 2 gaskets
Options (on demand)	Flow sensor Datalog function when using Master/Slave installation Nitrogen storage vessel, including accessories (sizes on demand)

Table 4-1: General data

4.2 Production capacity

Type	Nominal product capacity Nm^3/hr					
Purity%	**99.5**	**99**	**98**	**97**	**96**	**95**
Main-unit	6.0	9.4	16.2	22	28	34
Main + 1 sub-unit	12.0	18.8	32.4	44	56	68
Main + 2 sub-units	18.0	28.2	48.6	66	84	102
Main + 3 sub-units	24.0	37.6	64.8	88	112	136
Main + 4 sub-units	30.0	47.0	81.0	110	140	170
Main + 5 sub-units	36.0	56.4	97.2	132	168	204

Table 4-2: Capacity at nominal conditions:

- *Feed pressure at inlet: 7 bar(g)/100 psi(g)*
- *Ambient temperature: 20 ℃ / 68℉*
- *Ambient pressure: 1013 mbar(a).*

Type	Nominal product capacity scfm					
Purity %	**99.5**	**99**	**98**	**97**	**96**	**95**
Main - Unit	3.5	5.5	9.5	13.0	16.5	20.0
Main+1sub unit	7.0	11.0	19.0	26.0	33.0	40.0
Main+2 sub unit	10.5	16.5	28.5	39.0	49.5	60.0
Main+3 sub unit	14.0	22.0	38.0	52.0	66.0	80.0
Main+4 sub unit	17.5	27.5	47.5	65.0	82.5	100
Main+5 sub unit	21.0	33.0	57.0	78.0	99.0	120

Table 4-3: Capacity at nominal conditions:

- *Feed pressure at inlet: 100 psi(g)/ 7 bar(g)*
- *Ambient temperature: 68℉ / 20 ℃*
- *Ambient pressure: 1013 mbar(a).*

4.2.1 Air consumption

Type	Nominal air use Nm^3/hr					
Purity %	**99.5**	**99**	**98**	**97**	**96**	**95**
Main - Unit	51	56.4	69.7	77	84	88.4
Main+1sub unit	102	112.8	139.3	154	168	176.8
Main+2 sub unit	153	169.2	209	231	252	265.2
Main+3 sub unit	204	225.6	278.6	308	336	353.6
Main+4 sub unit	255	282	348.3	385	420	442
Main+5 sub unit	306	338.4	418	462	504	530.4

Table 4-4: Air use at nominal conditions:

- *Feed pressure at inlet: 100 psi(g)/ 7 bar(g)*
- *Ambient temperature: 68℉ / 20 ℃*
- *Ambient pressure: 1013 mbar(a).*

Type	Nominal air use SCFM					
Purity %	**99.5**	**99**	**98**	**97**	**96**	**95**
Main - Unit	29.8	33	40.9	45.5	49.5	52
Main+1sub unit	59.5	66	81.7	91	99	104
Main+2 sub unit	89.3	99	122.6	136.5	148.5	156
Main+3 sub unit	119	132	163.4	182	198	208
Main+4 sub unit	148.4	165	204.3	227.5	247.5	260
Main+5 sub unit	178.5	198	245.1	273	297	312

Table 4-5: Air use at nominal conditions:

- *Feed pressure at inlet: 100 psi(g)/ 7 bar(g)*
- *Ambient temperature: 68℉ / 20 ℃*
- *Ambient pressure: 1013 mbar(a).*

4.2.2 Pressure correction

For calculation of the capacity at feed pressure, other than the nominal:
multiply the nominal capacity by the correction factor for the pressure at the inlet of the compressed air pre-treatment section.

Pressure	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
bar(g) /psi(g)	**58**	**73**	**87**	**101**	**116**	**130**	**145**	**160**	**174**	**190**
Correction factor	0.35	0.51	0.76	1.0	1.2	1.4	1.6	1.9	2.1	2.4

Table 4-6: Pressure correction

4.2.3 Temperature correction

When the ambient temperature deviates from the nominal 20℃/68℉ the performance of the generator will be affected. For corrected capacity multiply below factors with nominal capacity.

Temperature	**Correction factor for capacity at various product concentrations**					
Nitrogen content (%)	**99.5**	**99**	**98**	**97**	**96**	**95**
10℃ / 50℉	0.9	0.9	0.9	0.9	0.9	0.9
30℃ / 86℉	1	1	1	1	1	1
40℃ / 104℉	0.6	0.8	1	1	1.1	1.1

Table 4-7: Capacity correction factors for temperatures differing from 20℃ / 68 ℉

For corrected air use multiply below factors with nominal air use.

Temperature	**Correction factor for air use at various product concentrations**					
Nitrogen content (%)	**99.5**	**99**	**98**	**97**	**96**	**95**
10℃ / 50℉	0.9	0.9	0.9	0.9	0.9	0.9
30℃ / 86℉	1.1	1.1	1.1	1.1	1.1	1.1
40℃ / 104℉	1.2	1.2	1.2	1.2	1.2	1.2

Table 4-8: Correction factors on air use for temperatures differing from 20℃ /68℉

4.3 Maintenance kits

Part	p/n
Maintenance kit main unit, consisting of: • 1x Coarse filter element (1/200-35-DX) • 1x Fine filter element (1/100-18-BX) • 1x Dust filter element (1/100-18-BX) • 1x Active carbon refill for carbon adsorber (p/n 2386)	159.003569
Maintenance kit sub-unit, consisting of: • 1x Fine filter element (1/10018-BX) • 1x Dust filter element (1/100-18-BX) • Active carbon refill for carbon adsorber (p/n 2386)	159.003570
Oxygen sensor	159.002284
Fuse	159.002002

Table 4-9: Maintenance kits. Refer to chapter 9.

5 Installation

Follow the paragraphs in this chapter to install the generator.

5.1 Transport

Warning

- **Transport the generator upright.**
- **Put the generator in the original box to transport the generator over longer distances.**
- **Lift the generator with a forklift.**
- **For qualifications of personnel, refer to §2.1.**

5.2 Define location

Install the generator on a fixed location. The location must meet following requirements:

- Indoors
- Dry
- Vibration free
- No continuous direct irradiation by sunlight
- Away from heat sources
- Properly ventilated room. Refer to §2.5
- Easy accessibly for operating and service

Perform the complete installation procedure again if you move the generator to a new location.

Transport the generator box to this location.

5.3 Compressed air supply

5.3.1 Ambient temperature of generator

With increasing temperatures the pressurised air consumption will increase and consequently the capacity will decrease. Make sure the ambient temperature of the compressed air is as low as reasonably possible.

5.3.2 Checklist for compressed air supply

The source of compressed air can be either a central compressed air system or a stand-alone compressor dedicated to the nitrogen generator. The compressed air entering the membrane gas separation section must be dry and non-condensing (refer to §4.2).

Checklist when connecting to a central compressed air system

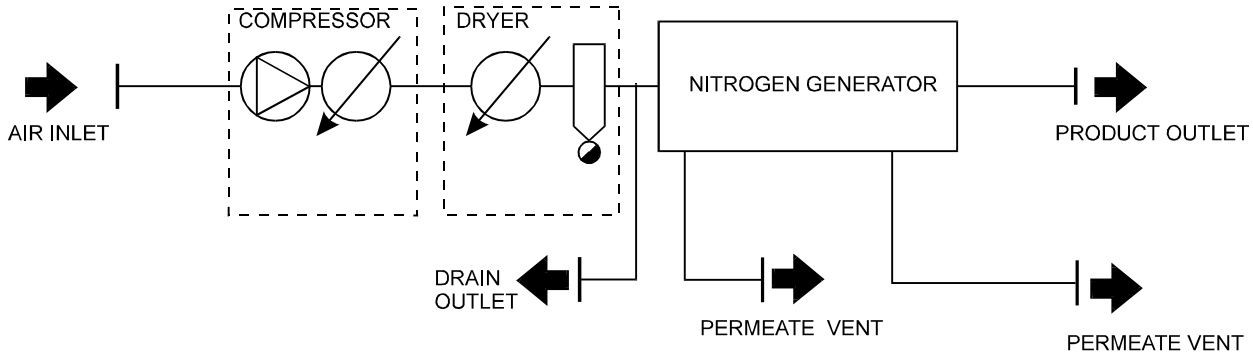
1. Dew-point of compressed air: ≤ 5℃
2. System has sufficient capacity
3. System can produce the required pressure (take pressure drop into consideration)

Checklist when connecting to a dedicated stand-alone compressor
A compressor feeding a generator should have the following characteristics:

1. Equipped with after-cooler cooling the compressed air to 10-15 ℃ above ambient temperature.
2. Equipped with incorporated or separate refrigerant dryer of sufficient capacity.
3. Equipped with oil separator (in case of oil lubricated compressor).
4. Equipped with water separator.
5. Suitable for continuous operation.
6. Equipped with modulating pressure control. If this option is not available a backpressure vent valve can be installed as an alternative measure to modulate the capacity.
7. Preferably the compressor is slightly over-dimensioned in case elevated nitrogen delivery pressure is required.

5.4 Installation scheme of generator

A basic installation scheme is shown below.



In case variable or peak-wise nitrogen consumption is foreseen, installation of a nitrogen storage vessel is recommended.

A nitrogen storage vessel should bear warnings for the dangerous suffocating properties of nitrogen according to local legislation.

5.5 Unpack and check equipment

1. Open the packaging.
2. Make sure that all components are delivered. Refer to Table 4-1.
3. Make sure that the oil content of the compressed air is below 3.0 mg/m^3.
4. Make sure that the supplied compressed air is correct:
   - If the generator is connected to a house air system: Make sure that the compressed air pressure is always between 3 bar(g)/ 42 psi(g) and 13 bar(g)/190 psi(g). The capacity must be sufficient.
   - If the generator is connected to a stand-alone compressor: Make sure that the compressor works properly. Refer to the instructions of the compressor supplier. Make sure that the cooler and the water separator of the compressor work correctly.
   - Make sure that the pressurised air dryer has the correct size. The pressurised air dryer must work properly.

