



Version	Document Title	Release Date
06	Dryer 2.0 Installation Manual	2020-07-30



**Dryer 2.0**  
Hydrogen Dryer (35bar)

**Installation Manual**  
Rev. 06 – July 2020



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Rev. 06  
July 2020

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## PREFACE

Thank you for choosing the Dryer 2.0 hydrogen dryer. Please read through this Installation Manual carefully before performing any operation.

The dryer 2.0 is equipped with two pairs of dryer elements placed in parallel that work alternately allowing the regeneration of one while the other is in operation. Thanks to electric heaters the hydrogen is dried.

If you have any further question on the installation of the device, please contact Enapter Italy 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 modules.

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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 Dryer 2.0. The information contained in this manual will help you to install the Hydrogen Dryer safely and as intended.

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 Dryer 2.0 is in a proper condition at all times. Please observe any additional local requirements applicable to the installation of the Dryer 2.0.

## APPROVED USE

The Dryer 2.0 has been designed to dry hydrogen generated by Enapter’s hydrogen generators.

Observance of 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 or surface is busy 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 inflammable 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. Avoid any contact with earthing surfaces.
5. **Handle** the power supply cable with care. **Do not pull** the electric cable to disconnect it from the plug. Keep the electric cable away from heat, oil and sharp edges.
6. **Use always personal protection devices:** Wear protective goggles. Wear ear muffs or plugs in noisy areas. Wear gloves when handling parts with sharp edges.
7. **Disconnect** the tool from electricity when you are not using it, before maintenance and change of the accessories.
8. **Use** the machine, the tools and accessories in the way and for the purposes mentioned in this manual. Different uses and parts can pose risks for the operator.
9. **Get the machine repaired** by qualified personnel. Only who use original spare parts, otherwise risks may arise for the operator.
10. **Never store** the unit at temperatures below 2°C.
11. **Only operate** the unit in a room with sufficient ventilation

## HAZARDS DESCRIPTION

The owner/operator and the user of a device operated with hydrogen need 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 in paragraph “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 Italy Srl recommends wearing appropriate Personal Protective Equipment (PPE) and to use suitable tools.



### Operator protection

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

To perform the preliminary steps of the installation specifically trained personnel is not necessary. A general training regarding 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 generate:



- ✓ 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 need at least 500 mm of free space in width and height when using aisles, passageways or doorways, 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.





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## ELECTRICAL HAZARDS

The unit poses no special electrical hazards if the following instructions on safety measures are observed:



- ✓ 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 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.**

## THERMAL HAZARDS

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

- The device can be accessed by authorized and trained personnel only;
- Operators must wear appropriate Personal Protective Equipment;
- 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 and respecting stability requirements (in absence of seismic or hydrogeological events of intensity).

Furthermore, the Dryer 2.0 has not been designed for outdoor use and it is the user's responsibility to protect the system and all its accessories against dust and atmospheric impacts such as direct sunlight, rain, snow and lightning.



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## ACOUSTIC HAZARDS

According to the requirements stated into the 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) has 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, noise produced is below the maximal acceptable threshold for long time exposure (80 dBA). However, a sudden purge (either caused by system shut down or unforeseen error) can be louder than 85 dB. Due to this, Enapter recommends wearing PPE (earplugs) while working around the device.



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## 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 reported to the shipping agent and supplier. The unit must be returned according to the shipping instructions provided in this manual.

In case there are any faulty or damaged parts, do not use them in order not to compromise the Dryer 2.0 efficiency and safety. Contact an after-sale 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 Dryer 2.0 package weights on average 30 kg. All packages are designed for easy handling. However, due to their weight, in order to move the box, it is recommended to use an auxiliary device such as a cart with wheels.






To remove the single unit from the package and place it to the end-use position, please use at least two people.



## ASSEMBLY

### REQUIRED TOOLS


Gas connections:

	9/16 combination wrench 5/8 combination wrench
	Stainless steel pipe cutter
	1/4" stainless steel hand tube bender


Electrical connections:

	Flat-blade screwdriver
	Crimping plier Cable section: 26 → 22 AWG

Modules installation:

	Phillips head screwdriver
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Gas and purge connections:

	Stainless steel AISI 136- ASTM A269 -1/4" X 0,89
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## INSTALLATION

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The unit is designed for use in indoor settings.

