



EL2.0
Hydrogen Generator (35 bar)

Installation Manual
Rev. 08 – Mar 2020



Version	Document Title	Release Date
08	EL2.0 – Installation Manual	2020-03-18

EL 2.0 Installation Manual

Rev. 08

March 2020

Enapter Srl

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WELCOME

Thank you for choosing the EL2.0 hydrogen generator. Please read through this Installation Manual carefully before performing any operation.

If you have any further question on the installation of the device, please contact the Enapter Srl Help Centre. Quote the system serial number when contacting us; you will find the serial number on the type plate placed on the rear side of the module.

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SCOPE OF THE DOCUMENT

This installation manual provides the installer with the information needed to carry out the installation of the EL 2.0. The information contained in this manual will help you to install the hydrogen generator safely and correctly.

Keep this installation manual in a safe place and readily available. Always follow its instructions. It is the operator's responsibility to ensure that an installed EL2.0 is in a proper condition at all times. Please observe any additional local requirements applicable to the installation of the EL2.0.

APPROVED USE

The EL2.0 hydrogen generator has been designed to produce pure hydrogen that can be used directly for fuel cells or other hydrogen consuming applications.

The unit must only be operated for this purpose, according to the specifications and instructions provided in this manual.

Adherence to this installation manual is part of "normal use".



Danger of injury due to improper use!

Improper use of the product can result in serious injuries.

- Ensure that the manual is accessible at all times.
- Make sure you have read and understood this manual in its entirety.
- Comply with all safety instructions and warnings.
- Store the manual and other documentation in a safe place and pass them on to future owners of the product.
- Comply with all local regulations.

WARNINGS AND HAZARDS

The following terms and symbols are used in this manual to indicate important text passages which must be given particular attention:

	Warns of dangers of fatal/serious injury
	Warns of danger of injury
	Warns of physical damage to the product
	Do not open or dismantle
	Keep away from sources of heat and ignition No naked flames
	No smoking
	Minimum two persons required to handle the item
	Wear Personal Protective Equipment

GENERAL SAFETY INSTRUCTIONS

The following rules should always be observed:

1. Keep the work area clean. If the work area is busy or the surface is untidy the probability of injuries is higher.
2. Do not use the machine in dangerous environment conditions. In order to prevent electric shock, do not expose the machine to rain and do not use it in a damp area. Keep the work area illuminated. Do not use the machine near gas or flammable substances.
3. Keep unknown persons and children away from the machine. All unknown persons and children must keep a safe distance from the work area.
4. Protect yourself from electric shock. Ensure proper grounding and do not touch any live connectors.
5. Handle the power supply cable with care. Do not pull the electric cable to disconnect the plug from the socket. Keep the electric cable away from heat, oil and sharp edges.
6. Always use personal protection devices: Wear protective goggles. Wear ear muffs or plugs in noisy areas. Wear gloves when handling parts with sharp edges or the conditioning solution.
7. Disconnect the machine from electricity if you do not use it, before maintenance and change of accessories.
8. Use the machine, the tools and accessories in the way and for the purposes mentioned in this manual. Different uses and parts may cause risks for the operator.
9. The machine must be repaired only by qualified people using original spare parts, otherwise risks may arise for the operator.
10. Never store the unit at temperatures below 2 °C with liquid inside the internal pipeline. This will cause irreversible damage to the electrolytic cells.
11. Only use demineralized water according to the specification stated in this manual.
12. Only operate the unit in a room with sufficient ventilation.

HAZARDS DESCRIPTION

The owner/operator and the user of a device operated with hydrogen needs to be aware of the potential dangers and know what to do in case of an accident or emergency. It must be ensured that the system is installed and operated in compliance with local regulations and standards.

HYDROGEN HAZARDS

Hydrogen itself is not a hazardous substance – its properties, however, can make it hazardous in interaction with other substances.

It is the user’s responsibility to implement a proper **safety area** (see specifications on par. “Safety Area”).



- ✓ **Danger of death due to explosion!**
- ✓ Escaping hydrogen can ignite and burn the skin.
- ✓ Escaping hydrogen can reduce the oxygen concentration and cause respiratory difficulties.



- ✓ Do not inhale hydrogen.
- ✓ The lab/room must be equipped with a suitable ventilation system for the use of hydrogen.
- ✓ Incorporate the unit, especially the vent line, into the operational safety concept.
- ✓ The lab/room must be equipped for hydrogen monitoring.
- ✓ Avoid heat in the vicinity of the system and the hydrogen source.



- ✓ No smoking, no naked flames.
- ✓ Comply with local safety regulations.
- ✓ Comply with regulations for handling of compressed hydrogen cylinders.
- ✓ In the case of escaping gas, keep away and keep inflammable materials away.
- ✓ Prevent electrostatic charges.
- ✓ Ensure proper installation of the hydrogen supply.
- ✓ Check the hydrogen lines and connectors regularly for leak tightness.

MECHANICAL HAZARDS

As for the generic mechanical hazard that can occur during operations requiring the use of hand tools, Enapter Srl recommends wearing appropriate Personal Protective Equipment (PPE) and to use suitable tools.



Operator's protection

When performing any operation, the operators must wear the appropriate PPE, such as cut resistant gloves, safety shoes, protective goggles etc.

The preliminary steps of the installation phase do not necessarily need to be performed by specifically trained personnel. A general training on how to transport heavy and bulky objects, the use of electrical equipment and the application of general safety principles is sufficient.

There are residual risks associated with the manual handling of the packaging and of the device during installation that can result in:



- ✓ impacts due to uncontrolled movements of the load,
- ✓ entanglements,
- ✓ falling of the load,
- ✓ loss of stability,
- ✓ overturning.

To prevent these risks, the packaging/device must be handled by at least two people.

Operators must comply with the general safety principles during the handling phases. In particular, before moving a load:



- ✓ Operators must allow for sufficient clearance when using aisles and passageways with openings/doorways with at least 500 mm of free space in width and height, to grant the easy transit of the packaging and/or machine parts.
- ✓ Operators must verify that there are no people on the passageways.
- ✓ Operators must verify that there is sufficient visibility to grant a safe moving of materials.