5.6 Connect sub-units to the main unit

This paragraph is only required when a sub-unit is ordered separately from a main unit. Otherwise the main unit and sub-units are always supplied connected to each other.

The main unit has all functions of the NitroSource®. You can add additional sub-units to increase the capacity. Sub-units are supplied with additional components necessary for adding the sub-unit.

Do following procedure to add a sub-unit:

1. Remove the back plate.
2. Remove the end caps of the feed, product and oxygen enriched air vent headers.
3. Connect the extension pipe A to the feed header.
4. Connect the extension pipe B to the product header.
5. Connect the extension pipe C to the oxygen enriched air vent header.

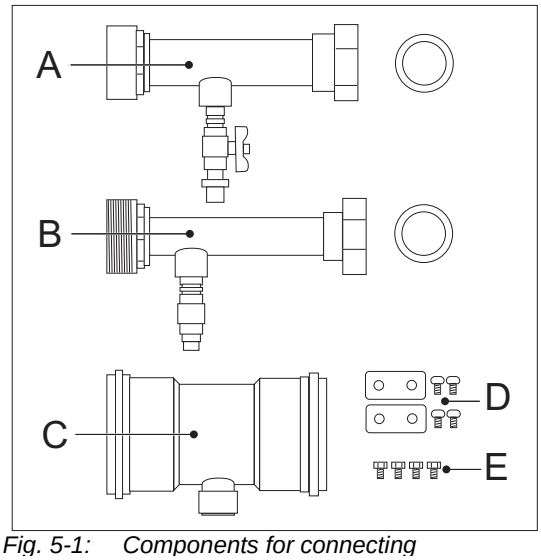


Fig. 5-1: Components for connecting

ATTENTION: to this header two hoses coming from the individual membrane tubes must be connected

6. Connect the frame of the sub-unit to the generator.
7. Connect the base plates with the M8 bolts (E):
   - Carefully screw the M8 bolts in the generator.
   - Position the sub-unit next to the generator. The bolts must point through the holes in the base plate of the sub-unit.
   - Fasten the bolts.
8. Connect the frames at the top with the brackets (D).
9. Connect the hoses that are connected to the membrane module to the appropriate header.
10. Repeat this procedure if you need to connect another sub-unit.
11. Reposition the end caps on the new header ends.
12. Reposition the back plate on the added sub-unit.
13. Follow the opposite procedure to remove a sub-unit.

5.7 Connect compressed air feed and nitrogen consumer

Warning
- **Do not connect the power at this time.**
- **Make sure that the inlet and outlet tubes are free of dust, particles, metal parts and curls, liquids and grease before you connect the generator.**

1. Connect the product outlet to the application or the storage vessel.
2. Connect the oxygen enriched air outlet to a tube of at least the same diameter as the outlet to discharge the O_2 enriched air safely and noise free.

Caution
Keep the vent line as short as possible a to get optimal performance.

3. Connect the compressed air supply to the compressed air inlet.
4. Connect the condensate drains to a condensate collection system. The reservoir in the generator is there for temporary collection of condensate in the test and installation phase.

Environmental care
Compressed air condensate is harmful for the environment. Make sure that condensate is collected in accordance with local legislation

5. In case a nitrogen reservoir is installed the oxygen sample flow can be taken from connection 2 instead of from sample flow connection 1 (refer to §3.4 and §6.2.4).

5.8 Connect power, inputs and outputs

1. Connect the generator to a fixed electrical power feed cable. Connect the power cable according to the wiring diagram (chapter 9).

Warning
Do not connect the generator to the mains electricity with a wall plug as to prevent incorrect disconnection. The main supply line voltage must be within 10% of nominal rated voltage for the generator.

For remote monitoring of different parameters, contacts on the terminal strips can be wired out. Specifications of each contact can be found below in Table 5-1.

2. Connect the required signal inputs and outputs to the terminal strip.

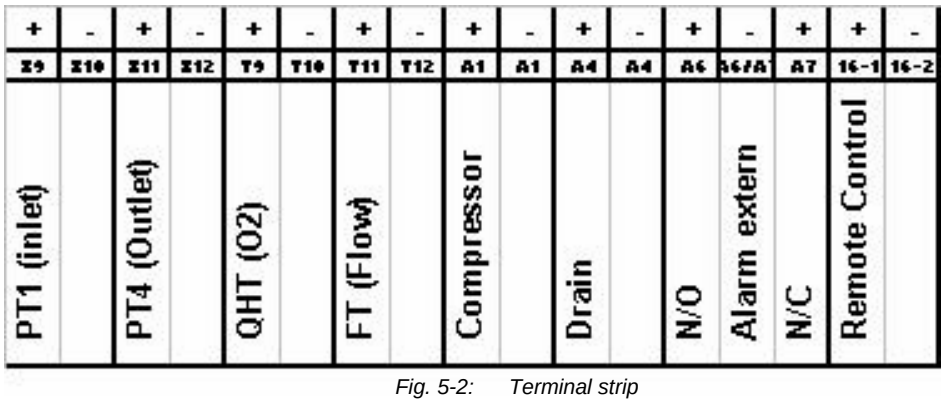


Fig. 5-2: Terminal strip

Clamp	Function	Range
PT1	Inlet pressure	2-10 V output (8mA at 10 V)/0-16 bar(g)
PT4	Outlet pressure	2-10 V output (8mA at 10 V)/0-16 bar(g)
QHT	Residual oxygen content	2-10 V output (8mA at 10 V)/0-25 % O2
FT	Product flow (option)	2-10 V output (8mA at 10 V)/on request
Compressor	Start stop signal to compressor	Relay (5-220V AC/DC, 0.01-2.5A), make-contact
Drain	Signal to optional solenoids on the drain outlets of the filters	Relay (5-220V AC/DC, 0.01-2.5A), make-contact
Alarm extern	General alarm output N/O = Normally Open N/C = Normally Closed	Relay (5-220V AC/DC, 0.01-2.5A), Break-contact make-contact
Remote control	Remote control input	*Digital input* Nominal input current: 10 mA Voltage: internal power supply

Table 5-1: Connections terminal strip

6 Operation of the control system

The control system is operated with a touch screen panel.

WARNING
Don't use sharp objects when touching the screen.

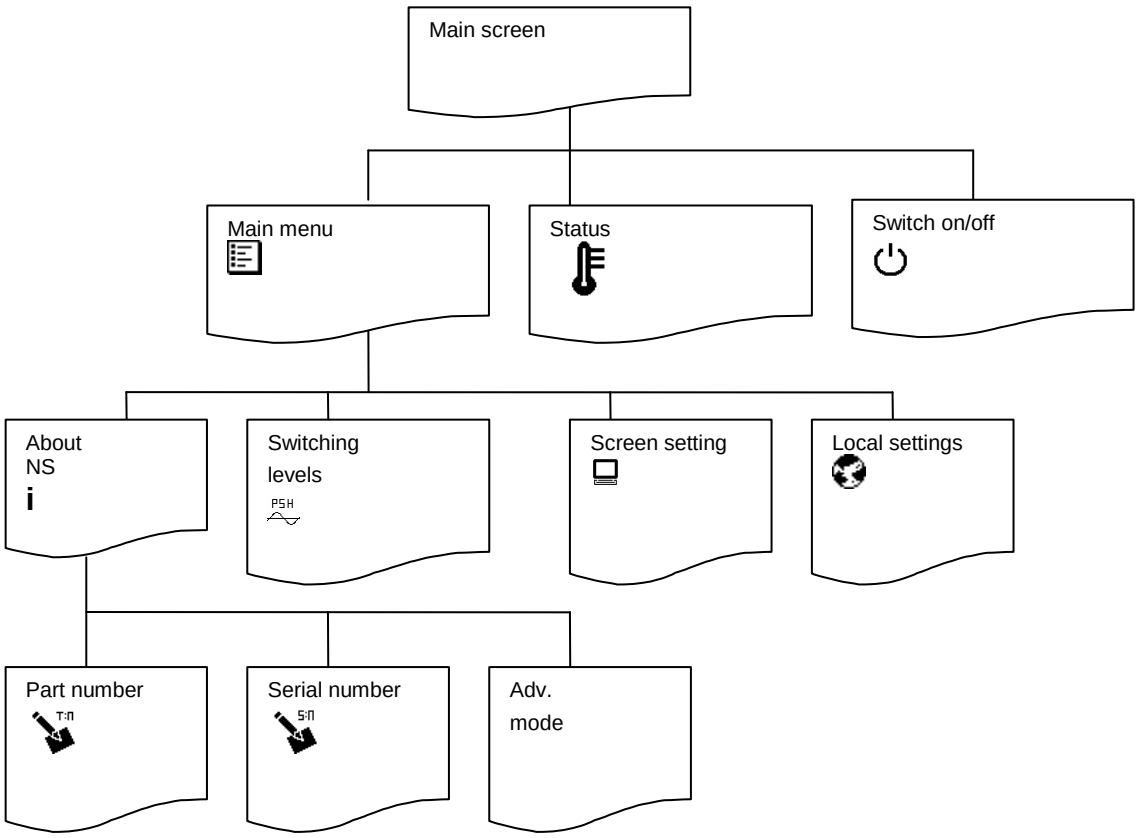
The control system can be operated in

- Basic mode with essential features or
- Advanced mode with additional features such as alarms and datalogging.

Installation in *Basic mode* is easy whereas installation in *Advanced mode* is technically more demanding. It is the choice of the user which mode to use. In most cases Basic mode will be sufficient. The generator is factory set in the Advanced mode.