The operation is to be avoided in closed or airtight environments such as cabinets without air recirculation, windowless rooms and areas in direct contact with inflammable gases.

Installation in outdoor settings is possible if the system is not in direct contact with atmospheric agents, such as sunlight, rain or snow. The Dryer 2.0 has no electrical protection for outdoor environments exposed to dust and water, it must be protected accordingly.

The unit must be placed on a flat, level, vibration-free, shock-free surface. Do not place the unit over or near a source of heat, as this may cause the device to overheat.

At least 30 cm of free space in front of the air inlets is necessary to prevent any objects entering and damaging the cooling fans. Do not operate the dryer in a sealed or unventilated room, or in proximity of flame or other sources of ignition.

The ambient temperature (preferable stable) must be between 5°C and 45°C.

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 Dryer 2.0 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

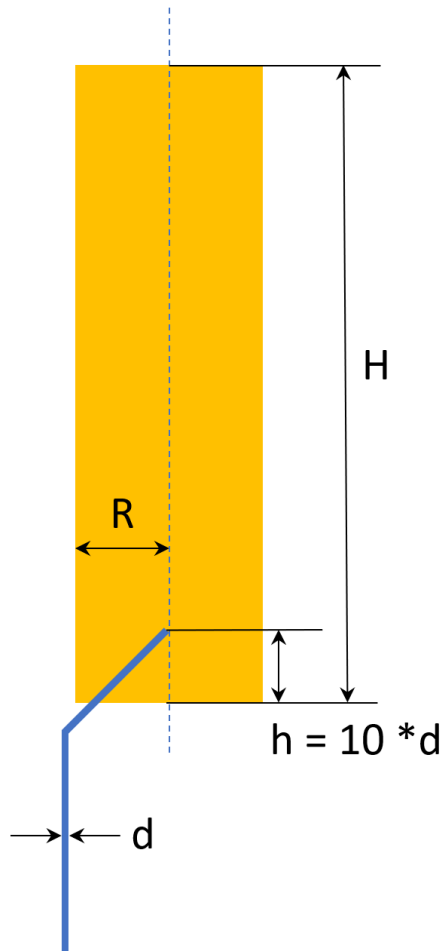
It is the user's responsibility to implement a safety area into which the hydrogen outputs must be driven and appropriately managed.

When stopped or at the end of a cycle, the Dryer 2.0 depressurizes and releases a maximum of 84 litres of hydrogen within 2 seconds, equalling a maximum momentary volume flow of 151,2 m<sup>3</sup>/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 led into a safe area, which is defined by the absence of any source of ignition. This area should be located at a height of 3 metres above ground or higher.

The size of this zone depends on different parameters (length/diameter of piping leading to the safe area, use of an orifice plate, use of a blowout pipe at the end, etc.).

Generally, there are two options:

1. The customer may either calculate the measurements of the zone based on the data provided above and based on the 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).