ELECTRICAL HAZARDS

The unit poses no special electrical hazards as long as the following instructions on safety measures are followed:



- ✓ Use only the supply voltage specified on the rating plate.
- ✓ Do not short-circuit inputs and outputs.
- ✓ Do not reverse the polarity of inputs and outputs.
- ✓ Equip the power supply line with proper protections.
- ✓ Do not to short-circuit the cables of the stack.
- ✓ Do not place the stack on conductive surfaces.
- ✓ Do not insert any mechanical parts, especially metal parts, into the product through the ventilation slots.
- ✓ Do not use liquids near the product.
- ✓ Never use the product if any part of it has been immersed in water.



WARNING!

Any servicing, other than cleaning and user maintenance, must be performed by specialist personnel and with the power supply switched off.

CHEMICAL HAZARDS

The hydrogen generating process requires the use of potassium hydroxide in order to perform the electrolysis of water.

This substance can be delivered as a powder or already diluted. The potassium hydroxide powder must be dissolved in demineralized water in order to obtain a concentration of 1 % in weight, while the aqueous solution is ready for use (see par. "Preparation of the Conditioning Solution").

The potassium hydroxide is not harmful for people, however, carefully read the following precautions and avoid contact with eyes and skin.

**WARNING!**

Handle in accordance with good industrial hygiene and safety practice and wear appropriate PPE as specified by the Material Safety Data Sheet included in the shipment. Avoid any contact with eyes and skin.



Please find below some precautions to be taken in the event of physical contact with the undiluted substance.

First Aid Recommendations

- ✓ In the event of skin contact, take off contaminated clothing immediately. Wash off with soap and plentiful water. Consult a doctor.
- ✓ In the event of eye contact, rinse carefully with plentiful water for at least 15 minutes, and consult a doctor.
- ✓ If ingested, do not administer anything to people that have fainted. Rinse mouth with water. Consult a doctor.

Chemical products information

Substance: Potassium Hydroxide

CAS no.: 1310-58-3

EC no.: 215-181-3

Classification: C, R22 – R 35

(see Safety Material Data Sheet included in the shipment)

Conditioning solution

When emptying the process tank, wear appropriate PPE as specified in the previous paragraph. Collect liquid in an appropriate container and place in a chemical waste container. Do not flush to sewer. Dispose of the liquid in compliance with local and national regulations.

**WARNING!**

Observe all warnings and precautions listed in the accompanying Safety Material Data Sheet.

THERMAL HAZARDS

Thermal hazards such as burns and scalds from contact with high temperature surfaces (which can be caused by the failure of some internal components of the device) can be easily prevented by adhering to the following safety instructions:

- Make sure the device can be accessed by authorized and trained personnel only.
- Operators must wear appropriate PPE.
- In case of testing, installers must operate with closed enclosures.
- Any servicing, other than cleaning and user maintenance must be performed by specialist personnel and with the power supply switched off.

ENVIRONMENTAL HAZARDS

The device has been designed for use in standard ambient conditions.

The EL2.0 has not been designed for outdoor use and it is the user's responsibility to protect the system and all its accessories against exposure to direct sunlight, rain, snow, lightning and the impact of seismic or hydrogeological events of particular intensity.

ACOUSTIC HAZARDS

According to the requirements stated in the European Machine Directive 2006/42/EC, the following topics have been considered:

- i. The noise level at a workplace of a machine (the emission sound pressure level) needs to be mentioned and specified in the user manual if it exceeds 70 dB(A).
- ii. Sound power has to be determined and declared if the emission sound pressure level exceeds 80 dB(A).

During normal operation, the noise emission is below the maximal acceptable threshold for long time exposure (80 dB(A)). However, a sudden purge (either caused by system shut down or unforeseen error) can be louder than 85 dB (A) but only for 1 second.

UNPACKING

The unit has been carefully inspected before shipping. Visual checks for damage and functional tests should be performed upon receipt. Any damage must be immediately noted and reported to the shipping agent and supplier. The unit must be returned according to the shipping instruction provided in this manual.

In case there are any faulty or damaged parts, do not use them in order to not compromise the EL2.0 efficiency and safety. Address to an after-sales centre to replace faulty parts.



IMPORTANT!

Please keep the original packaging material for possible future transport.



WARNING!

Keep packaging and packing parts out of the reach of children.



WARNING!

The EL2.0 package weights on average 63 kg. All packages are designed for easy handling. However, due to the weight, is recommended to use an auxiliary device to move the box.

The manual moving of the box is possible but needs to be done by at least two people.

The EL2.0 module net weight is ca. 53 kg.



