PROTON
THE LEADER IN ON SITE GAS GENERATION.

User's Manual

Hydrogen Generator HyGen

Table of contents

1. Introduction

This document is intended for the User of a HyGen Series Hydrogen Generator and provides all information regarding installation, use and maintenance.

The intended use of the generator is to provide a source (as an alternative to cylinders) of ultra-pure hydrogen gas for powering one or more gas chromatographs.

The generator models in this series are listed below:

HyGen 200 part no. 54-0100-0005,
HyGen 400 part no. 54-0100-0006,
HyGen 600 part no. 54-0100-0007.

The cTUVus mark guarantees that these generators comply with IEC/UL/CSA 61010-1, Safety Requirements for electrical equipment for measurement, control and laboratory use.

This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

The margin of the text contains the following symbols, indicating:

Compulsory safety standards to be observed

Electrical hazard

Recommendations and important information

When performing installation and maintenance operations, it is presumed that the manual user is experienced in the use of pneumatic components, and in particular is aware of all safety aspects linked to the use of hydrogen.
It is strongly recommended that all safety warnings are carefully read (para. 2.1.) before carrying out any operation on the generator.

2. Safety

ⓘ *The unit must be installed and used according to the instructions in this booklet. Furthermore, use of the unit must be limited to that described in Chapter 1 Introduction. Failure to observe the foregoing will render the guarantee null and void and release PROTON ONSITE. ("PROTON") from all liability for direct or indirect damage or physical injury.*

ⓘ *The user is responsible for asking local authorities if there are local safety regulations that are stricter than what is described in this manual.*

2.1. Warnings

⚠ **Hydrogen is an extremely flammable gas that forms EXPLOSIVE MIXTURES WITH AIR. If not aware of all safety aspects linked to the use of this gas, consult the relative safety datasheet**

⚠ **Place the generators FAR AWAY FROM HIGH HEAT, IGNITION SOURCES AND FLAMES**

⚠ **The generator must operate with all covers installed: this guarantees the correct circulation of air and prevents the formation of gas pockets**

⚠ **Place the generators in an environment PROTECTED AGAINST RAIN AND WIND**

⚠ **NEVER OPEN the generator while it is connected to the electrical mains: RISK OF FATAL INJURY BY ELECTROCUTION**

ⓘ *In the event of faults that cannot be resolved based on one of the procedures in the TROUBLESHOOTING chapter, contact exclusively PROTON Technical Service. Repairs and inspections must be carried out exclusively by* ***QUALIFIED PERSONNEL***

ⓘ ***If the generator will not to be used for a prolonged period of time,*** *it must be adequately depressurized (see par. 6.6. and par. 6.7.). In addition, in order to maintain hydrated the cell stack, the water should not be drained, as normally required for transportation (see par. 5.1.)*

⚠ **It is the Customer's responsibility to consult with the local authority having jurisdiction (AHJ) regarding local code requirements for installation and operation of this equipment.**

2.2. Safety devices

MAXIMUM PRESSURE: Maximum operating pressure that can be set is 8 bar.

There are two points of pressure control:

- One is a pressure sensor, via the control system, which shuts down the generator when pressure values exceed 0.5 bar of the set value;
- The other is a safety relief valve, independent from the control system, which limits pressure to 9 bar.

HYDROGEN-OXYGEN MIXTURE: The formation of potentially hazardous hydrogen-oxygen mixture inside the generator is prevented by a forced ventilation system. If the ventilation system fails to operate, a dedicated sensor makes the generator stop. Any significant gas leaks are also indicated by the control system.

2.3. Technical Service

PROTON Technical Service can be contacted as follows:

Proton OnSite
10 Technology Drive
Wallingford, CT 06492
203-949-8697
203-678-2000
customerservice@protononsite.com
www.protononsite.com

3. Description of the generator

3.1. Equipment supplied

Unless otherwise agreed upon, the supply of a HyGen series hydrogen generator includes:

- Hydrogen generator

- User manual
- Certificate of conformity to safety directives
- Cable for the electrical mains
- Connection kit

3.2. Technical specifications

3.2.1. Hydrogen

Capacity (*)		
HyGen 200	up to 0.200 Nl/min	up to 0.200 slpm
HyGen 400	up to 0.400 Nl/min	up to 0.400 slpm
HyGen 600	up to 0.600 Nl/min	up to 0.600 slpm
Pressure	Settable from 2 to 8 bar	Settable from 30 to 116 psi

(*) flow measurement at 20°C and 1 atmosphere

3.2.2. Deionized water requirements

Capacity		
HyGen 200	up to 12 ml/h	up to 0.4 fl oz/h
HyGen 400	up to 24 ml/h	up to 0.8 fl oz/h
HyGen 600	up to 36 ml/h	up to 1.2 fl oz/h
Temperature	from 5°C to 35°C	from 41° to 95°F
Maximum Pressure (in case of external deionized water supply line)	1.4 bar	20 psi
Quality		
Required resistivity	>1 MΩ cm @25°C	ASTM Type II
Preferred resistivity	>10 MΩ cm @25°C	ASTM Type I

3.2.3. Electrical requirements

Supply voltage	**110/240 Vac; 50/60Hz**
Maximum power consumption	
HyGen 200	110 W
HyGen 400	180 W
HyGen 600	250 W

3.2.4. Pneumatic connections

Hydrogen output	G 1/8” female
Hydrogen vent	quick coupling for plastic pipe diameter 4mm
Optional deionized water inlet from external line	Hose connection ¼”

3.2.5. Electrical connections

Power supply	IEC320
CAN bus IN, CAN bus OUT	RJ45

3.2.6. Dimensions

Width	38 cm	15”
Depth	53 cm	21”
Height (with support base)	47 cm	18.5”
Weight (generator only)	29 kg	64 lbs
Weight (with support base)	31 kg	68 lbs
Protection rating	IP20	

3.2.7. Environmental requirements

Installation site	indoors, classified non-hazardous	
Minimum ventilation	4 Nm3/h	150 SCFH
Maximum inclination	± 1°	
Relative humidity	up to 90%, no condensation	
Use temperature	from 5°C to 35°C	from 41° to 95°
Storage and transport temperature	from 5°C to 40°C	from 41° to 104°

3.2.8. Noise

Noise level at 1 meter	< 50 dB(A)

3.3. Generator components

3.3.1. Front view

A. CPU generator control unit with integrated user interface touch screen;
B. FRONT PANEL removal for maintenance operations;
C. LED WARNING LIGHT indicates the operating condition of the generator (see also par. 6.3.)
D. BASE for supporting the generator on a level surface