It is always possible to go back in the menu structure by touching the return-button .

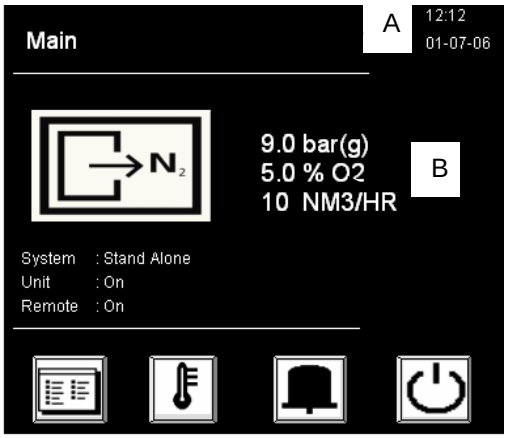
6.1 Menu structure basic mode



6.1.1 Main screen

Access: This is the screen, which is lit-up during normal operation.

Function: Access to different menus and actual status of the unit during operation.

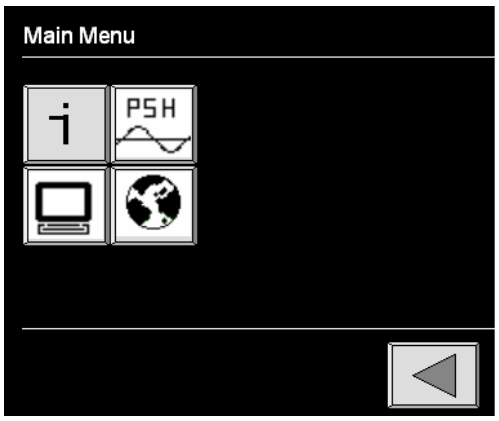


Symbol/data	Information/result
Date/time (A)	Shows actual date and time
Status of unit (B)	Shows actual outlet pressure, O2 percentage and gives flow indication
	Main menu button (refer to §6.1.2)
	Status menu button (refer to §6.1.3
	Active alarm menu button
	Switch **ON/OFF button**, generator will turn ON or OFF

6.1.2 Main menu

Access: Press the **Main menu** button.

Function: Access to the different menus.



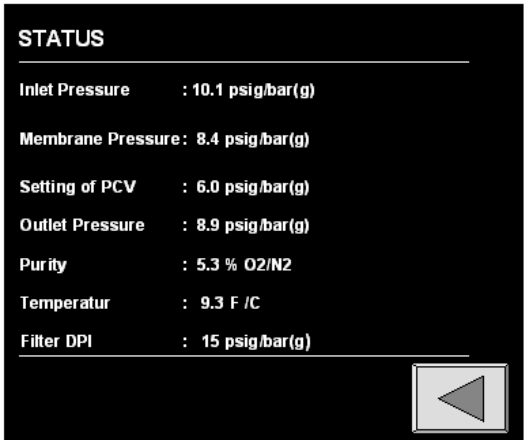
Symbol	Menu
	Access to **About NitroSource+ menu** (refer to § 6.1.4)
PSH	Access to **pressure switch menu** (refer to §6.1.5)
	Access to **screen settings menu** (refer to §6.1.6)
	Access to **local settings menu** (refer to § 6.1.7)

6.1.3 Status Menu

Access: Touch **status menu symbol** in the main screen (refer to §6.1.1)

Function: Shows the status of different sensors:

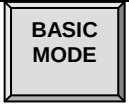
- Inlet pressure
- Membrane pressure
- Setting of PVC
- Outlet pressure
- Purity
- Temperature
- Filter DPI



6.1.4 About NitroSource menu

Access: Touch **About NitroSource+ symbol** in the main menu (refer to §6.1.2)

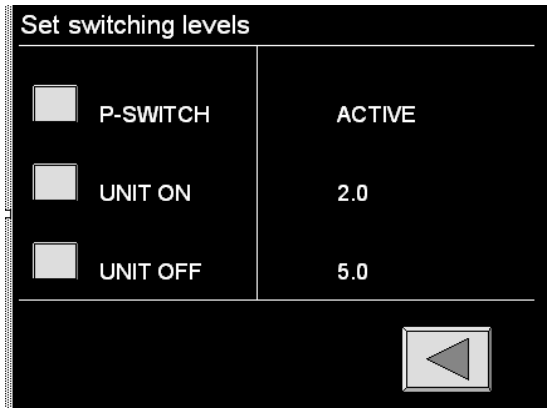
Function: Shows general information about the appliance and the supplier. Enter different sections to change part number, serial number and between basic and advanced mode.

Symbol	Action
	Enter the part number of the unit
	Enter serial number of the unit
	Basic/advanced mode button. For basic mode, enter license key 46 87 63 For advanced mode, enter license key 89 74 65

6.1.5 Pressure switch menu

Access: Touch pressure switch menu button in settings screen (refer to § **Error! Reference source not found.**)

Function: Set the pressure switch



In the pressure switch menu the levels at which outlet pressure the generator will switch on and off, can be set. The pressure switch function is activated especially in case a nitrogen receiver is installed at the outlet of the generator.

To change the settings, touch the button in front of the text.

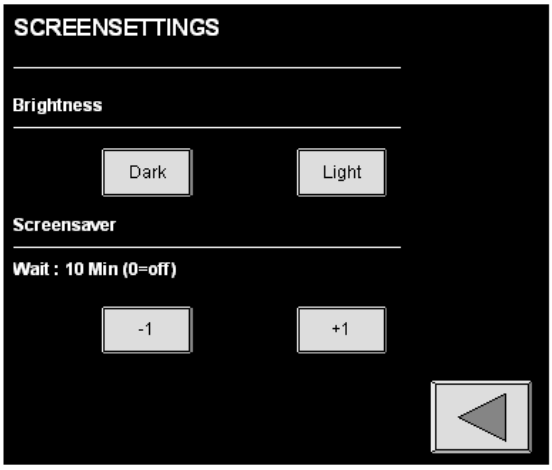
Button	Selection	Result
P-switch	Active	Pressure switch is active
P-switch	Inactive	Pressure switch is not active
Unit on	0-10 Bar*/ 0-145 PSI*	Pressure level at which the unit will switch on
Unit off	0-10 Bar*/ 0-145 PSI*	Pressure level at which the unit will switch off. Max. setting 2 bar/29 psi below inlet pressure.

*refer to local settings menu

IMPORTANT
The difference between switch on and off is advised to be at least 1 bar/15 psi to prevent excessively high switching frequencies

6.1.6 Screen settings menu

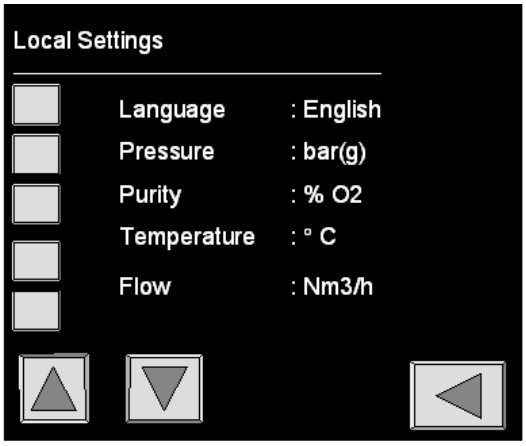
Brightness of the display backlight saver can be set in this menu



6.1.7 Local settings menu

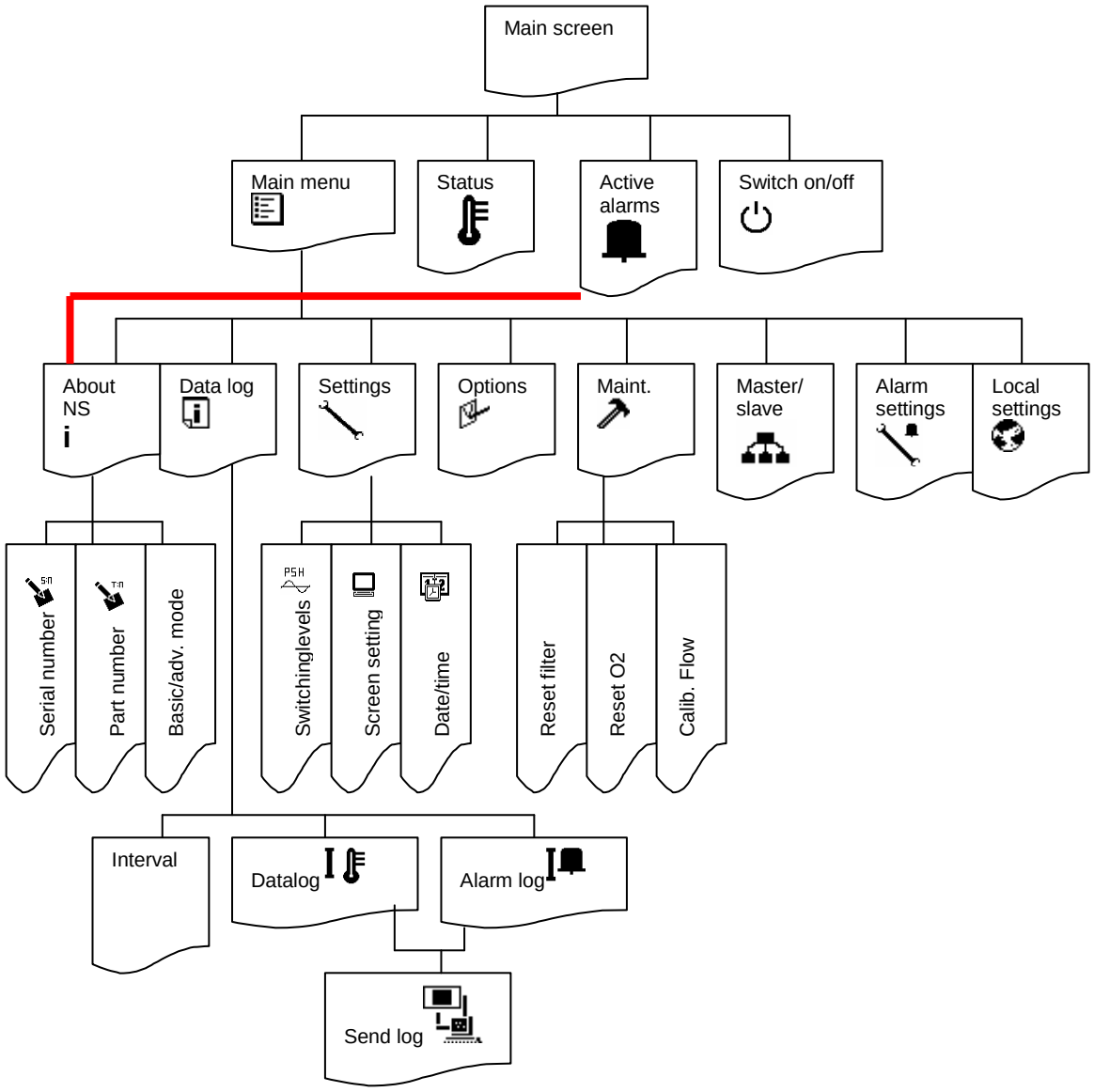
Access: Touch **local settings menu symbol** in the main menu.