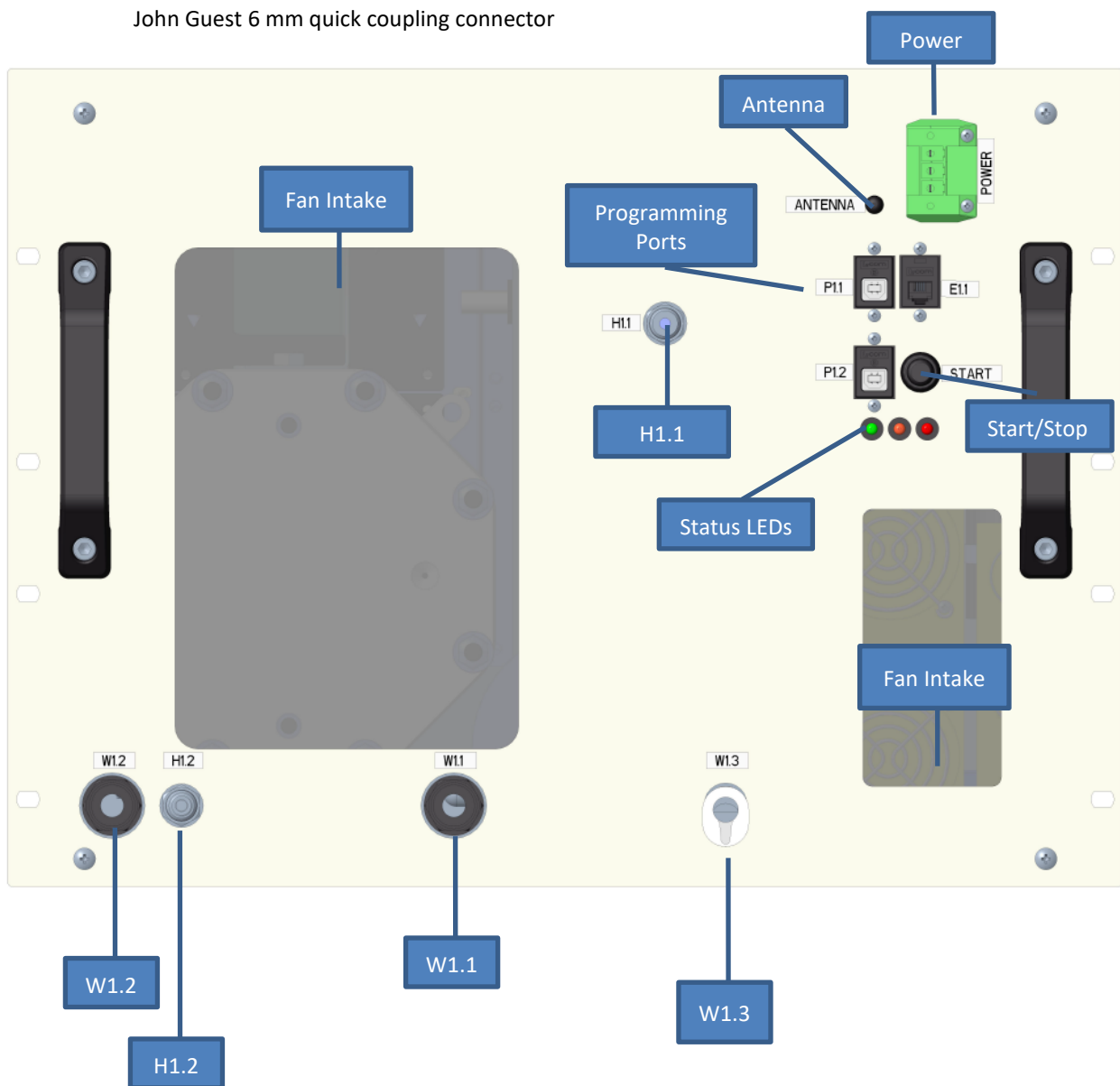
Removing the single units from the package and placing them into the end-use position needs to be done by at least two people.

PRODUCT OVERVIEW

EL2.0 - FRONT VIEW

The front features all ports, plugs and connectors for safe operation of the hydrogen generator.

- H1.1** - H₂ Output
1/4" stainless steel pipe Swagelok connector
- H1.2** - Purge
1/4" stainless steel pipe Swagelok connector
- W1.1** – O₂ Vent
John Guest push fit 10 mm pipe
- W1.2** - Water Refill
John Guest push fit 8 mm pipe
- W1.3** - Drain
John Guest 6 mm quick coupling connector



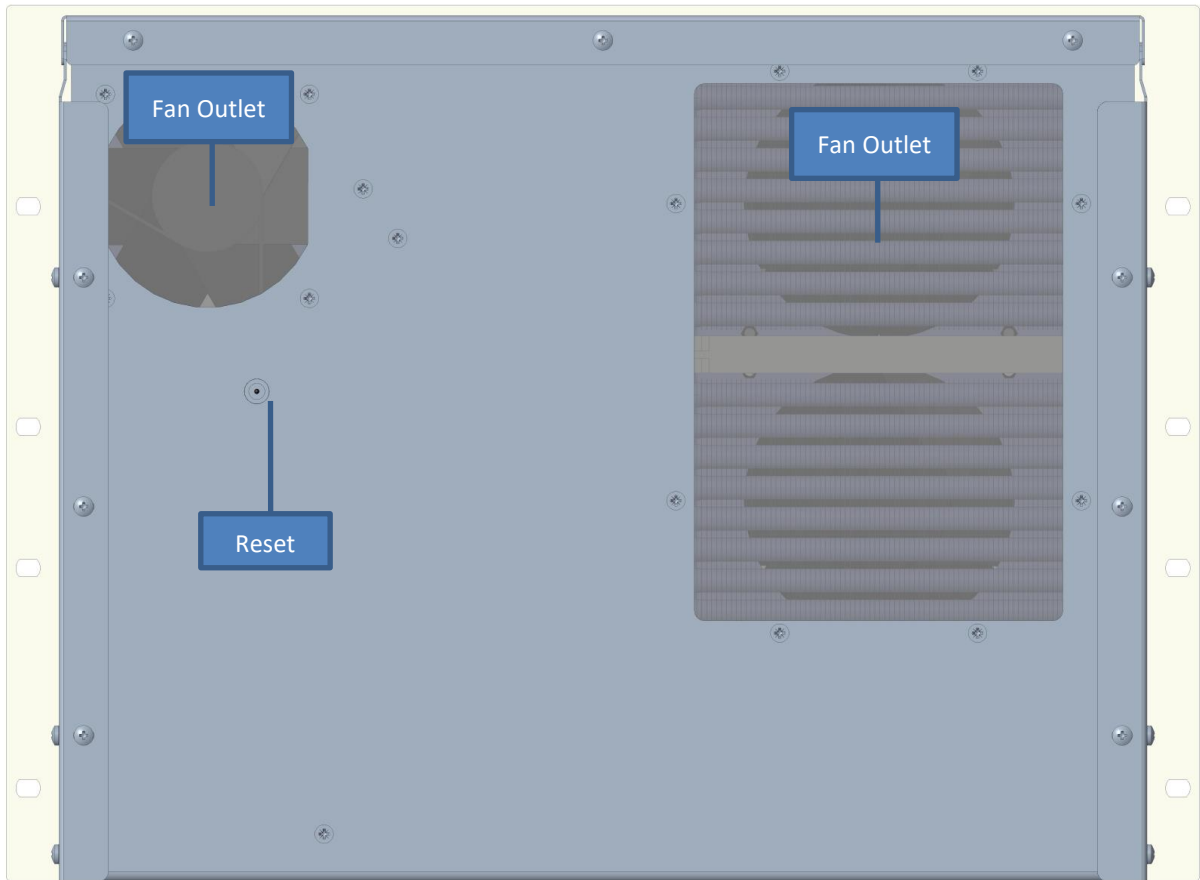
References:

Swagelok parts: www.swagelok.com

John Guest parts: www.johnguest.com

EL2.0 - REAR VIEW


The rear of the electrolyser features two hot air fan exhausts and a factory reset button.