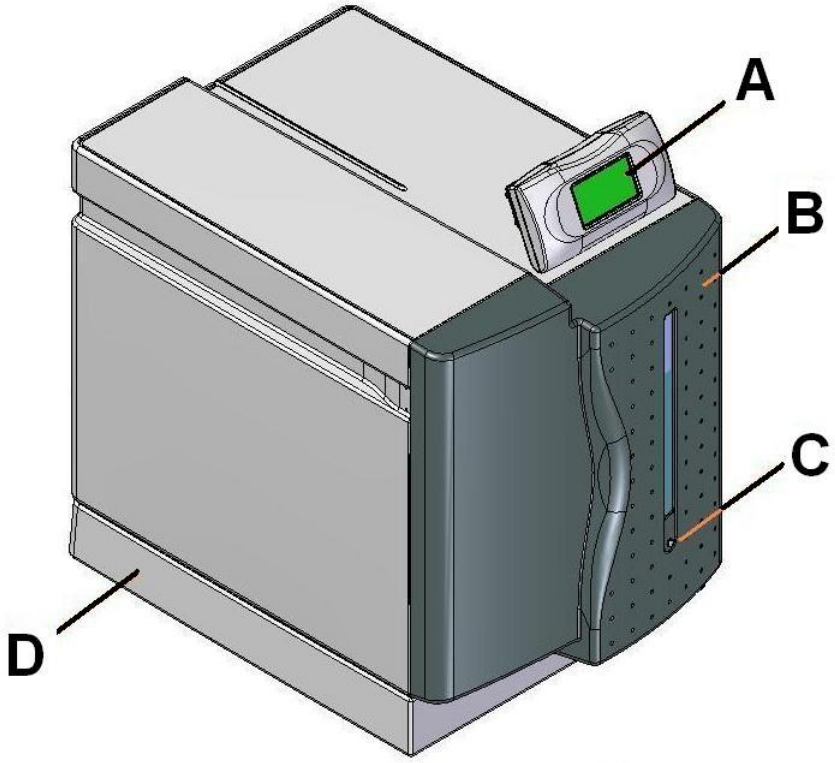


FIGURE 3.3.1: Front view

3.3.2 Rear view

- **E.** AUXILIARY WATER INLET: hose connection for connecting an optional deionized water line (1/4” hose barb)
- **F.** H2 DELIVERY: coupling for connecting the hydrogen product line (G1/8 female)
- **G.** SILENCER for venting at ambient pressure
- **H.** H2 VENT: coupling for connecting the hydrogen vent line (Quick disconnect for 4 mm tube)
- **I.** CAN BUS OUT
- **J.** CAN BUS address (DIP switch)
- **K.** CAN BUS IN: connector for connecting the CPU
- **L.** EXT CMD (for optional equipment)
- **M.** CONNECTOR for electric power supply cable (IEC 320/C13) ; includes housing for main FUSE
- **N.** ON-OFF SWITCH
- **O.** IDENTIFICATION LABEL: states the model, serial number (SN) and electrical specifications
- **P.** VENTILATION GRILLE

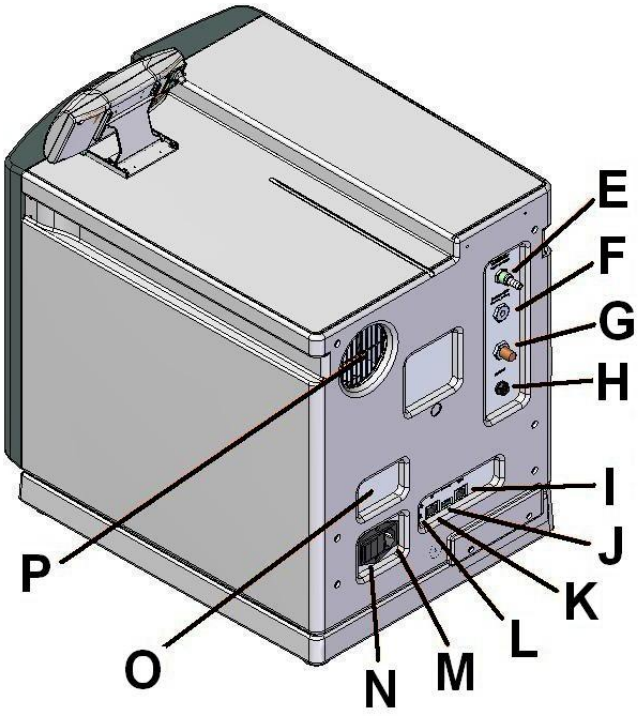


FIGURE 3.3.2: Rear view

3.3.3. Internal view

Q. DEIONIZED WATER TANK

R. DEIONIZED WATER DRAIN: quick coupling for drain tube

S. DRYER: metal cylinder containing molecular sieves for drying the gas

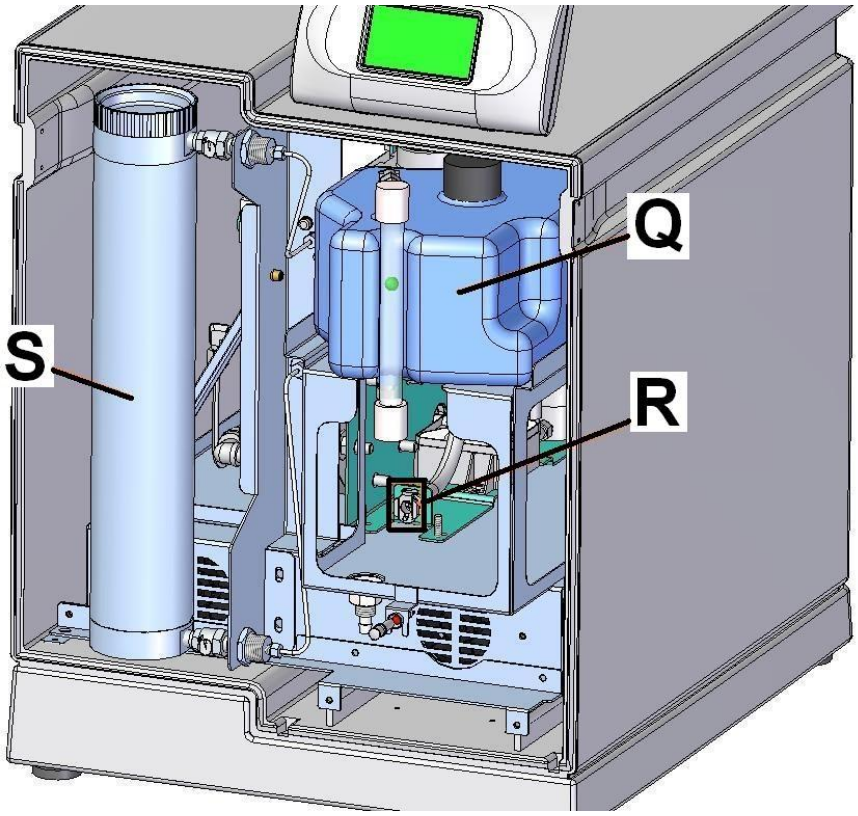


FIGURE 3.3.3. Internal view

4. Installation

4.1. Installation area requirements

4.1.1. Environment

The area where the generator is installed must meet the requirements listed under *para. 3.2.7. Environmental requirements*

