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THE LINDE GROUP

User manual.

Hydrogen Generator

Models PGH_2 Series
PGH_2 100, PGH_2 160, PGH_2 250,
PGH_2 300, PGH_2 500, PGH_2 600

Date June 18, 2008

HiQ®

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Introduction.

Scope of the manual

This manual provides operation and maintenance instructions for the Hydrogen Generator models PGH_2 100, PGH_2 160, PGH_2 250, PGH_2 300, PGH_2 500 and PGH_2 600.

Specifications

Specifications of the different Hydrogen Generator models			HiQ® code
Hydrogen flow rate STP: Standard temperature and pressure (20 °C, 1 bar)	Model PGH_2 100	0–100 ml/min at STP	5517
	Model PGH_2 160	0–160 ml/min at STP	5518
	Model PGH_2 250	0–250 ml/min at STP	5519
	Model PGH_2 300	0–300 ml/min at STP	6001
	Model PGH_2 500	0–500 ml/min at STP	5520
	Model PGH_2 600	0–600 ml/min at STP	6002
Max outlet pressure	7 bar (100 psi)		
Purity	99.999 %		
Weight (dry)	Models PGH_2 100, 160, 250, 300	16 kg	
	Models PGH_2 500, 600	18 kg	
Power consumption	Model PGH_2 100	70 VA	
	Model PGH_2 160	95 VA	
	Model PGH_2 250	140 VA	
	Model PGH_2 300	160 VA	
	Model PGH_2 500	280 VA	
	Model PGH_2 600	310 VA	
Input voltage	110–230 V/50–60 Hz		
Fuse (not user-replaceable)	5 x 30, 6.3 A		
Pressure accuracy	0.1 bar (±0.5 %)		
Microprocessor-controlled display	LCD		
Index of protection	IP2x		
Operating conditions: → Temperature → Relative humidity	 +15° C to +40° C 80 % up to 31° C, decreasing linearly to 50 % at 40° C		
Over voltage category	II		
Pollution degree	2		
Sound pressure level	46 dB(A)		
Case dimensions	220 x 330 x 395 mm (W x D x H)		

Notes on FCC compliance

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio-frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- → Reorient or relocate the receiving antenna.
- → Increase the separation between the equipment and the receiver.
- → Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- → Consult the dealer or an experienced radio/TV technician for help.



Warning
Any changes or modifications to this equipment not expressly approved by the manufacturer may void the user's authority to operate the equipment.

Correct use

The Hydrogen Generator is designed to produce hydrogen for laboratory use. The unit must only be operated for this purpose, according to the specifications and instructions provided in this manual. In particular, the following warnings must be observed at all times:

- → Indoor use only.
- → Never operate the unit at below-zero temperatures. This will cause irreversible damage to the electrolysis cell.
- → Only use pure water (see "Filling the water tank").
- → Only operate the unit in a room with sufficient ventilation (see "Placing the generator").
- → Always unplug the unit from the mains power supply before accessing the internal components for replacement.
- → Only the parts described in the "Spare parts list" can be replaced by the user.

Packing list

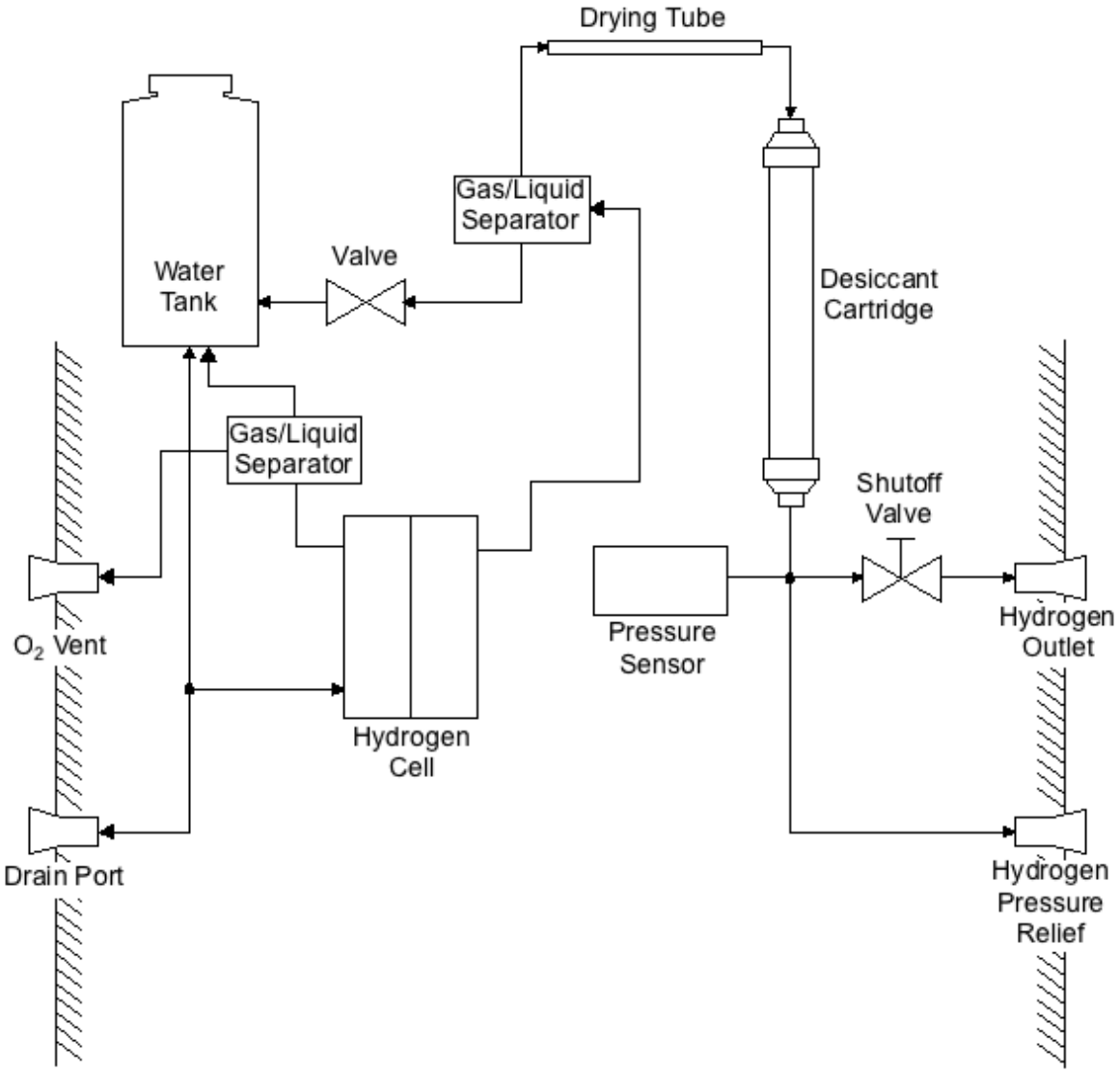
List of items included in the shipment

Quantity	Description
1	Hydrogen Generator
1	Instruction manual
1	Deioniser triangle bag
1	Water drain with flexible tubing
1	Power cable

Description.

