USER MANUAL

NitroFlow® HP

NITROGEN GENERATOR

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1 Introduction

1.1 General

NitroFlow® HP is a product of Parker Filtration & Separation B.V. This manual forms an integral part of the product. The manual describes the installation, daily operation, maintenance and troubleshooting.

Content

Read the manual carefully before the installation and operation of the *NitroFlow® HP*. 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) 1622 7233 00, USA +(1) 800 343 4048

Condition of change

No changes may be made to the NitroFlow® HP 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 must 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 Filtration & Separation B.V.

1.2 Pictograms

In this manual and on the product the following pictograms are used:

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 gasses.

Environment
Instructions with respect to the environment.

1.3 Identification and service

The identification plate is located on the back of the NitroFlow® HP. The identification plate shows the characteristics of the NitroFlow® HP.

For service and technical assistance, please contact our local representative or:

Fig. 1-1: Identification plate

PARKER FILTRATION & SEPARATION
Hermitage Court, Hermitage Lane,
Maidstone, Kent ME16 9NT
England
Tel: (+44) 1622 7233 00
Fax: (+44) 1622 7287 03

1.4 Certificates

The NitroFlow® HP meets with the following requirements:

Subject	**Applicable standard**
Directive for electromagnetic compatibility (EMC)	EN 61326 (1997) + A1 (1998) + A2 (2001) + A3 (2003) EN 61000-3-2 (2000) EN 61000-3-3 (1995) + A1(2001)
Low Voltage Directive	NEN-IEC 60204-1(1997)
Pressure equipment directive (PED)	Sound engineering practice
Quality assurance	ISO 9001:2000
Environmental care	ISO 14001:2004

1.5 Use in accordance with purpose

The NitroFlow® HP is intended to make nitrogen out of normal ambient air. The system is based on gas separation membranes. Each different or further use will not be in conformity with the purpose. Parker Filtration & Separation B.V. will not accept any liability for improper use.

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

1.6 User instructions

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

1.7 Liability

Parker Filtration & Separation B.V. will not accept any liability in case:

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

2 Health, safety and environmental aspects

2.1 General

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

Warning

- **Read this manual before you start the installation and commisioning of the NitroFlow® HP. Prevent accidents and damage to the NitroFlow® HP.**
- **Contact your supplier if you detect a problem that you cannot solve with this manual.**
- **Use the NitroFlow® HP in accordance with its purpose. Refer to §1.5.**
- **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 §1.6.**
- **Lift the NitroFlow® HP 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 NitroFlow® HP. Refer to chapter 4.**

2.2 Nitrogen and oxygen

The NitroFlow® HP 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! Refer to fig. 2-1 for indicative graphic.**

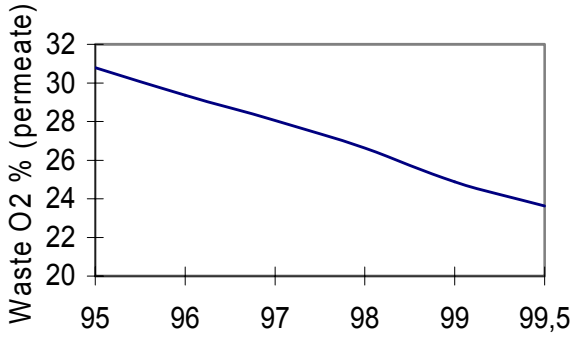


Fig. 2-1

- **The NitroFlow® HP is not designed for installation in an Ex-classified area.**
- **Do not install the NitroFlow® HP in an area where explosive mixtures may occur.**

2.3 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 NitroFlow® HP while the electric power is connected, the service-engineer must be very careful with respect to the electrical hazards.**

2.4 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 NitroFlow® HP with air.**
- **Keep the air feed to the NitroFlow® HP clean and free of organic solvent vapors and other contaminants. Do not place the NitroFlow® HP in a room where organic solvent vapors may occur in the air.**
- **Keep the ambient temperature for the NitroFlow® HP range between 10°C and 40°C (50°F and 104°F).**
- **Adjust the NitroFlow® HP to the appropriate nitrogen concentration for your application.**
- **Install the peripheral equipment, piping and nitrogen storage vessels according to standard procedures. Parker Filtration & Separation B.V. cannot take responsibility for this.**
- **Do regular maintenance to the NitroFlow® HP, 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.**

2.5 Environmental aspects

The use and maintenance of the NitroFlow® HP does not include environmental dangers. Most parts are made of metal and can be disposed in the regular way. The packaging of the NitroFlow® HP is 100% recyclable. Optimal installation according to instructions and according to good craftsmanship will result in minimal energy consumption and maximal life of your system.

According to EC-regulations electrical systems have to be disassembled and recycled at the end of their life. Parker Filtration & Separation B.V. 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 NitroFlow® HP separates compressed air into nitrogen and an oxygen enriched air stream. The separation system 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 NitroFlow® HP then switches on and off, depending on the nitrogen demand. The NitroFlow® HP has a residual oxygen analyzer. This analyzer continuously monitors the quality of the produced nitrogen.

3.2 Separation principle

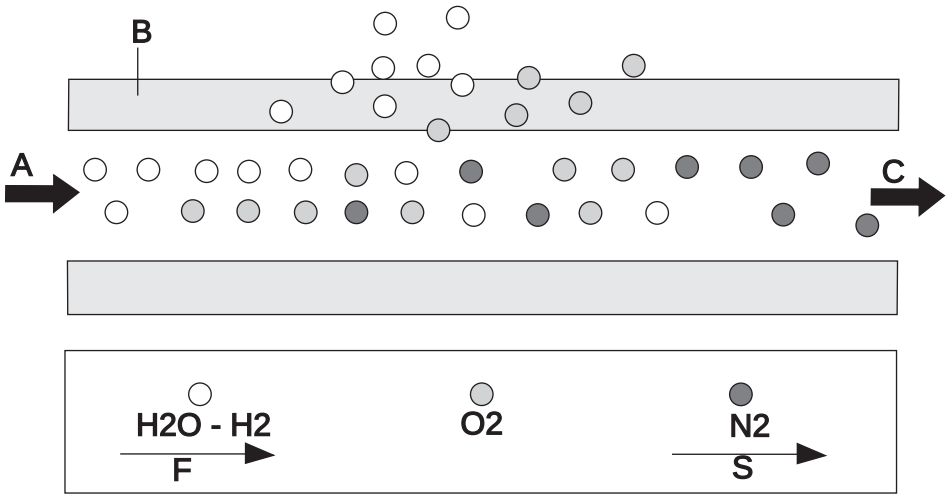


Fig. 3-1: Separation principle

A Pressurized air inlet
B Hollow fibre membrane
C Nitrogen outlet
F Fast permeation
S Slow permeation

Ambient air contains nitrogen (78.1%), oxygen (20.9%), argon (1%), carbon dioxide, water vapor and traces of other inert gasses. Pressurized 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 gasses:

- Oxygen and water vapour 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. Nitrogen enriched air is released at the outlet of the membranes (C).

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

3.3 Parts NitroFlow® HP

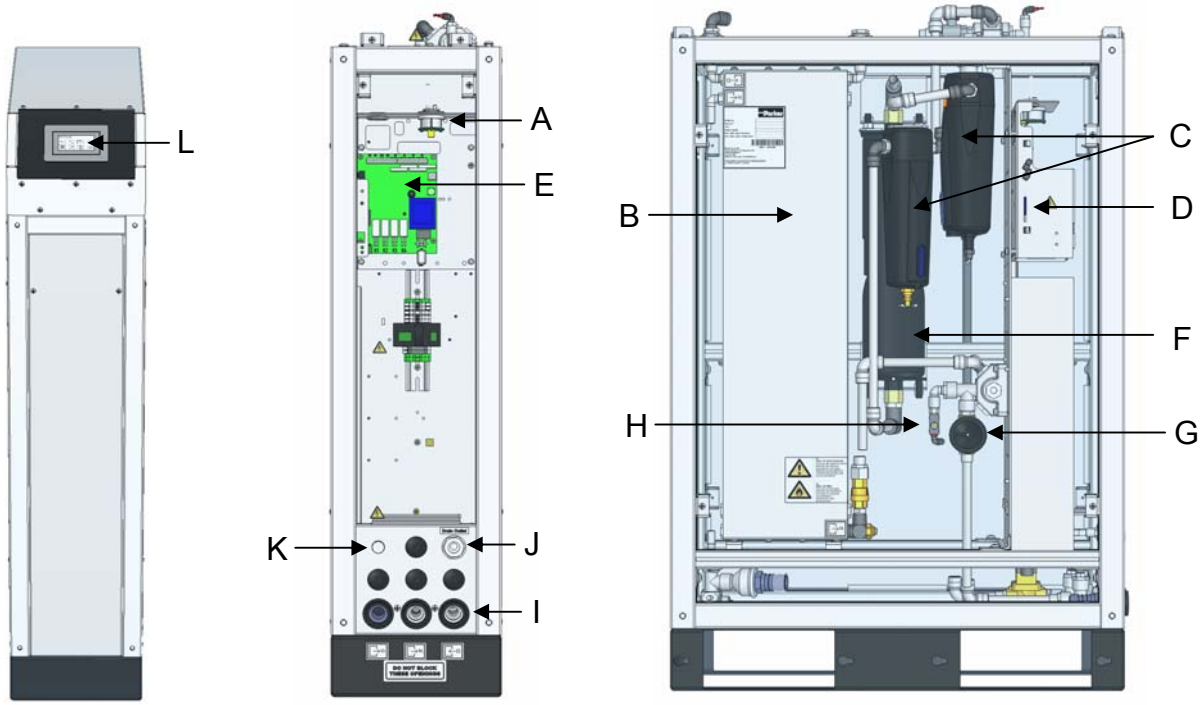


Fig. 3-2: Parts of NitroFlow® HP

A Oxygen sensor
B Hollow fiber membrane
C Compressed air filters
D SD-card
E Printed circuit board
F Active carbon adsorber
G Flow control valve for purity adjustment
H Flow control valve for sample flow
I In- and outlet connections
J Drain outlet
K Power inlet
L Display

3.4 Process diagram

The NitroFlow® HP can either be connected directly to the nitrogen consumer or to a nitrogen reservoir. The latter is advised in case of discontinuous or variable peak demands.