Function: Set data to local requirements.



Button	Selection	Result
Language	English, Francais, Deutsch, Nederlands, Español	Text in the screen will appear in the chosen language.
Pressure	bar(g) / psig	Pressure indications will appear in the chosen setting
Purity	%N2 / %O2	Purity will appear in nitrogen (%N2) or oxygen (%O2) percentage
Temperature	℃ / ℉	Temperature will appear in chos en setting
Flow	Nm3/h / Sft3/m	Flow will appear in the chosen setting

6.2 Menu structure advanced mode

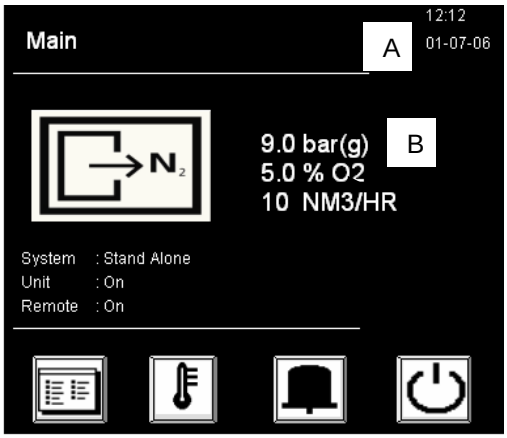


Advanced mode has additional features to *Basic mode*. The additional features are explained in detail hereafter.

6.2.1 Main screen

Access: This is the screen, which is lit-up during normal operation.

Function: Access to different menus and actual status of the unit during operation.

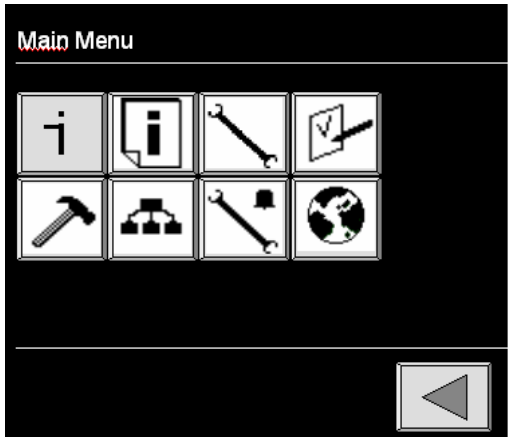


Symbol/data	Information/result
Date/time (A)	Shows actual date and time
Status of unit (B)	Shows actual outlet pressure, O2 percentage and gives flow indication
	Main menu button (refer to §6.1.2)
	Status menu button (refer to §6.1.3)
	Active alarm menu button (refer to §6.1.1)
	Switch **ON/OFF button**, generator will turn ON or OFF

6.2.2 Main menu

Access: Press the **Main menu** button.

Function: Access to the different menus.



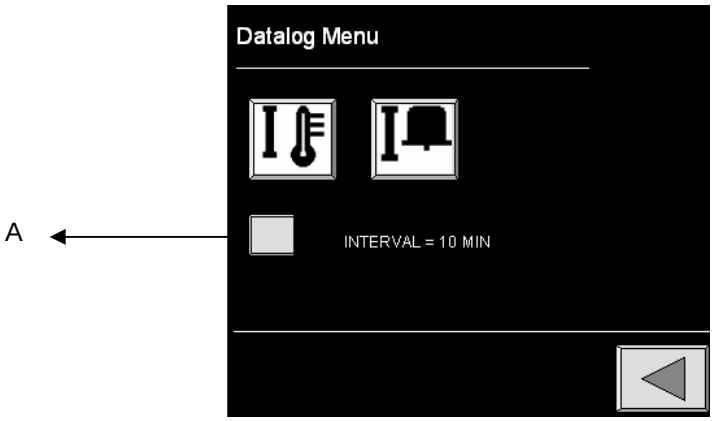
Symbol	Menu
	Access to **About NitroSource+ menu** (refer to §6.1.4)
	Access to **data log menu** (refer to §6.2.3)
	Access to **settings menu** (refer to §6.2.4)

	Access to **options menu** (refer to §6.2.5)
	Access to **maintenance menu** (refer to §6.2.6)
	Access to **master/slave menu** (refer to §6.2.7)
	Access to **alarm settings menu** (refer to §6.2.8)
	Access to **local settings menu** (refer to §6.1.7)
	Returning to previous menu

6.2.3 Datalog menu

Access: Touch **datalog menu symbol** in the main menu.

Function: Set the interval at which the data is logged. Show the logged process data and the logged alarms. Use the arrow keys to scroll through the data.



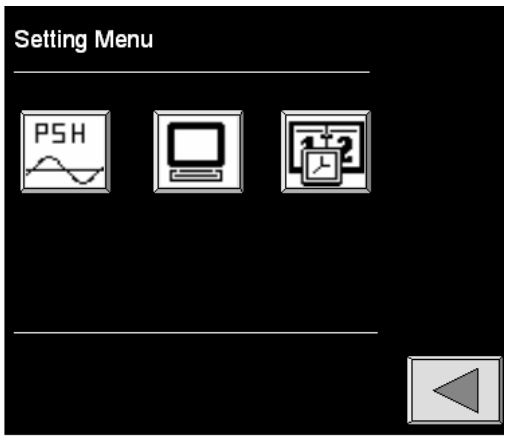
Symbol	Action
	Access to **logged process data**. Touch the arrow keys to scroll through the data.
	Access to **logged alarm data**. Touch the arrow keys to scroll through the data.
A	Button to change the interval time between the logging of the process and alarm data.

- Process data and alarm events are logged. A record is made every time the unit switches on or off. Further records are created at regular intervals when the system is on. The interval can be adjusted. Touch the button in the screen to do so.
- The generator has memory for 500 records. The oldest record will be erased by the latest.
- Records are also sent out to the RS232 communication-port, which can be connected to an external computer. A regular cable with a male and a female DB9-connector can be used for the connection between the generator and the computer.
- Logged data can be sent to an external computer through the RS232 communication port. To do so touch the -button.

6.2.4 Setting menu

Access: Touch **setting menu symbol** in the main menu.

Function: Set the pressure switch, screen settings and date/time.

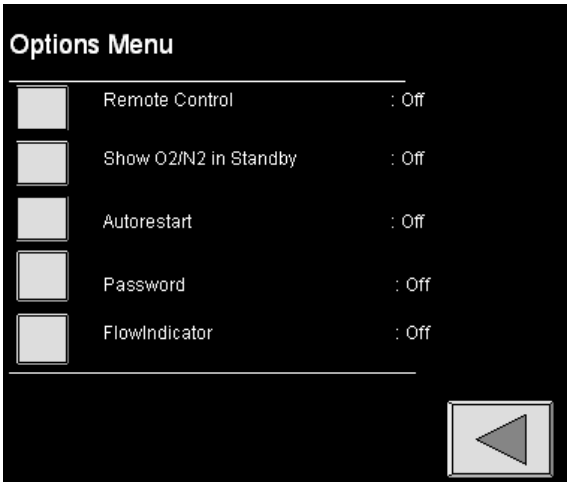


Symbol	Action
PSH	Set the pressure switch levels (refer to §6.1.5)
	Change the screen settings (refer to §6.1.6)
	Set date and time.

6.2.5 Options menu

Access: Touch **options menu symbol** in the main menu.

Function: Set the options: *Remote control, Show O2/N2 in standby, Auto Restart, Password, Flow Indicator*



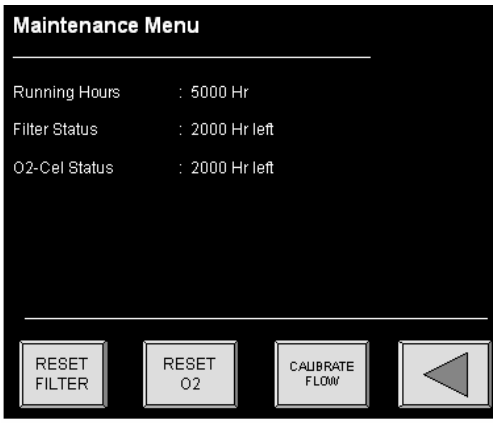
Button	Selection	Result
Remote	On	Unit can be controlled from a remote location. Only select YES after connecting the printboard to an external device (refer to §10.1). The unit can now be switch on and off from a remote location.
Remote	Off	Unit cannot be controlled from a remote location.
Show O2/N2 in standby	On	Oxygen level will always be displayed. Useful in case a nitrogen vessel is installed. In this case the O_2 sample should be taken from sample flow connection 2 (refer to §3.4)
Show O2/N2 in standby	Off	Oxygen level will not be displayed during stand-by.
Auto Restart	On	Return to the same situation/status after a power failure
Auto Restart	Off	Unit will not start automatically after a power failure. Unit needs to be started again manually.
Password	On	Settings are protected with a pin code. To change any settings enter the default pincode (1234).
Password	Off	Settings can be changed without a pincode
Flow indicator	On	Flow will be shown in main screen during normal operation. This indicator works when the O_2-level is between 0.5% and 5%
Flow indicator	Off	Flow will not be shown

6.2.6 Maintenance menu

Access: Touch **maintenance menu symbol** in the main menu.