The Hydrogen Generator produces pure hydrogen (and oxygen as a by-product) through the electrolysis of water. The key element of the generator is an electrochemical cell assembly which contains a solid polymer electrolyte. No free acids or alkalines are used. Deionised or pure, distilled water is the only liquid which may come into contact with the cell. Because the water is consumed, it must be refilled from time to time.

The generated hydrogen is accumulated in the hydrogen/water separator and the desiccant housing. The pressure is controlled by a pressure transducer. The output pressure is indicated on the display. The hydrogen is dried by passing it through a drying tube and a desiccant cartridge containing desiccant material. The hydrogen then passes through the shut-off valve and exits the generator through the outlet port at the rear.



Installation.

Receiving the generator

All units have been carefully inspected before transport. Visual checks for damage and functional tests should be performed upon receipt. Any damage must be immediately noted and reported. The generator must only be returned according to the shipping instructions provided.

Placing the generator

The Hydrogen Generator must be placed on a flat, level, vibration-free, shock-free surface. Do not place the generator over a source of heat, as this may cause the device to overheat. The unit should not be in contact with any other objects on any side and the air inlet must not be blocked. Leave at least 30 cm of free space at the rear for ventilation. Do not operate the generator in a sealed or unventilated room, or in close proximity to an open flame or other sources of ignition. Do not operate the generator at below-freezing temperatures. Operation is guaranteed at operating temperatures between +15 and +40° C.



Warning

Normal precautions for any hydrogen supply should be taken when using the generator. Do not use in sealed or unventilated rooms. Do not use in close proximity of open flames or other sources of ignition.

Symbols used on the generator



Earth symbol

This symbol marks the earth connections to the chassis of the Hydrogen Generator.

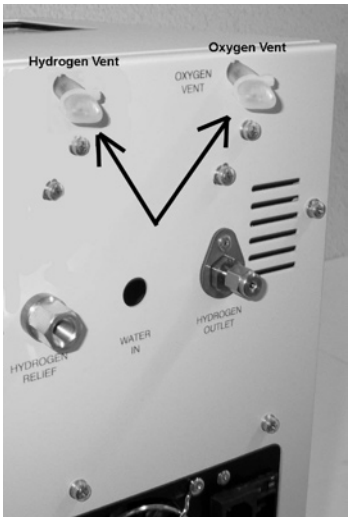
Gas connections

Pure dry hydrogen at regulated pressure is available at the hydrogen outlet port at the rear of the generator. This port must be connected to 1/8" tubing using a stainless-steel or copper Swagelok connector. Teflon connectors are not suitable. The pressure at this port is adjusted and shown on the display. The hydrogen relief port at the rear of the unit can be connected to an exhaust hood or another vent system.



Warning

The line from the relief port should never be connected in such a way that back pressure can develop.





Important
Remove the plug from the oxygen vent and hydrogen vent before operating the unit. Keep these plugs for transporting the unit.

Cartridge installation

The desiccant cartridge is shipped separately inside the packaging, and needs to be fitted before operating the unit. Refer to the photos below for the installation of the cartridge.
Make sure that the tubing that connects the cartridge is pushed back inside the unit after installation to allow the front door to close completely.

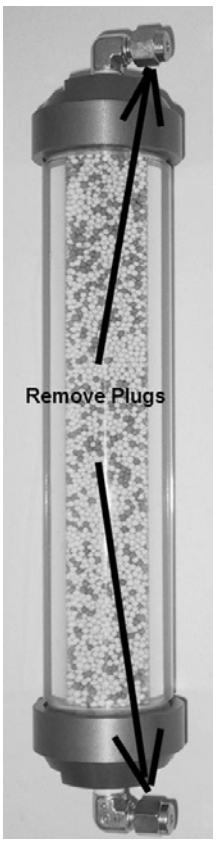
Step 1 to Step 3: Preparation for cartridge installation



Step 1

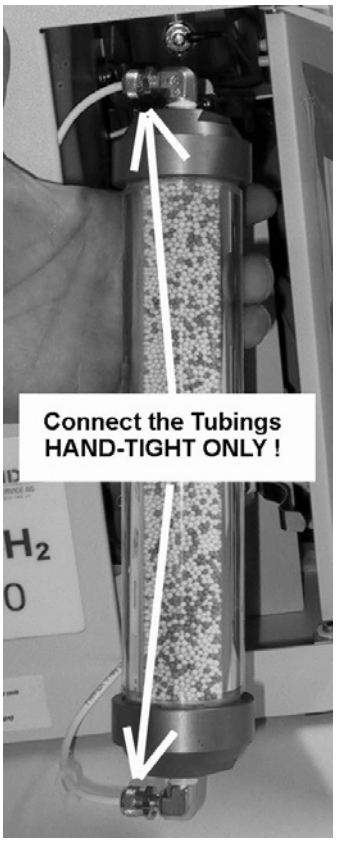


Step 2

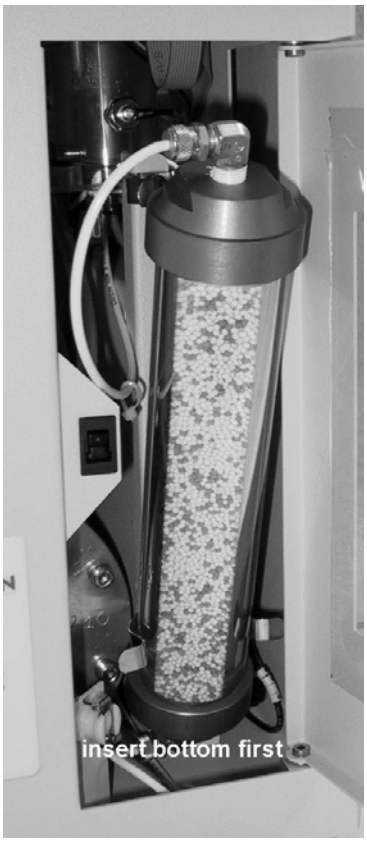


Step 3

Step 4 to Step 6: Cartridge installation



Step 4



Step 5



Step 6

Please note:

When the silica gel inside the cartridge has changed its colour completely, it's time to substitute it with a new one. Loosen the top fitting of the cartridge by unscrewing the fitting counter-clockwise, then empty the "old" molecular sieve and replace it with a new one. Make sure that the o-ring on top of the cartridge is free of dust before reinstalling the fitting.

Electrical connections

Check the setting of the voltage selector on the rear of the unit. The set voltage is indicated by the white arrow. To change the voltage, proceed as follows:
→ Using a small screwdriver, remove the voltage selector insert.
→ Replace the voltage selector insert so that the white arrow points to the correct voltage.

Remote connections (optional)

The Hydrogen Generators are fitted with an optional remote control feature, which allows the user to check the status of the machine from a remote position, and to start/stop the production of hydrogen.

The contacts used in the remote control are potential-free relay contacts. The contacts can be configured via software as “Normally open” or “Normally closed” (see the “Operation” section, page 19+20).
The maximum voltage and current ratings for the contacts are 1A / 48 V. The pin configuration of the remote connector is shown in the table below.

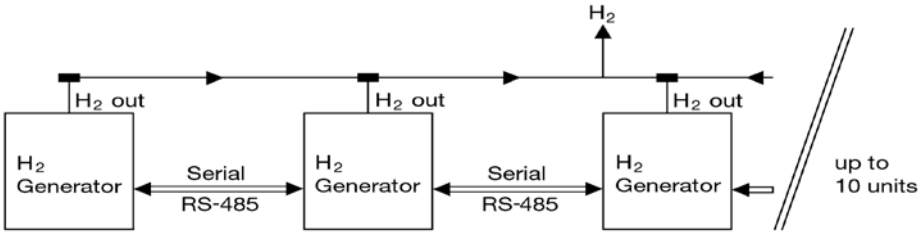
Remote connector pin configuration

Pin	Description
1+2	Start (12–30 VDC, polarity not important)
3+4	Standby (system not OK)
5+6	Reaching normal pressure (overproduction)
7+8	Refill water (low water)
9+10	Low water level (water level too low)
11+12	Bad water
13+14	Change water (bad water warning)

Cascading (optional)

The RS-485 interface allows up to 10 generators to be operated in parallel mode. One unit has to be defined as the master, while the others operate in "slave" mode. All the slaves need to be configured with individual ID numbers. Communication between the generators requires a standard D-sub 9 pin serial cable. The serial ports are connected as follows:

Master RS-485 out → Slave 1 RS-485 out - Slave 1 RS-485 in → Slave 2 RS-485 in ...



Configuration

Configuring the master

1. Enter "Menu".
2. Scroll until the display shows "Master" and press "Enter". Set the value to "YES" (using the +/- buttons).
3. Exit and scroll until the display shows "Number of slaves" and enter: set the number of slaves connected to the master using the +/- buttons.
4. Exit and scroll until the display shows "ID Nr" and set to "1".
5. Exit.

Configuring the slaves

1. Enter "Menu".
2. Scroll until the display shows "Master" and press "Enter". Set the value to "NO" (using the +/- buttons).
3. Exit and scroll until the display shows "ID Nr" and press "Enter". Set the ID number of the slave. Use a different number for each slave, starting from ID Nr. 2.
4. Exit.

The configuration is now complete.

Operating in master-slave mode

Connect the gas outputs of all the generators to the same line. Open all the main valves.
If the configuration and the serial connection is correct, the slaves will show "Slave mode" after starting up. Change the pressure setting on the master and the slaves will follow the master.

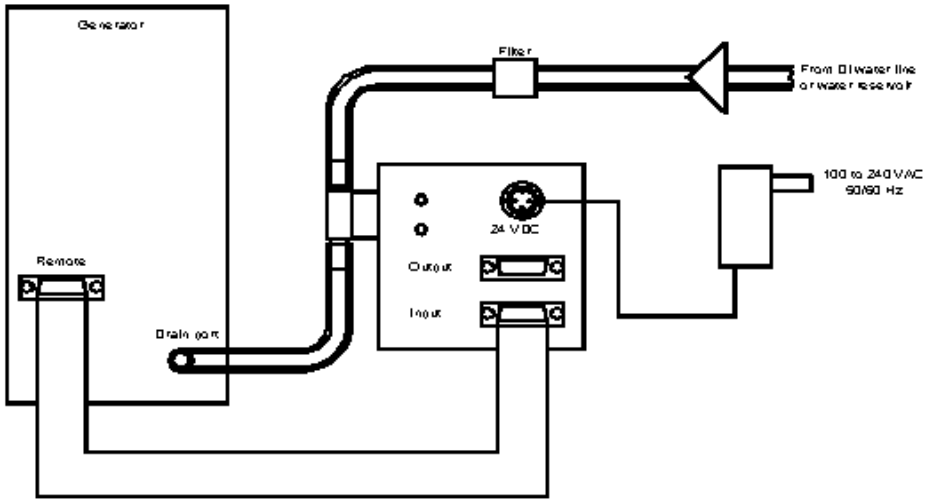


Important
The cascading function will only work properly if the gas outlets on all the generators are connected together and the main valves are in the "OPEN" position.

Auto refill (optional)

Description

The auto refill option gives you the possibility to refill the water tank of the generator automatically from an external water source. You can either use a DI water line or a water reservoir. The correct refill time depends on the pressure of the water source. A higher pressure results in a shorter refill time. Max. pressure is 60 psi g.
If you are using a water reservoir, make sure the minimum water level in the reservoir is 2-3 feet higher than the top of the generator.