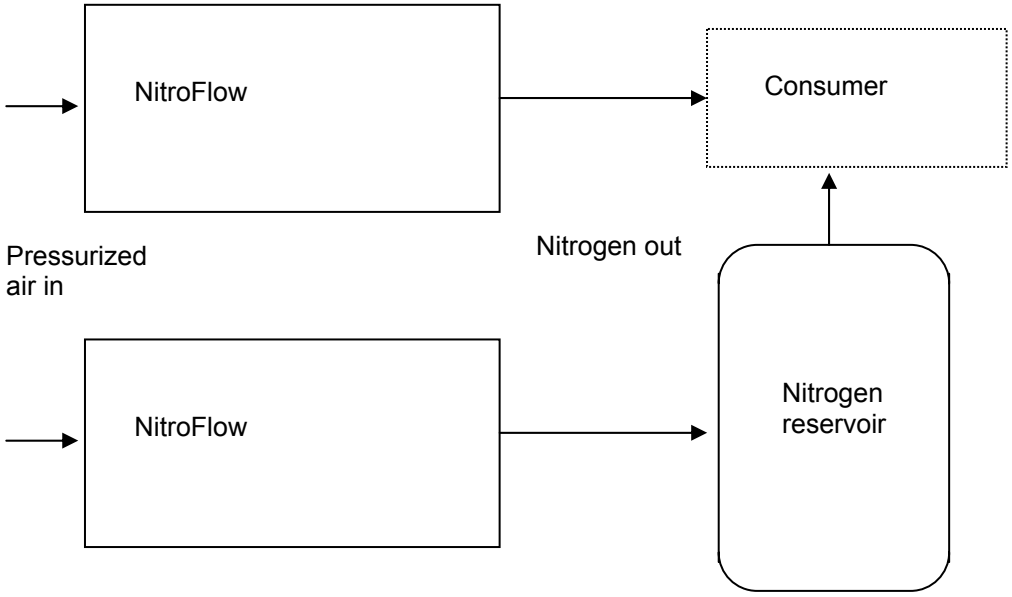
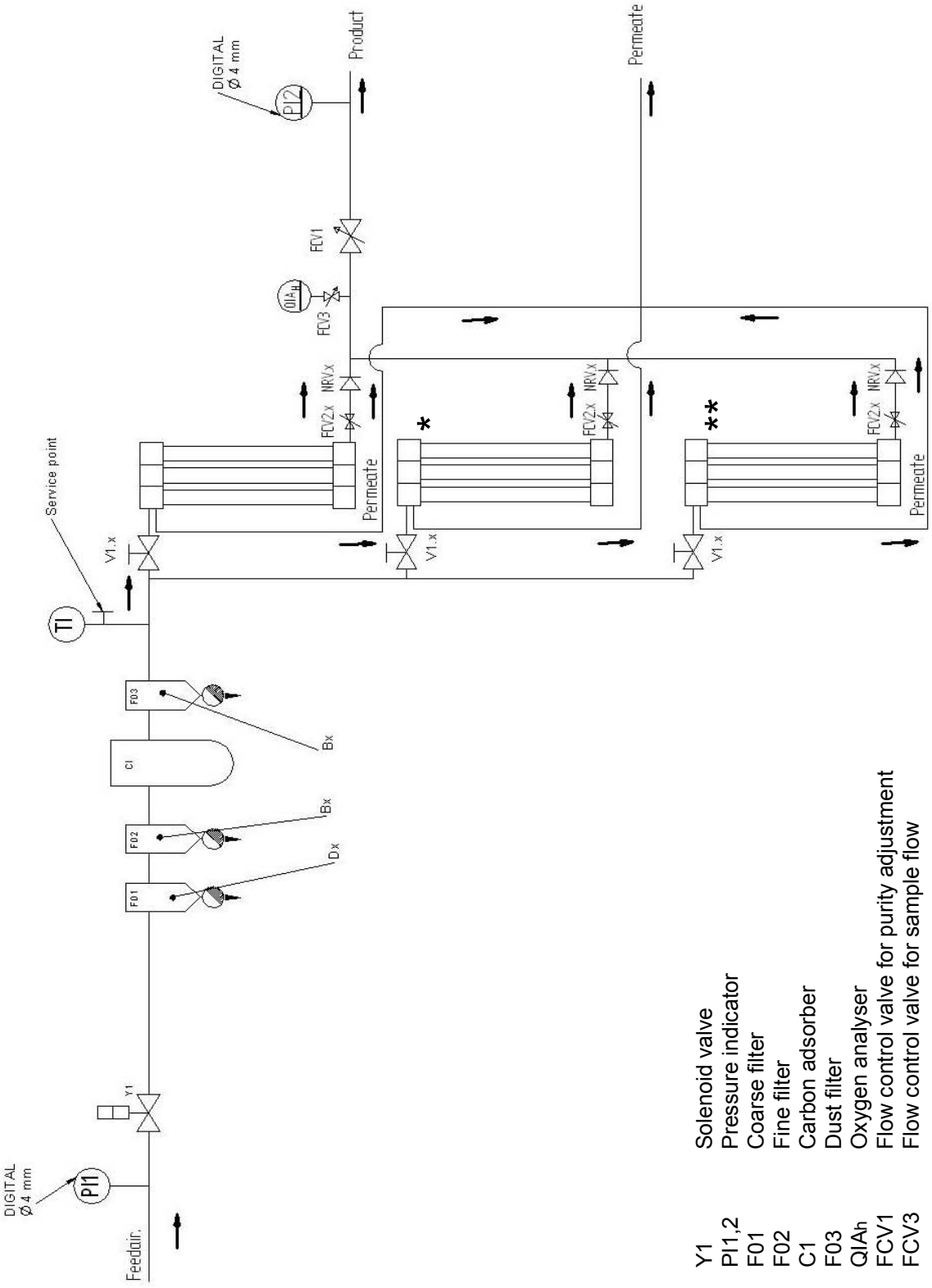


Fig. 3-3 Installation lay-out

3.5 Process scheme



Y1 Solenoid valve
PI1,2 Pressure indicator
F01 Coarse filter
F02 Fine filter
C1 Carbon adsorber
F03 Dust filter
QIAn Oxygen analyser
FCV1 Flow control valve for purity adjustment
FCV3 Flow control valve for sample flow

* Only in NitroFlow® HP2 and NitroFlow® HP3
** Only in NitroFlow® HP3

4 Technical specifications

4.1 General

Delivery pressure	
Max. delivery pressure (vessel)	inlet pressure minus pressure drop (max. 2 bar(g) / 29 psig)

Ambient conditions	
Temperature	10°C to 40°C / 50°F to 104°F
Air quality	Normal clean ambient air, relative humidity < 90%

Pressurized air specifications	
Max feed pressure	13 bar(g) / 190 psig
Compressed air temperature range	10-50°C / 50-120°F
Pressure dew point	< 5°C / < 41°F
Residual oil content	< 3.0 mg/m^3

Dimensions and connections		
Dimensions (H x W x D) [mm]:	1224 * 725 * 270	
Dimensions (H x W x D) [inch]	48.2 * 28.5 * 10.6	
Connections:	All connections: G 1”	
Net weight:	**Kg**	**Lbs**
NitroFlow® HP1	85	187
NitroFlow® HP2	95	209
NitroFlow® HP3	105	231

Housing	
Protection degree	IP 44

Electrical data	
Voltage/frequency	100-115-230Vac 1ph / 50-60Hz
Power consumption	30 W

Parts	
NitroFlow® HP	1x NitroFlow® HP 1x Manual

Table 4-1: General data

Default settings software parameters		
Menu	**What**	**Default setting**
Logs	Interval	60 min
Local settings	Language	English
Local settings	Pressure	Bar(g)
Local settings	Flow	LPM
Local settings	Purity	%O2
Alarm settings	O2 high	Active: No Unit stop: No Level: 5% Delay: 30 sec
Alarm settings	O2 low	Active: No Unit stop: No Level: 0.5% Delay: 30 sec
Alarm settings	Inlet pressure high	Active: No Unit stop: No Level: 13 bar(g) Delay: 30 sec
Alarm settings	Inlet pressure low	Active: No Unit stop: No Level: 2 bar(g) Delay: 30 sec
Alarm settings	Outlet pressure high	Active: No Unit stop: No Level: 10 bar(g) Delay: 30 sec
Alarm settings	Outlet pressure low	Active: No Unit stop: No Level: 2 bar(g) Delay: 30 sec

PSH Pressure switch	P-switch	No
PSH Pressure switch	Unit on	2.0 bar(g)
PSH Pressure switch	Unit off	7.0 bar(g)
Options	Auto restart	No
Options	Remote	No
Options	Pin code	No

Table 4-2: Default settings software parameters NitroFlow® HP

NitroFlow®	**Part number**
NitroFlow® HP1	159.004032
NitroFlow® HP2	159.004033
NitroFlow® HP3	159.004034

Table 4-3: Part numbers NitroFlow® HP

4.2 Production capacity

Type	**Nominal product capacity Nm³/hr**					
Nitrogen purity (%)	**99.5**	**99**	**98**	**97**	**96**	**95**
NitroFlow® HP1	1.7	2.5	3.8	5.0	6.3	7.5
NitroFlow® HP2	3.4	5.0	7.6	10.0	12.6	15.0
NitroFlow® HP3	5.1	7.5	11.4	15.0	18.9	22.5

Table 4-4: Capacity NitroFlow® HP (Nm^3/hr 20°C 1013mbar) at nominal conditions:

- Feed pressure at inlet 7 bar(g) / 100 psig
- Ambient temperature: 20°C / 68°F
- Ambient pressure: 1013 mbar(a)

4.2.1 Air consumption

Type	Nominal air use Nm³/hr					
Nitrogen purity (%)	**99.5**	**99**	**98**	**97**	**96**	**95**
NitroFlow® HP1	14.5	15.0	16.3	17.5	18.9	19.5
NitroFlow® HP2	28.9	30.0	32.7	35.0	37.8	39.0
NitroFlow® HP3	43.4	45.0	49.0	52.5	56.7	58.5

Table 4-5: Air use NitroFlow® HP (Nm^3/hr 20°C 1013mbar) at nominal conditions:

- Feed pressure at inlet 7 bar(g) / 100 psig
- Ambient temperature: 20°C / 68°F
- Ambient pressure: 1013 mbar(a)

4.3 Maintenance kit

Part	part number
Maintenance kit NitroFlow® HP (yearly or after 8000 running hours, which comes first)	159.004045
O_2-sensor (approx. every three years)	159.002284

Table 4-6: Maintenance kit

4.4 Expansion kit (option)

Part	part number
Expansion kit NitroFlow® HP	159.004303

Table 4-7: Expansion kit

5 Installation

Follow the paragraphs in this chapter to install the NitroFlow® HP.

5.1 Transport and storage

Warning

- **The NitroFlow® HP is heavy in weight; take appropriate safety measures in handling and transport**
- **Put the NitroFlow® HP in the original box to transport the NitroFlow® HP over longer distances.**
- **Lift the NitroFlow® HP with a forklift.**
- **For qualifications of personnel, refer to §2.1.**
- **The NitroFlow® HP must be transported and stored within a temperature range between -25°C and +50°C.**

5.2 Define location

Install the NitroFlow® HP on a fixed location. The location must meet following requirements:

- Indoors
- Ambient temperature between 10°C and 40°C
- Dry
- No continuous direct irradiation by sunlight
- Away from heat sources
- Properly ventilated room.
- Easy accessible for operating and service
- Installation can be used up to 1000m above sea-level. In case of installations above this height, contact your dealer, since the performance of your equipment will reduce.

5.3 Compressed air supply

5.3.1 Ambient temperature of NitroFlow® HP

With increasing temperatures the pressurised air consumption will increase and consequently the capacity will change. Make sure the 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 §4.1).

Checklist when connecting to a central compressed air system

1. Dew point of compressed air: < 5°C (< 41°F)
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 NitroFlow® HP should have the following characteristics:

1. Equipped with after-cooler cooling the compressed air to 10-15 °C (50-59°F) 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 Unpack and check equipment

1. Open the packaging.
2. Make sure that all components have been delivered (refer to table 4-1).

5.5 Connecting to pressurized air supply

1. The NitroFlow® HP must be connected to the pressurized air supply on the inlet indicated with the icon (fig. 5-1).
2. Lead the drain outlet (fig. 5-4) to receiving reservoir. The amount of drained condensate collected in this reservoir depends on the compressed air system. This may vary from several liters a day to almost nothing.

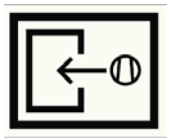


Fig. 5-1 compressed air inlet icon

CAUTION
Compressed air condensate can contain oil and other contaminants and cannot be disposed to the sewer as such.

5.6 Connecting to mains electricity

Warning
Do not connect the NitroFlow® HP to the mains electricity with a wall plug as to prevent incorrect disconnection.

1. The NitroFlow® HP must be connected to a fixed connection to mains.
2. Remove the cover above the inlet and outlet connections to connect the NitroFlow®HP. It is not necessary to remove the top cover.
3. Select the right voltage with the voltage selector switch on the printed circuit board (refer to fig 5-2).

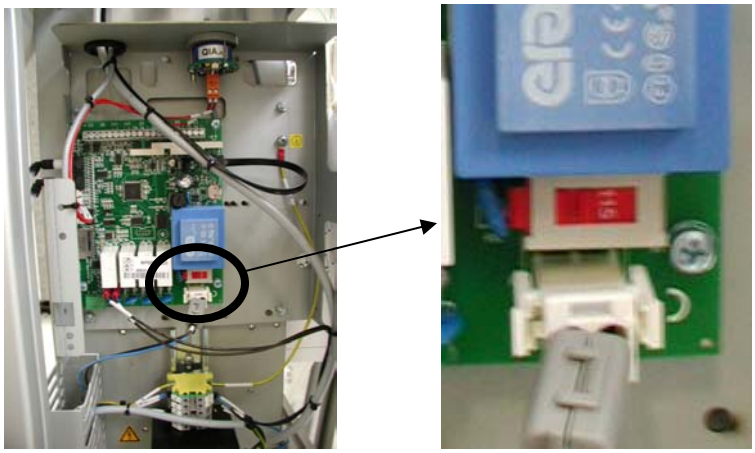


Fig. 5-2 Voltage selector switch on printed circuit board

Mains supply	Position
100V – 50/60Hz	115V
115V – 50/60Hz	115V
230V – 50/60Hz	230V