⚠ **In particular, check if ventilation is adequate. Do not install the generator into a closed cabinet with insufficient ventilation.**

4.1.2. Mating surface

The surface where you plan to install the generator must be level (maximum incline ± 1°)

4.2. Installation procedure

4.2.1. Step 1: Remove the packaging

- Open the packaging from the top
- Remove the box containing the accessories
- Lift the generator by grasping its side handles (two people are needed for this operation) and set it momentarily on a flat surface
- Remove the support base and place it on the desk where you plan to install the generator.

ⓘ *It is recommended storing the packaging to ensure adequate protection if the generator is transported in the future.*

4.2.2. Step 2: Position the generator

- Position the generator on its support base or above another generator of the same series (two people are needed for this operation).

⚠ **Ensure a clearance of at least 20cm at the rear of the generator. There must be no potential sources of sparks in this clearance at the rear of the generator, such as: flames, electrical contacts, hot surfaces, moving parts that can generate sparks, etc.**
To not decrease ventilation efficiency, also ensure a clearance of at least 20cm at the front of the generator

⚠ **If positioned vertically with other generators of the same series, the HyGen hydrogen generator must be at the top.**

ⓘ *For the correct installation of a "stack" of generators, consult the dedicated User's Manual*

4.2.3. Step 3: Fill the deionized water tank

- Remove the front panel

FIGURE 4.2.3.1. Removal of the front panel

- Locate the deionized water tank inside the generator, at the top right
- Disconnect the tank by means of the quick coupling at the bottom of the tank

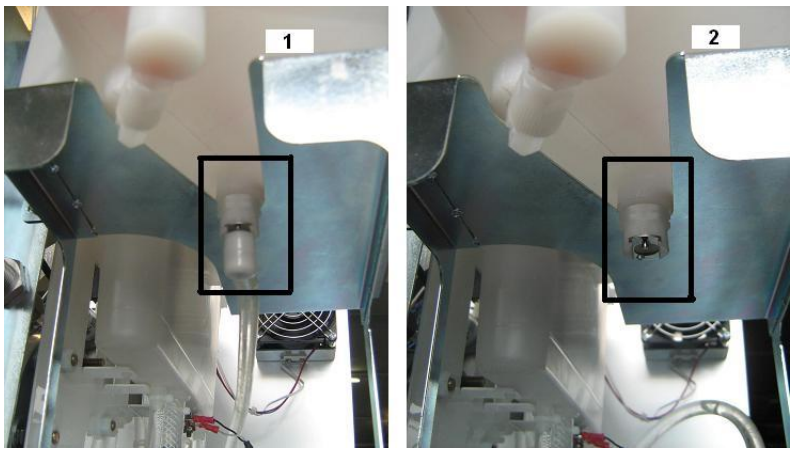


FIGURE 4.2.3.2. Filling tank quick coupling disconnection

- Remove the tank

- Unscrew the cap, fill the tank with the type of deionized water required to *para*. 3.2.2. *Deionized water requirements* and refit the cap
- Put the tank back in place, reconnect the quick coupling
- Check that water flows from the filling tank to the internal tank; otherwise squeeze the tube to force air bubble to exit
- Reposition the front panel

ⓘ *If the required type of water is not used, the performance of the generator may no longer be ensured and it may lead to permanent damage to the generator*

ⓘ ***AUXILIARY WATER INLET OPTION***

To connect an optional external deionized water supply line, follow these directions:

- *Disconnect the quick coupling from the tank and connect it to the AUXILIARY WATER INLET coupling (side inside the generator)*

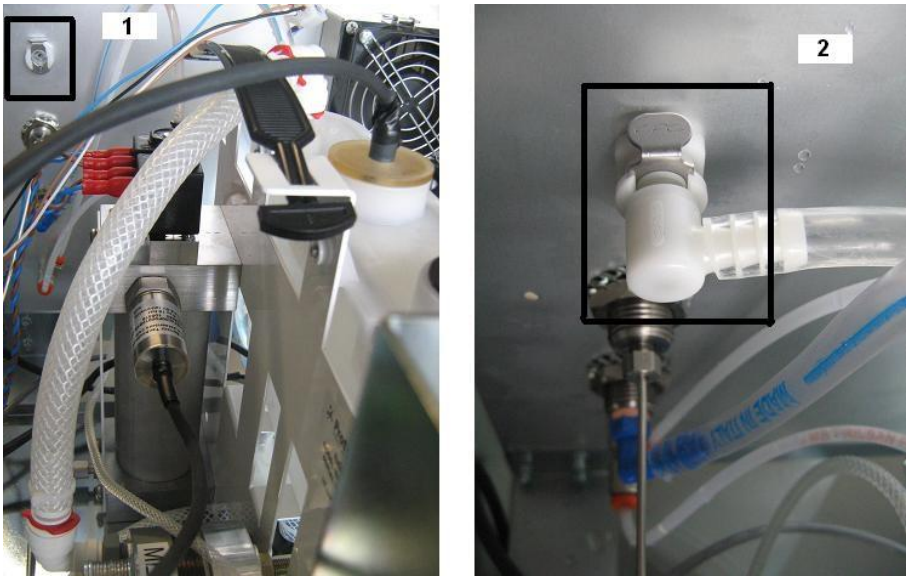


FIGURE 4.2.3.3. Auxiliary water inlet coupling inside generator

- *Connect the deionized water line to the AUXILIARY WATER INLET coupling (outside the generator). ATTENTION: maximum pressure = 1.4 bar (20 psi)*

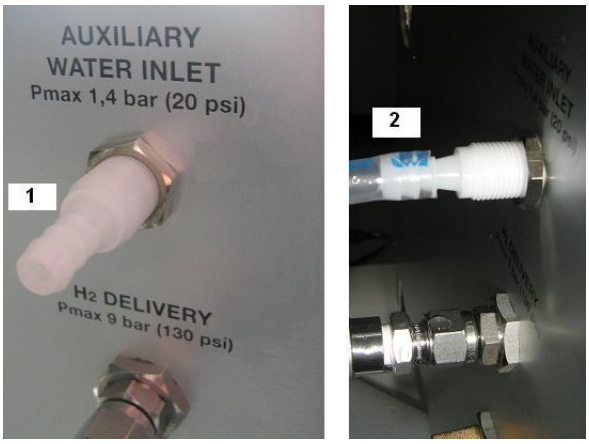


FIGURE 4.2.3.4. Auxiliary water inlet coupling outside generator

ⓘ *If an external container of water is used to periodically fill the internal HyGen deionized water tank, it is recommended that an Ionic Exchange Resin Bag be added to the external container in order to maintain the purity of the deionized water after the initial seal of the container has been broken.*