ASSEMBLY

REQUIRED TOOLS



Gas connections:

	<p>9/16 combination wrench 5/8 combination wrench</p>
	<p>Stainless steel pipe cutter</p>
	<p>¼" stainless steel hand tube bender</p>


Water connections:

	<p>Plastic pipe cutter</p>
---	----------------------------

Electrical connections:


	<p>Flat-blade screwdriver</p>
	<p>Crimping plier Cable section: 26 → 22 AWG</p>

Modules installation:


	<p>Phillips head screwdriver</p>
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ACCESSORIES/SPARE PARTS


Gas and purge connections:

	<p>Stainless steel AISI 136- ASTM A269 -1/4" X 0,89</p>
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Water connections:

	<p>8 mm (outer diameter) LLDPE pipe 10 mm (outer diameter) LLDPE pipe</p>
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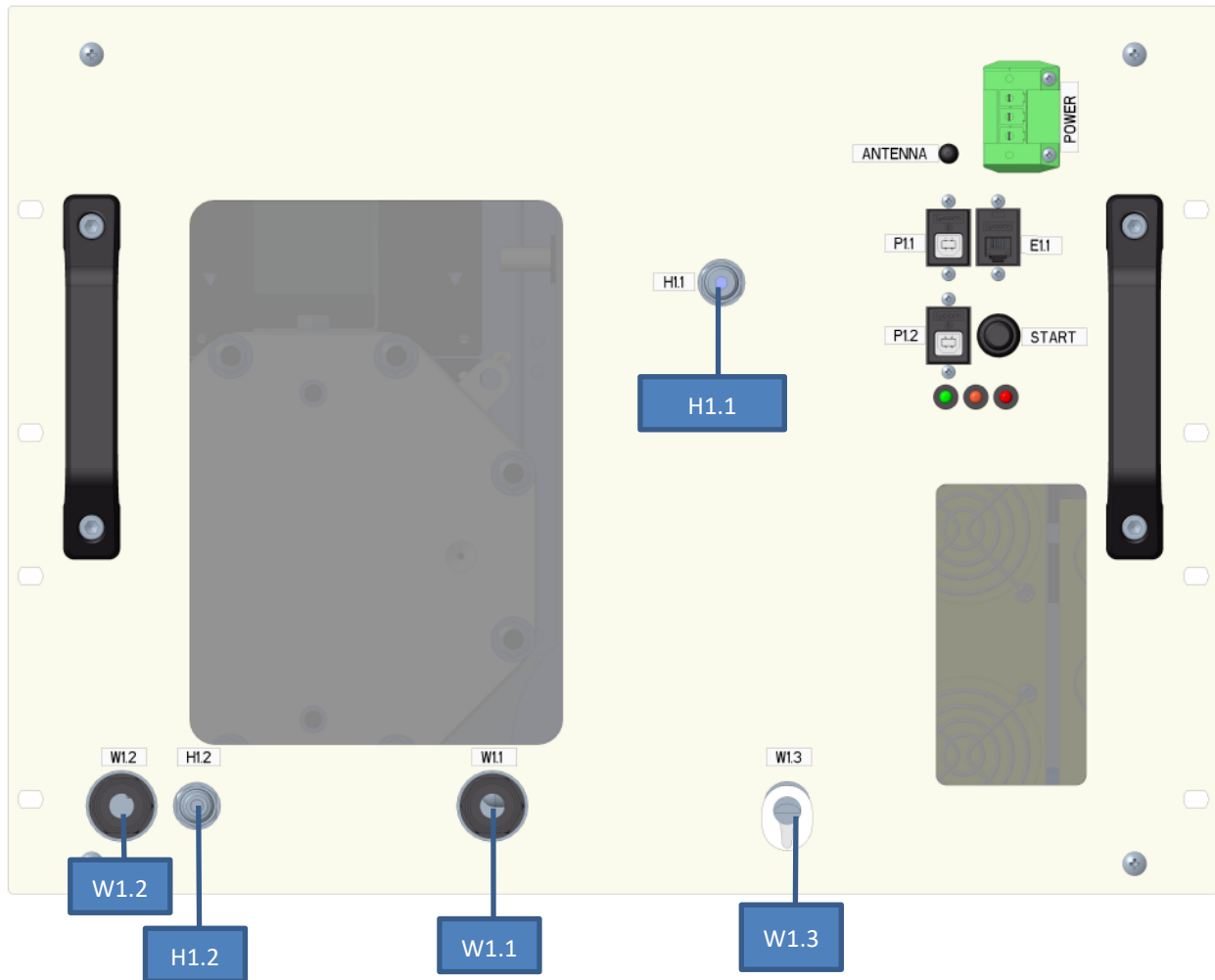
Conditioning solution:

	<p>KOH Potassium Hydroxide 99.99 % purity 40 g</p>
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PC-EL communication

	<p>Ethernet cable (LAN cable)</p>
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GAS AND WATER CONNECTIONS



Operators must perform the following actions:

1. Insert the supplied pipe labelled **W1.2** (Water Refilling) into the corresponding port and connect it to the user's external water tank;



WARNING

In order to supply the EL2.0 with clean DI water for refilling, water must be present in the electrolyser water refilling pipe at a pressure between 0.75 bar and 4 bar. If the EL2.0 does not detect the water pressure the system may not be able to refill itself.

2. Connect a ¼ inch stainless steel tube to port **H1.2** (Hydrogen Purge) and vent it to an external safety area (see par. "Safety Area").
3. Connect port **H1.1** (Hydrogen OUT) to the user's gas line or storage tank with a ¼ inch stainless steel tube;



WARNING:

After working on the external gas line we recommend that the user performs a hydrogen leakage test.

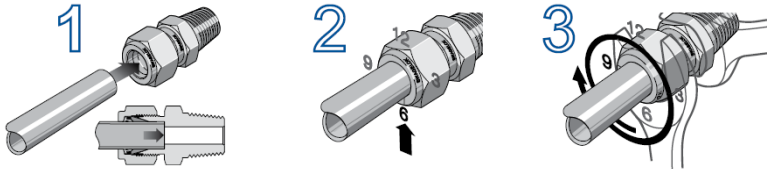
4. Connect the supplied pipe labelled **W1.1** (O2 Vent/Overfilling) to the corresponding port. This pipe must lead into an appropriate container placed in an external safety area. The collected liquid must be disposed of in compliance with local and national regulations. Ensure that the vent pipe cannot be blocked.
5. The **W1.3** (Drain) port is equipped with a quick coupling connector. It can be accessed by the operator only in case it becomes necessary to empty the process tank.