Function: Read the condition of the filters and the oxygen analyzer and read the running hours.

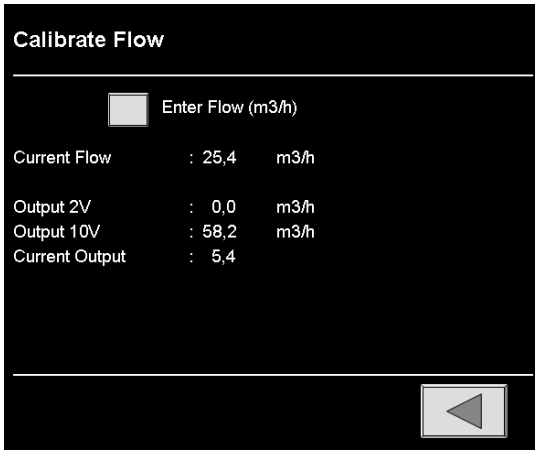
Reset filter and O_2 countdown and calibrate the flow.



When the filters have been replaced during maintenance, the hour countdown for the filters can be reset. Touch the “reset filter” button and touch YES. The filter status will now read “xxxx hours left”.

When the O_2 cell has been replaced during maintenance, the hour countdown for the O_2 cell can be reset. Touch the “reset O2” button and touch YES. The O2 cell status will read: “xxxx hours left”.

It is possible to calibrate the flow that is shown on the screen to a value measured by the user. To do this the “Calibrate Flow” button (in the “Maintenance Menu” screen) must be touched, resulting in the next screen.



With:

- "Enter Flow" button	→ Touch this button if you want to calibrate the flow, a keypad will appear to enter your measured value for flow.
- Current Flow	→ Shows current flow
- Output 2V/10V	→ Shows the range for the flow as expressed by the analogue output.
- Current Output	→ Shows the current value of the analogue output in Volts
- return button	→ To return to the previous screen

ATTENTION:
When the flow is calibrated the range for the analogue output will be changed as well.

6.2.7 Master/slave menu

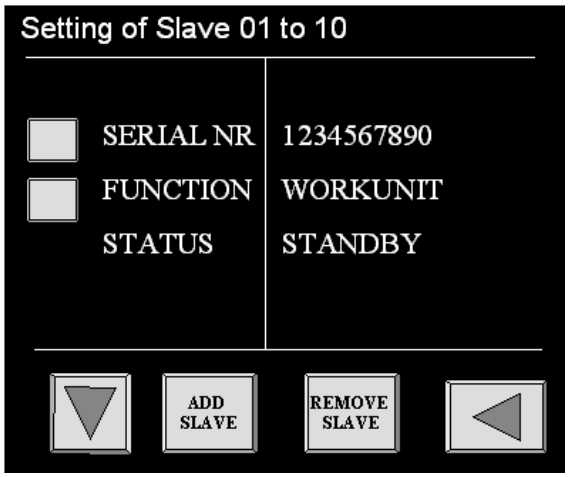
Access: Touch **Master/slave menu symbol** in the main menu.

Function: Set the generator to a master/slave unit.

With the master-slave functionality of the software it is possible to make several generator units (11 max.) work together as one system.
One control unit must be designated to be the master. The other generator units must consequently be designated to be slaves. To do this, input each individual controller in the Master-unit. The master receives signals from external units and manages all the generator units including its own. The slaves follow the instructions coming from the master. The control units communicate by means of the RS 485-protocol.

1. Check whether all generators have the same software version (refer to §6.1.4). When this is not the case ask your supplier for an update.
2. Generators that are combined in a master-slave environment must be connected in series through standard flat cables and standard DB9 female connectors to fit in the communication port of the generators.

3. The master/slave option must be switched on in the menu of all controllers.
4. All units must be set as either master or slave; only one unit can be the master.
5. The slave units must now been made known to the master by entering their serial numbers into the master. At maximum 10 slaves can be entered.
6. For all slaves, its function must be inputted into the master.



7. You can choose between work unit, backup or off. The master is always a work unit.

   Work unit: work units will work together as one unit
   Back-up-unit: will not run unless the working-unit has failed; in that case the back-up units will work together as one unit; denominating a unit as back-up can only be done when the installed capacity is redundant.
   Off: a unit set like this will not work.

8. The slaves will automatically adopt the settings of the master.
9. Now choose whether all units run equally or not by switching on the equal use option. When this option is not enabled, all slaves will be switched on and off in a fixed order.
10. A start-up delay can be set. This delay represents a lag time between the signal that an extra slave is required and the actual switch on. Would the signal still be there after this delay an extra slave is started up. A delay is advised when pressure peaks downstream are likely to occur.
11. After having finished the master/slave programming it is advised to switch all generators off and on again.

6.2.8 Alarm menu

Access: Touch **alarm menu symbol** in the main menu.

Function: Set different alarms. Use the arrow keys to scroll.

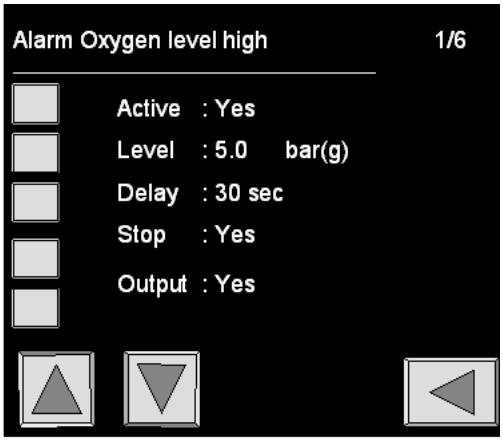
The 6 alarms that can be set are:

Screen	Alarm
1/6	Alarm oxygen level high
2/6	Alarm oxygen level low
3/6	Alarm filter DPI high
4/6	Alarm inlet pressure low
5/6	Alarm outlet pressure high
6/6	Alarm outlet pressure low

ATTENTION:
Default all alarms are set to NO, which means they are not activated. Alarms do not influence the output and purity

To activate an alarm touch the active button. When the button is touched it switches between **Yes** and **No**.

When selected **Yes**, the rest of the data that needs to be set for the specific alarm, will automatically pop-up (see below screen).



Button	Selection	Result
Active	No	Alarm is switched off
Active	Yes	Alarm is switched on All alarms have to be manually reset when they have been resolved.
Level	1-16% O_2	For screen 1/6 and 2/6. This is the percentage of oxygen* at which the alarm will appear.
Level	100 – 84% N_2	For screen 1/6 and 2/6. This is the percentage of nitrogen*(100-O_2%) at which the alarm will appear.
Level	0-13 BAR*	For screen 3/6 and 4/6. This is the pressure level at which the alarm will appear.
Level	0-188 PSI*	For screen 3/6 and 4/6. This is the pressure level at which the alarm will appear.
Level	0-10 BAR*	For screen 5/6 and 6/6. This is the pressure level at which the alarm will appear.
Level	0-145 PSI*	For screen 5/6 and 6/6. This is the pressure level at which the alarm will appear.
Delay	0-360 sec	Time in seconds between an alarm occurs and showing on the screen, giving a noise and switching the relay.
Stop	Yes	Generator will switch off when alarm occurs.
Stop	No	Generator will continue running when alarm occurs.
Relay	Yes	Alarm is not sent to the general alarm relay
Relay	No	Alarm is sent to general alarm relay

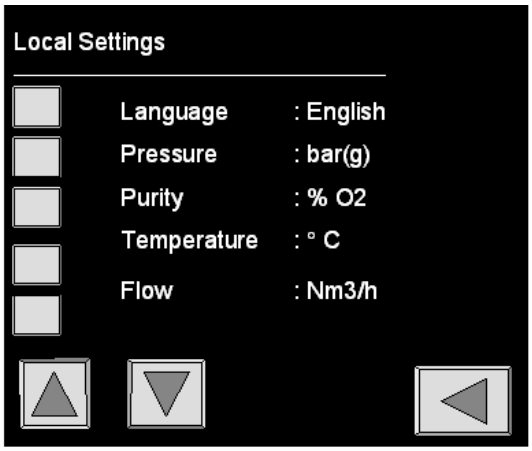
* Setting can be selected in local settings menu (refer to §6.2.9)

ATTENTION:
When changing the settings in screen 1/6 and 2/6 remember that O_2 low can never exceed O_2 high. Therefore first change O_2 high settings before changing O_2 low settings.

6.2.9 Local settings menu

Access: Touch **local settings menu symbol** in the main menu.

Function: Set data to local requirements.