4.2.4. Step 4: Connect the DRYER vessel

- Remove the DRYER vessel from the accessories box of the packaging
- Remove the two caps [A] from the DRYER vessel and store them
- Connect the DRYER vessel in its seat (snap-on quick couplings)
- Put the front panel back on

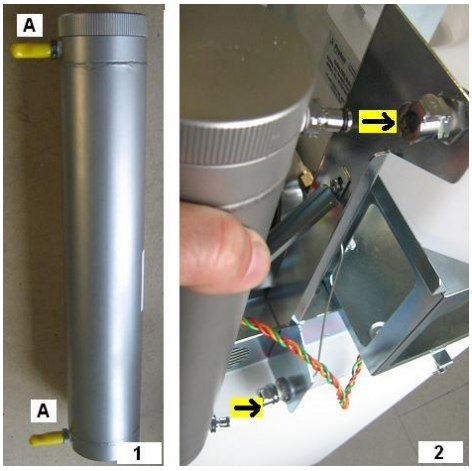


FIGURE 4.2.4

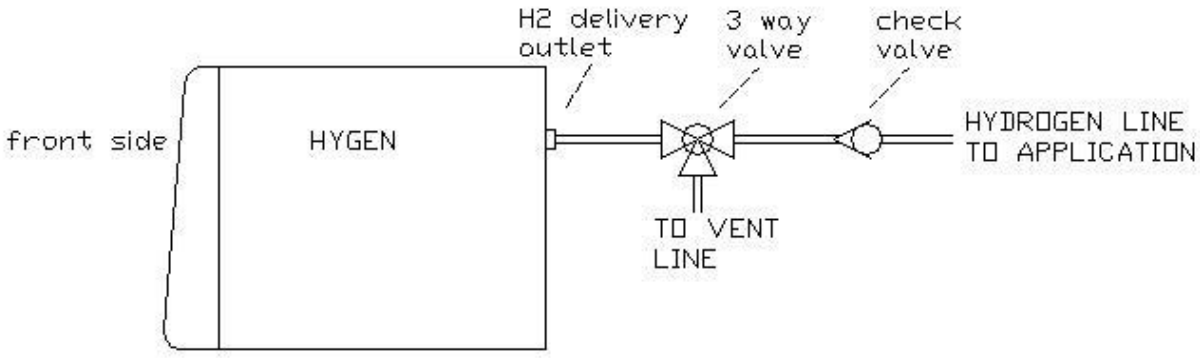
4.2.5. Step 5: Connect the hydrogen line

- Locate the coupling H_2 DELIVERY at the rear of the generator
- Connect the line

ⓘ *The hydrogen line must be able to withstand a pressure of at least 9 bar*

ⓘ *Downstream to the H_2 DELIVERY outlet, the customer must install a manual three-way valve (*) and, downstream to the valve, a check valve (*). This combination will avoid return of pressure from the line to the generator and allow the depressurisation and purging of the generator hydrogen line when necessary (example for Dryer desiccant replacement - see para. 7.3. Drier replacement)*

(*) May not be included in the equipment supplied, may be ordered separately



4.2.6. Step 6: Connect the electrical mains

- Check that the mains specifications correspond to the data on the generator nameplate
- Ensure that the POWER key is set to OFF
- Make the electrical connection using the cable supplied with the generator

⚠ **Make sure that the off button on the rear of the generator is easily accessible.**

⚠ **For safety purposes, the following instructions must be strictly observed.**
The electrical installation must comply with current standards, in particular regarding the protection line / ground wire.

⚠ **Recommendations for correct installation:**

- Do not use extension leads, adaptors or multiple sockets; if necessary, replace the cable supplied with one that is longer. In case the standard supplied cable is not suitable, it is the Customer's responsibility to obtain a power cable conforming to the local plug configurations.

- Always connect the protection wire / ground wire;
- The mains socket must be located in an easily accessible position.

ⓘ *If a failure in gas supply (due to a power failure, activation of an electrical safety device, or generator fault), even temporary, is not admissible, a pneumatic panel should be developed, to enable provisional activation of a reserve gas source (totally or partially automatic).*

4.2.7. Step 7: Connect the vent line

The VENT outlet is a vent for automatically depressurizing the generation module in the case of production shutdown or alarm. Vented hydrogen may be wet or moisture may be present.

- Locate the H2VENT outlet at the rear of the generator
- Connect the vent line to the quick disconnect fitting.

⚠ **VENT line must be directed to an exhaust hood or non-pressurized H2 vent stack, away from ignition sources and far away from the suction of the fans**

⚠ **The vent line must never be clogged or subjected to the risk of freezing**

4.2.8. Step 8: Connect the CPU

- Position the CPU where it will be used, e.g. above the generator, using the supplied support
- Connect the Ethernet cable to the rear of the CPU (top connector)

FIGURE 4.2.8.1. Ethernet cable connection to CPU

- Connect the Ethernet cable to the rear of the generator (CAN BUS IN connector)

FIGURE 4.2.8.2. Ethernet cable connection to generator

ⓘ *Additional information about the communication connections can be found in the Stack User's Manual.*

4.3. Packaging disposal

It is recommended to store the original packaging to ensure adequate protection for the purifier when moved in the future.

5. Disassembly and transport

5.1. Disassembly

- Stop the generator (see *par. 6.6.*)
- Wait for depressurization and for the circulation pump to stop (1 minute)
- Switch off the generator (see *par. 6.7.*)
- Disconnect the electric power cable
- Disconnect the Ethernet cable connected to the CPU
- Close the valves downstream of the generator and detach the pneumatic connections
- Remove the front panel
- Empty the deionized water tank and re-place it in the unit
- Drain the water from the generation module using the supplied hose, connecting it to the drain coupling (see *para. 3.3.3. Internal view*)
- Remove the Dryer hose and close its couplings using the two original caps
- Put the front panel back on

5.2. Transport

Use the original packaging, if available; otherwise use a pallet of adequate dimensions to hold the generator, affixing instructions in visible locations, such as: THIS WAY UP, FRAGILE.

