



VERSION  
01

DOCUMENT TITLE  
EL 4.0 – Battery Limits

RELEASE DATE  
2022-10-24



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## Battery Limits Electrolyser 4.0



Please study these battery limits carefully before unpacking, installing, and operating the device.

Rev. 01 – October 2022



## PREFACE

Thank you for choosing Enapter. Please study these battery limits carefully before unpacking, installing, and operating the device.

If you have any further questions, please contact the Enapter customer support team. Quote the device serial number and hardware number on the back of the device to help identifying your product quickly.

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## SCOPE OF THE DOCUMENT

This document must be read and understood in addition to the owner's manual which is also available on [handbook.enapter.com](http://handbook.enapter.com). Reading this document does not replace the intensive studying of the owner's manual.

The purpose of this document is to define and describe the battery limits of the Electrolyser 4.0. It illustrates the physical interface ports of the device, to allow the operator to integrate it with the other equipment that composes his system.

This document applies to all Enapter devices with the following product code: ELE4005XXXXXSV00

## APPROVED USE

This device must only be operated for its intended purpose, according to the specifications and instructions provided in the owner's manual. This document is intended as ancillary information only. Keep this document in a safe place and readily available. It is the operator's responsibility to ensure that an installed device is always in proper conditions. Please observe any additional local requirements applicable to the installation and operation of the device.

**Improper use of the device can result in serious injuries and damage to the environment.**



- ≡ Always use the device according to the specifications described in this document. Ensure that this document is always accessible.
- ≡ Make sure you have read and understood this document in its entirety.
- ≡ Comply with all safety instructions and warnings.



VERSION  
01

DOCUMENT TITLE  
EL 4.0 – Battery Limits

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- ≡ Store this document and other documentation in a safe and accessible place and pass them on to future owners and operators of the device.
- ≡ Comply with all relevant local safety guidelines, rules, directives, and regulations.
- ≡ Enapter is not guaranteeing efficiency, safety, and functionality in case of modifications not described in this document.
- ≡ Enapter is not responsible for any damage caused by the device or to the device based on wrong operation or setup.

## TERMS

The following terms are used in this document:

- ≡ **Device:** Device means the unit, including its hardware and software as well as contained materials and substances. It also includes directly attached tubes, pipes, and other equipment from Enapter if not stated differently.
- ≡ **System:** System means the combination of devices, tubes, pipes, and equipment from Enapter and other manufacturers which are connected physically, logically or in any other way to produce, store, use, transfer or convert hydrogen and related substances.
- ≡ **Operator:** The operator is the responsible person in charge who operates, installs, connects, maintains, and/or owns the device, its subcomponents, and additional components. To simplify reading, this document only refers to the operator to distinguish from Enapter but may also include the user, customer, client, owner, installer, instructor, system integrator or persons who are responsible for a safe operation of the device.