Installation steps

1. Connect the water tubes and the electric wires as shown in the diagram above.
2. Configure the generator as follows:
   - → Set the generator to standby.
   - → Set the auto refill function to “ON”.
   - → Adjust the auto refill time to 8 s.
3. Test the auto refill time as follows:
   - → Empty the water tank.
   - → Start the generator.
   - → Obtain the refilling level (should be approx. 30 to 50 % of the max. level).
   - → If the refill level is too low, increase the auto refill time.
   - → Repeat these steps until you have a correct refilling volume.
   - → Note: every time you go into the “Auto refill” menu, you have to put the generator to standby and start it again.



Warning

If the refill time is too long, the water tank of the generator can overflow and damage the unit.

Initial start-up.

Filling the water tank

To fill the generator with water, remove the cap on the water tank. Carefully fill the tank with distilled or deionised water. The conductivity of the water used in the generator must not exceed 2µS.
Fill the tank to the maximum level indicator. Replace the cap and leave the small hole free for ventilation.



Warning
Do not fill the water tank higher than the marked level.



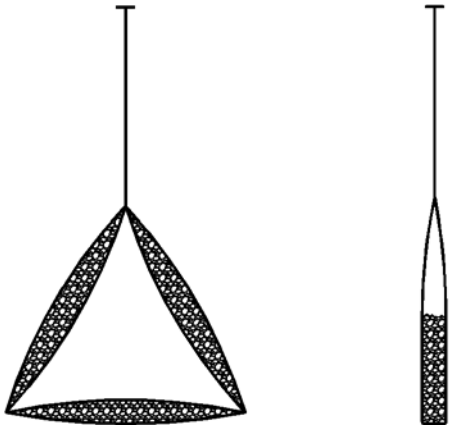
Caution
To prevent contamination of the cell assembly, it is important to use only deionised or distilled water in the generator. Water containing metallic impurities will contaminate or damage the cell and will void the warranty.

Installing the deioniser bag

After having filled the tank with water, the deioniser bag (supplied) must be placed in the tank. Inspect the bag thoroughly for holes or tears, indicated by loose deioniser beads on the outer surface. If the bag is damaged in any way, discard and replace it with a new one. Only use original parts (see "Spare parts list"). Wash the deioniser bag in deionised water before proceeding.

Insert the free end of the "T" fastener through the hole in the centre of the water filler cap until it is securely fastened. The bag should not block the outlet at the bottom of the tank. Once in place, the bag should not be allowed to dry out.

This new triangle deioniser bag has been designed for a higher water purifying capacity. It is recommendable to use this bag for new generators in the first 4 to 6 months of operation. After this time, you can use the standard deioniser bag (see "Spare parts list").



Starting the unit

Once all of the previous operations have been performed, the generator is ready for operation.

1. Close the shut-off valve located on top of the unit, next to the water tank cap.
2. Check that the tank is filled with deionised water.
3. Check that the hydrogen outlet connector is tightly fitted.
4. Check that the plug has been removed from the oxygen vent.
5. Turn the "POWER" switch to the "ON" position.
6. Enter the desired set pressure, using the arrow buttons on the keypad.
7. Press the "START" button to start the unit. If the unit has been configured for „Auto start" (see "Configuration") it will start automatically.
8. The unit will immediately begin to build up pressure. The liquid crystal display (LCD) will show the message „Reaching normal pressure", and the H_2 flow bar will indicate maximum flow (fully illuminated).
9. Wait until the "Act" pressure reaches the "Set" value. These values are shown on the liquid crystal display (LCD). It may take a few minutes to reach the "Set" operating pressure.

   Note
   If the generator does not build up pressure as required, the unit will shut down. Refer to the "Troubleshooting" table.

10. Once the pressure reaches the "Set" value, the LCD will show the message „Normal pressure" and the H_2 flow bar will indicate no flow (no segments illuminated). This indicates that there are no gas leaks within the generator itself.
11. Open the shut-off valve. Initially, the outlet pressure will fall. The amount and the duration of this pressure drop depends on the volume of the external equipment connected to the generator.
12. After the initial pressure drop, the outlet pressure should stabilise at the "Set" pressure. A continuing drop in pressure indicates a gas leak in the external equipment or an elevated hydrogen consumption. Check the external equipment for leaks or elevated consumption.
13. The generator is now in normal operating conditions.