GAS CONNECTIONS

Bulkhead unions for ports **H1.1** (Hydrogen outlet) and **H1.2** (Hydrogen purge)



Assembly description:



1. Fully insert a ¼ inch stainless steel tube into the bulkhead union.
2. Rotate the nut finger-tight.
3. While holding the fitting body steady with one wrench, tighten the nut with another wrench rotating clockwise.

WATER AND PURGE CONNECTIONS

- ✓ Bulkhead union 10 mm \varnothing for **W1.1** (O2 Vent/Overfilling port)
- ✓ Bulkhead union 8 mm \varnothing for **W1.2** (Refilling port)



Assembly description:



1. Cut the tube and remove sharp edges. Ensure the outside diameter is free of score marks.
2. Push the tube into the fitting, to the tube stop (the pipe diameter must be 8 or 10 mm according to the respective port).
3. Pull on the tube to check it is secure. Test the system before use.
4. To disconnect, ensure the system is depressurized, push the collet square against the fitting. With the collet held in this position the tube can be removed.

Quick coupling connector for **W1.3** (Water drain port)



Assembly description:

1. Attention: the unit must be completely switched off. Wear appropriate PPE.
2. Push the tube into the fitting to the tube stop (the pipe diameter must be 6 mm).
3. Insert the supplied quick male connector into the water drain port (W1.3).
4. The solution starts flowing out immediately. Collect liquid in an appropriate container and place in a chemical waste container. Do not flush to sewer. Dispose of the liquid in compliance with local and national regulations.
5. To disconnect, push the button and pull the connector.

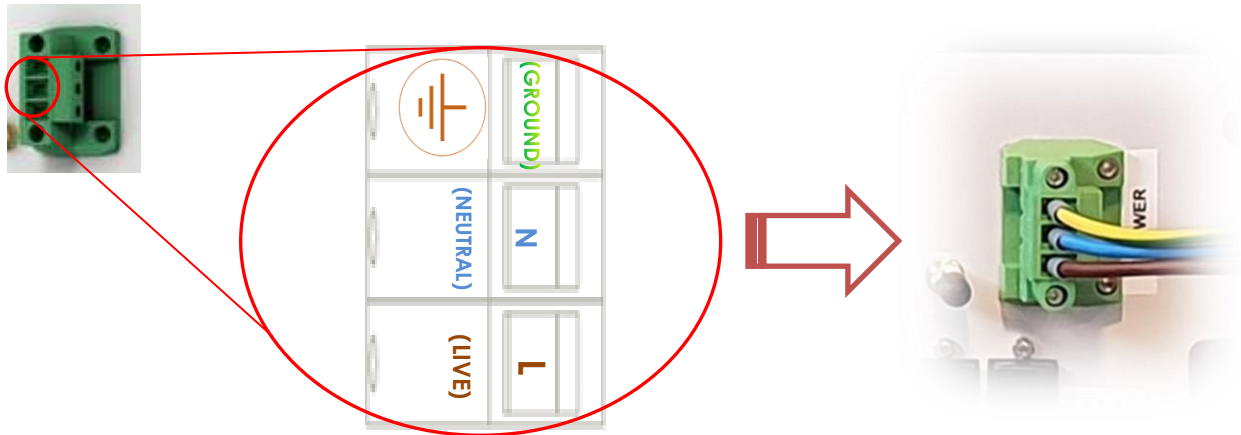
ELECTRICAL CONNECTIONS



IMPORTANT:

The EL2.0 must be duly connected as per the following instructions before switching ON the power supply. Incorrect wiring of the electrical connectors can lead to hazardous conditions in and around the electrolyser.

Connect the EL 2.0 to the mains as shown below, using the power supply cables code N07V-K 6mm² (or equivalent rating), brown (live), blue (neutral) and yellow/green (ground). Make sure you use the male connector in the correct orientation.



Install a protection against indirect contact. The kind of protection should be chosen in relation of the power supply system (TT, IT, TN-C, TN-S) and in compliance with all local and national safety requirements.

We recommend to also install a protective device against overload and short circuits on the power supply line. The protective device must be selected in relation to the EL2.0 maximum power consumption and in compliance with all local and national safety requirements.

We suggest to install a SPD (Surge Protection Device) on the power supply line in order to protect the Electrolyser from potential over-voltages generated by lightning strikes.

GROUND CONNECTION

The EL2.0 must be connected to ground to prevent user contact with dangerous voltage and to allow the correct functioning of the device. The grounding system must comply with the local and national regulations.

COMMISSIONING

When using the device for the first time, the following activities need to be performed:

- Removal of the protections from the unit, where present;
- Ensure that all the electrical and gas connections have been duly installed;
- Preparation of the conditioning solution (see below);
- First filling of the process tank;
- Ensure Wi-Fi accessibility in the commissioning area

Solution Included in Shipment

The initial solution to fill the process tank inside the EL2.0 is shipped with the device, barring restrictions from the courier or local laws.

Before powering on the device, please finish reading the rest of the manual. Carefully prepare your work area for the commissioning of the electrolyser.

PREPARATION OF THE CONDITIONING SOLUTION

Prepare the conditioning solution by following point “a” if the device is supplied with the chemical powder or point “b” if it is supplied with a diluted substance:

- Potassium hydroxide powder: solve the total content of the supplied jar of potassium hydroxide (40 g) into 4 litres of demineralized water in a dedicated vessel;
- Potassium hydroxide aqueous solution: pour the total content of the supplied jars into a dedicated vessel.



WARNING!

Handle in accordance with good industrial hygiene and safety practice and wear appropriate PPE as specified by the KOH’s Material Safety Data Sheet. Avoid any contact with eyes and skin.



Since the electrolytic process consumes only water, replenishment of the conditioning solution is only required when the device is used for the very first time or after a complete emptying of the internal water tank.

The refill must be done using **demineralized water only**.



IMPORTANT

Every time the process tank is completely emptied, (e.g. for servicing) it is necessary to prepare the solution as per the following table:

Volume solution	KOH (Potassium Hydroxide)
4 l	40 g

FIRST FILLING OF THE PROCESS TANK

The definition “first filling” refers to any time the process tank must be filled with the conditioning solution (i.e. also after commissioning and servicing). The further refills must be done using demineralized water only.