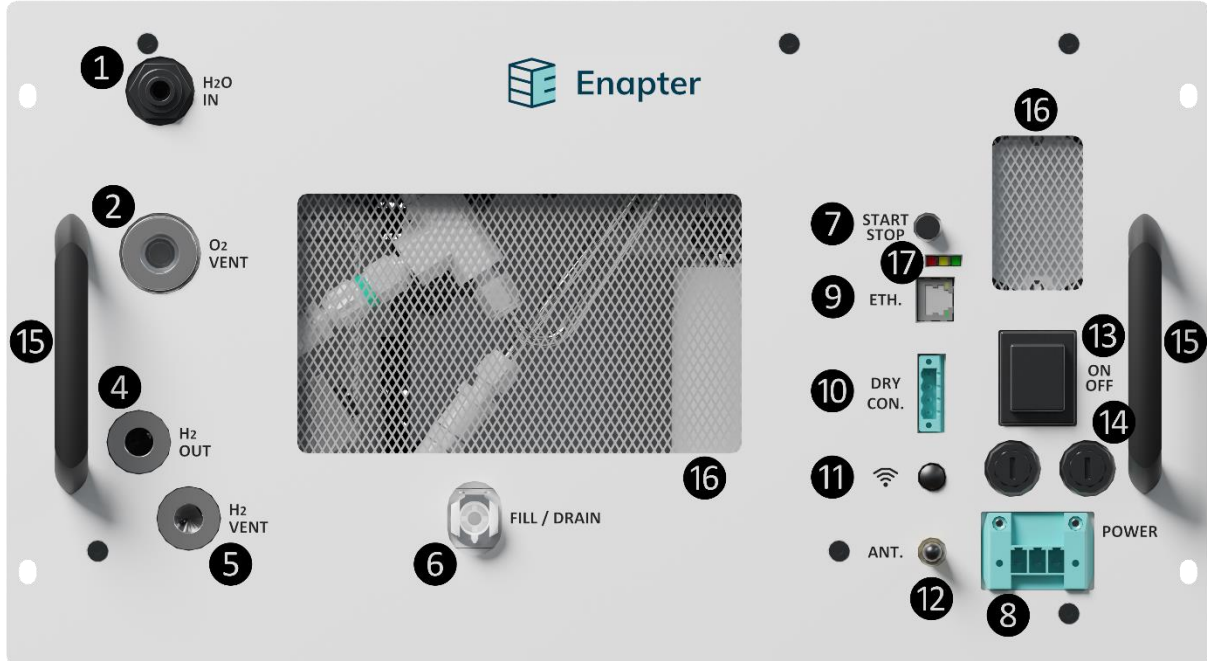
# TABLE OF CONTENTS

<b>1. Device Interfaces</b> .....	<b>7</b>
<b>2. Interfaces specifications</b> .....	<b>9</b>
2.1 H <sub>2</sub> O IN.....	9
2.2 O <sub>2</sub> VENT.....	9
2.3 COOLING WATER IN / OUT.....	10
2.4 H <sub>2</sub> OUT .....	10
2.5 H <sub>2</sub> VENT.....	11
2.6 FILL / DRAIN .....	11
2.7 START / STOP .....	12
2.8 POWER.....	12
2.9 ETHERNET .....	12
2.10 DRY CON .....	12
2.11 WiFi BUTTON .....	13
2.12 ANTENNA.....	13
2.13 ON/OFF BUTTON / BREAKER.....	13
2.14 FUSES.....	13
2.15 HANDLE BAR .....	13
2.16 FRONT MESH.....	13
2.17 LED .....	13
2.18 LEAKAGE DRAIN HOLE .....	13

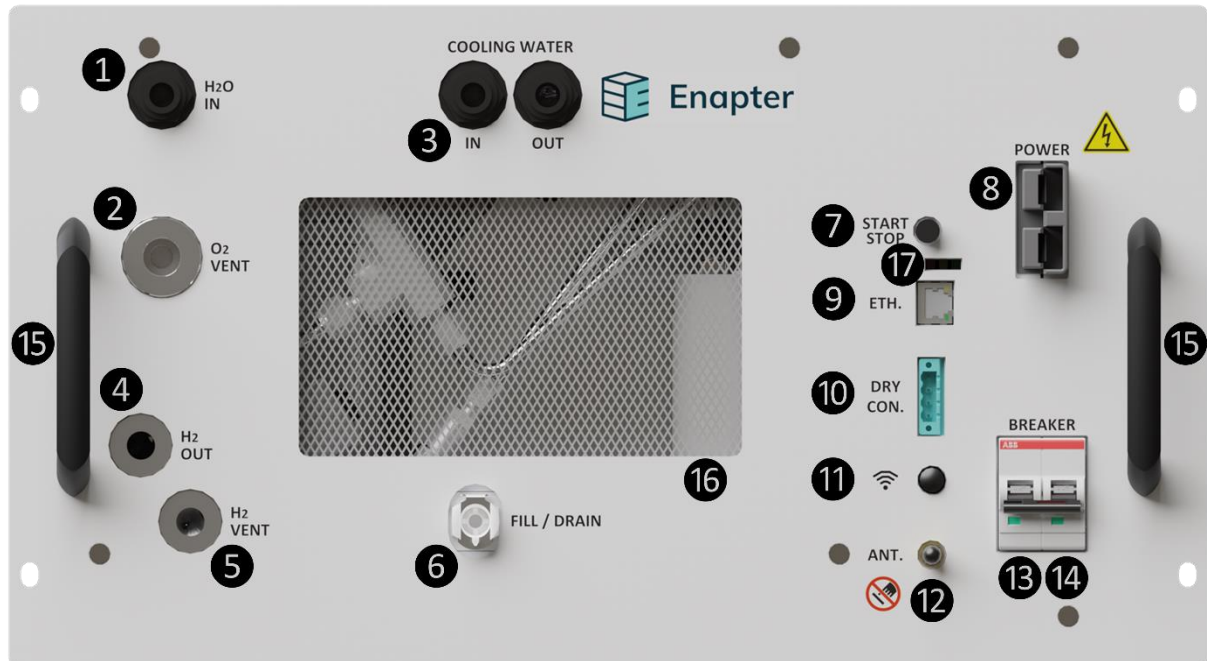


# 1. DEVICE INTERFACES

The following figure shows the position of the EL4.0's physical interfaces.