Button	Selection	Result
Language	English, Francais, Deutsch, Nederlands, Español	Text in the screen will appear in the chosen language.
Pressure	bar(g) / psig	Pressure indications will appear in the chosen setting
Purity	%N2 / %O2	Purity will appear in nitrogen (%N2) or oxygen (%O2) percentage
Temperature	℃ / ℉	Temperature will appear in chos en setting
Flow	Nm3/h / Sft3/m	Flow will appear in the chosen setting

7 Operation

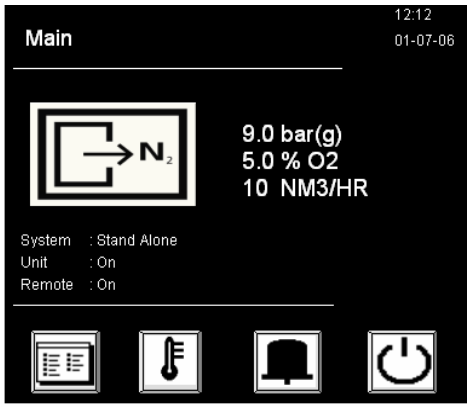
7.1 Commissioning

To commission the generator several steps have to be taken. Follow § 7.1.1 through §7.1.5 to make sure the generator is commissioned correctly.

7.1.1 Prepare for first start up

1. Make sure that the connections are correct and fixed properly.
2. The sample stream that is going to the O_2-analyzer is taken from sample flow connection 1 upstream the backpressure valve (PCV). It represents the quality of the product as actually produced. In case a nitrogen vessel is installed it can be considered to take the sample from sample flow connection 2, downstream the backpressure valve (PCV). By doing so, an oxygen sample is taken from the vessel also when the generator is in stand-by. Changing the sample connection can be easily done by taking the hose from sample flow connection 1 and connecting it to sample flow connection 2, which is ex-factory plugged with a red plug.
3. Make sure that the emergency stop switch is closed. The button must be in the pulled out position.
4. Switch on the generator with the mechanical switch inside the generator. (refer to §3.4)
5. Messages are shown on the LCD display. The start-up screen displays the general information of the generator, such as part number, serial number, software version and as well as general business information.

6. After a few seconds the next screen will pop-up, which is the main screen, shown when the generator is switched on.



7. Set the control system according to your wishes and local situation. If you choose not to input any settings, the generator will run at its default settings, which are the minimum requirements for operation.

IMPORTANT
Setting the control system is dependent on local situations. We advise you to carefully analyze what is required. The generator is a pressurised air process instrument that needs to be installed and set accordingly

8. After controller settings have been inputted the generator can be started up.

7.1.2 First start up

Make sure that the nitrogen that will be produced can be vented instantaneously during the initial start up.

1. Open the compressed air supply.
2. Press the on/off button ⏻ to put the system in operating mode.
3. The pressure and purity can be read on the main screen.
4. Make sure that the compressed air pressure is as high as expected.
5. Touch the button to open the status screen
6. Adjust the backpressure regulator (PCV) so that the reading *Setting of PCV* (refer to §6.1.3) is at least 2 bar/29 psi below the inlet pressure.

IMPORTANT
Correct setting of PCV is important in case a nitrogen vessel has been installed or in case pressures at the outlet vary. Correct setting optimises the performance of your system by 15% max.

7. Make sure that the installation has no leaks, which may have arisen during transport.

7.1.3 De-dusting of active carbon adsorber

Active carbon can produce some dust. Carbon dust may have been created in transport. It is advised to de-dust the adsorber because of this.

1. This procedure must be done while the generator is running.
2. Close the ball valve V1 in the compressed air supply to the membrane.
3. Depressurise the membrane via the valve at the bottom of the dust filter.
4. Remove the bowl of the dust filter.
5. Slowly open the ball valve and allow pressurised air to be vented through the open dust filter for some 30 seconds
6. Close the ball valve
7. Replace the bowl of the dust filter, make sure the valve at the bottom of the bowl is closed
8. Open the ball valve in the compressed air supply of the membrane again
9. Repeat this procedure for any sub unit

7.1.4 Purity adjustment

1. Check for the desired purity (%).
2. Adjust the purity adjustment valve (FCV1) to set the purity to the desired value.
3. Check whether the generator controller functions work as planned.
4. Close the sheet metal covers.
5. The system is ready for use now.

7.1.5 Dust filter exchange after 10 running hours

The dust filters need to be exchanged after the first $\pm$ 10 running hours because initially larger amounts of dust, which may have arisen during transport, are released.

Before exchanging the filter it is recommended to de-dust the adsorbers once more as described in §7.1.3. Afterwards exchange the dust filter elements. Contact Parker's technical support group.

7.2 Start generator

1. Open the compressed air supply.
2. Press the on/off button ⏻ on the control panel.
3. Check the desired purity (%).
4. Set the oxygen concentration with the purity adjustment valve (FCV1).
5. Read the oxygen concentration from the display.
6. The system is ready for use now.
7. The oxygen level of the product and the pressure level in the application or storage vessel are shown on the display.

7.3 Stop generator

Warning:
Do not switch off the generator during the depressurisation. The pressurised air inlet remains on pressure if electricity is switched off before depressurisation.

1. Switch off the power switch before you perform maintenance.
2. Switch off the supply of pressurised air.
3. Depressurise the system by venting the nitrogen outlet.
4. Make sure that the system is fully depressurised by checking the reading on the status screen .

7.4 Switch on and off sub-unit

You can switch on or off a sub-unit depending on the required capacity.

To do this it is possible to shut one or more of the ball valves (V1) in the feed lines to the membrane benches.

The main unit must never be shut off, as this will influence the control system.

In case a dedicated standalone compressor feeds the generator: the compressor control must be able to adapt for the reduced compressed air consumption. Consult your compressed air supplier.

8 Troubleshooting

8.1 Error list

Error	Possible cause	Possible solution
Delivery of nitrogen too low or absent	Sample too low	Check the sample flow to the O_2 sensor. Contact Parker for service.
	O_2 sensor out of calibration	Calibrate the O_2 sensor - Contact Parker for service.
	Compressed air supply too low	Check/increase the air supply
	Ambient temperature is too high	Lower the temperature, if possible
	Compressed air temperature is too high	Lower the temperature, if possible
	Air filters are polluted	Change or clean the air filters
	Generator is switched off	Switch on the generator
	Flow control valve (FCV1) is closed	Open the valve
	Leak in piping	Check for leaks in the piping.
	Automatic drain is continuously open	Check the automatic drain. Contact Parker for service.
Required O_2 concentration cannot be reached	Nitrogen outlet line is blocked.	Check/open the outlet line
	Sample too low	Check the sample flow to the O_2 sensor. Contact Parker for service.
	O_2 sensor out of calibration	Calibrate the O_2 sensor - Contact Parker for service.
	O_2 sensor used up	Contact Parker for service.
	No pressure in the system	Check the compressed air supply
	Unit is standby	Wait until the pressure in the application or in the vessels drops
Generator does not automatically switch off	Switch-off pressure set too high	Change the switch-off pressure
	Compressed air pressure too low	Check the compressed air supply
Pressure is not attained	Blockage	Check the compressed air delivery to the generator
	Ambient temperature is too high	Lower the temperature, if possible
	Compressed air temperature is too high	Check if the cooler of the compressor functions properly
	Air filters are polluted	Check/clean the air filter
	Leak in piping	Check for leaks in the piping.
	The filter drain is open or looses air	Increase the feed pressure. Stop the compressed air supply and turn it open again
Alarm 122-125	Pressure sensor failure	Check plug on back of controller.
Alarm 126	Temperature sensor failure	Check plug on back of controller.
Alarm 127	O_2 sensor failure	Expose to ambient. If display shows 0.0 replace O_2 sensor. Check plug on back of controller.

Table 8-1: Error list

8.2 Alarm handling

The display will show alarm messages during the installation. During the operation, alarm messages must be an exception. If there are frequent alarm messages during the operation, you must check the cause of these alarms.

1. An alarm messages is accompanied by an acoustic signal. On the display the alarm pictogram will flash.
2. Press to show the alarm cause.

3. Press **ACCEPT** to accept the alarm. The acoustic signal will stop.
4. When you have solved the alarm cause, press **RESET** to reset the alarm.

IMPORTANT

When an alarm has been accepted but not reset, the acoustic signal it will come back after 24 hours.

When an alarm is reset while the cause has not been taken away, the alarm will come back after the delay time that is set in the alarm menu.

Unnecessary alarms can be caused by too tightly set alarm settings.

9 Maintenance

9.1 Maintenance scheme

Part	Action	Frequency
Dust filter	Replace dust filter on each sub and main unit	After the first 10 running hours Element supplied with each sub and main unit
Oxygen sensor	Replace oxygen sensor. Contact Parker's technical support group.	• 1x per 3 years, or • If there is an alarm that tells you to exchange the sensor.
Filters	Replace filter element. Contact Parker's technical support group.	• 1x per year, • If there is an alarm that tells you to exchange the filters.
	Clean drain filter. Contact Parker's technical support group.	As required
	Empty drain liquid from container.	As required
Carbon Adsorber	Replace carbon adsorber cartridge. Contact Parker's technical support group.	Together with the filter elements
General Cleaning	Wipe with dry cloth. Do not use water or spray products	As required