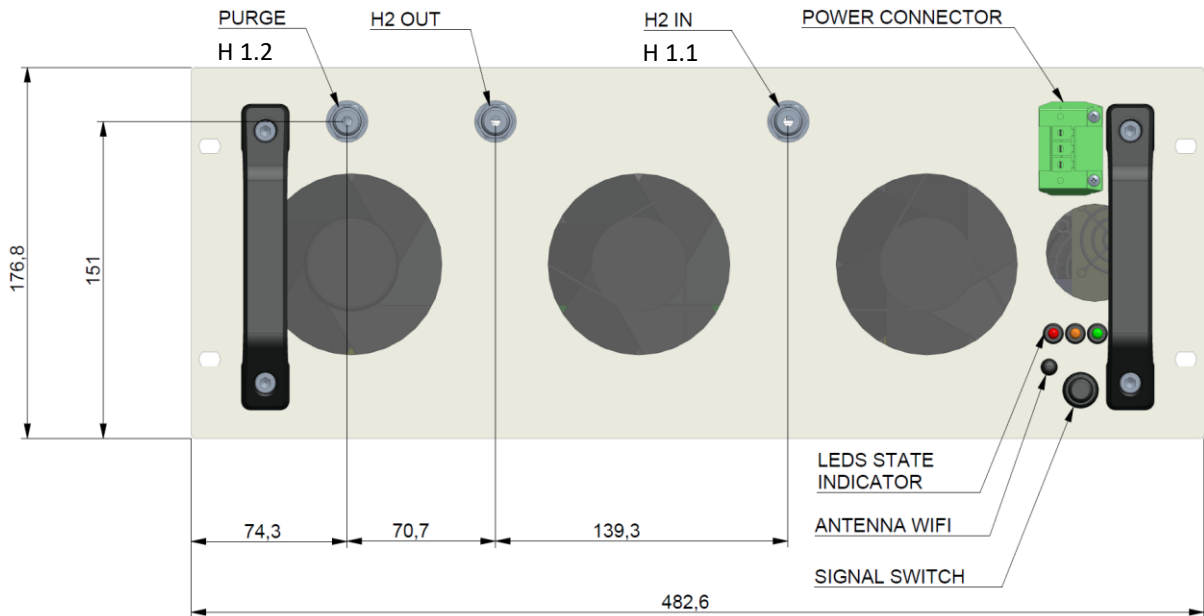


Safety area around vertical blowout pipe

## PRODUCT OVERVIEW

### DRYER 2.0 - FRONT VIEW

All hydrogen connections and the power connector are located on the front panel. It also features a start/stop button as well as several air intakes.