*EL4.0 air cooled AC version front view*



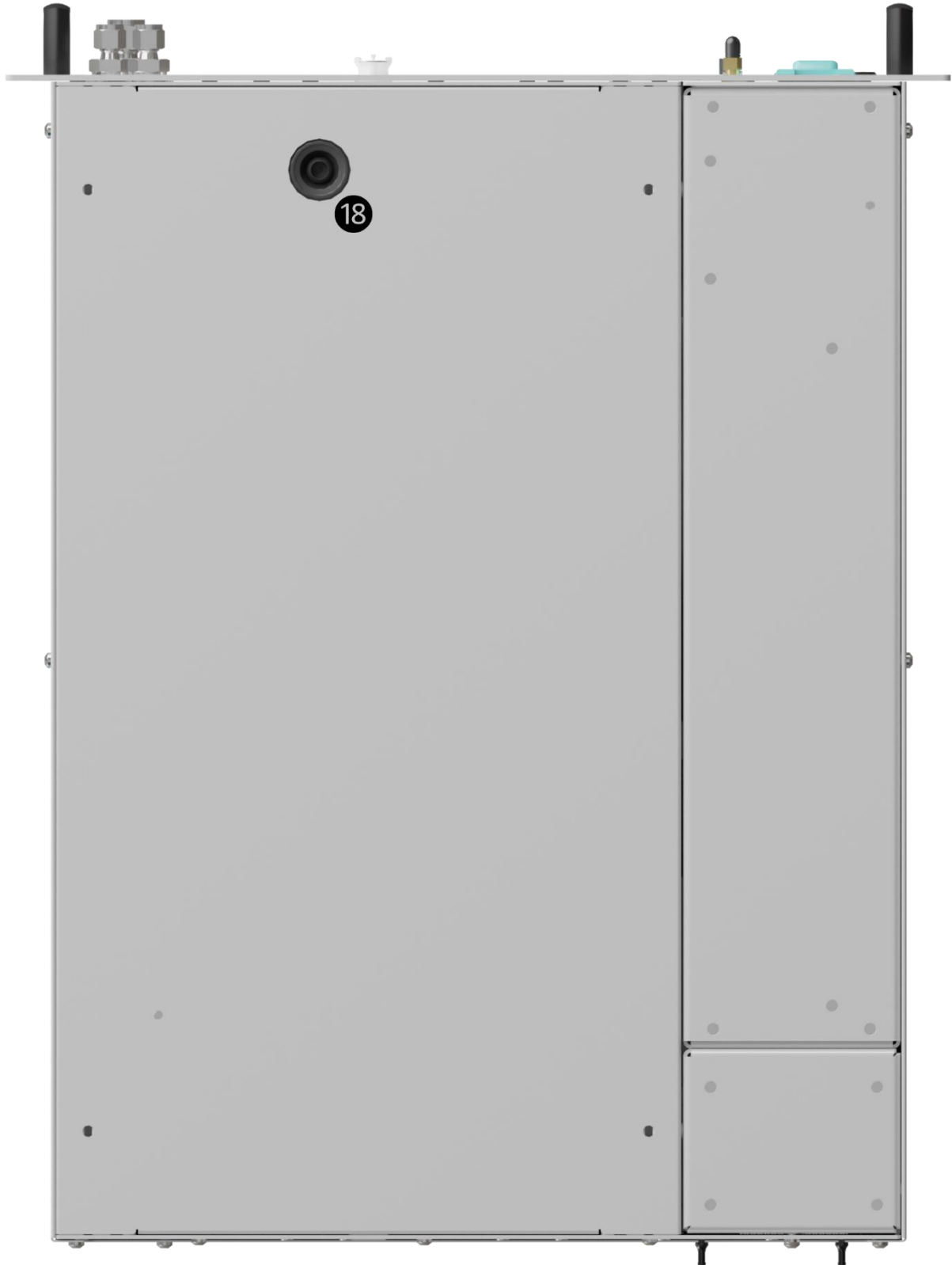
*EL4.0 liquid cooled DC version front view*



VERSION  
01

DOCUMENT TITLE  
EL 4.0 – Battery Limits

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2022-10-24



*EL4.0 bottom view*



## 2. INTERFACES SPECIFICATIONS

The interfaces described in the following refer to the figures above. Not meeting these requirements may result in a higher degradation and damages to the device. The requirements in this document must always be met. However, this document does not contain the complete list of requirements for each interface. For more information, please refer to the owner's manual.