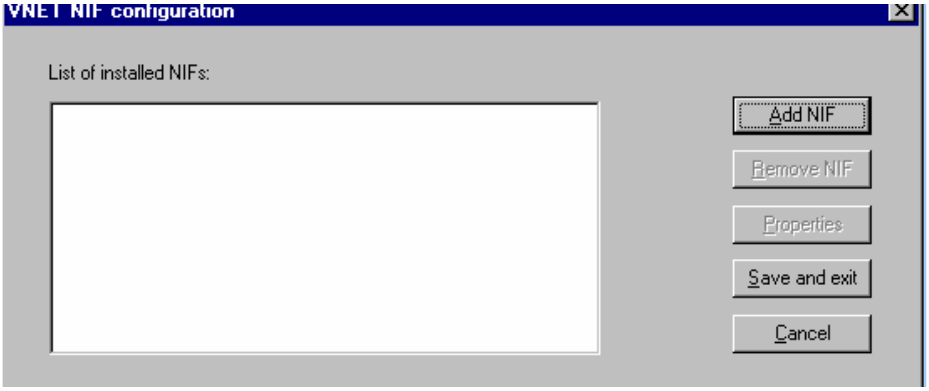
Table 9-1: Maintenance scheme

Notes

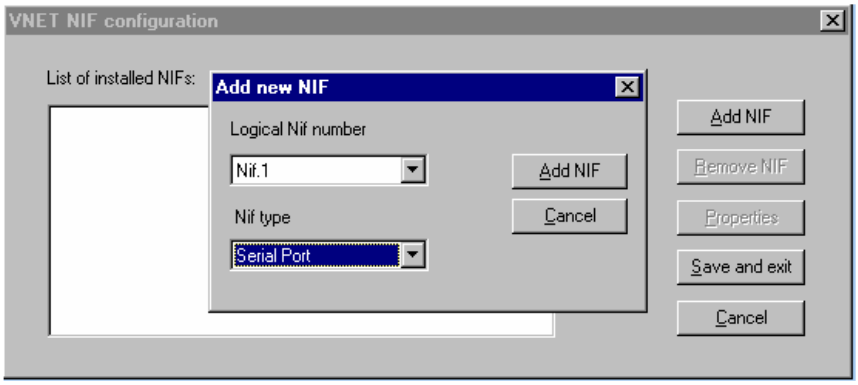
- The dust filters need to be exchanged after the first $\pm$ 10 running hours because initially larger amounts of dust, that may have arisen during transport, are released.
- Always replace the elements for all three filters and the carbon adsorber, if the indicator bar is shown in the maintenance screen.
- Use the maintenance kits for yearly maintenance. Refer to §4.3.

9.2 Software updates

1. For installing the latest version of the software of the nitrogen generator you need a (laptop) computer and a cable as supplied with this kit. General computer knowledge is necessary to carry out the upload procedure.
2. Connect the cable to your computer and to the controller; erroneous connection is impossible.
3. Before you can upload the software you must install the programme HPCLoad on your computer. Close all programs before doing that
4. Go to the directory **HPCLoad\disk1\set up** on the CD-ROM
5. Run **set up** and follow the instructions
6. When it asked to insert another disk push the **browse**-button and go to disk 2 on the CD-ROM
7. After the installation is finished close all programs.
8. Open the **control panel** in Windows
9. Double click **VNET NIF**
10. Click on **Add NIF**

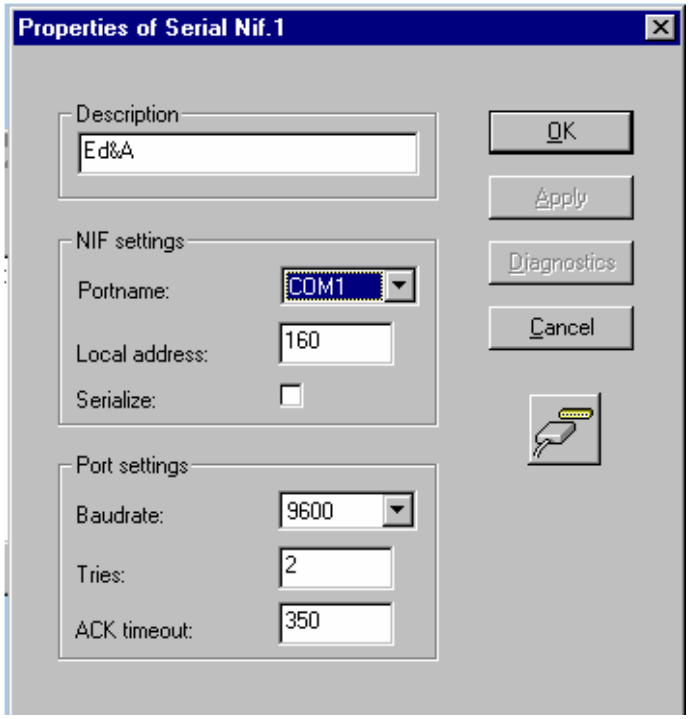


11. The logical unit will be made automatically.
12. Select **serial port** under Nif type

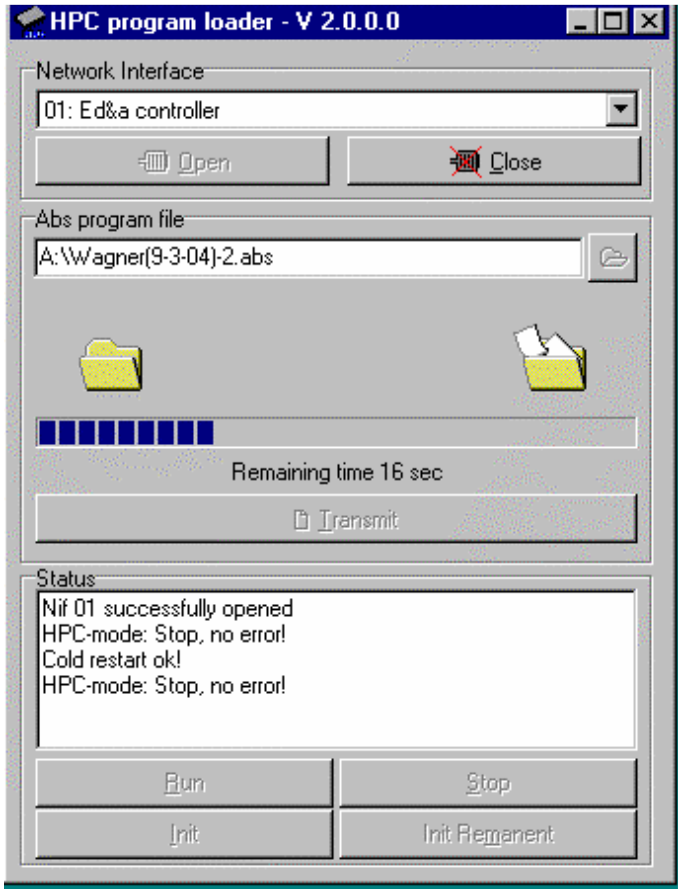


13. Click on **Add Nif** in the active Add new NIF-screen

14. Click on **properties** in the VNET NIF Configuration-window and input as shown below



15. Press **OK**
16. Press **save & exit**
17. Click **START** on the desktop and select **HPCLoad**. The window as shown below will appear.

