

HYDROFILL[®] PRO

USER MANUAL

WARNING

- Do not tamper with, or disassemble the HYDROFILL PRO
- Keep HYDROFILL PRO away from fire, open flame, or heat sources
- Keep HYDROSTIK or HYDROSTIK PRO cartridge away from fire, open flame, or heat sources
- Keep HYDROFILL PRO away from children
- Keep HYDROFILL PRO in upright position
- Add de-ionized or distilled water carefully to avoid over-filling the water tank
- Keep HYDROFILL PRO in a ventilated location during operation
- Do not ingest the powder (malic acid) contained in the maintenance kit, keep away from children
- Keep all electrical connections dry at all times

SYSTEM OVERVIEW

The HYDROFILL PRO system uses a proton exchange membrane (PEM) electrolyzer to recharge Horizon's HYDROSTIK and HYDROSTIK PRO metal hydride cartridges automatically.

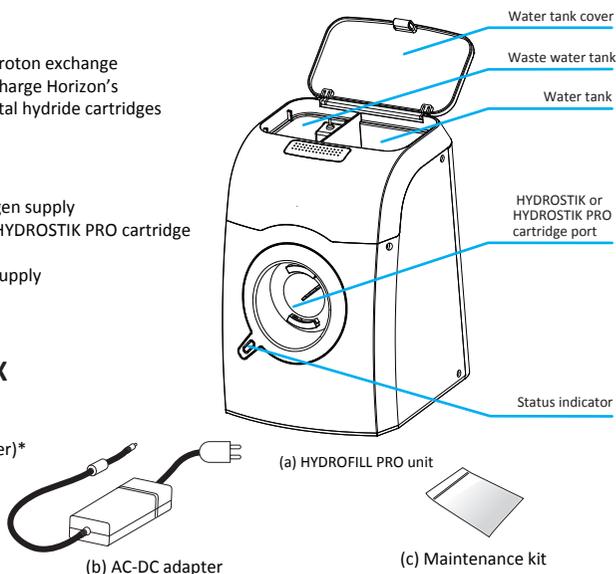
SYSTEM FEATURES

- Quiet, safe and convenient hydrogen supply
- Compatible with HYDROSTIK and HYDROSTIK PRO cartridge
- High hydrogen purity 99.99%
- Optional DC solar or wind power supply
- Connects to AC power

INCLUDED IN THIS BOX

- HYDROFILL PRO unit
- AC-DC adapter cord
- Maintenance kit (malic acid powder)*
- User Manual

*Additional malic acid powder maintenance kits can be purchased from Horizon. Contact support@horizonfuelcell.com.



SPECIFICATIONS

Stack type	Proton exchange membrane electrolysis cell
Dimensions (W x D x H)	145 x 153 x 208 mm (5.7 x 6 x 8.2 in)
Weight	1.8Kg ±5% (3.97Lbs ±5%)
Rated power	≤23W
Input voltage	DC: 10V-19V
Water input	De-ionized or distilled water
Water temperature	10-40°C (50-104°F)
Water consumption	Approx. 20ml/hr (1.2in ³ /hr)
Hydrogen output pressure	0-3.0 MPaG (0-435.11 PSI)
Hydrogen generation capacity	Up to 3L/hr (0-183 in ³ /hr)
Purity	99.99%
Compatible cartridge	HYDROSTIK and HYDROSTIK PRO
Refilling time for one cartridge	Around 4 hours (at 25C ambient temperature)

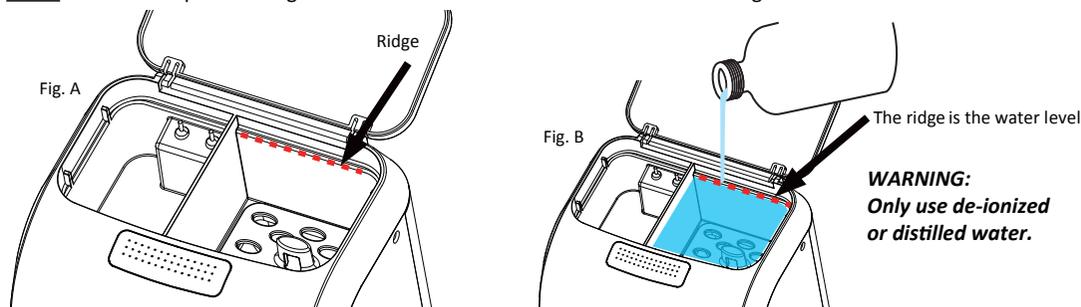
The specifications are subject to change without notice.