ⓘ *Take the necessary precautions so that the generator is never exposed to temperatures lower than 5°C during transport and storage: risk of the deionized water freezing inside the electrolytic cell, will result in permanent damage to the generator.*

6. Use

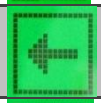
6.1. Operator interface

TOUCH SCREEN

The CPU screen enables the user to interact with the generator, i.e. give specific commands or display and set parameters.

The table shows the function of the various keys on the screen:

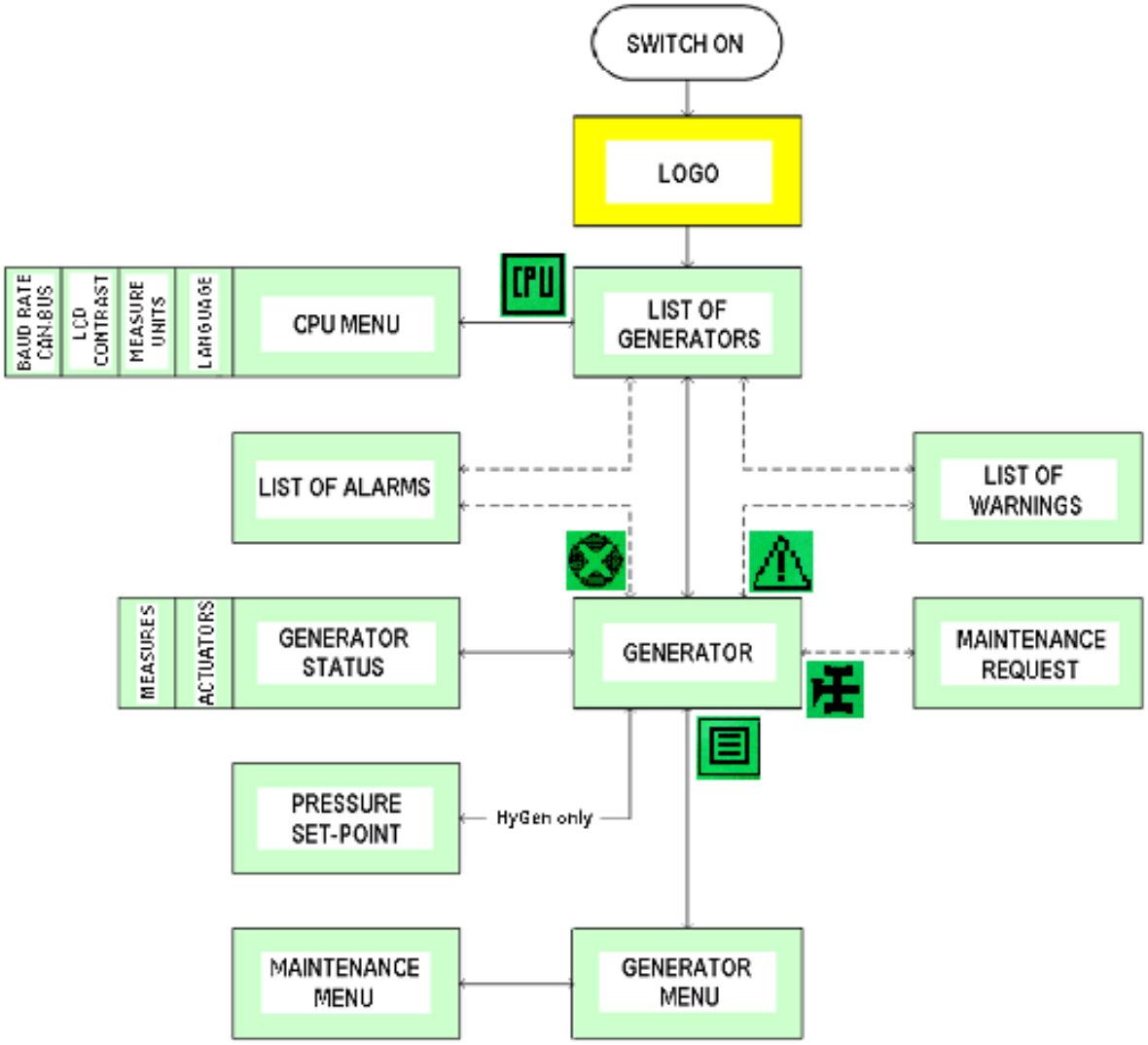
Key		Function
CPU	CPU	Access to CPU menu
	PREVIOUS	Go to previous page
	NEXT	Go to following page
	ALARM	Access to list of alarms
	WARNING	Access to list of warnings
RES	RESET	Reset of alarms and warnings
	MAINTENANCE	Go to maintenance request description
	MENU	Access to different menus
ESC	ESC	Exit from menu

Key		Function
	START	Start the production of gas
	STOP	Stop the production of gas
	INCREASE	Decrease the value
	DECREASE	Increase the value
	ADD	Add one digit
	DELETE	Delete last digit
	OK	Confirms modified value

Do not press on the touch screen with sharp objects

6.2. Menus

The following chart shows the accessible menus for the operator:



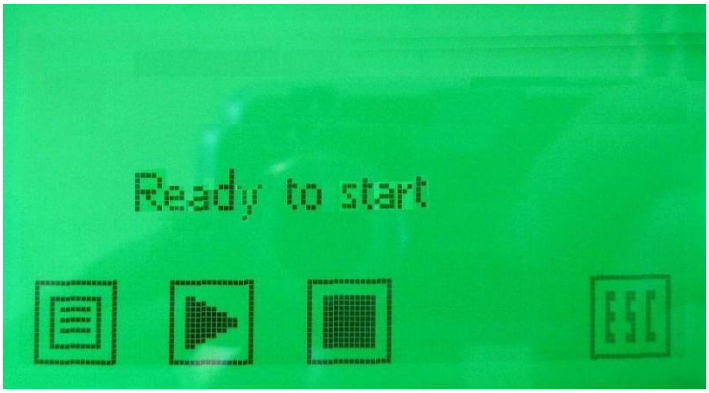
6.3. LED warning light

In addition to the information on the CPU screen, a LED warning light on the front panel (see *par. 3.3.1. Front view*) indicates the operating condition of the generator.
The LED is yellow in the READY TO START condition.
The LED is green in the PRODUCTION condition.
The LED is flashing red in case of an error condition (see *par. 8.4. List of errors*).