### 2.1 H<sub>2</sub>O IN

This inlet port is used for the automatic refilling of highly purified, demineralised water for the electrolysis process.

Name	H2O IN
Direction	Pressurised input
Fitting Type	10 mm push-fit female bulkhead connector
Fitting Material	POM (Polyoxymethylene)
Fluid	Demineralised water (<20µS/cm at 25 °C) <5 µS/cm at 25 °C recommended
Flowrate	Refilling speed up to 4 l/min periodically, 0.42 l/h water consumption in average
Pressure	1-4 barg
Temperature	5-55 °C

- ≡ Make sure to not exceed the stated limits, especially do not exceed the maximum inlet pressure.

### 2.2 O<sub>2</sub> VENT

This outlet port is directly connected to the electrolyte tank and allows the produced O<sub>2</sub> to leave the device. Apart from the produced O<sub>2</sub>, up to 38 g/h of H<sub>2</sub>O @ 25 °C (ambient) is condensed in the line, this is dependent on the ambient temperature and vent line material and insulation. Furthermore, some trace of H<sub>2</sub> (<2% concentration) can be contained in the gaseous vent output. The O<sub>2</sub> vent additionally serves as an overflow port if too much water or electrolyte has been provided.

Name	O2 VENT
Direction	Input and output
Fitting Type	3/8" bspp female port
Fitting Material	KOH and heat resistant material like Stainless Steel 316L
Fluid	O <sub>2</sub> + H <sub>2</sub> O vapour + H <sub>2</sub> (<2%)
Flowrate	Up to 250 Nl/h (O <sub>2</sub> ) + 38 g/h (H <sub>2</sub> O) @ 25 °C
Pressure	<0.5 barg
Temperature	20-225 °C

- ≡ Make sure to not exceed the stated limits, especially make sure that there is no pressure building up in this line. The device must be able to exhaust and take in gases at all times.



- ≡ Make sure that this line is exhausting safely to the atmosphere.
- ≡ Make sure to install an appropriate water trap at the lowest point of the O<sub>2</sub> vent line to allow the H<sub>2</sub>O to drain freely.
- ≡ Make sure to connect O<sub>2</sub>, H<sub>2</sub> and KOH compatible and heat resistant materials only.

### 2.3 COOLING WATER IN / OUT

Please be aware that this interface might not be available in your device.

This inlet/outlet port allows the device to be cooled via an external cooling loop. Temperature, pressure, and flowrate must be calculated depending on the individual setup.

Name	COOLING IN / OUT
Direction	Pressurised input / output
Fitting Type	10 mm push-fit female bulkhead connector
Fitting Material	POM (Polyoxymethylene)
Fluid	Clean water or a water-glycole mixture with up to 50% glycole
Flowrate	1-2 l/min non continuous depending on the temperature
Input pressure	2-7 barg depending on the temperature
Input temperature	5-40 °C depending on the pressure and flowrate
Output temperature	<50 °C depending on input temperature

- ≡ Make sure to not exceed the stated limits, especially do not exceed the maximum inlet pressure.
- ≡ Make sure to only provide cleaned fluids, free of particles and install the water filter shipped with each device right upstream the COOLING IN port.

### 2.4 H<sub>2</sub> OUT

This outlet port releases the produced H<sub>2</sub>. H<sub>2</sub> downstream of that port, will not flow back through the device.

Name	H <sub>2</sub> OUT
Direction	Pressurised output
Fitting Type	¼" bspg female port
Fitting Material	Stainless Steel 316L
Fluid	H <sub>2</sub> + 1000-ppm of H <sub>2</sub> O
Flowrate	300-500 NI/h during hydrogen production
Pressure	Up to 35 barg (35 barg version) / Up to 8 barg (8 barg version)
Temperature	20-55 °C (max 58°C)

- ≡ Make sure to not exceed the stated limits, especially do not exceed the maximum outlet pressure by attaching pressurised tanks or sudden purges.





- Make sure to connect H2 compatible and pressure resistant materials only.

## 2.5 H2 VENT

This outlet port allows water which has been extracted from the H2, to leave the device. This venting happens twice during ramp up, every 6 h during operation (35 barg version) / every 3 h (8 barg version) and once during ramp down.