STATUS INDICATOR LIGHTS

Green	Red	System Status
on		HYDROSTIK or HYDROSTIK PRO cartridge is full
on 1 second, off 1 second		Waiting to fill HYDROSTIK or HYDROSTIK PRO cartridge
	on	HYDROSTIK or HYDROSTIK PRO cartridge is being filled
	on 1 second, off 3 seconds	Add maintenance kit (malic acid)
	on 1 second, off 1 second	Add water or empty waste water tank

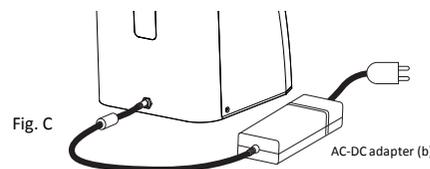
OPERATION INSTRUCTIONS

1. Open the water tank cover located at the top of the unit (Fig. A). Carefully add de-ionized or distilled water** EXACTLY up to the ridge level inside the water tank as shown below in Fig. B. Close the cover.

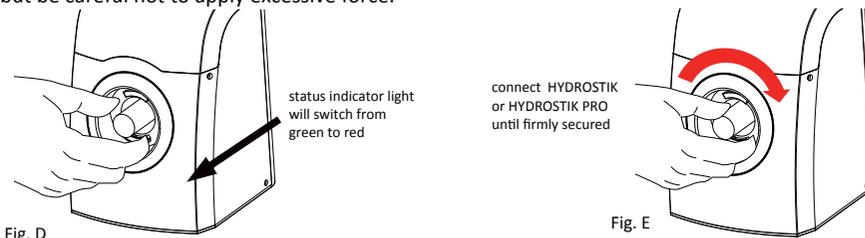


2. Connect the AC-DC adapter to the unit (Fig. C).

Once plugged in to an AC point, the unit's status indicator light should start to flash green.



3. Fully insert the HYDROSTIK or HYDROSTIK PRO cartridge into the HYDROFILL PRO unit by turning it clockwise into the cartridge port until firmly secured. During the insertion process, the green indicator light may turn red to indicate a connection (Fig D), but continue turning to make sure the HYDROSTIK or HYDROSTIK PRO is firmly secured (Fig E). Secure the HYDROSTIK or HYDROSTIK PRO tightly to the unit, but be careful not to apply excessive force.



4. While the indicator light is RED, your HYDROSTIK or HYDROSTIK PRO cartridge is being filled with hydrogen. The HYDROSTIK or HYDROSTIK PRO cartridge is fully charged when the indicator lights GREEN. When completed, disconnect the HYDROSTIK or HYDROSTIK PRO cartridge from the HYDROFILL PRO (turn anti-clockwise to disconnect). *Note: 1. It will be normal to hear short bursts or puffs during the refilling procedure, due to water being purged from the system from time to time.*

2. It will be normal to hear the sound of air being released when the HYDROSTIK or HYDROSTIK PRO is disconnected from the HYDROFILL PRO.

5. Disconnect the HYDROFILL PRO from the AC and empty the water tank if you will not use the HYDROFILL PRO for more than one week. If more cartridges need to be charged, repeat step 3.