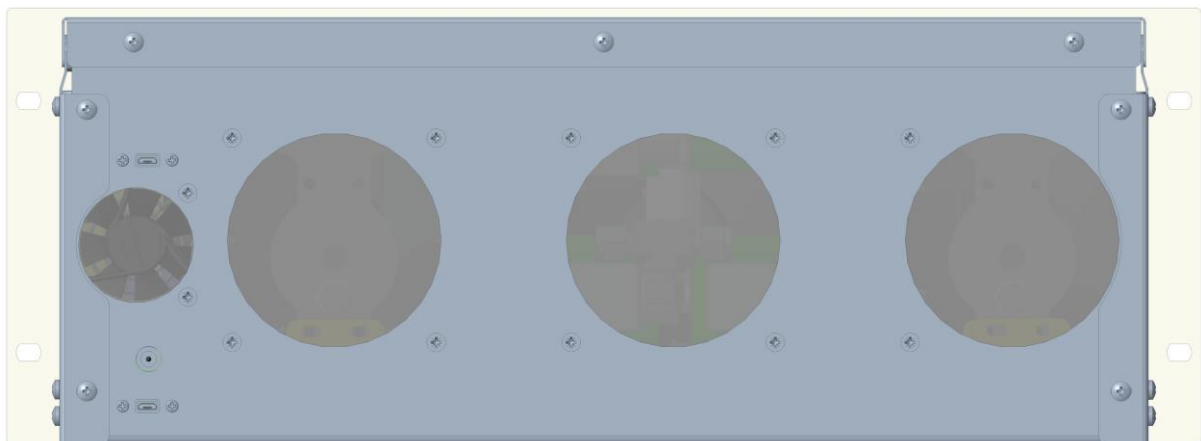


#### H1.1 – H1.2 – H2 Out

1/4" stainless steel pipe Swagelok connector

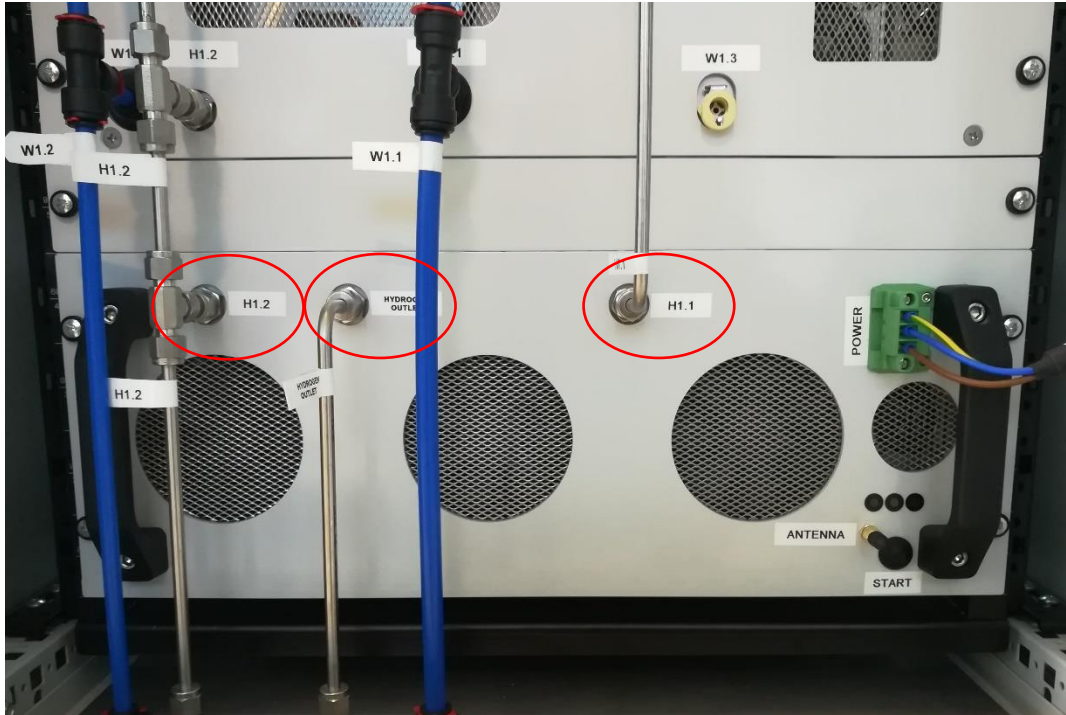
### DRYER 2.0 - REAR VIEW

The rear of the dryer features hot air exhausts and the factory reset button for the communication module.



## DRYER 2.0 CONNECTIONS

### GAS CONNECTIONS



1. Connect a ¼ inch stainless steel tube to port **H1.2** (Hydrogen Purge) and vent it to an external safety area (see paragraph "[Safety Area](#)").
2. Connect port **H1.1** (Hydrogen Inlet) to the electrolyzers, with a ¼ inch stainless steel tube;
3. Connect the **Hydrogen Outlet** port 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.

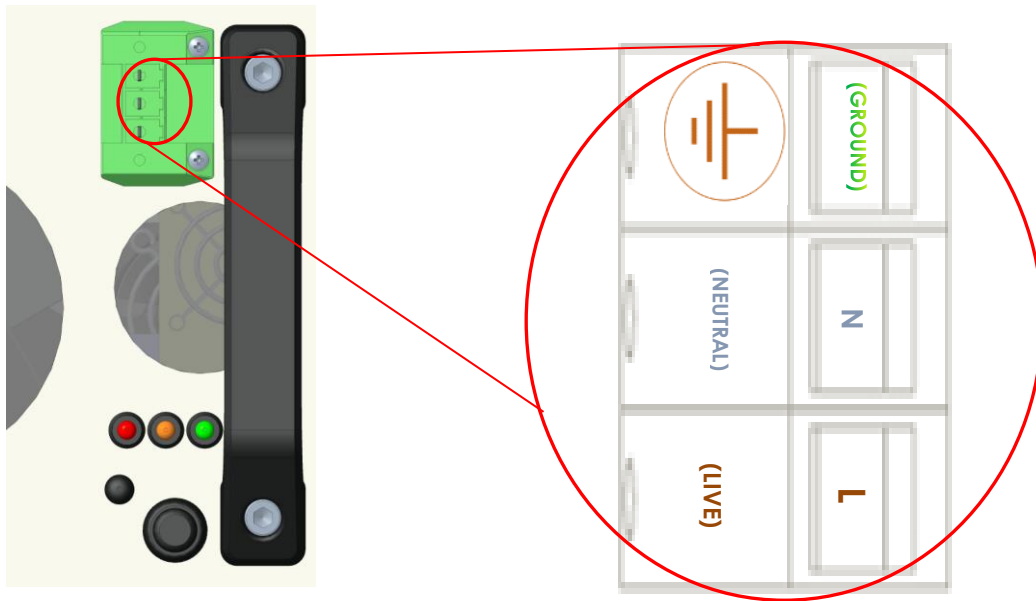


## POWER CONNECTION



**IMPORTANT:**  
 The Dryer 2.0 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 device.

Connect the Dryer 2.0 to the mains as shown below, using the power supply cables code N07V-K 6mm<sup>2</sup> (or equivalent rating), brown (live), blue (neutral) and yellow/green (ground). Ensure to use the male connector in the correct orientation.