Table 5-1: Switch position

4. Connect the unit to mains electricity (refer to fig. 5-3 and chapter 10).

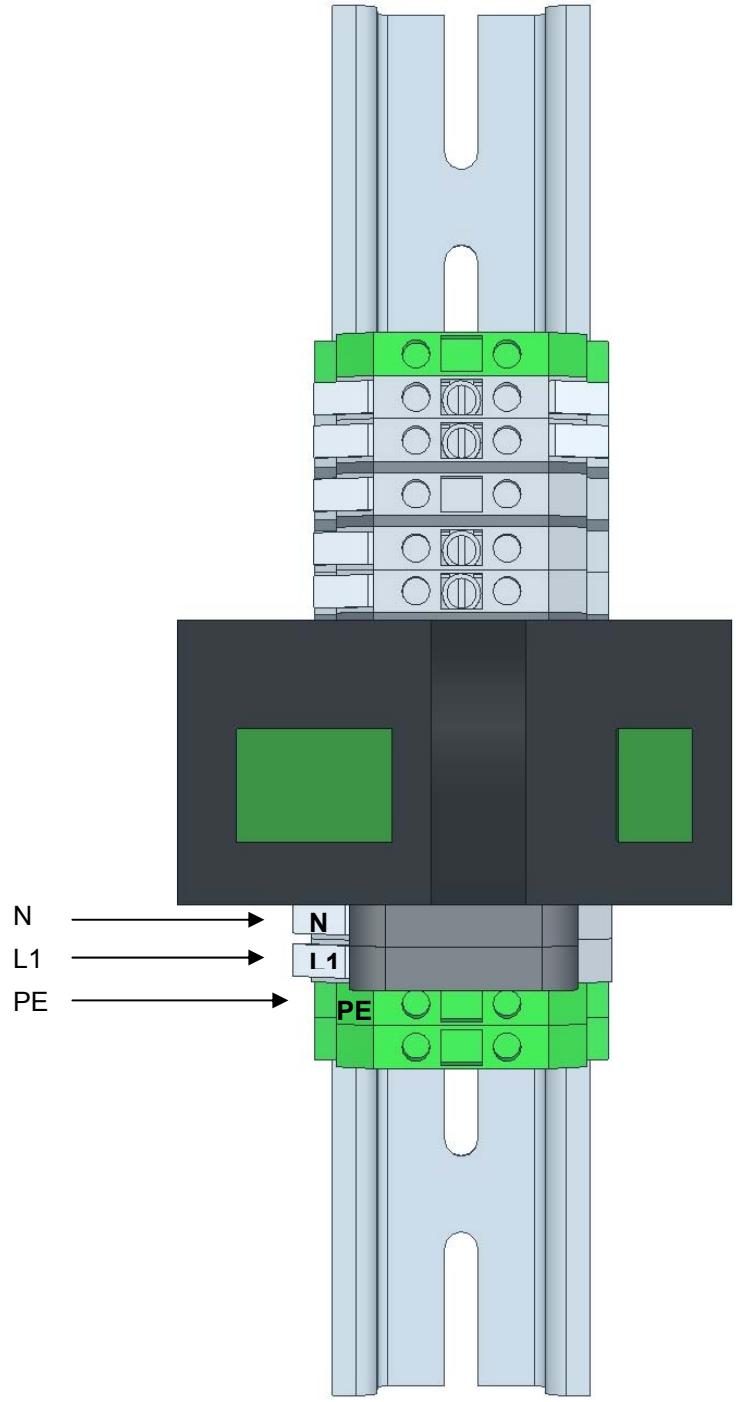


Fig. 5-3 Terminals NitroFlow®HP

Refer to fig. 5-4 for location of power cable inlet.

5.7 Connect nitrogen consumer

Warning

- **Make sure that tubes connected to the system are free of dust, particles, metal parts and curls, liquids and grease before you connect the NitroFlow® HP.**

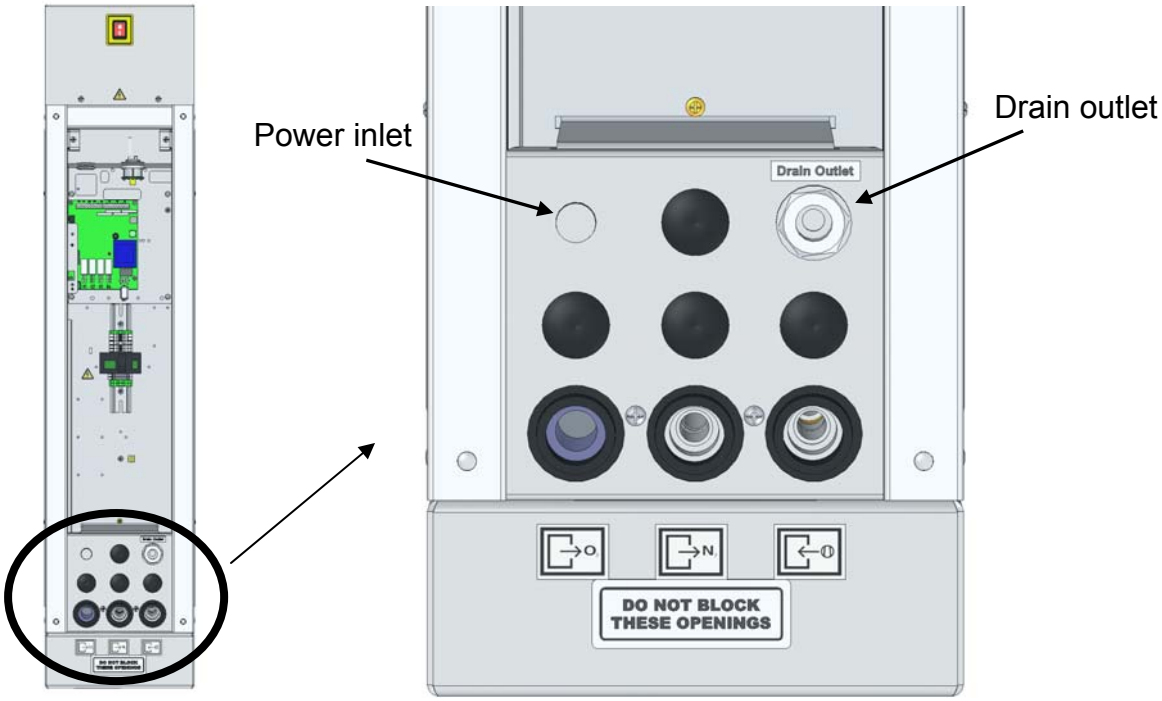
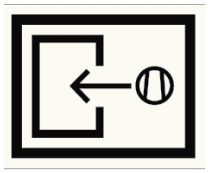
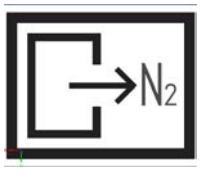


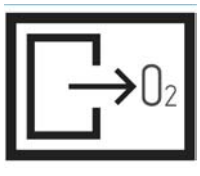
Fig. 5-4 Connections NitroFlow®HP



Compressed air inlet. Temperature of compressed inlet air must be within 10°C (50°F) and 50°C (120°F) (refer to table 4-1).



Nitrogen outlet. Connect nitrogen outlet to the application or to the reservoir refer to fig 3-3).



Oxygen outlet. The outlet of the oxygen enriched air (permeate outlet) must not be blocked or restricted. Restriction of the outlet will lead to bad performance of the unit. Blocking the outlet will lead to shut down of the unit. Permeate outlet must be open to atmosphere at all times (no back pressure).

5.8 Connect input and output contacts

In- and output signals can be connected to the terminal strip on the printed circuit board (refer to §3.3).

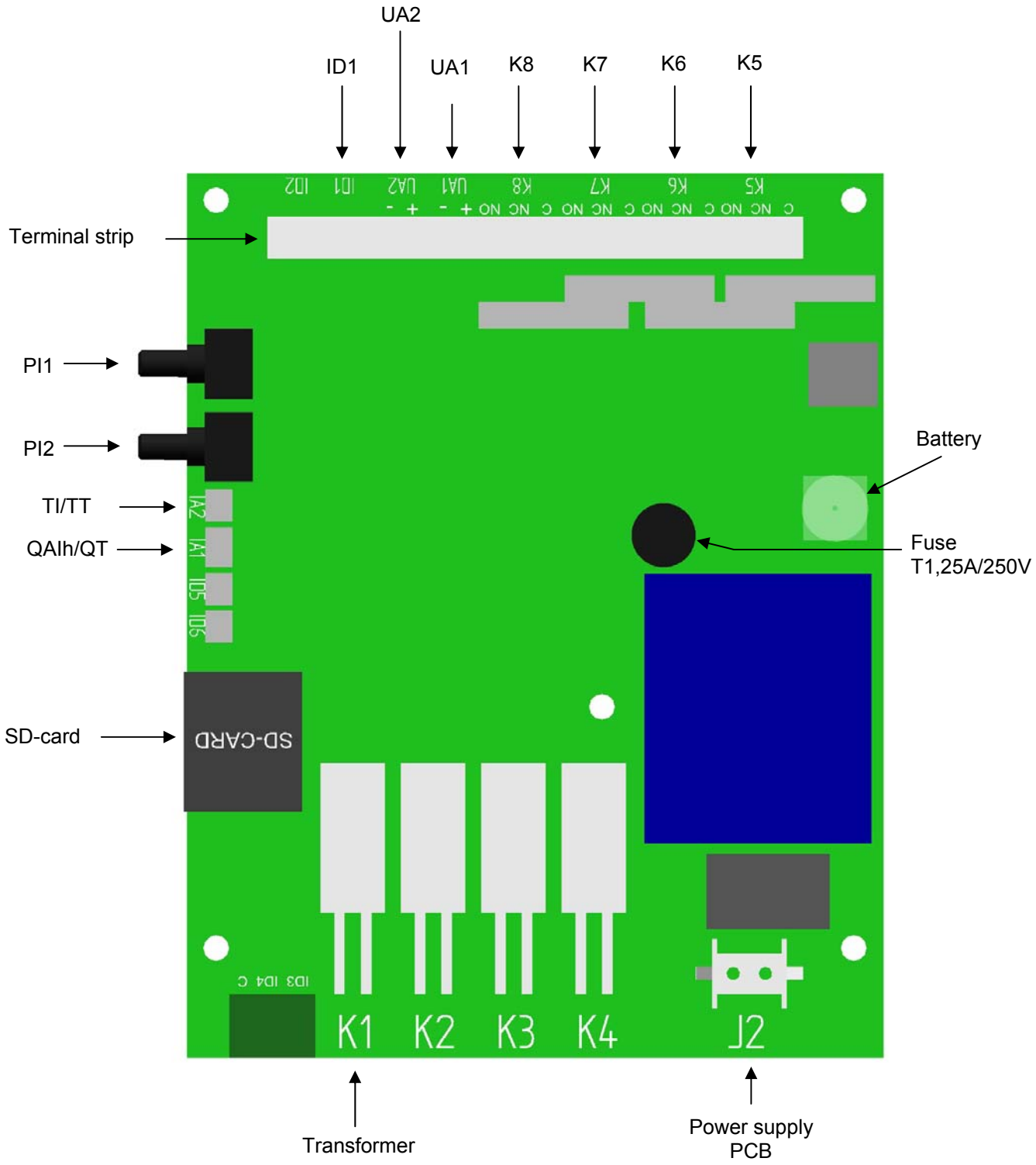


Fig.5-5: Printed circuit board

Clamp	Function	Input/output signals
ID1	Remote start/stop	*Digital input* Nominal input current: 10 mA Voltage: internal power supply
UA1	Outlet pressure	*Analogue outputs* 4 – 20 mA. Max. 200 Ohm
UA2	Oxygen concentration	
K5	Generator is producing nitrogen (RUN)	*Digital outputs* Potential free relay contacts (normally open / normally closed) Max. 48V, 1A
K6	General alarm	
K7	No alarms	
K8	Buzzer is activated by alarm	

Table 5-2: Inputs and outputs

When connecting input and output signals use a double insulated and shielded cable.

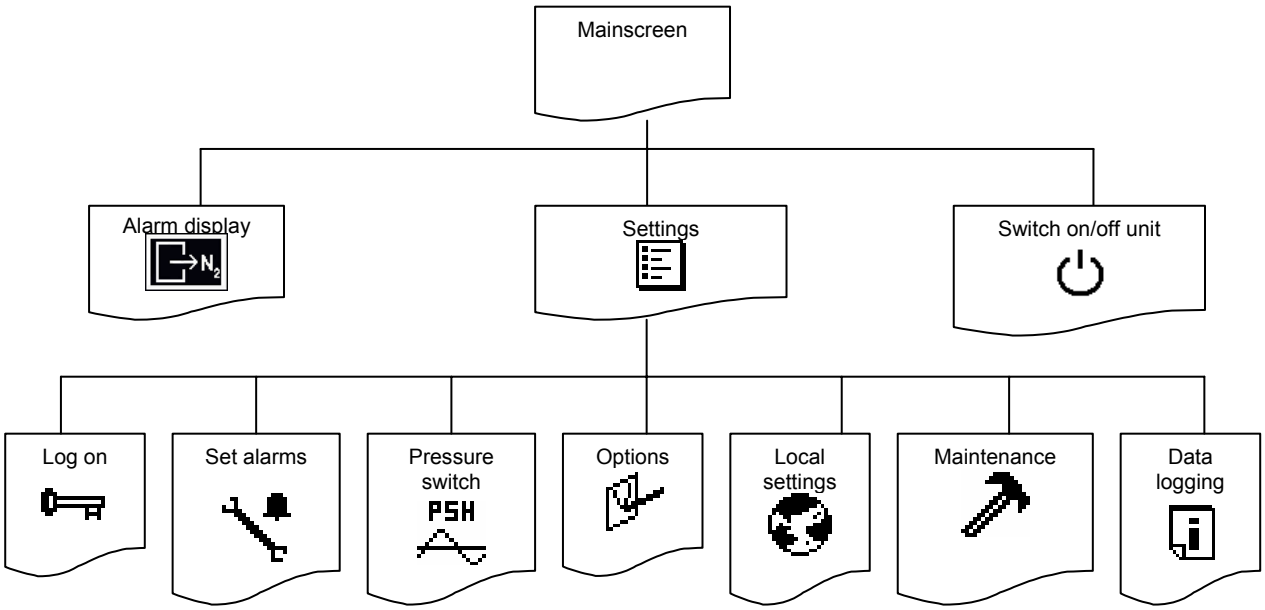
5.8.1 Connect external device for remote control

When selected YES at the remote option (refer to §6.2.6), a voltage free relay contact or switch needs to be connected to the digital input (ID1) on the printed circuit board.