SWITCHING FROM AC TO DC SOLAR OR WIND POWER OPTIONS

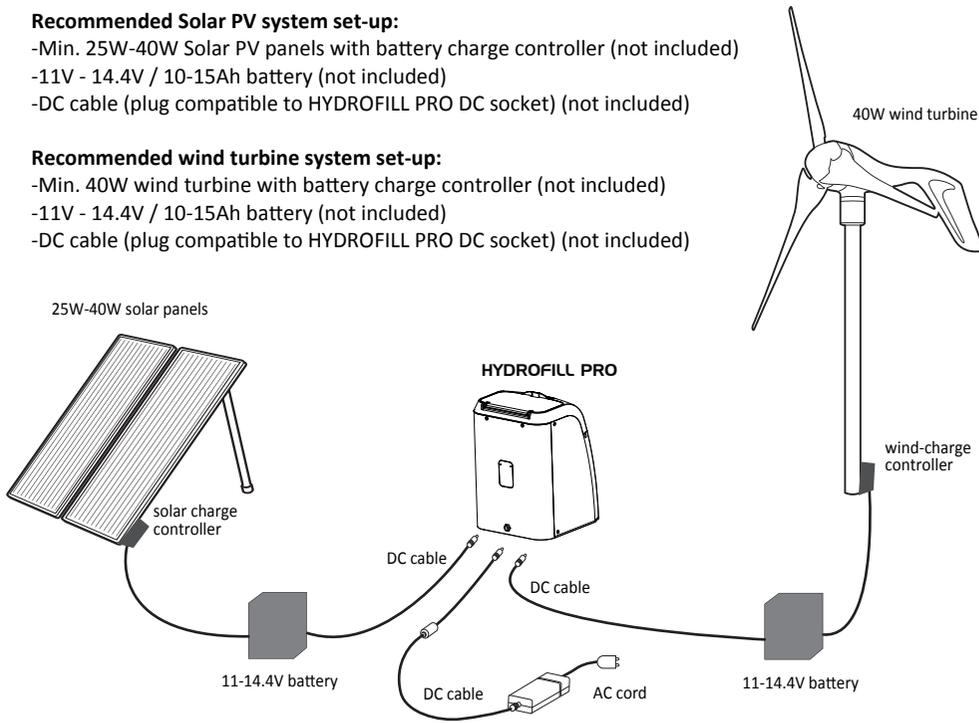
HYDROFILL PRO can be powered by using the standard (included) AC to DC power cable (b), or can be connected to renewable power sources such as solar PV or small wind turbines. Both sources should include a battery buffer to regulate power supplied to the HYDROFILL PRO.

Recommended Solar PV system set-up:

- Min. 25W-40W Solar PV panels with battery charge controller (not included)
- 11V - 14.4V / 10-15Ah battery (not included)
- DC cable (plug compatible to HYDROFILL PRO DC socket) (not included)

Recommended wind turbine system set-up:

- Min. 40W wind turbine with battery charge controller (not included)
- 11V - 14.4V / 10-15Ah battery (not included)
- DC cable (plug compatible to HYDROFILL PRO DC socket) (not included)



USEFUL INFORMATION / MAINTENANCE

- Only use **de-ionized or distilled water**.
- Around 4 hours operation are required to fully charge a cartridge.
- If the red status indicator light alternates between red for 1 second and off for 3 seconds, carefully add the entire contents of one maintenance kit bag (c) into the water tank without disconnecting the cartridge. Allow the HYDROFILL PRO to charge the HYDROSTIK or HYDROSTIK PRO cartridge for more than 1 hour. This procedure will help improve the performance of the HYDROFILL PRO.
- If the LED light alternates red for 1 second and off for 1 second, check the water level of the water tank and waste water tank. Either add water to the water tank or remove water from the waste water tank as required. Follow set up instructions carefully.
- The HYDROFILL PRO can still run and generate hydrogen even if the LED light alternates between red for 1 second and off for 3 seconds, but HYDROSTIK or HYDROSTIK PRO charging time will be slower.

TROUBLESHOOTING

1. The status indicator light does not flash green after the power supply cord is connected.

SOLUTION: Check the connection between the AC-DC adapter and the power supply.

2. The status indicator light does not turn red after the HYDROSTIK or HYDROSTIK PRO is connected to the HYDROFILL PRO.

SOLUTION A: Disconnect the HYDROSTIK or HYDROSTIK PRO and re-connect it again slowly. Make sure the connection is smooth and the HYDROSTIK or HYDROSTIK PRO is fully inserted into the thread.