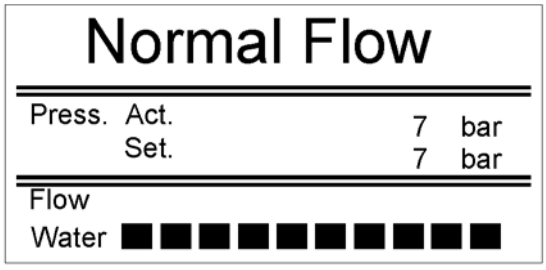
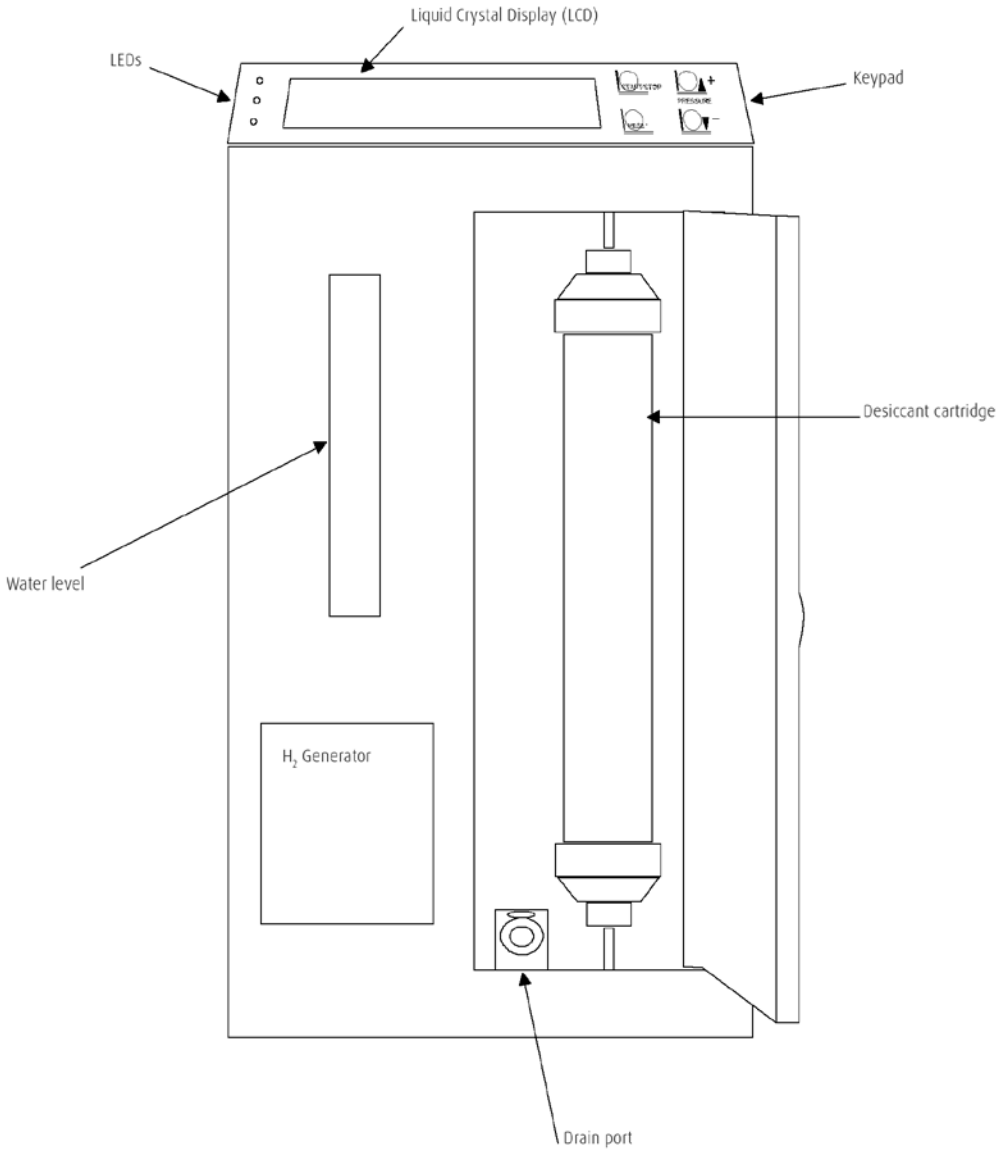


Figure 3: LCD

Operation.


Liquid Crystal Display (LCD)
LEDs
Keypad
Desiccant cartridge
Water level
H$_2$ Generator
Drain port

LEDs

The unit is fitted with three LEDs which offer an overall view of the unit´s status.

Green LED
The green LED shows that the unit is powered.

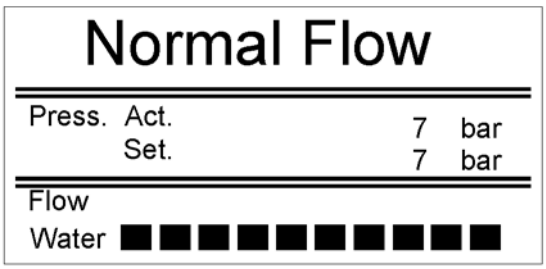
Yellow LED
When the yellow LED is on, the unit is producing hydrogen.

Red LED
The red LED shows that the unit has shut down due to an alarm.

Liquid crystal display (LCD)

All important operating information is shown on the display.

Layout of the display
The LCD provides the following information:



First row, status information
"Sts" shows current information on the operating status of the generator. The information can be divided into 3 groups:

Information	Displays normal operating status.
Warning (pre-alarm)	Indicates that a maintenance intervention will soon be required; accompanied by an audible signal.
Alarm	Indicates that maintenance intervention is required and that the machine has been shut down; accompanied by an audible signal.

List of messages displayed

Message	Description	Type	Action
Standby	Device is ready for H_2 production.	Information	Press "START"
Reaching normal pressure	Device is producing H_2 and increasing pressure to the set value.	Information	
Normal pressure	Device is producing H_2 and has reached the set pressure value.	Information	
Normal flow	Device is producing H_2 and has reached the set pressure value; with H_2 flowing.	Information	
Refill water	Water level approaching alarm threshold.	Warning (pre-alarm)	Fill the tank with water.
Change water	The conductivity of the water has exceeded 33 µs.	Warning (pre-alarm)	Drain and then refill the tank; change the deionizer bag.
Low pressure	The set pressure can not be reached.	Alarm	Check for internal or external leaks. Check max. H_2 consumption.
Low water level	There is too little water in the tank.	Alarm	Refill the tank.
Bad water	The conductivity of the water has exceeded 38 µs.	Alarm	Drain and then refill the tank; change the deioniser bag.
High cell voltage	High cell voltage.	Alarm	Notify service agent.

Second row, pressure information

"Act" is the actual pressure of the hydrogen, while "Set" is the set pressure. The pressure can be increased using the ↑ button, or decreased using the ↓ button.

Third row, hydrogen flow

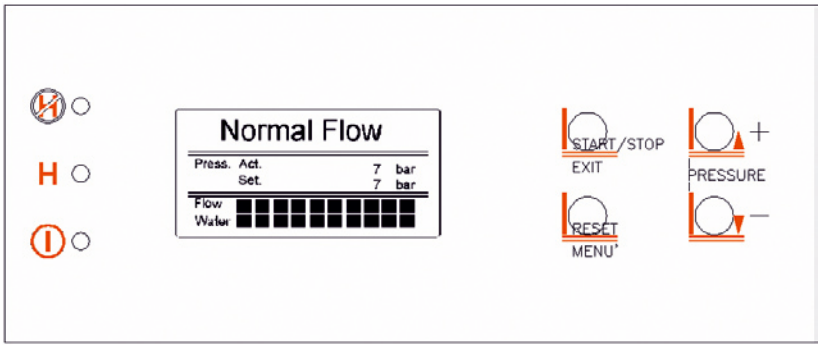
This row displays the current quantity of hydrogen being produced. Each point represents approx. 10 % of the maximum capacity. This graph also indicates approximately how much hydrogen is being consumed by the connected equipment.

Note
The last point on the flow graph will flash only. This indicates that the generator is producing at maximum capacity. In normal operation, this should not be the case, as it indicates that the consumption is too close to the maximum limit and the unit may shut down if the consumption increases further. Maximum flow is normal when the unit is building up pressure.