For a first fill follow the steps below:

1. Prepare the solution as described in the previous paragraph (“Preparation of the Conditioning Solution”) or use the solution included in the shipment.
2. In a separate container, prepare a 2 litres of DI water, this is used to top up the solution in case more water is needed to fill the system to the appropriate level.
3. Insert one end of the rigid tubing into the water refilling port (**W1.2**) and the other end into the external vessel. Notice: the pump draws up to 1 meter in height, keep the solution elevated so that filling is performed faster.
4. Plug the power cable into the EL2.0. Press the start/stop button and continue to apply pressure to it. Start supplying power to the EL2.0. Continue to hold the start/stop button down.
5. The refilling pump will start drawing the solution and it will automatically fill the internal water tank. When the water starts being pumped into the module you can release the start/stop button. The process will stop automatically when the water reaches maximum level.

**WARNING!**

It is the responsibility of the user to ensure that after system draining, the module is refilled using the specified solution.

FURTHER REFILLS

Since the electrolytic process consumes only water, only a first fill with the conditioning solution is required. The further fills must be done using demineralized water only.

The refilling of the process tank in the EL2.0 module from an external water tank starts automatically and is independent from the hydrogen production. The pump starts drawing as soon as the water level sensor indicates that the solution has reached the medium level.

**WARNING:**

Ensure that the refilling water pressure never exceeds 4 bar!

An alarm appears in case the liquid contained in the process tank has reached the minimum level: this normally means that the external water tank is empty, and the user has to refill it with demineralized water up to maximum level in order to restore conditions without shutting down and re-starting the device.

**WARNING:**

Do not repeatedly reset the device (by switching on/off) because the pump will start drawing immediately and may overheat.

**WARNING:**

Dried out cells will cause damage, which is not covered by warranty.

INSTALLATION

When choosing a location for the installation of the EL2.0, pay attention to the following:

- The unit is designed for use in indoor settings.
- Do not place the device into a sealed or unventilated space/room.
- Direct contact with flammable gases is to be avoided
- Do not place flammable materials in proximity of the device.
- Do not place the unit over or near a source of heat, as this may cause the device to overheat.
- Do not use naked flames/do not smoke.
- Avoid any risk of the building up of an explosive concentration of hydrogen.
- Do not place electric equipment near the device so it cannot get wet by the water from the hydrogen relief port.

The unit should be placed on a flat, level, vibration-free, shock-free surface. The electrolyser should stand free, without touching any objects in the vicinity. In front of the air inlets of the fans there should be a free space of at least 30 cm.

The ambient temperature must be between 5 °C and 45 °C and should be preferably stable.

Installation in outdoor settings is possible as long as the electrolyser is shielded from direct contact with atmospheric influences, such as sunlight, rain or snow. The EL2.0 has no appropriate electrical protection for exposure to dust and water, it must be protected accordingly against this risk.

For special installations in very humid, wet or partially open environments, please contact the producer to ensure the correct use and installation of the device.



WARNING!

Inappropriate installation of the EL2.0 or installation differing from that described herein shall lead to the loss of warranty coverage and shall release the manufacturer from any and all liability set forth in existing legislation.

SAFETY AREA

The operator of the EL2.0 must define a safety area which must be free of any source of ignition. This area should be located at a height of 3 metres above ground or higher.

The lines from the ports H1.1, hydrogen output, H1.2, hydrogen purge and W1.1, O2 vent/overfilling must be led into the safety area.

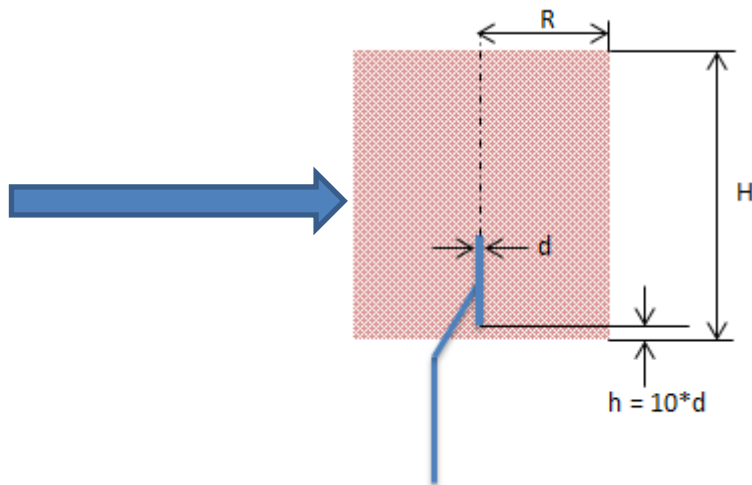
H1.2:

At the end of operation or after 24 hours of continuous operation, whichever comes first, the electrolyser depressurizes, releasing a total of 19 litres of hydrogen within two seconds, equalling a momentary volume flow of 34 m³/h of hydrogen. The hydrogen is released via the purge outlet port labelled H1.2. The released hydrogen bears the risk of explosion –therefore, it must be piped into a safe area.

The size of this zone depends on different parameters (length/diameter of piping leading to the safe area, use/no use of an orifice plate, use/no use of a blowout pipe at the end, etc.).

Generally, there are two options:

1. The customer can either calculate the size of the zone based on the information provided above and based on his layout of the purge line up to the safety area, or
2. The customer may follow the recommendations of Enapter. This comprises the use of a standardized blowout pipe. The resulting explosive area, created by the released hydrogen, is cylindrical and has a height H of 8,8 m and a radius R of 1.3 m. Note that this area also extends in direction of the ground for a value of 10 times the diameter d of the used blowout pipe (see the figure below).



Safety area around vertical blowout pipe

W1.1

During operation, the Electrolyser produces 250 NL/h of oxygen with a small amount of water vapour and a small amount of hydrogen. This gas mixture release must be piped into a safe area.

The size of this zone depends on different parameters (length/diameter of piping leading to the safe area, use/no use of an orifice plate, use/no use of a blowout pipe at the end, etc.).

EL2.0 – MANUAL OPERATION

Powering on the device

To power the device on ensure that the power cable is connected properly and that all water, vent, purge and hydrogen pipes are properly connected and secured as described in this manual.

Then **push the start button for 3 seconds**, this will start the electrolyser.