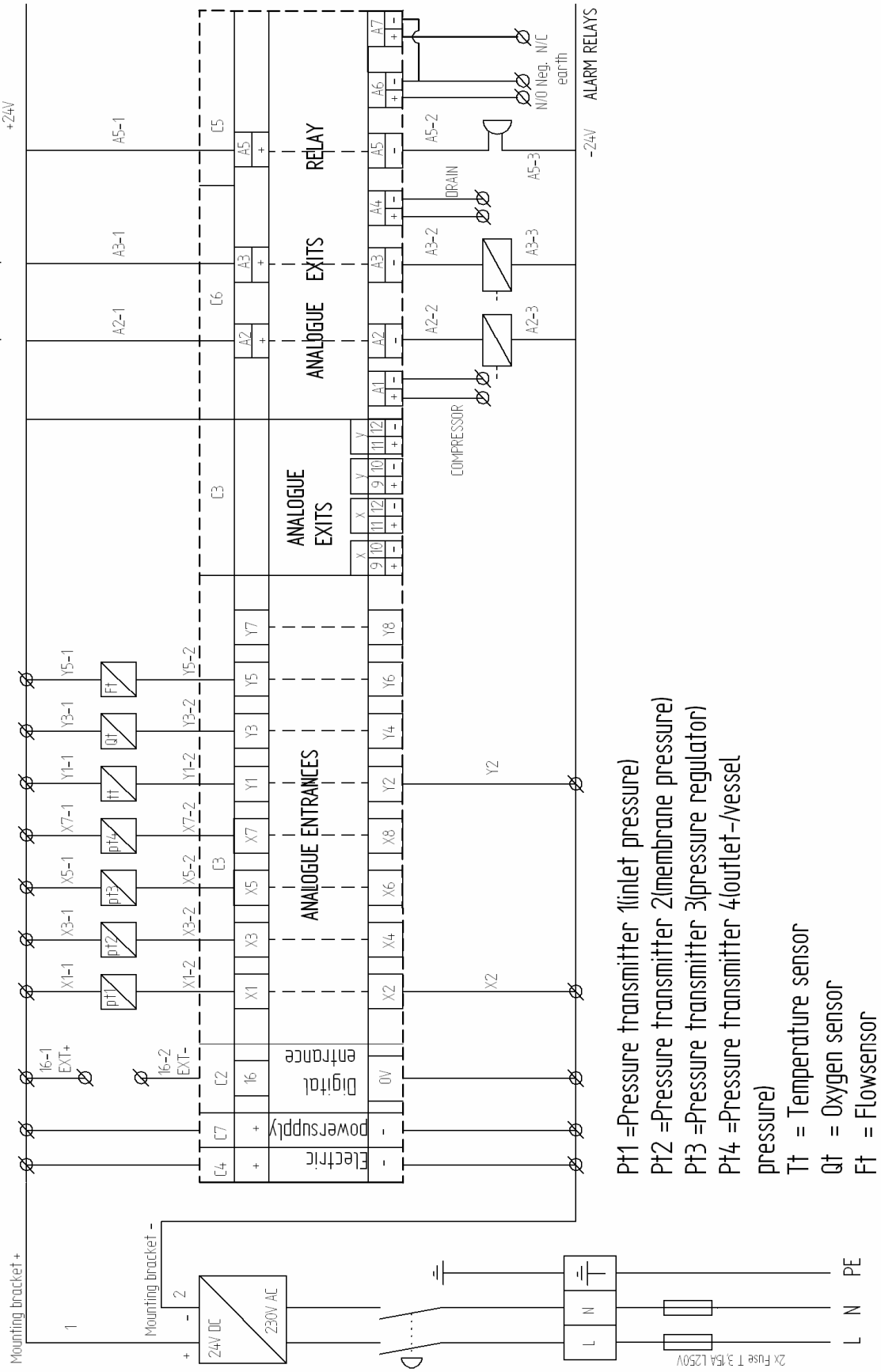


18. Click on **open**
19. Select the *.abs-file on the CD-ROM

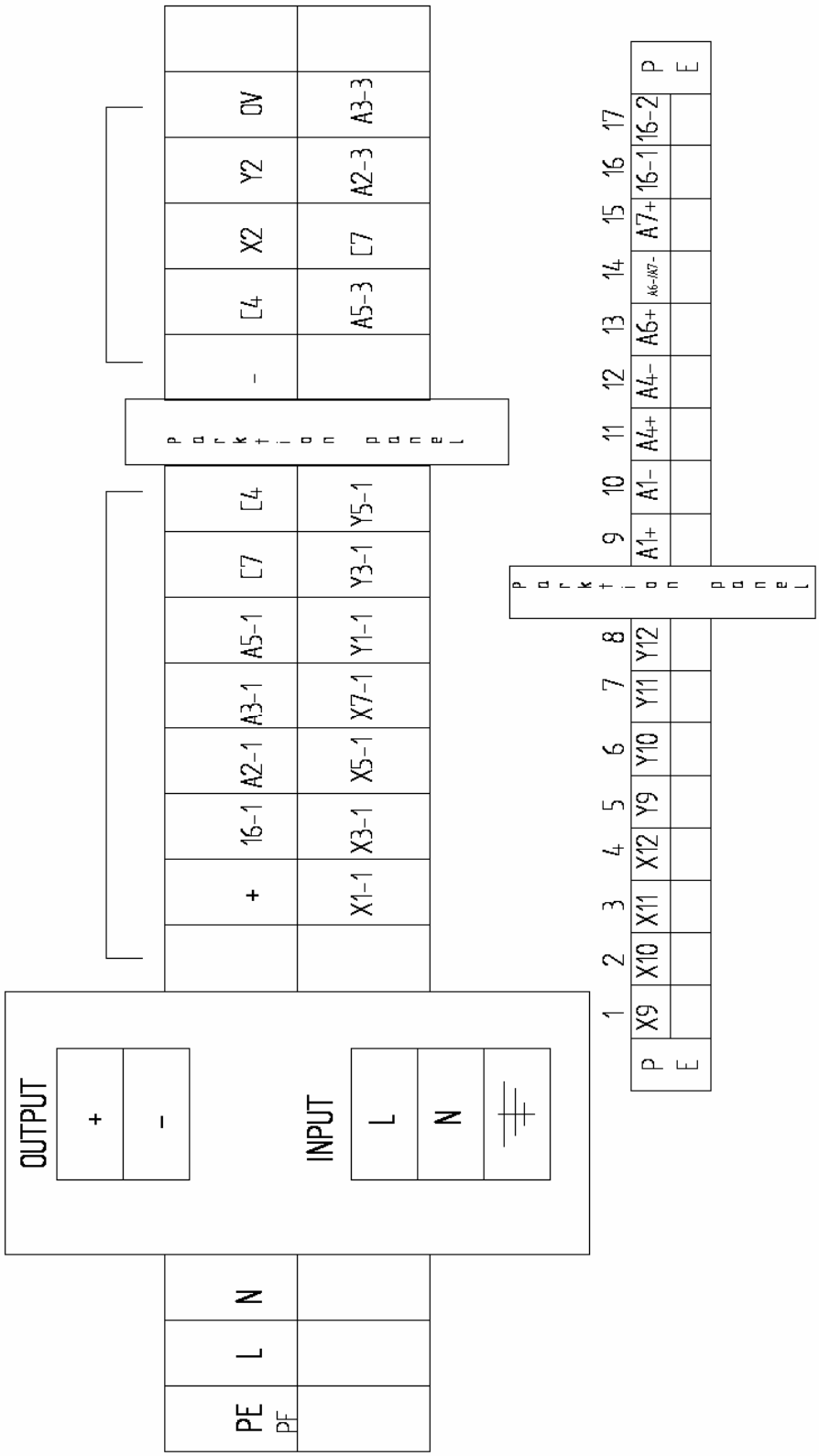
20. Click on **Init Remanent**
21. Click on **Transmit**
22. Transmission progress can be followed on the indicator baron the screen.
23. Other texts in the status field may indicate problems; consult your supplier in that case
24. The upload is complete when this shown on the screen. You can stop the programs and disconnect your computer from the controller.

Switch off the generator and switch it back on and the software will be ready for use. The upload does not change the settings. Nevertheless it is advised to make sure that all the settings are the same as before.

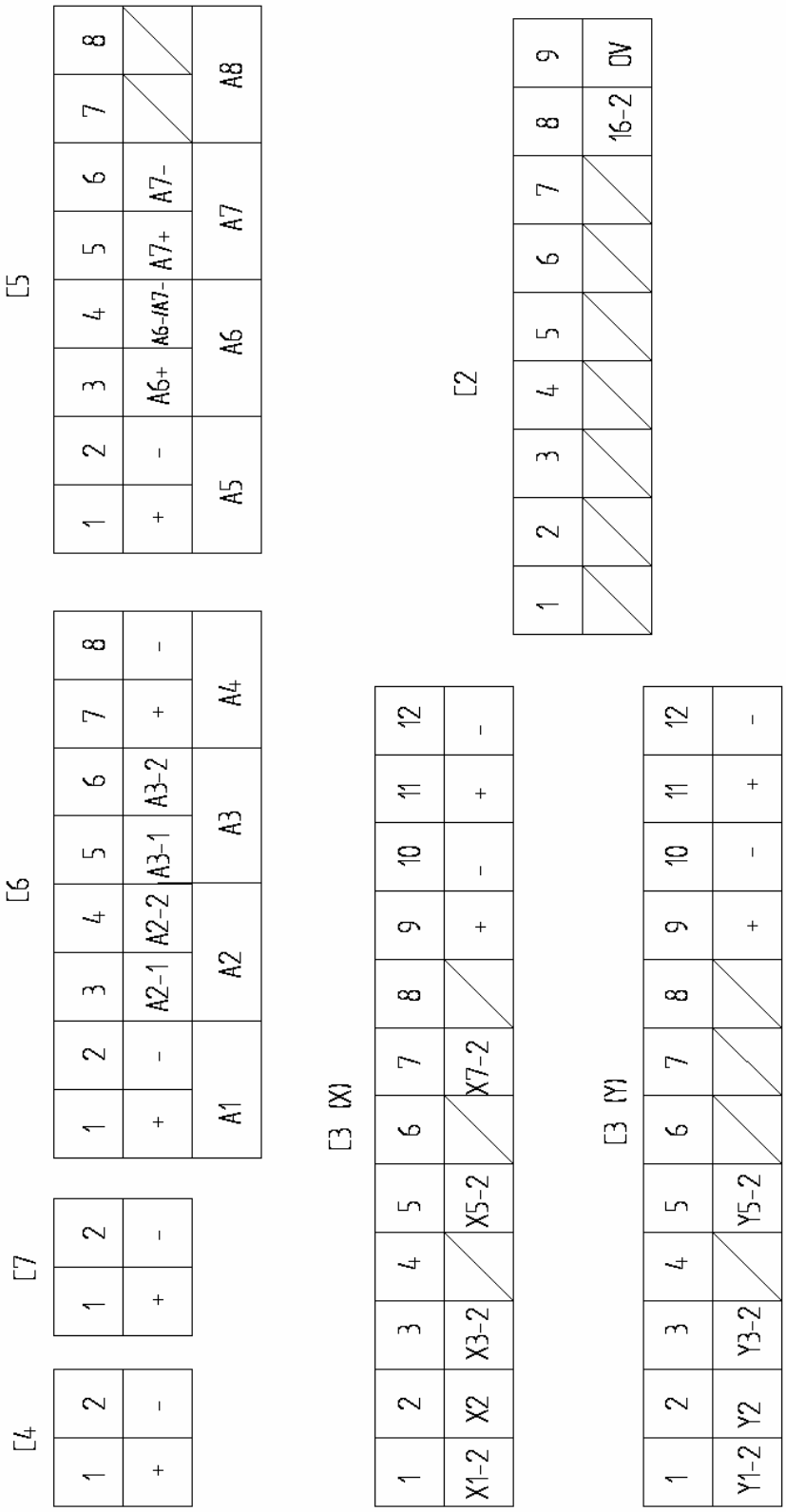
10 Electrical scheme



10.1 Layout of terminal strip



10.2 Layout of connectors for control unit



11 Index

Declaration of Conformity EN

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Nitrogen Gas Generator
NitroSource

Directives	97/23/EC 2006/95/EC 2004/108/EC
PED Assessment Route :	All components, and the entire assembly, comply with the provisions of the directive in accordance with Module A. Risk Category is 1. The pressure vessel Euro Reservoir 18239-1 a30 determines the category of the assembly, based on chart 2 for group 2 gases.
EC Type-examination Certificate:	N/A
Notified body for PED:	N/A
Authorised Representative	Derek Bankier Divisional Quality Manager Parker Hannifin ltd, Industrial division

Declaration

I declare that, as the authorised representative, the above information in relation to the supply / manufacture of this product is in conformity with provisions of the above Directives.

Signature: 

Date: 05/07/11

Declaration Number: 00226/050711

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Catalogue: K3.1.010
07/11 Rev: P

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