6 Controller

6.1 Menu structure

The menu structure of the control system is as shown below. Return to a previous screen in the menu by pushing the “return to previous screen” -button.

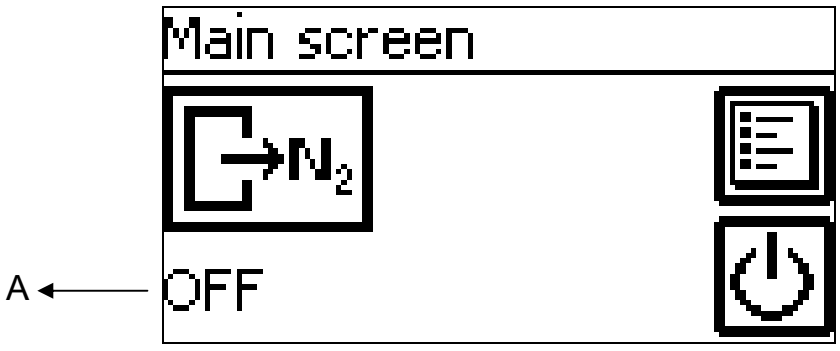


6.2 Configure software parameters

6.2.1 Main screen

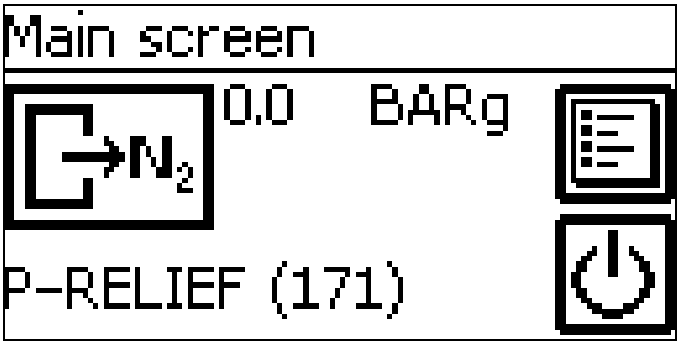
Access: This is the start-up screen that automatically appears when the generator is switched on.

Function: Access to the various menus.



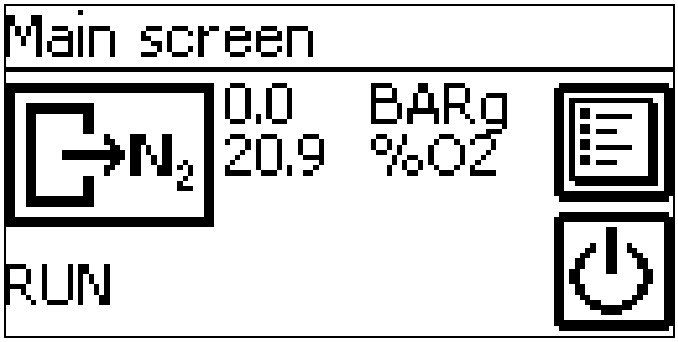
Symbol/data	Information/result
	When flashing there is an alarm; touch the symbol and the current alarm will be shown. (refer to § 7.3.1)
Unit status (A)	Can be OFF / RUN / STAND-BY / ALARM / P-RELIEF OFF: Main switch is on but generator is not operational RUN: Generator is operational (producing nitrogen) STAND-BY: Generator is stopped by the option pressure switch (PSH) or generator is waiting for remote control signal. ALARM: Generator is stopped by an alarm ALARM / RUN: There is an alarm but generator is still running. P-RELIEF: The generator is doing a countdown to depressurize and protect the system. Generator will not start if it was stopped less then 3 minutes ago. Remaining time is shown on the display. When the generator was stopped longer then 3 minutes ago it will start immediately once pressing the start/stop button.
	Menu button, touch to go to settings menu
	Start/stop button, generator will start or stop.

To start the unit, first switch on the main switch and then touch the start ⏻-button. The unit status will switch to P-RELIEF. Solenoid valve Y1 will be opened three minutes (180 seconds) after the unit was switched on. The remaining countdown time is shown next to the text P-RELIEF.



When the unit is started and normally running the controller will show:

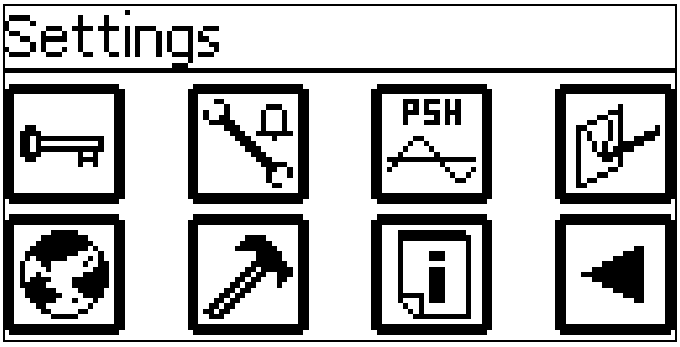
- Actual outlet pressure
- Actual oxygen or nitrogen level (when selected not to hide, refer to §6.2.7)
- Flow indication (when selected not to hide, refer to §6.2.7). The flow indication will appear after 30 seconds.



6.2.2 Settings menu

Access: Touch settings menu button in main screen

Function: Access to various menus



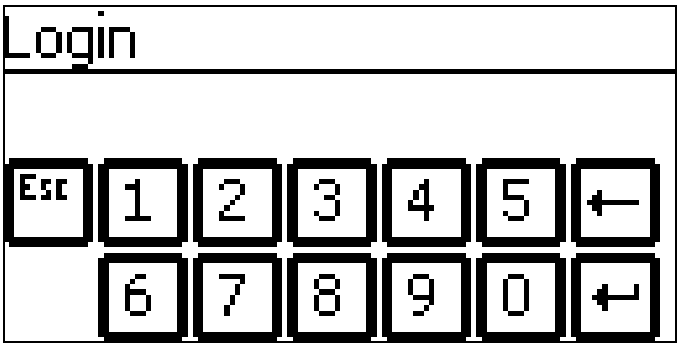
Symbol	Menu
	Access to **log on menu** (refer to §6.2.3)
	Access to **alarm settings menu** (refer to §6.2.4)
PSH	Access to **pressure switch menu** (refer to §6.2.5)
	Access to **options menu** (refer to §6.2.6)
	Access to **local settings menu** (refer to §6.2.7)
	Access to **maintenance menu** (refer to §6.2.8)
	Access to **data logging menu** (refer to §6.2.9)
	Return to previous menu

6.2.3 Log-on menu

Access: Touch log on button in settings screen

ATTENTION: The PIN CODE is default off. Therefore you do not need to enter a PIN CODE when you start-up the system for the first time.

Function: Protect the settings in the system with a (personal) pin code.

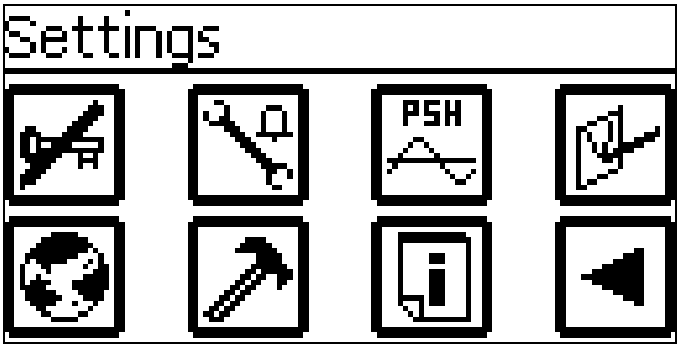


In the log on menu:

- To activate the pin code go to options menu (refer to §6.2.6)
- After selecting PINCODE YES the default pin code = **1234.**
- Select PIN CODE CHANGE if you want to enter your personal pin code.
- In case you forgot your personal pin code enter pin code **7833** to return to factory settings (refer to §4.1).

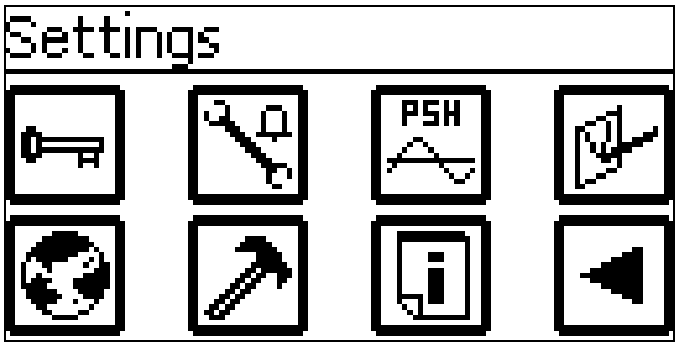
Caution:
When returning to factory settings by using pin code 7833, the alarms, P-switch, options and settings are set to default (refer to §4.1). Also the login pin code is back to default value 1234.

If pin code is activated and the button in the settings screen is crossed out (see below), all menus are free accessible (so correct pin code was entered).



If the button in the settings screen is not crossed out (see below), there are two possible options:

- Pin code is not activated and all menus are free accessible
- Pin code is activated but menus are not accessible because correct pin code was not entered. When touching a restricted button beeps are generated. Correct pin code has to be entered to have access to menus.



6.2.4 Alarm menu

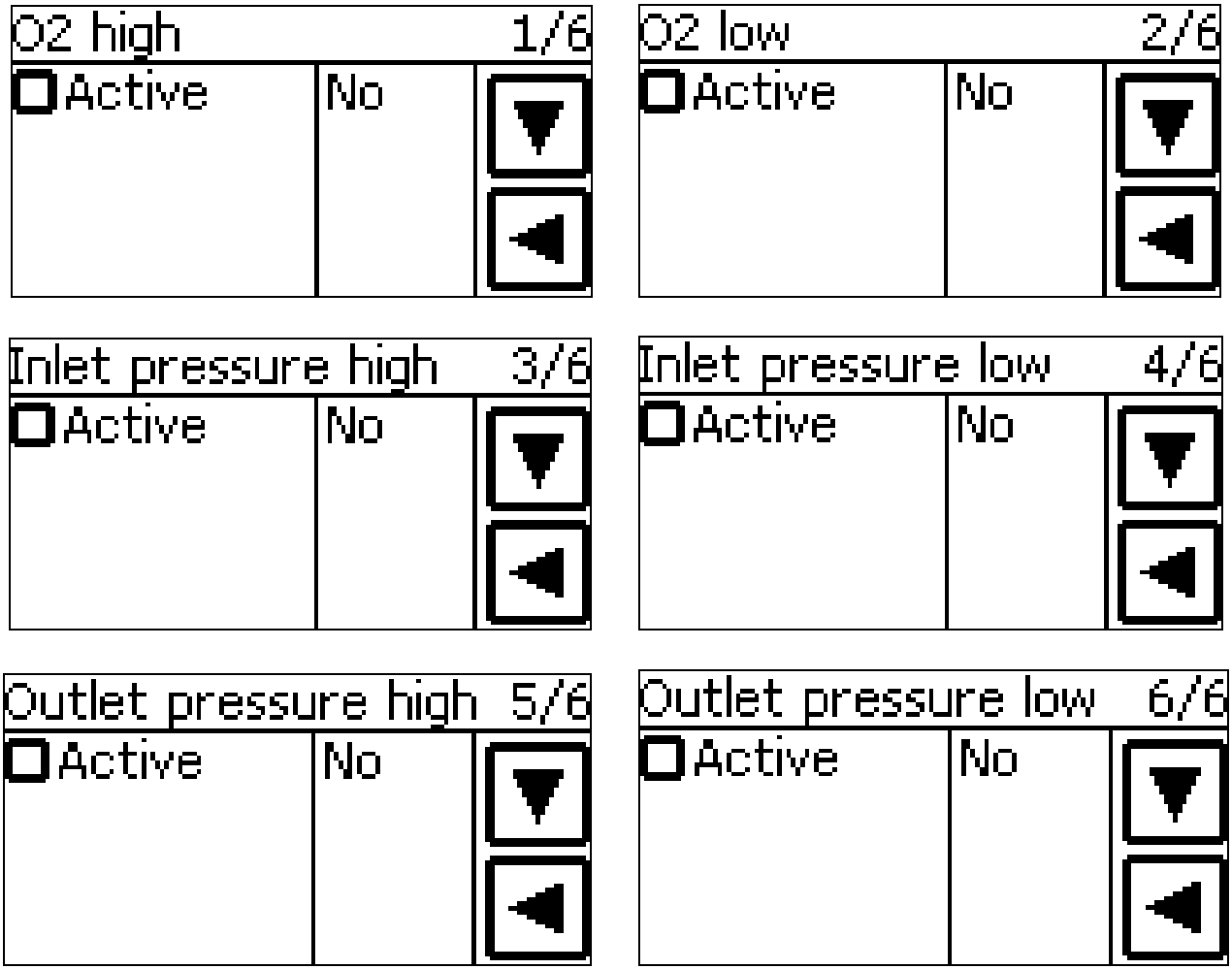
Access: Touch alarm menu button in settings screen