EL2.0 start-up and ramp

If the conditioning solution inside the module is within the operating temperature range, the EL2.0 will first enter a 90 second hydration cycle, in which the process pump begins to cycle electrolyte around the module. Otherwise, a short heating and hydration cycle will take place first. After the heating/hydration cycle the electrolyser will start ramping up, it will immediately start producing hydrogen.

Shutting down the device safely

In order to manually shut down the device safely, simply press and release the start/stop button on the front panel of the electrolyser module. The device will ramp down, start the refilling procedure of the process tank and then turn itself off. The device will be in standby mode until either the power is disconnected from the device or the module is started again.



WARNING!

Do not unplug/disconnect the power to the EL2.0 without shutting down the device safely either manually or via software control. Unexpected power cuts can shorten the device's lifetime and damage the system!

ELECTROLYSER MONITORING TOOLS

The EL2.0 can be monitored and controlled remotely by authorised users simply by logging into Enapter’s cloud services on a web browser (<https://cloud.enapter.com/login>).

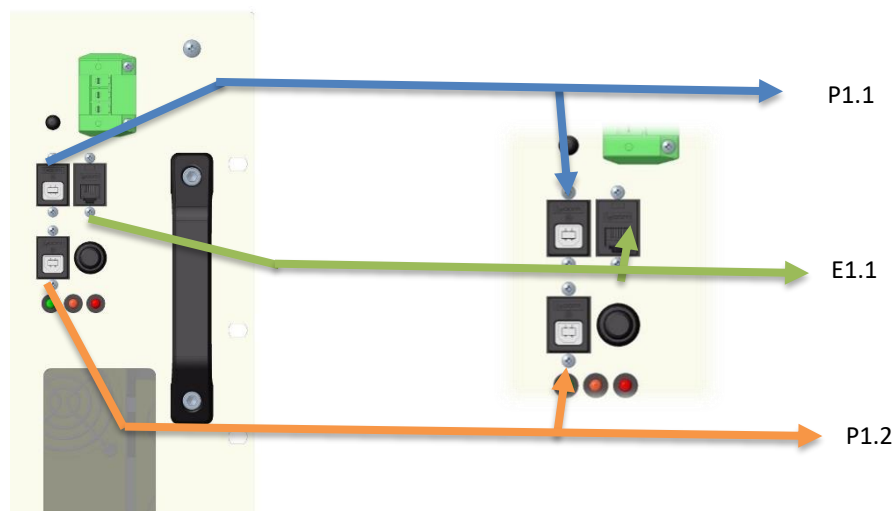
This is also available on mobile by using the Enapter application, which is available for iOS and Android.

MOBILE APPLICATION

You can control and monitor your Enapter devices and integrated systems using the Enapter application, available for iOS and Android. Please refer to your relevant manual to help you with the installation and usage of the applications.

PROGRAMMING PORTS

The programming ports have been implemented in order to allow firmware updates. These updates are performed by Enapter Srl. Please do not use it without previous agreement with the supplier.



The front panel features two USB and a single ethernet port.

P1.1 - This USB port acts as the primary board programming port that allows wired firmware upgrades for the EL board. These updates are performed by Enapter Srl. Please do not use it without previous agreement with the supplier.

P1.2 - This USB port acts as the acquisition board programming port that allows wired firmware upgrades for the communication board. These updates are performed by Enapter Srl. Please do not use it without previous agreement with the supplier.

E1.1 - This Ethernet port allows Modbus access for system integrators.



WARNING

Do not use the programming ports, they are strictly reserved for future firmware updates by Enapter Srl.
Enapter Srl declines any responsibility in case of damage due to the disregard of this warning.

TRANSPORT, MAINTENANCE AND RECYCLING

The EL2.0 Hydrogen Generator is designed to provide many hours of service with minimal maintenance. Proper care and maintenance by qualified personnel will help maximize the operating life of the unit.

MAINTENANCE ROUTINE

The unit should be inspected annually for obvious signs of physical deterioration. Hydrogen connections should be tested for leakage using a combustible gas detector.

Once a year, empty the process tank and replace the conditioning solution – starting from the date of commissioning. To empty the process tank, place an appropriate container below the electrolyser. Then connect the quick coupling connector and pipe supplied with the EL2.0 to the port W1.3 and let the conditioning solution drain into the container. This will take 20 to 30 minutes. Then disconnect the pipe and connector and do a first fill with new conditioning solution. Always wear appropriate PPE when handling the conditioning solution. Dispose of the conditioning solution in compliance with local and national regulation.

CLEANING



The internal components of the device 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).

TRANSPORT

If the unit has to be transported or returned to the factory for repair, make sure that the water tank is completely empty, close the water tank with the cap and place the protections supplied with the unit.

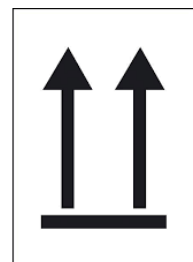


Important:

We will not accept the unit if returned without the original shipping boxes or equivalent packaging for safe transport.

The unit has to be transported in an upright position and the warning label shown on the right side should be clearly visible on the outside of the packaging.

Attention: In winter, the shipping box has to be additionally marked with a special label informing the shipping agent that the generator may not be exposed to temperatures below 2 °C at any time.



DISPOSAL



The EL2.0 is a cradle to cradle product, please return it to Enapter at the end of life, where we will fully recycle the system.

By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health.