Fourth row, water quality

This graph shows the quality of the water. With more than 3 points illuminated, the water quality is good. If only 3 or less points are illuminated, the conductivity of the water is around 33 µS (warning level). If only 1 point or no points are illuminated, the conductivity of the water is equal to or greater than 38 µS (alarm). The generator will be shut down.

The keypad



“START/STOP”-”EXIT” button

The “START/STOP” button places the generator in normal operating mode from standby and vice versa. It is also used to re-start the unit following an alarm. When the problem leading to the alarm has been resolved, the generator must be reset using the “RESET” button and then can be started by pressing the “START/STOP” button.

The button is also used to exit from a displayed choice of the menu tree.

“RESET” and “MENU” button

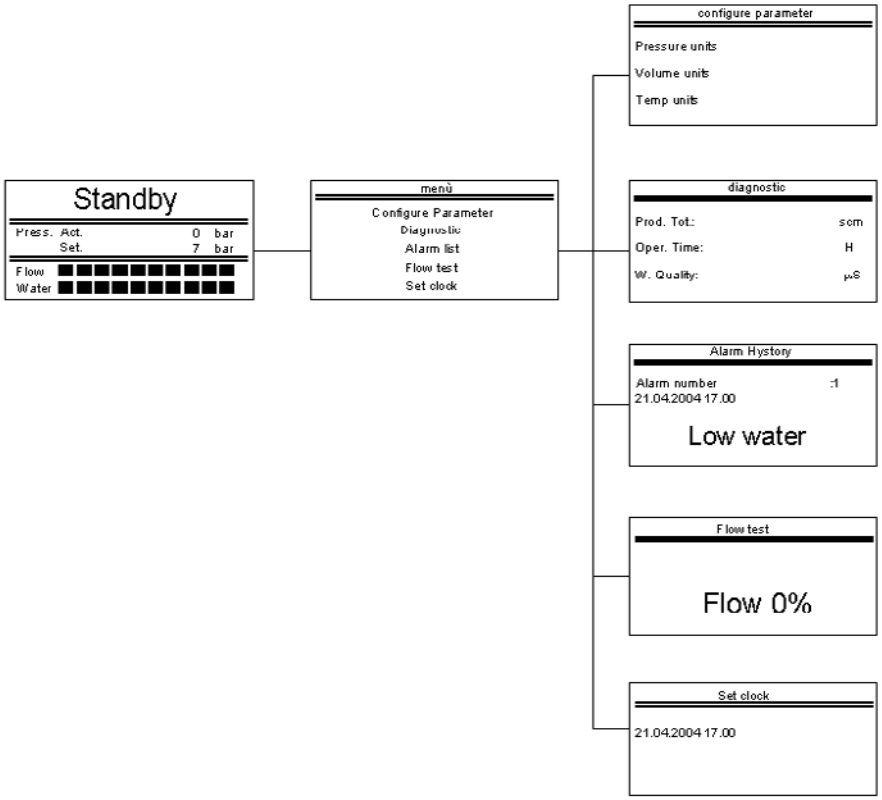
This button silences the audible alarm. When the problem leading to the alarm has been resolved, the “RESET” button must be pressed before the generator can be restarted (also see “Special functions”).

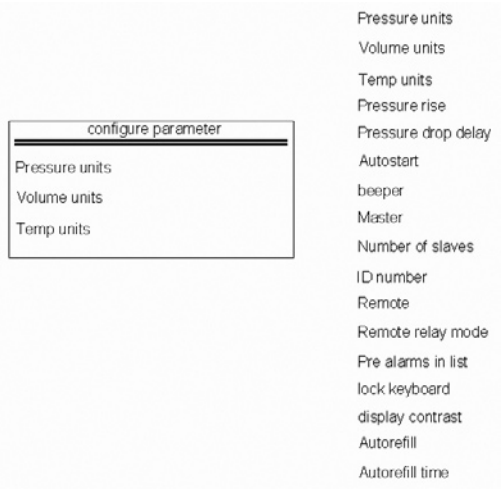
The “RESET” and “MENU” button is also used to access the menu and select.

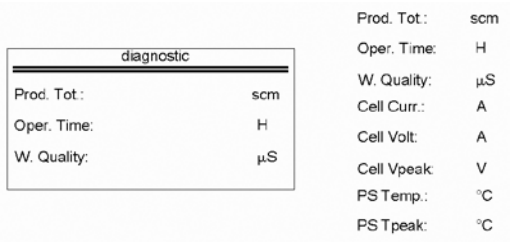
“PRESSURE” button

The pressure can be increased using the ↑ button or decreased using the ↓ button. Use these buttons to scroll the menu.

Menu tree


Standby
Press. Act. 0 bar
Set. 7 bar
Flow
Water
menù
Configure Parameter
Diagnostic
Alarm list
Flow test
Set clock
configure parameter
Pressure units
Volume units
Temp units
diagnostic
Prod. Tot.: scm
Oper. Time: H
W. Quality: µS
Alarm Hystory
Alarm number :1
21.04.2004 17.00
Low water
Flow test
Flow 0%
Set clock
21.04.2004 17.00


configure parameter
Pressure units
Volume units
Temp units
Pressure units
Volume units
Temp units
Pressure rise
Pressure drop delay
Autostart
beeper
Master
Number of slaves
ID number
Remote
Remote relay mode
Pre alarms in list
lock keyboard
display contrast
Autorefill
Autorefill time


diagnostic
Prod. Tot.: scm
Oper. Time: H
W. Quality: µS
Prod. Tot.: scm
Oper. Time: H
W. Quality: µS
Cell Curr.: A
Cell Volt: A
Cell Vpeak: V
PS Temp.: °C
PS Tpeak: °C