Function: Set various alarms

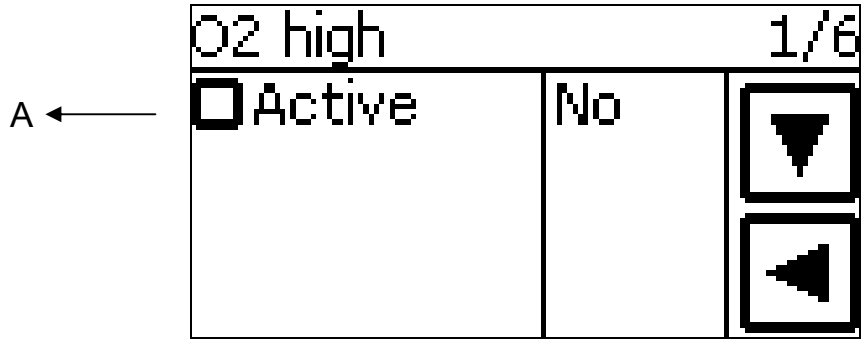
The alarms that can be set, are:

Screen	Alarm
1/6	O2 high (oxygen level too high)
2/6	O2 low (oxygen level too low)
3/6	Inlet pressure high (membrane pressure too high)
4/6	Inlet pressure low (membrane pressure too low)
5/6	Outlet pressure high (outlet pressure too high)
6/6	Outlet pressure low (outlet pressure too low)

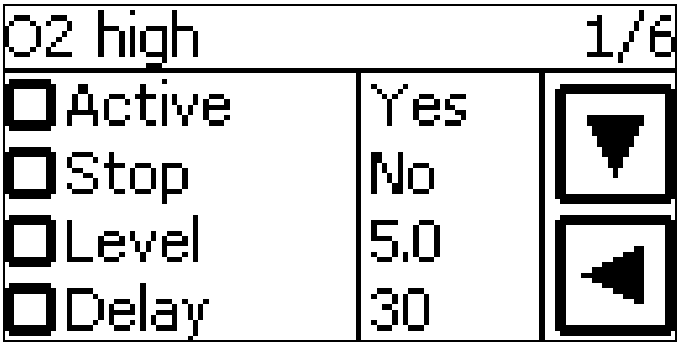
ATTENTION:
Default all alarms are set to NO, which means they are not activated.



To activate an alarm touch the active button (A). You can select NO, YES or AUTO RESET.



When you select YES or AUTO RESET, the rest of the data that needs to be set for the specific alarm will automatically pop-up.



Button	Selection	Result
Active	NO	Alarm is switched off
Active	YES	Alarm is switched on
Active	AUTO RESET (only if Stop=NO)	If actual fault is resolved before alarm is reset manually, the alarm will disappear from the alarm message menu automatically.
Stop	YES	Generator will stop when alarm occurs.
Stop	NO	Generator continues running when alarm occurs.
Level (screen 1/6 + 2/6)	0-16% O_2	Percentage of oxygen* at which the alarm will appear.
Level (screen 1/6 + 2/6)	100 – 84% N_2	Percentage of nitrogen* (100-O_2%) at which the alarm will appear.
Level (screen 3/6 + 4/6)	0-13 BAR(G)*	Inlet pressure level at which the alarm will appear.
Level (screen 3/6 + 4/6)	0-189 PSIG*	Inlet pressure level at which the alarm will appear.
Level (screen 5/6 + 6/6)	0-11 BAR(G)*	Outlet pressure level at which the alarm will appear.
Level (screen 5/6 + 6/6)	0-160 PSIG*	Outlet pressure level at which the alarm will appear.
Delay	0-300 sec	Minimum duration of an alarm before the alarm is shown on the display, a sound is given and the alarm relay is activated.

* Setting can be selected in local settings menu (refer to §6.2.7)

ATTENTION:
When changing the settings in screen 1/6+2/6 or 3/6+4/6 or 5/6+6/6 remember that low level can never exceed high level. Therefore if levels must be increased first change high level settings before changing low level settings. If levels must be decreased first change low level settings before changing high level settings.

Please note that the 6 alarms will not be monitored before 60 seconds after the generator has switched to status RUN.

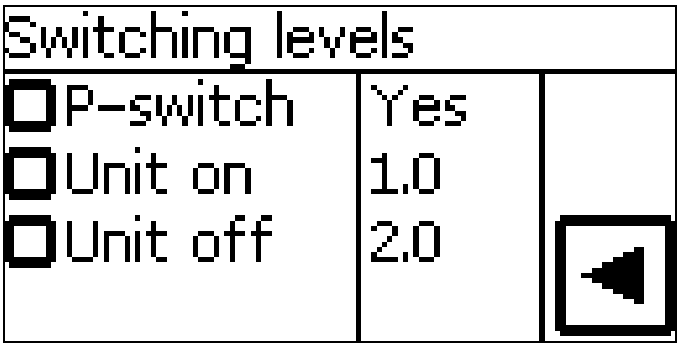
In case of an alarm the generator will give a sound, the alarm relay will be activated and the symbol will start flashing. By pressing the symbol you will open the alarm screen and a alarm message is shown. There are 2 options to select:
ACCEPT: The sound will stop but the alarm is still there
RESET: Alarm will disappear and sound will stop. This can only be done if the actual problem was solved.

6.2.5 Pressure switch menu

Access: Touch pressure switch menu button in settings screen

Function: Activate and set the pressure switch function

In the pressure switch menu you can set the levels of the outlet pressure at which the generator will start and stop. To change the settings, touch the button on the left side of the text.



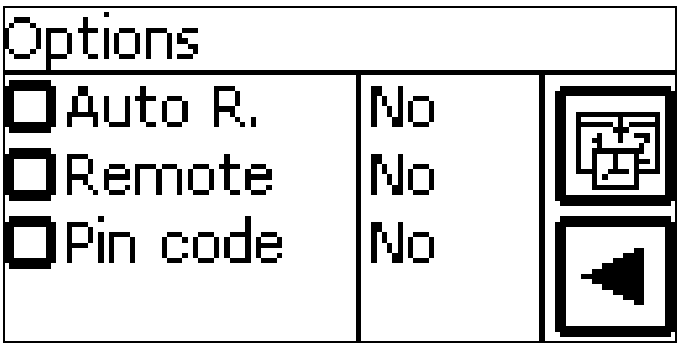
Button	Selection	Result
P-switch	Yes	Pressure switch function is activated
P-switch	No	Pressure switch function is not activated
Unit on	0-11 Bar(g) / 0-160 PSIG	Pressure level at which the unit will start
Unit off	0-11 Bar(g) / 0-160 PSIG	Pressure level at which the unit will stop

6.2.6 Options menu

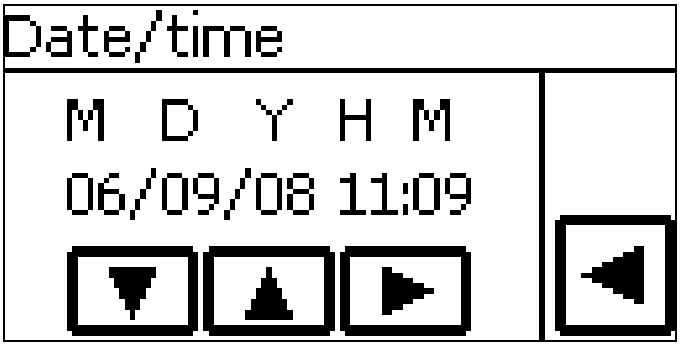
Access: Touch options menu button in settings screen

Function: Set various options (auto restart, remote and pin code)

ATTENTION: All options are default set to NO.



Button	Selection	Result
Auto R. (= auto restart)	Yes	Return to the same situation/status after a power failure
Auto R. (= auto restart)	No	After a power failure unit will return in status OFF and has to be restarted manually (not automatically)
Remote	Yes	Unit can be controlled from a remote location. Only select YES after connecting an external device to the printboard (refer to §5.8.1). This external device has to be a voltage free switch or relay contact. Unit can now be started from a remote location by closing the contact/switch. By opening the contact/switch the unit will be stopped. If REMOTE is set to YES and there is no remote signal available the generator will not start.
Remote	No	Unit cannot be controlled from a remote location.
Pin code	Yes	Settings are instantly protected with a pin code. If adjustment of all settings is required return to **log on menu** (refer to §6.2.3) and enter personal pin code (or default pin code (1234) in case no personal code is used)
Pin code	No	Settings can be changed without a pin code
Pin code	Change	Pin code can be changed to a personal code. **(In case you forget your pin code refer to §6.2.3).**
		Screen where date and time can be set will appear (see below)



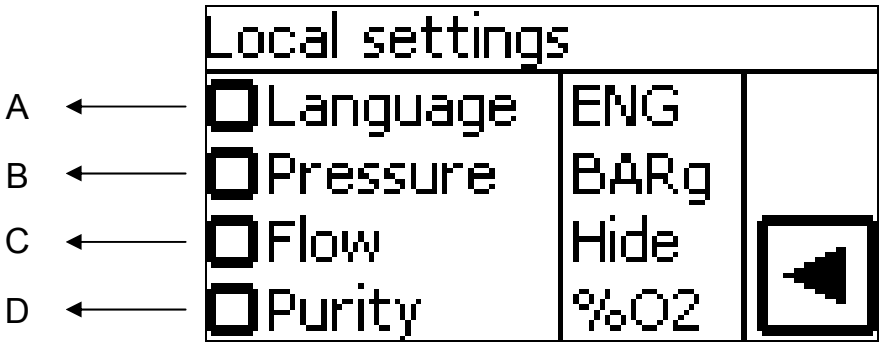
B B A

Button (A) can be used to make a selection and with buttons (B) adjustments can be made.

6.2.7 Local settings menu

Access: Touch local settings menu button in settings screen

Function: Set data to local requirements



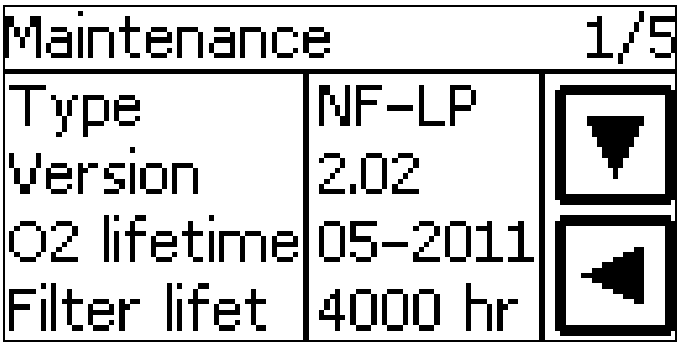
Button	Selection	Result
Language (A)	English / Nederlands / Deutsch / Francais / Español / Romana	All text in the screen will appear in the chosen language.
Pressure (B)	BAR(G) / PSIG	Pressure indications will appear in the chosen setting. If BAR(G) is chosen then temperature will be automatically in °C. If PSIG is chosen then temperature will be automatically in °F.
Flow (C)	LPM / CFH / CFM / M3H / HIDE	Flow will appear in the chosen setting. If HIDE is chosen flow will not be shown in main screen.
Purity (D)	%N2 / %O2 / HIDE	Purity will appear in nitrogen (%N2) or oxygen (%O2) percentage. If HIDE is chosen purity will not be shown in main screen.