TECHNICAL SPECIFICATIONS

EL 2.0

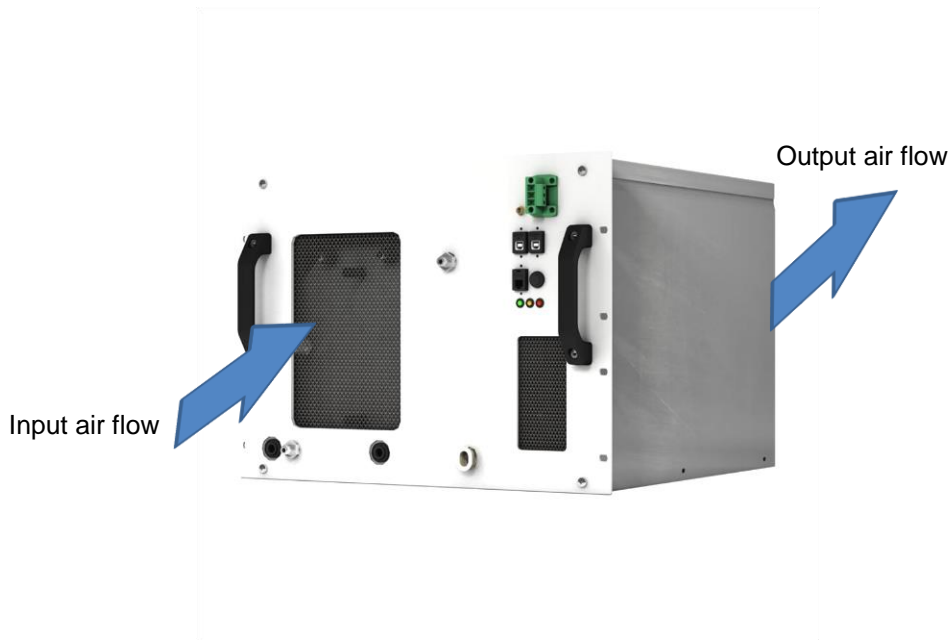
Max hydrogen flow rate @ 0°C/1bar:	500 NL/h
Max outlet pressure:	35 bar
Purity of hydrogen:	99.95% @ 35bar
Operative power consumption:	2.4 kW
Max power consumption:	3 kW
Power supply:	AC 180-264 V/50-60Hz
Ambient conditions:	
- Temperature:	5°C – 45°C
- Relative humidity:	20-95% non-condensing
- Storage temperature:	Min. 2°C
Demineralized water:	
- Max conductivity at 25°C:	< 20 µS/cm
Conditioning solution:	Solve 40 g KOH in 4 L of demineralized water
Max water consumption:	0.40 l/h
Water input pressure:	0.75-4 bar
Net Weight: EL 2.0 Module	54 kg
EL 2.0 module dimensions (WxDxH):	483x490x354 mm (8U)
Index of protection:	IP22

APPENDIX A: SYSTEM INTEGRATION

Since the EL2.0 hydrogen generator can be integrated into cabinets or other systems, the scope of this chapter is to provide technical information in order to allow a safe and proper integration. The user/integrator must comply with the manufacturer's instructions described hereafter.

MANAGEMENT OF AIR FLOWS

The intakes and vents must not be obstructed. To enable a more compact design a front to back airflow approach has been taken.



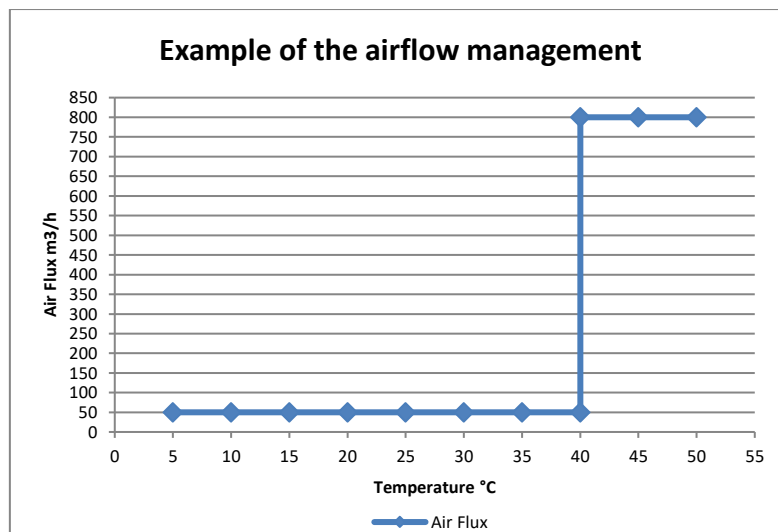
The air flow must enter from the front and exit from the back, passing through the modules.

CABINET

The front side of the EL2.0 must be accessible in order to manage all electrical and mechanical connections and maintain the devices. The front must allow air to flow into mounted systems, as all Enapter systems will feature front to back airflow. The rear side of the cabinet must allow the hot air exhaust to escape unobstructed.

When integrating the modules into a cabinet not supplied by Enapter, the following should be considered, please also note the values for airflow management through the cabinet below.

- 1) A continuous air flow of minimum 50 m³/h must be guaranteed.
- 2) A max. air flow of 800 m³/h should be possible, it will be used to adjust the cabinet temperature.
- 3) We recommend maintaining the max. cabinet temperature below 40 °C.
- 4) The cabinet air inlets must be equipped with proper filters to avoid the penetration of dirt into the cabinet. They must be kept free from obstructions/filth and they must have at least 30 cm of clear space to allow a regular air flow passage.



The manufacturer recommends the installation of the EL2.0 into a cabinet with a base of 800x800 mm to make the design of the air conveyor and of the electrical, gas and water outputs easier.

The cabinet’s basement must be equipped with fixing holes and bolted to the floor to avoid any risk of overturning. The fixing holes are also necessary on the internal sides to fix the modules. Please refer to the technical drawings supplied with the instruction manual.

GAS AND WATER CONNECTIONS

The Cabinet’s O2 Vent/Overfilling pipeline output must be positioned at a level lower than the port **W1.1**, otherwise it will not work.

The liquid must be gathered in an appropriate container and disposed of in compliance with local and national regulations.

ELECTRICAL AND SIGNALS CONNECTIONS

The cabinet must be designed making sure there is enough space at the front of the EL2.0’s front plate to attach piping and the power supply cables.

HYDROGEN STORAGE

Do not connect to a compressed gas storage cylinder which has a pressure of more than 35 bar

The device is protected against overpressure, but it is recommended that the operating pressure is not exceeded in order to minimize the risk of system failure. The safety valves of the unit will activate in case the maximum pressure reaches 40 bar, therefore if the user’s storage tank is rated to a pressure lower than 40 bar, it must be equipped with a safety valve set according to this lower pressure.



WARNING!

The tank used to store the hydrogen must be standard compliant and unblemished, and meet all local safety requirements. It must be positioned in compliance with legal provisions concerning the storage of combustible substances in force and applicable in the country in which the electrolyser is installed. This component is not supplied by the manufacturer of the electrolyser and must accordingly be connected under the buyer’s direct responsibility.



Version	Document Title	Release Date
08	EL2.0 – Installation Manual	2020-03-18



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