Configuration parameters

Item	Description	Options / Range	Default
Pressure units	Sets the desired unit of measure for the pressure.	bar/psi/kPa	bar
Volume units	Sets the desired unit of measure for the volume.	scm (standard cubic metres) scf (standard cubic feet)	scm
Temp. units	Sets the desired unit of measure for the temperature.	°C and °F	°C
Pressure rise	Sets how fast the pressure has to increase. If the pressure increases at a slower rate, a low-pressure alarm is activated.	0.1–6.8 bar/min 1.4–100 psi/min	0.3 1.5
Pressure drop delay	Sets a delay in seconds to ignore a pressure drop (overrides the low-pressure alarm).	2–10 min	2
Auto start	Sets whether the unit automatically starts production when the power is switched on.	YES/NO	NO
Beeper	Sets whether the audible signal is activated in the event of an alarm.	ON/OFF	ON
Master	Configures the unit as the master for cascading operation.	YES/NO	NO
Number of slaves	Enter the number of slaves connected to the master.	0–32	0
ID number	Sets the ID number.	0–32	0
Remote start/stop mode	Configures the remote start/stop function.	START/STOP, START only, direct control	START/STOP
Remote relay mode	Configures the remote relay contacts.	Normally open (NO) Normally closed (NC)	NC
Warnings (pre-alarms) in alarm log	If set to “YES”, the warnings (pre-alarms) are also shown in the alarm log.	YES/NO	NO
Lock keyboard	If set to “YES”, the keyboard will be locked automatically after the generator is in the main window for more than 20 s. To unlock the keyboard, press the unlock button and hold for 5 s.	YES/NO	NO
Display contrast	Adjusts the contrast of the display.	0–10	5
Auto refill	If set to “ON”, the pre-level water alarm is used to trigger an external pump or valve to refill the water tank.	ON/OFF	OFF
Auto refill time	Sets the duration of water refilling after the pump or valve has been triggered.	0–60 s	0

Diagnostic display

Item	Description	Max.
Production tot.	Total hydrogen production	99.999 scf 4000.00 scm
Operating time (h)	Total number of hours of unit operation	99,999 hours
Wat. quality (µS)	Actual water conductivity	38 µS
Cell current (A)	Actual cell current	–
Cell voltage (V)	Actual cell voltage	–
Cell voltage peak (V)	Maximum cell voltage in the life of the cell	–
PS. temp.	Actual temperature of the power supply	–
PS. temp. peak	Maximum temperature of the power supply	–

Maintenance.

With proper care and maintenance, your Hydrogen Generator should provide you with years of trouble-free operation. There are no adjustments to be made to the generator. The only routine service operations are those described below.

Nevertheless, the generator should be inspected approximately every 2 years. Contact your supplier.

Routine maintenance

The following section describes the maintenance operations required for the correct operation of the Hydrogen Generator.

Cleaning

The internal components of the Hydrogen Generator do not need to be cleaned and should not be accessed by the user for cleaning. To clean the outside of the unit, only use a damp cloth (no detergents, acids or aggressive or abrasive substances).

Water refilling

The tank must be refilled when the water level approaches the lower level, and the **"Refill water"** warning message appears.

Desiccant replacement

Change the desiccant cartridge when the red colour of the desiccant turns to slight orange. The colour of the desiccant can be observed through a view port in the front panel of the generator.

To remove the desiccant cartridge, first loosen the top and bottom connectors. These are screwed in hand-tight; no tools are required. Then extract the cartridge and replace it with a new or regenerated one. Reconnect the cartridge to the tubing and tighten the connectors (hand-tight!).
Return the used cartridge to your retailer for refilling.

Deioniser replacement

Rinse the water tank and replace the deioniser bags approximately every six months, or whenever the **"Change water"** message appears.

Installing the new deioniser bag

After having refilled the tank with water, the new deioniser bag must be placed in the tank. Inspect the bag thoroughly for holes or tears, indicated by loose deioniser beads on the outer surface. If the bag is damaged in any way, discard and replace it with a new one. Only use original parts (see "Spare parts list"). Wash the deioniser bag in deionised water before proceeding.

Insert the free end of the "T" fastener through the hole in the centre of the water filler cap until it is securely fastened. The bag should not block the outlet at the bottom of the tank. Once in place, the bag should not be allowed to dry out.

Returning the unit

In the event of any faults or damage, first notify the agent or distributor who supplied the unit. If this is not possible, inform the producer directly. Please also provide full details of the problem, plus the model and serial number. Instructions will then be provided for the service or the return of the unit. The device will be received and repaired by the producer only if return authorisation is provided by the producer as per these instructions. If the one-year warranty has expired or the fault is due to misuse of the unit, all repair and shipping costs are to be paid by the customer. All other costs are borne by the customer, except as otherwise expressly agreed upon.



Warning

If the unit has to be transported, make sure that the water tank is completely empty and place the plug (supplied with the unit) on the oxygen vent at the rear of the unit. Close the small hole in the cap on the water tank with a strip of adhesive tape. Use suitable packaging.
The unit should be transported in an upright position; this warning should be visible on the outside of the packaging.

Spare parts list.

The table below provides a list and descriptions of the spare parts for the Hydrogen Generator. Please also refer to the corresponding figures.

List of spare parts – PGH$_2$ 100

p/n	Description
H200-019	Desiccant refill (3 cartridges)
PGH$_2$-DES-Cart	Desiccant cartridge + fittings + refill
H200-031	Deioniser bag
PGH$_2$-DI-Bag	New deioniser triangle bag
PG201-001	Water tank + level sensor
PG200-002	Water tubing kit
H200-005	Water drain outlet + tube
PG200-003	Ball valve for cell IN
H200-007	G/L separator, complete with fittings
H200-008	Perma Pure drying tube
PG200-004	Display
H200-013	Pressure release valve
H200-014	Gas outlet connector + check valve
NM200-006	O_2 separator
NM200-007	H_2 separator
H200-017	Door closer
NM200-015	Rear intake fan
NM200-016	Internal circulation fan
H200-021	Gas ON/OFF valve
H200-022	Connector for the Perma Pure tube
H200-024	Gas ON/OFF polycarbonate labels
H200-025	Painted metal casing
H200-026	Slide frame + plexiglass cover
H200-028	Display polycarbonate label
H210000-001	Complete cell
NM200-011	Transformer 230 VA 50/60 Hz
NM200-017	START button 240/120 V 50/60 Hz
PG201-005	Mainboard
PG201-006	Cables
H210000-004	Cell service (on old cell)