6.2.8 Maintenance menu

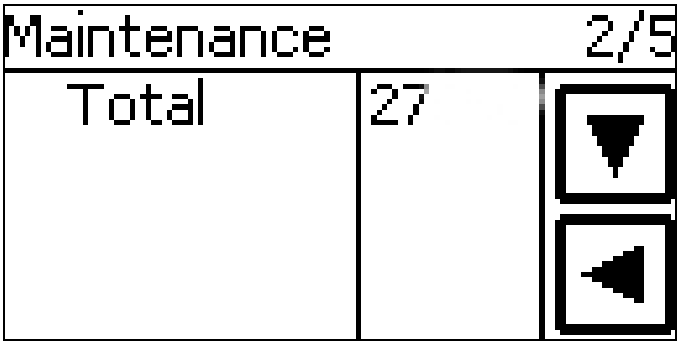
Access: Touch maintenance menu button in settings screen

Function: Shows maintenance status and offer calibration possibility.

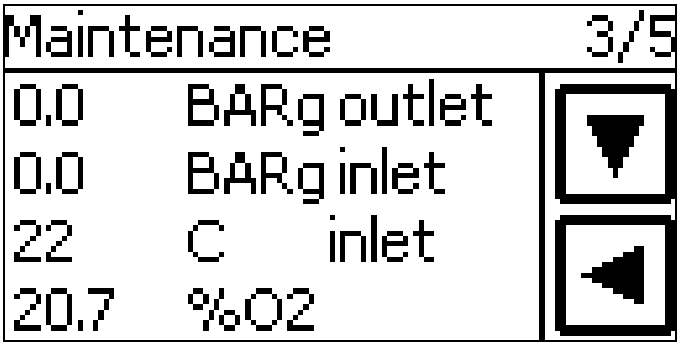
The maintenance menu consists of 5 different screens. Each screen displays maintenance status or calibration buttons.



Data	Explanation
Type	Shows type of generator
Version	Software version of system
O2 lifetime	Month-year when O_2-sensor needs to be exchanged (first indication is 3 years from month of order)
Filter lifet. (lifetime)	Hours countdown to 0 hrs

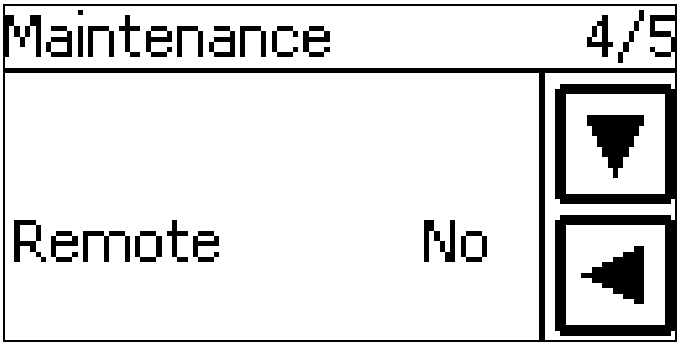


Data	Explanation
Total	Total running hours of the generator (producing nitrogen)

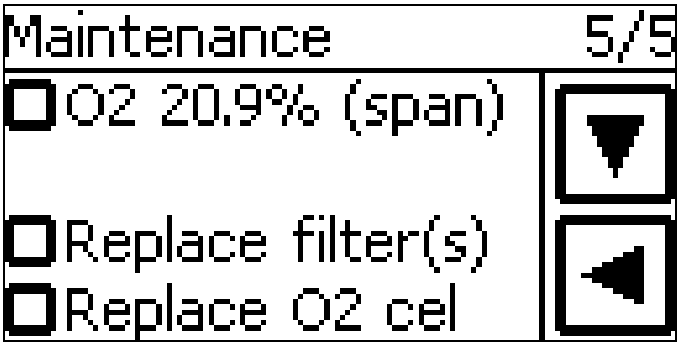


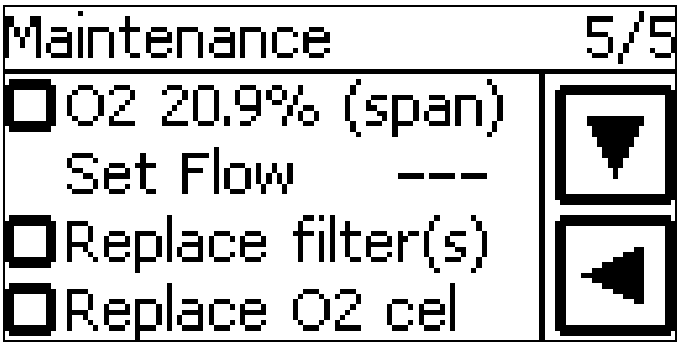
Data	Explanation
Outlet	Outlet pressure in either BAR(G) or PSIG
Inlet	Membrane pressure in either BAR(G) or PSIG
C Inlet	Compressed air inlet temperature in Celcius* or Fahrenheit*

* When selected BAR(G), temperature is displayed in Celcius. When selected PSIG, temperature is shown in Fahrenheit. Refer to §6.2.7



Data	Explanation
Remote	YES or NO Shows presence of remote input signal (refer to §6.2.3 how to activate remote control option)





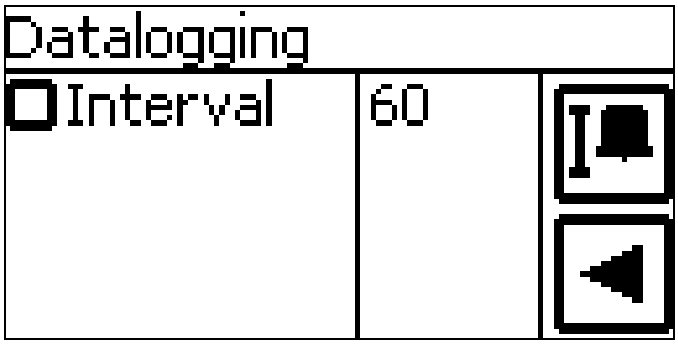
Button	Explanation
O2 – 20.9%	Touch this button to calibrate the O_2 sensor to 20.9%. When touching this button the O_2 sensor has to be exposed to ambient air (refer to §9.4 for detailed explanation how to calibrate the O_2 sensor)
Set flow	Only visible when selected LPM in the local settings menu and when unit is running. Calibrate flow by entering flow value measured with external flow meter.
Replace Filter	When a filter has been replaced during maintenance, button can be touched and countdown for the new filter is set. System asks for confirmation. In maintenance screen 1/5 the filter lifetime should read 8000 hr.
Replace O2-cel	When O2-cel has been replaced during maintenance, button can be touched and a new date to replace O2-cel is set. System asks for confirmation. In maintenance screen 1/5 the O2 lifetime should read 3 year ahead from date of changing (shown with a delay of a few minutes).

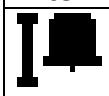
6.2.9 Data logging menu

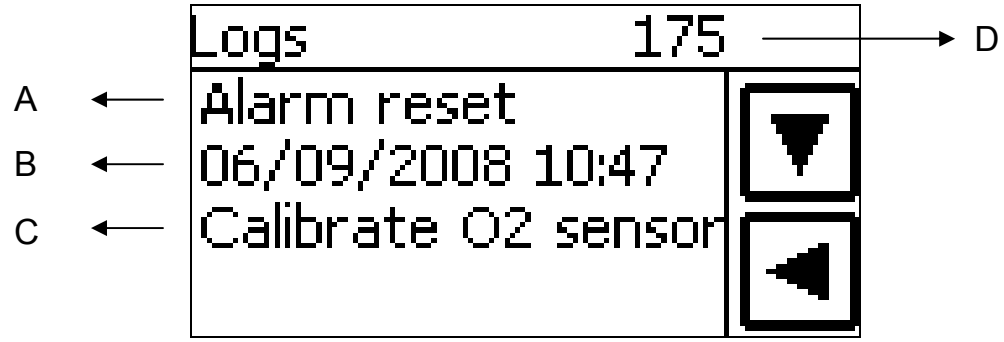
Access: Press data logging menu button in the settings screen

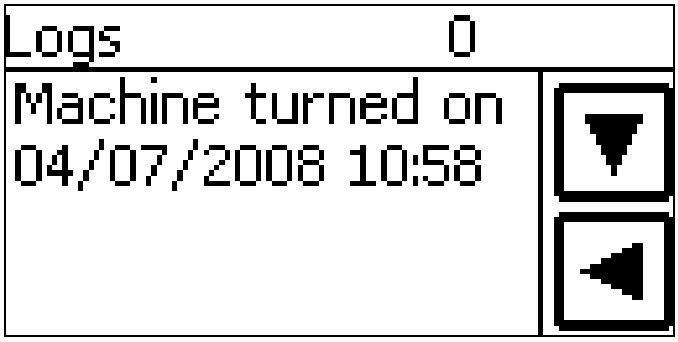
Function: Read the logged process data (only alarms)

Alarms as well as status of the sensors (temperature, pressure, O_2, flow and maintenance) are saved on the SD-card. The time between the logging (saving) of this data on the memory card can be chosen in the data logging menu (default 60 minutes).



Button	Selection	Result
Interval	5-120	Time in minutes between the saving of (alarm) data
		Shows all alarm logs





Button	Explanation
A	Status of the alarm (new, reset, accepted) and information when machine turned on by power)
B	Date and time that the alarm occurred
C	The description of the alarm that occurred
D	The code of logged (saved) alarm

Each month a log file is saved in a folder on the SD-card (maximum 12 files, after that the oldest file will be overwritten). It is possible to read the logged data from the SD-card on a computer. Extra software (NitroView) has to be installed on your computer for this option (contact your supplier for this software). Your PC also needs a SD-card reader.

1. Switch off the generator
2. Remove the SD-card (refer to §3.3)
3. Refer to appendix A for information how to use the NitroView software.
4. Replace the SD-card in the generator
5. Switch on the nitrogen generator

WARNING:
The unit cannot run without the SD-card. This will generate an alarm (SD-card failed)

6.3 Software updates

The software version for the touch screen controller for the NitroFlow® HP can be found in the maintenance -menu (refer to §6.2.8). When Parker Filtration & Separation updates the software, a new version can be put on the touch screen controller following the instructions in appendix B of this manual.

Caution:
Please check the alarm, P-switch, options and settings before restarting the unit.

7 Commissioning and Operation

7.1 Commissioning the NitroFlow® HP

1. Make sure that the connections are correct and fixed properly.
2. Make sure that pressurized air pressure is available on the inlet.
3. Connect the unit to mains electricity by setting the main switch to the ON-position
4. Touch the start ⏻-button (the NitroFlow® HP will start after a delay-time of 3 minutes (refer to §6.2.1).
5. Check whether the connections of the tubing between the NitroFlow® HP and the application are free of leaks.
6. The oxygen content is factory preset according to order. To adjust the oxygen content (fine tuning), adjust the flow with the flow control valve FCV. Decreasing the flow will result in a decrease of the oxygen level and vice versa. The oxygen level can be read on the display (refer to §3.3).
7. Check whether the system works according to the settings of the control system.
8. Close all sheet metal covers.

Important

The NitroFlow® HP must run with sheet metal covers mounted on the unit; the sheet metal protects against external damage and unauthorized adjustments.

7.2 Start NitroFlow® HP

1. Set the power switch of the NitroFlow® HP in the on position. Start the NitroFlow® HP by touching the ⏻-button on the screen.
2. The NitroFlow® HP will start after a delay-time of 3 minutes (refer to §6.2.1).
3. There is a 3 minutes delay between stop and restarting the generator.

7.3 Stop NitroFlow® HP

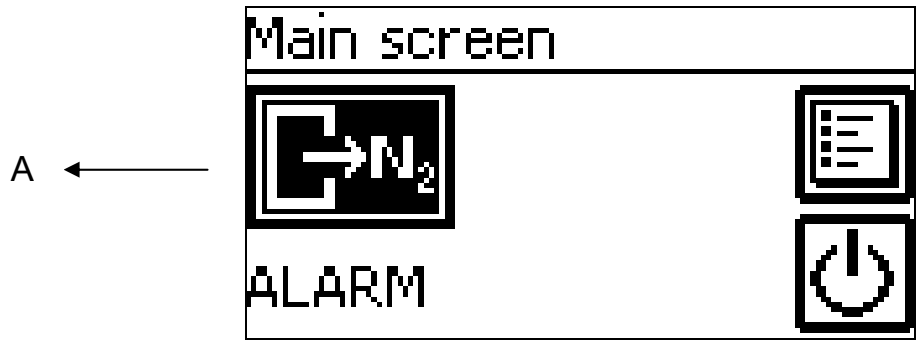
1. Stop the system by touching the ⏻-button on the screen
2. Before performing maintenance make sure the system is depressurized; check the pressures in the system.

Important:

When stopping the system for maintenance, switch off the main switch and isolate the generator from power supply.

7.3.1 Alarm messages

When the Nitrogen Out symbol (A) in the main screen is flashing, it means that an alarm is occurring. To see which alarm is occurring, touch the symbol for more information (refer to §6.2.4).