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

We recommend also to install a protective device against overload and short circuits on the power supply line. The protective device must be selected according to the Dryer 2.0 maximum power consumption and in compliance with all local and national safety requirements.

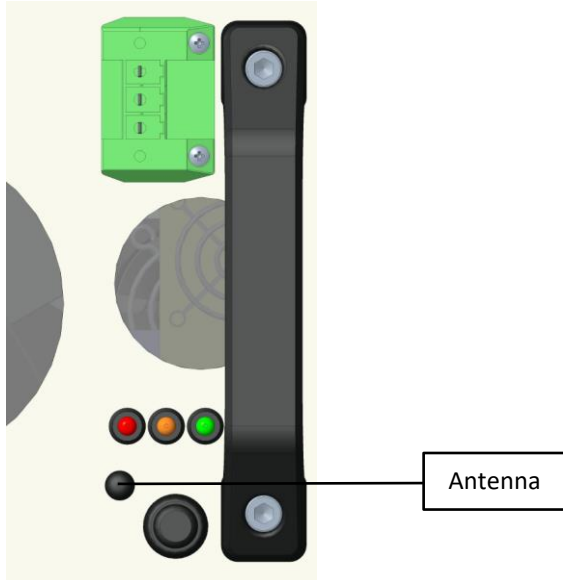
We are suggesting installing a SPD (Surge Protection Device) on the power supply line in order to protect the dryer from potential over-voltages generated by lightning strikes.

## GROUND CONNECTION

The Dryer 2.0 must be connected to ground to prevent user's contact with dangerous voltage and to allow the correct functioning of the device. The grounding system must comply with the local and national regulations.

## ANTENNA PORT

Screw in the supplied antenna here. This will extend the network range for the Dryer 2.0, enabling real time updates and monitoring for the user.





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## SOFTWARE MONITORING TOOLS

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The Dryer 2.0 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 the relevant manual to help you with the installation and usage of the applications.

## COMMISSIONING

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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 performed;
- Connect the system to the cloud via the app or using a web browser.



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## DRYER 2.0 – OPERATION

### POWERING ON THE DEVICE

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

### DRYER 2.0 AUTOMATIC OPERATION

The dryer will start automatically from standby once it detects incoming pressure in the **H1.1** (hydrogen in pipe), however a stop command should be sent when the electrolyzers supplying the dryer with hydrogen. This can be done manually via the app, or it can be performed by the rule based control system built upon the Enapter EMS.

If the dryer is not turned to standby mode before the electrolyzers have stopped supplying hydrogen, the dryer can go into error mode. To find out more about how to set up the rule based controls for automatic stopping of the dryer, please consult the [Enapter Handbook](#).

### DRYER 2.0 MANUAL OPERATION

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 go into standby mode until either: power is disconnected from the device or the module is started once more by manually pressing the start/stop button for at least 3 seconds.



**WARNING!**  
Do not unplug/disconnect the power to the Dryer 2.0 without either manually or via software control shutting down the device safely. Unexpected power cuts can shorten the device's lifetime and damage the system!

### LED STATUS DISPLAY

There are 3 different states for the Dryer 2.0 that are indicated by the LED status lights on the front panel of the device.

- Green Blinking LED  
Dryer is in standby mode
- Green Continuous LED  
Dryer is operative
- Red Blinking/Continuous LED  
Dryer has encountered a problem and gone into the safety alarm or error mode

**TECHNICAL SPECIFICATIONS**

	<b>DRYER 2.0</b>
Max hydrogen flow rate @ 0°C/1bar:	DM2030 version: 2000 NL/h DM1030 version: 1000 NL/h
Purity of hydrogen:	99,999% in molar fraction
Operative power consumption:	DM2030 version: 0.35 kW DM1030 version: 0.2 kW
Max power consumption:	0.45 kW
Power supply:	110-240 VAC/50-60Hz
Ambient conditions: - Temperature: - Relative humidity: Storage temperature:	5°C – 45°C 20-95% non-condensing Min. 2°C
Dryer Module Weight:	25 kg
Dimensions Dryer Module (WxDxH):	483x494x171 mm
Index of protection:	IP22



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