List of spare parts – PGH$_2$ 160

p/n	Description
H200-019	Desiccant refill (3 cartridges)
PGH$_2$-DES-Cart	Desiccant cartridge + fittings + refill
H200-031	Deioniser bag
PGH$_2$-DI-Bag	New deioniser triangle bag
PG201-001	Water tank + level sensor
PG200-002	Water tubing kit
H200-005	Water drain outlet + tube
PG200-003	Ball valve for cell IN
H200-007	G/L separator, complete with fittings
H200-008	Perma Pure drying tube
PG200-004	Display
H200-013	Pressure release valve
H200-014	Gas outlet connector + check valve
NM200-006	O_2 separator
NM200-007	H_2 separator
H200-017	Door closer
NM200-015	Rear intake fan
NM200-016	Internal circulation fan
H200-021	Gas ON/OFF valve
H200-022	Connector for the Perma Pure tube
H200-024	Gas ON/OFF polycarbonate labels
H200-025	Painted metal casing
H200-026	Slide frame + plexiglass cover
H200-028	Display polycarbonate label
H216000-001	Complete cell
NM200-011	Transformer 230 VA 50/60 Hz
NM200-017	START button 240/120 V 50/60 Hz
PG202-005	Mainboard
PG201-006	Cables
H216000-004	Cell service (on old cell)

List of spare parts – PGH$_2$ 250

p/n	Description
H200-019	Desiccant refill (3 cartridges)
PGH$_2$-DES-Cart	Desiccant cartridge + fittings + refill
H200-031	Deioniser bag
PGH$_2$-DI-Bag	New deioniser triangle bag
PG201-001	Water tank + level sensor
PG200-002	Water tubing kit
H200-005	Water drain outlet + tube
PG200-003	Ball valve for cell IN
H200-007	G/L separator, complete with fittings
H200-008	Perma Pure drying tube
PG200-004	Display
H200-013	Pressure release valve
H200-014	Gas outlet connector + check valve
NM200-006	O_2 separator
NM200-007	H_2 separator
H200-017	Door closer
NM200-015	Rear intake fan
NM200-016	Internal circulation fan
H200-021	Gas ON/OFF valve
H200-022	Connector for the Perma Pure tube
H200-024	Gas ON/OFF polycarbonate labels
H200-025	Painted metal casing
H200-026	Slide frame + plexiglass cover
H200-028	Display polycarbonate label
H225000-001	Complete cell
NM200-011	Transformer 230 VA 50/60 Hz
NM200-017	START button 240/120 V 50/60 Hz
PG203-005	Mainboard
PG201-006	Cables
H225000-004	Cell service (on old cell)

List of spare parts – PGH$_2$ 300

p/n	Description
H200-019	Desiccant refill (3 cartridges)
PGH$_2$-DES-Cart	Desiccant cartridge + fittings + refill
H200-031	Deioniser bag
PGH$_2$-DI-Bag	New deioniser triangle bag
PG201-001	Water tank + level sensor
PG200-002	Water tubing kit
H200-005	Water drain outlet + tube
PG200-003	Ball valve for cell IN
H200-007	G/L separator, complete with fittings
H200-008	Perma Pure drying tube
PG200-004	Display
H200-013	Pressure release valve
H200-014	Gas outlet connector + check valve
NM200-006	O_2 separator
NM200-007	H_2 separator
H200-017	Door closer
NM200-015	Rear intake fan
NM200-016	Internal circulation fan
H200-021	Gas ON/OFF valve
H200-022	Connector for the Perma Pure tube
H200-024	Gas ON/OFF polycarbonate labels
H200-025	Painted metal casing
H200-026	Slide frame + plexiglass cover
H200-028	Display polycarbonate label
H210000-001PG	Complete cell
NM200-011	Transformer 230 VA 50/60 Hz
NM200-017	START button 240/120 V 50/60 Hz
PG203-005	Mainboard
PG201-006	Cables
H210000-004PG	Cell service (on old cell)

List of spare parts – PGH_2 500

p/n	Description
H200-019	Desiccant refill (3 cartridges)
PGH_2-DES-Cart	Desiccant cartridge + fittings + refill
H200-031	Deioniser bag
PGH_2-DI-Bag	New deioniser triangle bag
PG201-001	Water tank + level sensor
PG200-002	Water tubing kit
H200-005	Water drain outlet + tube
PG200-003	Ball valve for cell IN
H200-007	G/L separator, complete with fittings
H200-008	Perma Pure drying tube
PG200-004	Display
H200-013	Pressure release valve
H200-014	Gas outlet connector + check valve
NM200-006	O_2 separator
NM200-007	H_2 separator
H200-017	Door closer
NM200-015	Rear intake fan
NM200-016	Internal circulation fan
H200-021	Gas ON/OFF valve
H200-022	Connector for the Perma Pure tube
H200-024	Gas ON/OFF polycarbonate labels
H200-025	Painted metal casing
H200-026	Slide frame + plexiglass cover
H200-028	Display polycarbonate label
H250000-001	Complete cell
NM200-011	Transformer 230 VA 50/60 Hz
NM200-017	START button 240/120 V 50/60 Hz
PG204-005	Mainboard
PG201-006	Cables
H250000-004	Cell service (on old cell)

List of spare parts – PGH_2 600

p/n	Description
H200-019	Desiccant refill (3 cartridges)
PGH_2-DES-Cart	Desiccant cartridge + fittings + refill
H200-031	Deioniser bag
PGH_2-DI-Bag	New deioniser triangle bag
PG201-001	Water tank + level sensor
PG200-002	Water tubing kit
H200-005	Water drain outlet + tube
PG200-003	Ball valve for cell IN
H200-007	G/L separator, complete with fittings
H200-008	Perma Pure drying tube
PG200-004	Display
H200-013	Pressure release valve
H200-014	Gas outlet connector + check valve
NM200-006	O_2 separator
NM200-007	H_2 separator
H200-017	Door closer
NM200-015	Rear intake fan
NM200-016	Internal circulation fan
H200-021	Gas ON/OFF valve
H200-022	Connector for the Perma Pure tube
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H200-025	Painted metal casing
H200-026	Slide frame + plexiglass cover
H200-028	Display polycarbonate label
H250000-001PG	Complete cell
NM200-011	Transformer 230 VA 50/60 Hz
NM200-017	START button 240/120 V 50/60 Hz
PG204-005	Mainboard
PG201-006	Cables
H250000-004PG	Cell service (on old cell)



Important

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