Alarms that can appear are:

Alarm description	What happens?	Default
O2 high	Oxygen level too high	Off *
O2 low	Oxygen level too low	Off *
P-inlet high	Inlet pressure too high	Off *
P-inlet low	Inlet pressure too low	Off *
P-outlet high	Outlet pressure too high	Off *
P-outlet low	Outlet pressure too low	Off *
T-inlet high	Inlet temperature too high	On
T-inlet low	Inlet temperature too low	On
P-Inlet sensor fail	Inlet pressure sensor fails	On
P-Outlet sensor fail	Outlet pressure sensor fails	On
T-Inlet sensor fail	Inlet temperature sensor fails	On
P-inlet > max	Inlet pressure above maximum of 15 bar(g) / 218 psig	On
Replace filter	Filter needs to be changed	On
Replace O2 cel	Oxygen sensor is aged and needs to be changed	On
Replace O2 cel !	Oxygen sensor needs to be changed because of failure	On
Calibrate O2 cel	Oxygen sensor needs to be calibrated	On

* Alarms can be set (refer to §6.2.4).

8 Troubleshooting

8.1 Troubleshooting list

In case of trouble always start with calibrating the O_2 sensor (refer to §9.5).

Trouble	Possible cause	Possible solution
Delivery (flow) of nitrogen too low	Compressed air supply too low	Check / increase the air supply
	Leak in piping (external or internal)	Check for leaks in external and internal piping.
	Compressed air temperature is too high	Lower the temperature, if possible
	Air filters are polluted	Change or clean the air filters
	Automatic drain is continuously open	Check the automatic drain. Refer to §9.3 and §9.2.
	Flow control valve (FCV1) is set incorrect	Adjust valve FCV1 to correct setting.
	Sample flow to O_2 sensor is too low	Check / readjust the sample flow to the O_2 sensor. Refer to §9.5.
	Nitrogen outlet line is restricted	Check / open the outlet line
	Faulty module set(s)	Check / replace module set(s)
No nitrogen delivery	NitroFlow® HP is switched off	Switch on the NitroFlow® HP
	No power	Check fuses
		Check mains switch
		Check voltage power supply
	No compressed air available	Check compressed air supply
	Loose tubing (internal or external)	Check / restore tubing and piping
	Nitrogen outlet line is blocked.	Check / open the outlet line
	NitroFlow® HP is in alarm	Check / reduce inlet temperature
		Replace temperature sensor
		Check / reduce inlet pressure (absolute maximum is 15 bar(g))
	Solenoid valve failed	Check / replace solenoid valve
	Flow control valve (FCV1) is closed completely	Check / readjust valve FCV1

Trouble	Possible cause	Possible solution
	Unit is standby	Wait until pressure in application or storage vessel drops
N2 purity is too low (= O2 purity too high)	Sample flow to O_2 sensor is incorrect	Check / readjust the sample flow to the O_2 sensor. Refer to §9.5
	O_2 sensor drifted	Calibrate O_2 sensor. Refer to §9.5
	O_2 sensor used up	Replace O_2 sensor. Refer to §9.4
	Flow control valve (FCV1) was incorrectly adjusted	Readjust purity to correct value with FCV1
	Permeate outlet blocked or restricted	Check / open permeate outlet
	Faulty module set(s)	Check / replace module set(s)
Required O2 concentration can not be reached	Nitrogen outlet pressure high	Reduce outlet pressure (if possible)
	Sample flow to O_2 sensor is incorrect	Check / readjust the sample flow to the O_2 sensor. Refer to §9.5.
	O_2 sensor drifted	Calibrate O_2 sensor. Refer to §9.5
	O_2 sensor used up	Replace O_2 sensor. Refer to §9.4
NitroFlow® HP does not automatically switch off	Switch-off pressure set too high	Change switch-off pressure
	Compressed air pressure too low	Check compressed air supply
Nitrogen outlet pressure is not attained	Compressed air pressure too low	Check compressed air delivery to NitroFlow® HP
	Compressed air temperature is too high	Lower the temperature if possible / check if the cooler of the compressor functions properly
	Leak in piping (external or internal)	Check for leaks in external and internal piping
	Air filters are polluted	Check / clean / replace air filter(s). Refer to §9.2
	Filter drain is open or looses air	Increase feed pressure. Close compressed air supply and turn it open again.
	Faulty module set(s)	Check / replace module set(s)

Table 8-1: Trouble list

9 Maintenance

9.1 Maintenance scheme

The NitroFlow® HP is virtually maintenance free

Part	Action	Frequency
Filters	Replace filter elements	Yearly or after 8000 running hours, which comes first.
Active carbon adsorber	Replace adsorber	1x per year, together with filter elements
Check purity setting	Determine oxygen content in output and readjust by readjusting the flow control valve	1x per year
O_2-sensor	Change O_2-sensor Calibrate O_2-sensor	1x per 3 years 4x per year
Clean display	Clean with a moist cloth	1x per year

Table 9-1: Maintenance scheme

9.2 Replace inlet filter element

1. Close the compressed air supply.
2. Allow the system to depressurize. Check on display.
3. Switch off the NitroFlow® HP on the touch screen.
4. Remove the side sheet metal of the gas separation compartment (refer to fig. 3-2).
5. Open the bleed screw (E) to make sure that the filter is depressurized.
6. Turn the filter bowl (D) clockwise and pull the bowl from the filter housing (A).
7. Unscrew the blue knob (C).
8. Remove the old filter element (B).
9. Place a new filter element (B).
10. Assemble the parts in the reverse order.
11. Close the bleed screw (E).
12. Open pressurized air supply and switch the unit back on.
13. Check on leakages at filter.
14. Replace the sheet metal.

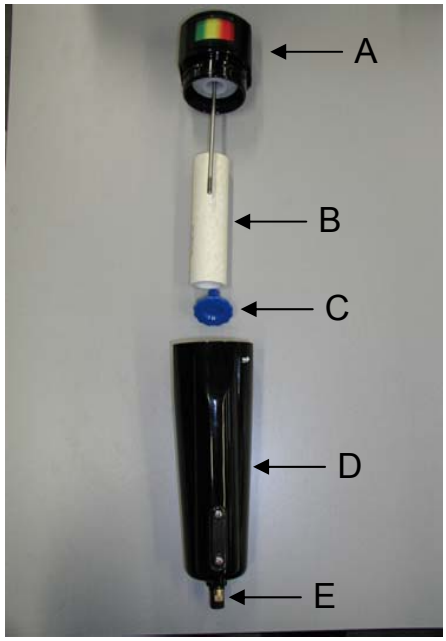


Fig. 9-1 Replace filter element

Warning

Never run the system without filters; operating without filters will lead to expensive repair

9.3 Replace automatic drains of filters

1. Open the filter (refer to §9.2).
2. Unscrew the nut (D).
3. Remove the old drain unit (B) from filter bowl (A).
4. Check if the O-ring (C) came out with old drain.
5. Replace new drain (B) in filter bowl (A).
6. Close filter (check on leakages after restarting NitroFlow® HP).

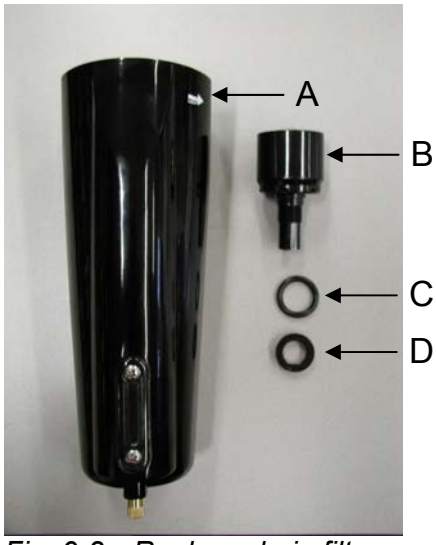


Fig. 9-2: Replace drain filter

9.4 Replace oxygen sensor

1. Stop and switch off the NitroFlow®HP.
2. Remove the cover plate above inlet and outlet connections of the NitroFlow®HP.
3. Disconnect connector (A).
4. Carefully remove the sensor cap (E). Do not pull at the tube (F).
5. Unscrew the screw ring (D).
6. Install the new sensor (C) in reverse order of removal.
7. Switch on and start the NitroFlow ®HP.
8. Calibrate the oxygen sensor (refer to §9.5)

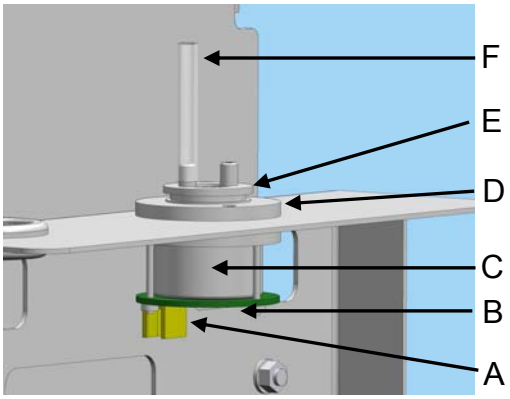


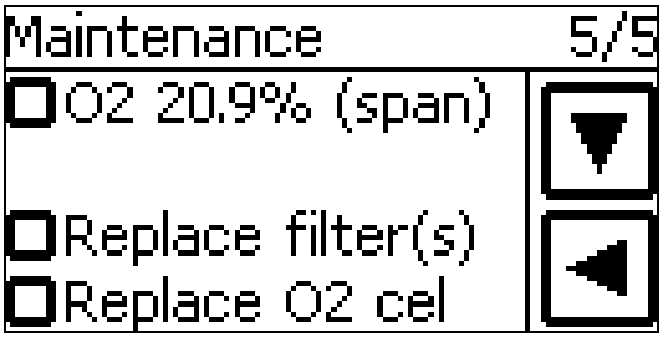
Fig 9-3: Replace oxygen sensor

9.5 Calibrate oxygen sensor

1. Stop the unit by touching the ⏻ button in the main screen (refer to §6.2.1).
2. Let the system depressurize

Warning:
Do not touch live wires!

3. Remove the sensor cap (E) and expose the sensor to ambient air.
4. Enter the maintenance menu screen 3/5 and wait until the oxygen level has stabilized (this will take approx. 60 seconds).
5. Go to screen 5/5 and touch **O2 20.9%** (span) button. The system will ask for confirmation: select YES.



6. Start the NitroFlow® HP by touching the ⏻ button in the main screen (refer to §6.2.1).
7. Check the sample flow of the sensor (0.3 l/min.) coming out of the tube (F) that is connected to the sensor cap (E). As an indication the sample flow is only just felt when flown against a wet skin.
8. Reconnect the tube (F) and the sensor cap (E) with the sensor (C).

9.6 Replace fuse

To maintain the safety of the product, use only the fuse of the size and rating as specified (T3.15A / 250V).

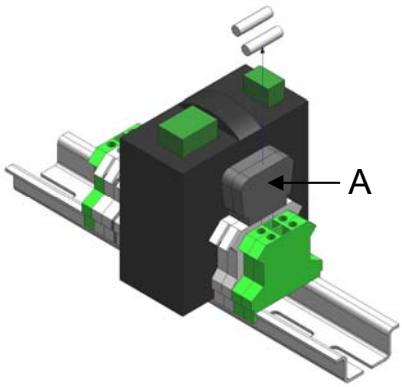


Fig. 9-4 Replace fuse

1. Stop the unit by touching the ⏻ button in the main screen (refer to §6.2.1).
2. Switch off the main switch.
3. Remove the cover plate above inlet and outlet connections.
4. Remove the fuse holder (A).
5. Place a new fuse.
6. Close the cover plate above inlet and outlet connections.
7. Switch main switch back on.
8. Start the unit by touching the ⏻ button.