6.4. Generator start-up

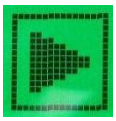
To switch on the generator, put the start button on the rear of the generator in position **I**: the CPU screen lights up.
After the LOGO page is shortly displayed, the GENERATORS LIST page appears

Press on the generator of interest.
The READY TO START page appears



6.5. Hydrogen production

To start production, press the START operation key



If initiating from start-up, the generator initially carries out a SET-UP preparation cycle lasting about 1 minute

After the set-up, the generator starts to pressurize the generation module, showing the following page

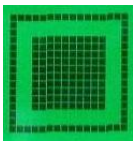
After few minutes, the generation module has reached the set-point pressure and the product valve will open. From this point, the dryer and the hydrogen line connected to the generator starts to pressurize.

ⓘ *Depending on individual customer plumbing and process usage, it may take several minutes for operating pressure to be realized*

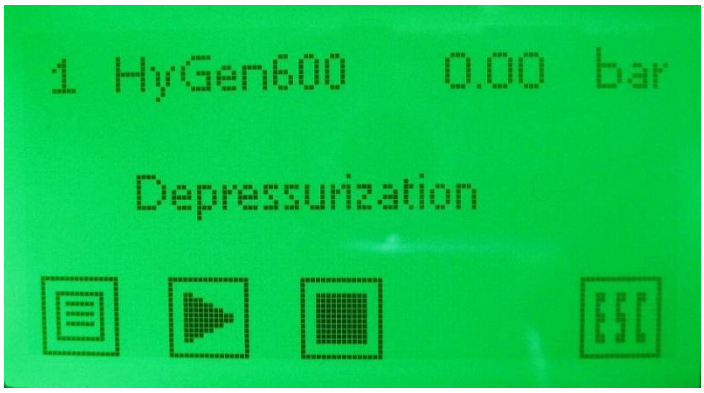
ⓘ *WARNING: on first start-up, the internal pneumatic circuit may contain residual air. For this reason, the line should be vented with the gas (for approx. 40 minutes) before employing the hydrogen for the application utility*

6.6. Stopping the generator

At any time during production the generator can be stopped by pressing the STOP key.



The generator will immediately start to depressurize the generation module, showing the following page



When depressurization is completed, after approximately 15 seconds, the READY TO START page appears

6.7. Generator shutdown

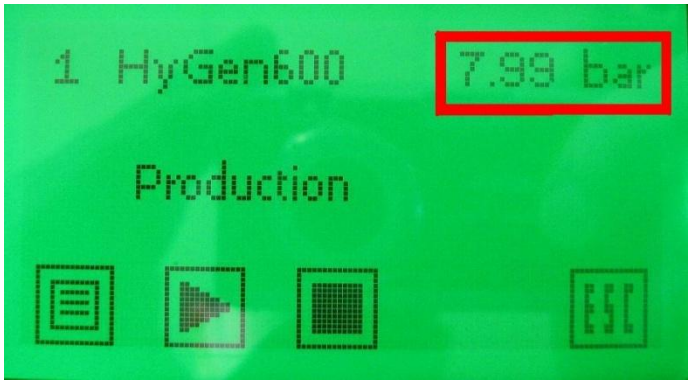
After stopping the generator (see *par. 6.6.*), **wait for the circulation pump to stop (approx. 1 minute),** then put the main switch on the rear of the generator in position **O**

ⓘ *Avoid turning off the generator directly, without first stopping it as described in* par. 6.6..

6.8. Parameter display

6.8.1. Hydrogen pressure display

At any moment, during production, it is possible to read the hydrogen pressure in the line



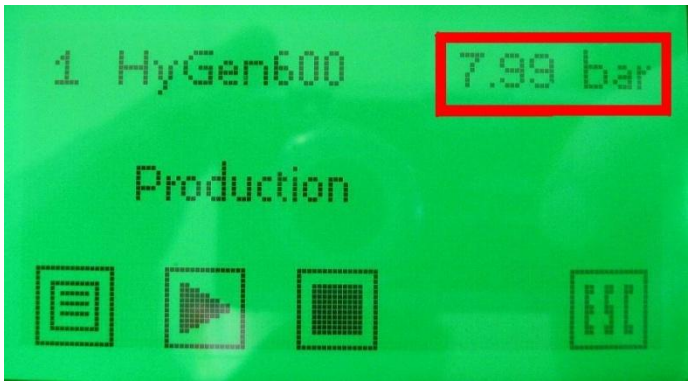
6.9. Parameter settings

ⓘ *Modification of system parameters may greatly affect the operation of the system. Ensure parameter to be modified is fully understood prior to proceeding with the change.*

6.9.1. Hydrogen delivery pressure settings

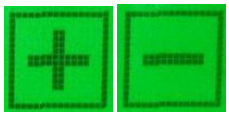
To set the operating pressure to the required value, proceed as follows.

Press on the pressure value:



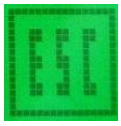
The following page appears:

Press the displayed value.
To modify the value, use the INCREASE or DECREASE keys



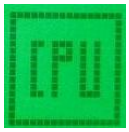
To set the required value, press the OK key

To exit this menu, press the ESC key

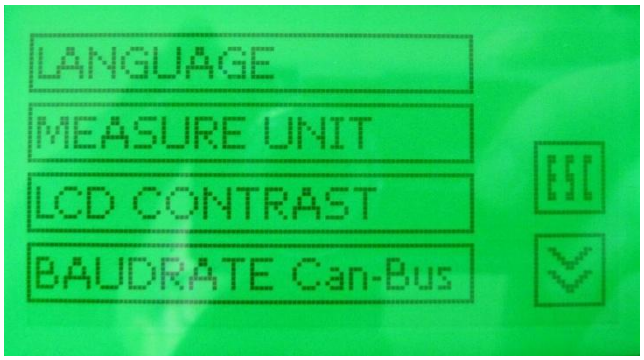


6.9.2. Adjustment of the display contrast

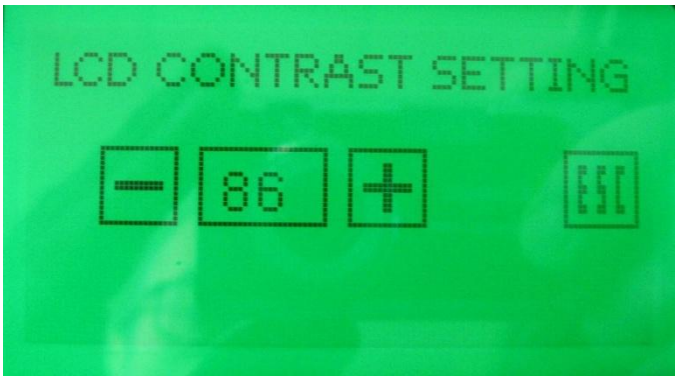
To increase the legibility of the LCD display, press the CPU key



The following page appears:

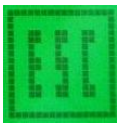


Press LCD CONTRAST



Adjust to the desired value.