Name	H2 VENT
Direction	Input and pressurised output
Fitting Type	¼" bspp female port
Fitting Material	Stainless Steel 316L
Fluid	H2 + H2O
Flowrate	Up to 35 NI/s (transient)
Pressure	Up to 35 barg (transient) (35 barg version) / Up to 8 barg (transient) (8 barg version)
Temperature	20-55 °C

- Make sure to not exceed the stated limits, especially make sure that there is no pressure building up in this line. The device must be able to exhaust and take in gases at all times.
- Make sure that this line is exhausting safely to the atmosphere.
- Make sure to install an appropriate drainage system, in order not to exceed 0.2 barg of pressure drops in the pipe, at the lowest point of the H2 vent line to allow the H<sub>2</sub>O to drain freely.
- Make sure to connect H2 and KOH compatible and pressure resistant materials only.

## 2.6 FILL / DRAIN

This inlet/outlet port is used to fill up the device with electrolyte and to drain it again for maintenance.

Name	FILL / DRAIN
Direction	Input and output non-pressurised
Fitting Type	10 mm CPC quick connector
Fitting Material	POM (Polyoxymethylene)
Fluid	Aqueous KOH solution (1% concentration)
Flowrate	Up to 0.6 l/min
Pressure	Atmospheric
Temperature	5-55 °C
Manual Filling volume	2 l – 1.54 % KOH concentration
Draining volume	Up to 4 l of KOH solution with up to 2 % KOH concentration

- Make sure to connect KOH compatible materials only.
- Hold the electrolyte bag above the device's top edge.to fill the device
- Hold the electrolyte bag below the device's lower edge.to drain the device



## 2.7 START / STOP

This button allows the operator to start and stop the hydrogen production.

- Make sure to never start the device without a proper installation, inspection, and approval according to all relevant local safety guidelines, rules, directives, and regulations.

## 2.8 POWER

This inlet port allows the power supply of the device.

Name	POWER
Direction	Input
Fitting Type	PCB 3-pin 7.62 mm pitch female socket (AC version) / 2-pin 16 mm <sup>2</sup> AMP Power Series - 23.5 mm TYCO ELECTRONICS (DC version)
Fitting Material	PA (Polyamide)
Fluid	Electric current
Current	0-13 A (AC version) / 0-50 A (DC version)
Voltage	220-230 V (AC version) / 48 – 60 V (DC version)
Frequency	50/60 Hz (AC version)

- Make sure to always follow the stated limits.
- Keep in mind that the device's production rate is not controlled by adjusting the voltage or power supply of the device.

## 2.9 ETHERNET

This port allows reading and writing monitoring and control registers of the device via Modbus TCP/IP.

Name	ETH
Fitting Type	RJ45 Female Ethernet port

## 2.10 DRY CON

This port allows external devices to power cut the stack inside the electrolyser.

Name	DRY CON.
Direction	Input and output
Fitting Type	PCB 4-pin 5.08 mm pitch female socket (<2.5 mm <sup>2</sup> cross section cables)
Fitting Material	PA (Polyamide)
Fluid	Electric current
Maximum input resistance and	0.1 kΩ – 1 mA



current for closed status (S1, COM1)	
Maximum output resistance and current in closed status (S2, COM2)	0.01 kΩ – 250 mA

- ≡ Make sure to not exceed the stated limits.

### 2.11 WIFI BUTTON

The WiFi button allows the operator to switch on/off the WiFi of the device.

### 2.12 ANTENNA

The antenna port allows the operator to install an antenna for a better WiFi connection.

### 2.13 ON/OFF BUTTON / BREAKER

This button is used to switch on/off the device. Please be aware that this interface might not be available in your device.

### 2.14 FUSES

Please be aware that this interface might not be available in your device.

The port allows the operator to replace the fuses in case they burned through.

### 2.15 HANDLE BAR

The handle bar allows the operator to lift and move the device.

### 2.16 FRONT MESH

The front mesh allows air to enter the device, allows appropriate cooling and ensures, that no H<sub>2</sub> is accumulating inside the device in case of a H<sub>2</sub> leakage.

- ≡ Make sure to always keep the meshes free of dust and dirt.

### 2.17 LED

The LED shows the status of the device. For more information, please refer to [handbook.enapter.com](http://handbook.enapter.com).

### 2.18 LEAKAGE DRAIN HOLE

The leakage drain hole allows the operator to drain the tray in case of an electrolyte or water leakage.

Name	Leakage Drain Hole
Direction	Output
Fitting Type	Sealing Plug GPN 915
Fitting Material	PHT
Fluid	KOH, water



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