10 Electrical scheme and terminal connections

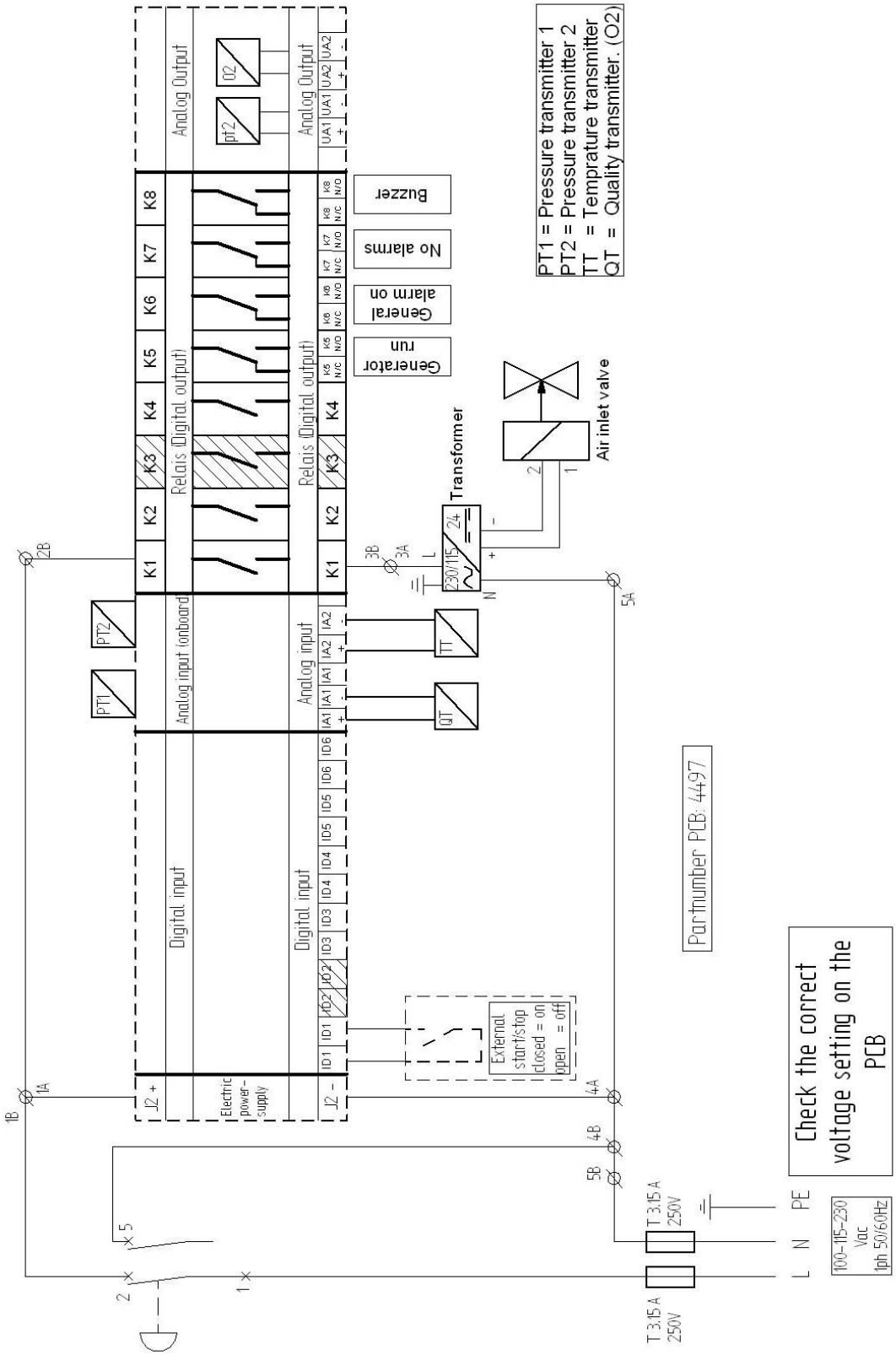


Fig. 10-1 Electrical scheme NitroFlow® HP

		TERMINAL CONNECTIONS NITROFLOW-HP1-3 & ORC D1-3 24V								
		SIDE A								SIDE B
		earth Transf.				PE				earth chassis (PCB Panel) 3997
		Transf. N (primary)				5	N			Cable code 3,15A N
		PCB-N				4	N			Emergency con. S1-5 cable 4-1-3
		Transf. L (primary)				3				PCB code K1 (sec)
						2				PCB code K1
		PCB(phase)-L				1				Emergency con. S1-2 cable 4-1-2
		Terminal 3A		L	230V/115V 50Hz/60Hz	Transf.	24VDC	+		Solenoid valve + cable 3-1-1
		Terminal 5A		N				-		Solenoid valve - cable 3-1-2
Main Power Cable		PE side A		PE						
N		Mains power cable N			T3,15A 250V		N			Terminal 5B
L		Mains power cable L1			T3,15A 250V		L1			Emergency con.code S1-1 cable 4-1-1
PE		Mains power cable PE				PE				earth con. unit cover cable 4-1-PE
		earth chassis (DIN-rail Panel) 3899				PE				Solenoid valve PE cable 3-1-PE

Fig. 10-2 Electrical terminal connections NitroFlow® HP

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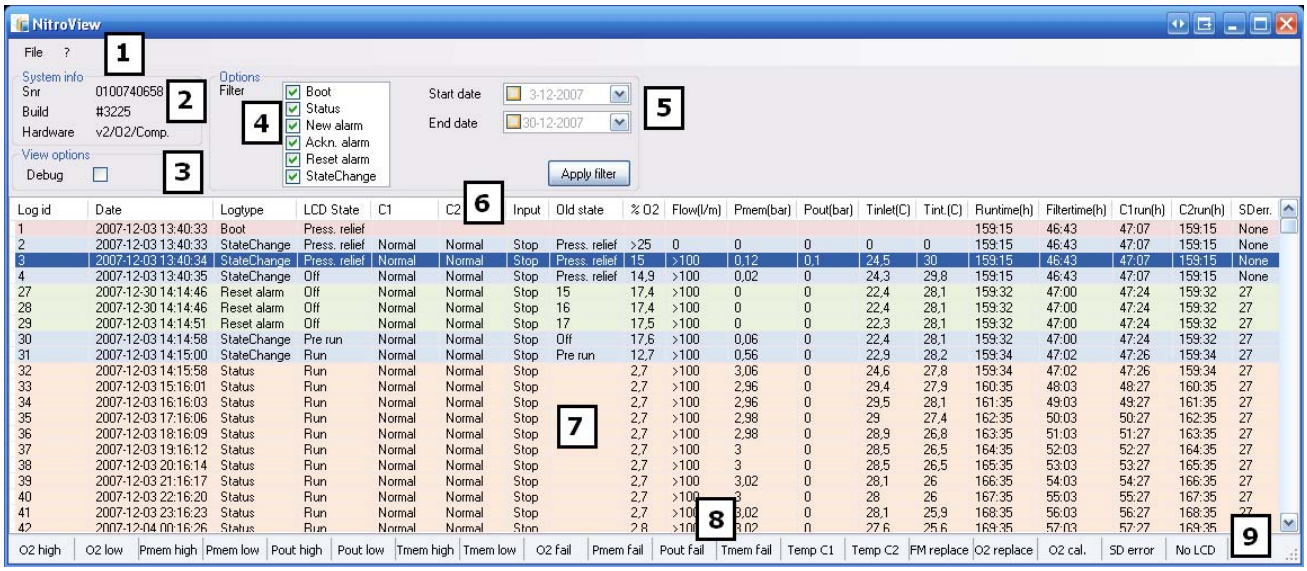
12 Appendix A: NitroView Quick reference v1.0

First start up

After installing NitroView via the Suite installer you can start using it, start with 2 questions. First, you need to create a configuration file, where settings will be saved in. (even width/height, column width/height/order)
You can exchange this file with other PC's to create the same configuration everywhere.

Main screen



1: Menu bar — The menus can be found on this bar
There are 2 menus: File (main menu) and ? (about)

2: System info — Info about the log you are viewing
Info about the hardware the log came from

3: View options — Enable extra columns of the log containing some detailed information only readable by technical engineers

4: Filter options — Filter logs out
After changing this you need to press 'Apply filter' so it regenerates the log

5: Start/end date — Logs are display between these dates
By default, the values will be filled with the first and last found log date. You can change these dates to view a different period of the logs. You can disable this by clicking the checkbox in front. After

changing this you need to press ‘Apply Filter’ so it regenerates the log.

6: Log columns — The columns for the log
The text in this row will be changed when selecting a log. You are free to change the order and width of each column. You can also click on it to sort the log by this. Pressing it again switches to Asc/Desc.
If you press 2 columns, NitroView will first sort on the last column clicked, and whenever a record is the same it will sort those records by the previous column you
clicked.

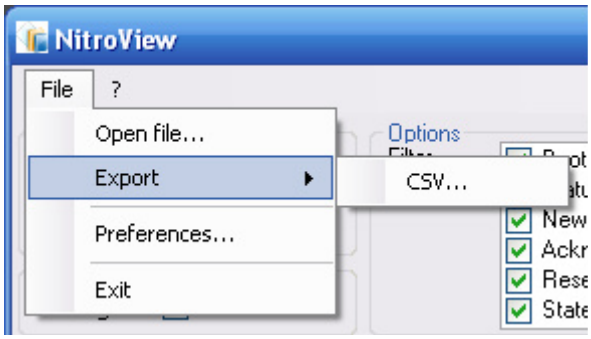
7: Actual log — This is where the actual log records are.
The colors are depending on the type of log (see Preferences).
When selecting a line, the alarms will be showed on the bottom of the screen (8).

8: Alarm bar — This bar shows alarm states of the selected log
When you’ve selected a log, this will fill itself with the alarms corresponding to the type of log. The alarm is divided in 3 states:

- Default color (grey) : No alarm
- Red : The actual alarm is there (after timeout)
- Orange : The alarm is accepted on the system

9: Status bar — The status of NitroView is shown here.
When loading a log, a progress bar will show the progress.

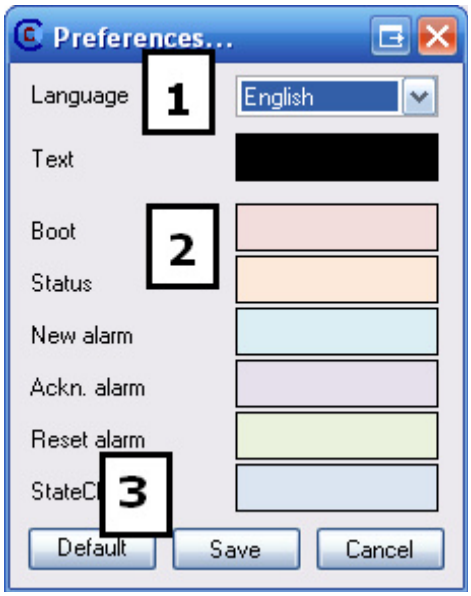
Main menu



The main menu contains everything you need to work with NitroView apart from the main screen:

Open file… : Open a different log file
Export->CSV : export the current view of NitroView to an comma separated file
Preferences : Open the preferences for NitroView
Exit : Exit NitroView

Preferences



1: Language — Change the language of NitroView

2: Color — The colors for each event
Each log type has its own color scheme for background colors. You can globally change the text color as well. (For example: if you use dark colors for the events, you can choose white text)
Just click on a color box, then you can pick a color.

3: Default colors — Click this to reset all colors back to default

When you change something, it will remain unsaved till you click Save. If you click cancel everything is reversed to its original settings.
Note: This doesn't apply when you've clicked 'Default color', this is a irreversible action.

13 Appendix B: Firmware upgrade instructions V2.03 NitroFlow® series

Controller upgrade warning:
Do not cut the power during the upgrade process.

All log data is erased during the upgrade process (also on the SD-card).

When there is an error during the upgrade procedure, try again from the start.

In case of problems contact Parker technical support

Controller upgrade steps:

1. Switch the main Power switch OFF (consult manual)
2. Remove the SD-card (consult manual)
3. Place the latest version of the IO.bin & LCD.bin files in the root directory of the SD-card.
4. Remove the file FORCE.txt when present.
5. Place the SD-card in the controller.
6. Switch the main Power switch ON.
7. The IO-board is now upgrading (+/- 30sec)
8. The message initialisation pops up (+/- 60sec)
9. The message software needs update 34 will appear.
10. Switch the main switch OFF & ON
11. The display starts flashing (+/- 30sec)
12. The system beeps 2 or 4 times and then starts up.
13. Enter the menu then go to the login screen.
14. Enter 943363 and press enter.
15. The message Clearing flash will appear (+/- 60sec)
16. The message “Turn the unit off” will appear.
17. Switch the main switch OFF & ON
18. The upgrade process is completed.
19. Check the customer software settings.

Software revision history:

- V2.04 / 22 June 2009 - Current
  - Pressure sensors range changed.
  - Alarm inlet pressure above maximum.
  - Romanian language.

- V2.03 / 13 November 2008
  - Hour-counters for filter lifetime changed.
  - Logo revision.
  - Hour-counter reset bug fixed.

- V2.02 / 25 February 2008
  - Hardware compability bug solved. Readout of ID3, 4, 5, 6.
  - Service menu functionality improved.
  - Compressor hour counter reset code added.

- V2.0 / 03 December 2007
  - New version because of hardware changes.
  - Service messages no buzzer.
  - Filter lifetime counter adjusted.
  - Data log method improved.
  - Display 0_2 yes/no added.
  - Flow display in M^3/hr / SCFH / SCFM added.
  - Service menu functionality improved.
  - Functionality alarm relays improved.
  - Pressure range pressure switch adjusted.

- V1.0 / 01 May 2006
  - First release of the software