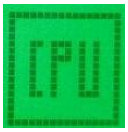
To exit this menu, press the ESC key



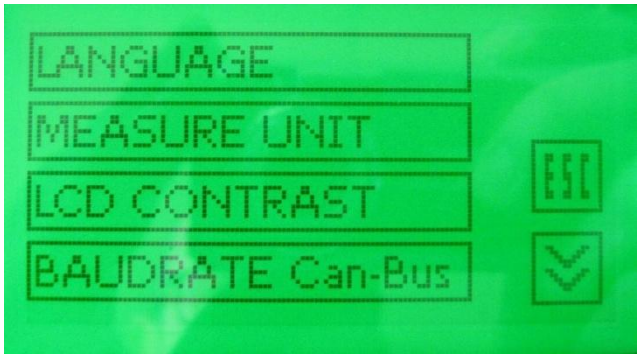
6.9.3. Selecting measuring units

The CPU allows the selection of different measuring units for temperature and pressure.

To perform the selection, press the CPU key



The following page appears:



Press MEASURE UNIT.
Select the desired measuring unit for pressure

Or go to the next page using the NEXT key

Select the desired measuring unit for temperature

To exit this menu, press the ESC key

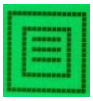
7. Maintenance

The maintenance operations required on hydrogen generators of the HyGen series are minimum.

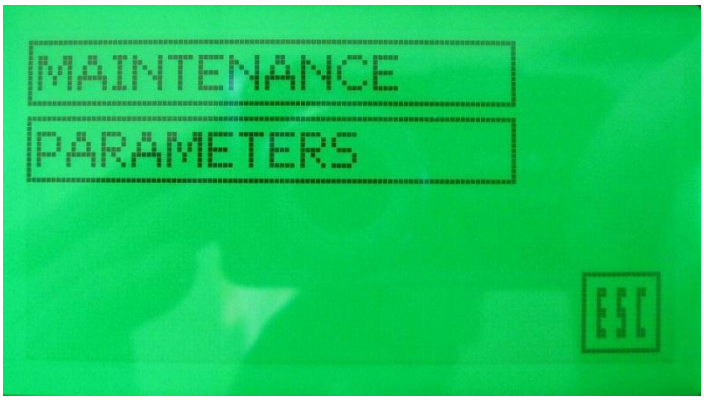
para. 7.2. Maintenance schedule lists these operations and the recommended frequency

7.1. Maintenance counters display

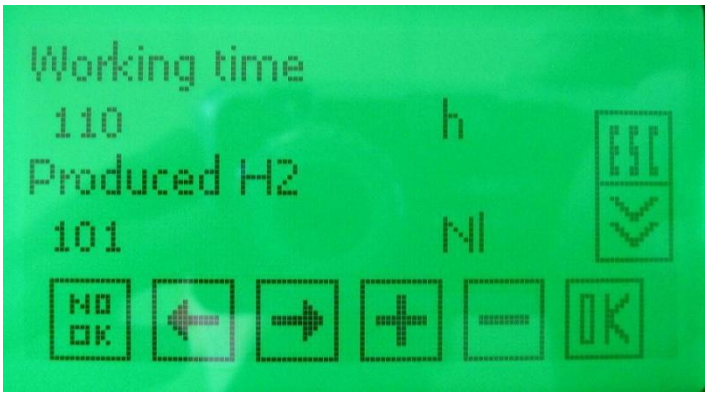
Press the MENU key



Then press MAINTENANCE:



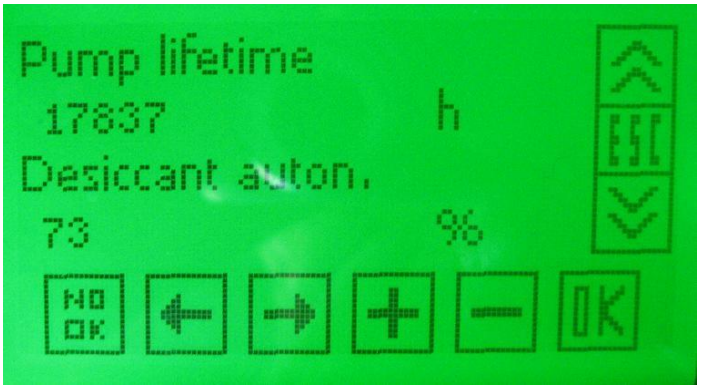
The following maintenance counters are displayed:



- WORKING TIME indicates the total working hours of the generator
- PRODUCED H2 indicates the total volume (in liters) of hydrogen produced by the generator

To display other counters, press the NEXT key

The following maintenance counters are displayed:



- PUMP LIFETIME indicates the residual working hours before recommended replacement of the pump.
- DESICCANT AUTONOMY indicates an estimation of the residual percentage of active desiccant before maintenance is required *(see par. 7.3. Dryer replacement)*

ⓘ *When one of these counters reaches zero, a WARNING will be display to recommend the related maintenance intervention.*

7.2. Maintenance schedule

To maintain generator efficiency and reduce the risks of faults, strictly observe the recommended maintenance schedule.

The following table specifies the frequency of the recommended maintenance operations.

Maintenance Operation	Operator	Operation Frequency
Dryer Replacement	User / technical assistance	Refer to the *dryer_life_time* counter
Ionic exchange resin bag replacement	User / technical assistance	Every 6 months
Water circulation pump replacement	Technical assistance	Every 2 years

ⓘ *If a correct maintenance schedule is not followed, the performance of the generator may no longer be ensured and it may lead to permanent generator damage.*

7.3. Dryer replacement

MATERIAL NECESSARY:
- A dryer recharge

TIME NECESSARY
-About 15 minutes

⚠ **It is recommended to wear gloves, safety glasses or goggles and dust mask. Avoid contact of the desiccant with moist skin and eyes.**

- Turn off the generator according to the procedures indicated in *par. 6.6. Stopping the generator* and *par. 6.7. Generator shutdown*
- Remove the front panel
- Depressurize the hydrogen line downstream of the generator

- Remove the DRYER hose by pressing on the two quick couplings

- loosen the cap

- empty the old dryer material from the dryer vessel
- open the new dryer package

- Pour the contents of the dryer recharge into the dryer vessel (if necessary, aided by a funnel); if used, ensure the funnel is completely dry.

- Install the cap
- Reposition the dryer vessel

- Reset the DESICCANT AUTONOMY counter to the value 100% *(see para. 7.1. Maintenance counters display)*

ⓘ *To avoid exposing the dryer to humidity in the ambient air, open the recharge cartridge only at the time of transfer and close the dryer vessel as soon as recharging is complete.*

ⓘ *The spent desiccant has not been in contact with toxic chemicals; therefore it should not be considered as hazardous waste: discard it in full compliance with applicable government regulations*

7.4. Ionic exchange resin bag replacement

MATERIAL NECESSARY:

- Ionic exchange resin bag replacement

TIME NECESSARY:

-5 minutes

- Remove the front panel
- Disconnect the tube from the coupling on the bottom of the deionized water filler tank
- Remove the tank
- Locate the black plastic pull tab on the resin bag cap

- Pull up to remove the spent ion exchange resin bag and cap

ⓘ *Minimize the amount of direct handling of the resin bag in order to minimize the amount of contamination prior to insertion into the deionized water tank*

- Replace with a new ion exchange resin bag assembly, reseat the cap in place
- Reposition the deionized water tank

- Reconnect the tube onto the bottom of the tank
- Reassemble the front panel

7.5. Consumables list

The following table summarizes the consumable parts available at PROTON

Description	Code
HyGen DRYER RECHARGE PACKAGE	KT-0500-0023
IONIC EXCHANGE RESIN BAG	KT-0200-0014
WATER CIRCULATION PUMP	54-0500-0149
MAIN FUSE	08-0301-0010

8. Troubleshooting

8.1. Alarms

The generator informs about a malfunction or the necessity of intervention in two different ways: warning or error.

WARNING

It indicates a condition that may require the intervention of the operator, but gas production is not shut down.

In WARNING status:

- An acoustic signal is emitted;
- The following page is displayed

ERROR

It indicates a condition that prevents continuation of gas generation. The generator shuts down production and depressurizes the generation module.

In ERROR status:

- An acoustic signal is emitted;
- The LED on the front panel is intermittent red;
- The following page is displayed

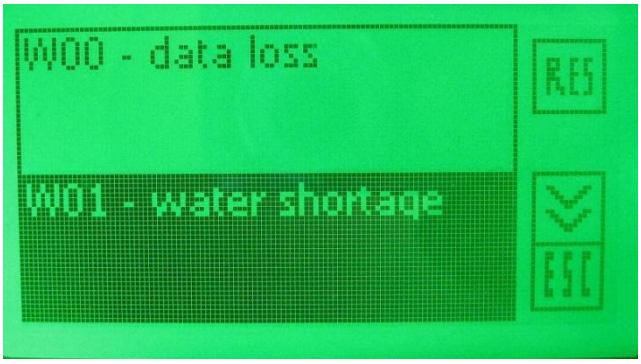
8.2. Reset and identification of an alarm

To shut off the acoustic signal, press the alarm page (WARNING yellow page or ERROR red page)

WARNING

To visualize a warning message, press on the WARNING symbol

The following page will appear



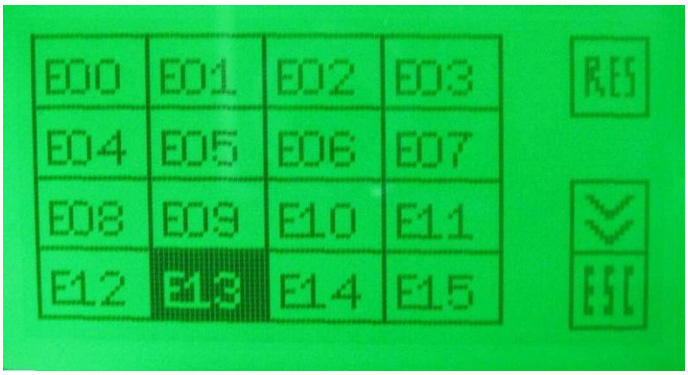
To find the active warning, scroll down the pages using the NEXT key

Active warnings are those highlighted; once the warning has been identified, follow the instructions in the following chapter.

ERROR

To visualize an error message, press on the ERROR symbol

The following page will appear:



To find the active error, scroll down the pages using the NEXT key

Active errors are those highlighted; once the error has been identified, follow the instructions in the following chapter.

To reset the alarm, press the RESET key

8.3. List of warnings

Warning Identification	Cause	Resolution
W-00	Data loss: the memory has lost the set up values of the parameters and has restored the default values	Contact service in order to set the correct values of the parameters
W-01	Water shortage	Refill deionized water filling tank
W-02	Water system feeding error	Contact service
W-03	Expiring desiccant	Recommended to replace desiccant, the reset counter to 100%
W-04	Pump maintenance required	Recommended to replace circulation pump (contact service)

8.4. List of errors

Alarm Indication	Cause	Resolution
E-00 type error	Generator not identified	Assign a number to the generator (see Stack user's manual)
E-01 cell voltage high	Voltage to electrolyzer over the maximum threshold	Contact service
E-02 cell voltage low	Voltage to electrolyzer below the minimum threshold	Contact service
E-03 poor water resistivity	Deionized water quality below requirement	Check deionized water quality; drain water from generator; refill using water with higher resistivity
E-04 water tank level empty	Water level below minimum threshold	Refill fill tank
E-05 high pressure	Pressure in the line is higher than set-point	Check pressure in the line
E-06 system leak detected	Leakage in the generation module	Contact service
E-07 product leak detected	Set-point pressure not reached	Check for leakage in the line

Alarm Indication	Cause	Resolution
E-08 failed pressure transducer	No signal from pressure transducer	Contact service
E-09 system high temperature	Water temperature in generation module above max threshold	Check if environment temperature is within specifications
E-10 water resistivity sensor failed	No signal from resistivity sensor	Contact service
E-11 temperature low	Water temperature in generation module below minimum threshold	Check if environmental temperature is within specifications
E-12 temperature sensor failed	No signal from temperature sensor	Contact service
E-13 fan error	Internal ventilation failure	Check if the rear fan is obstructed; contact service
E-14 pump error	Circulation pump is not powered	Contact service
E-16 microprocessor fault	No communication with the control board microprocessor	Contact service
E-17 invalid level sensor state	Level sensor failure	Contact service
E-18 water reserve over	Proper water level is not restored	Refill fill tank
E-20 cell thermal switch failure	Cell thermal switch disconnected	Contact service
E-21 electronic box temperature high	Electronic box temperature above threshold	Contact service
E-22 current generator temperature high	Current generator temperature above threshold	Contact service
E-23 vent error	Generation module is not able to depressurize	Check if vent line is obstructed
E-24 safety circuit malfunctioning	Invalid status of safety sensors	Contact service
E-26 electronic box temperature	No signal from electronic box temperature sensor	Contact service
E-27 current generator temperature	No signal from current generator temperature sensor	Contact service
E-28 max current	Cell current above threshold	Contact service
E-29 CAN communication fault	CPU cannot communicate with the generator	Check connection within generator and CPU.

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