SOLUTION B: Check that the water level in the tanks are correct (see operating instructions)

SOLUTION C: Remove and re-connect the AC-DC adapter.

3. The cartridge has been charging for more than 6 hours, but the indicator light is still red.

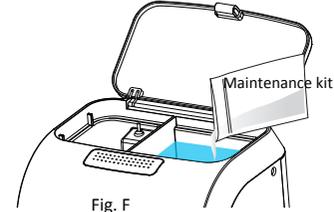
SOLUTION A: Disconnect the HYDROSTIK or HYDROSTIK PRO and re-connect it tightly and correctly.

SOLUTION B: Disconnect the HYDROSTIK or HYDROSTIK PRO and connect it to a fuel cell product to confirm there is hydrogen in the cartridge.

4. The LED light alternates between red for 1 second and off for 3 seconds.

SOLUTION A: Try to add 40°C to 70°C water into the water tank.

SOLUTION B: Pour the entire contents of one maintenance kit (c) into the water tank, mix with the water. Allow the HYDROFILL PRO to charge a cartridge for more than 1 hour. This will help to maintain the performance of the unit (Fig.F)



5. The LED light alternates between red for 1 second and off for 1 second.

SOLUTION: Check the water level of the water tank and waste water tank is correct. Either add water to the water tank or remove water from the waste water tank as required.

6. The light LED turns green (the cartridge has been charging for 6 hours), but no or little hydrogen is filled.

SOLUTION A: Check the HYDROSTIK or HYDROSTIK PRO to ensure it is connected tightly.

SOLUTION B: Check the water temperature (see 4. SOLUTION A)

SOLUTION C: If charging is slow, pour 1 bag of the maintenance kit into the water tank, mix contents with water and charge a HYDROSTIK or HYDROSTIK PRO cartridge for more than 1 hour. This will help to maintain the performance of the HYDROFILL PRO. If the problem continues, repeat this process once more.

*One way to check the volume of hydrogen inside a cartridge, is to weigh the HYDROSTIK or HYDROSTIK PRO before and after filling it using a precision scale. The weight difference between a full and an empty HYDROSTIK or HYDROSTIK PRO is around 0.9 grams.

If you are still experiencing problems, please contact support@horizonfuelcell.com for help.

FREQUENTLY ASKED QUESTIONS

Q: How is hydrogen stored?

A: Hydrogen is stored in small cartridges (HYDROSTIK or HYDROSTIK PRO) at low pressure. When refueling, hydrogen gas is sent into the cartridge at high pressure, and adsorbed onto the surface area of a special metal alloy which is contained inside the cartridges, thus becoming a solid (hydride). When connected to the fuel cell, the HYDROSTIK or HYDROSTIK PRO cartridges slowly release hydrogen using a heat exchange process with the ambient temperature.

Q: How can I refill HYDROSTIK or HYDROSTIK PRO cartridges with hydrogen?

A: Add water into the unit's water tank, connect the AC-DC adapter and insert a HYDROSTIK or HYDROSTIK PRO cartridge. The HYDROFILL PRO will split water into hydrogen and oxygen, sending hydrogen into the HYDROSTIK or HYDROSTIK PRO cartridge. It will take around 4 hours to fully fill a HYDROSTIK or HYDROSTIK PRO cartridge in normal conditions.

Q: What is the purity level of the hydrogen produced by the HYDROFILL PRO?

A: The purity of the hydrogen produced by the HYDROFILL PRO is 99.99%. The metal hydrides contained in the cartridge first adsorb hydrogen, then release it at a higher purity into the fuel cell.

Q: What is the maintenance kit and what does it contain?

A: The powder contained inside the maintenance kit bag is malic acid used in food additives. Metal ions will strongly affect and poison the electrolyzer stack inside the HYDROFILL PRO over time. Many acidic solutions have the ability to neutralize the ions and help recover the performance of the HYDROFILL PRO. Malic acid or in this case apple acid, a food additive, is very safe and can be used for system maintenance with no negative effect. Keep away from children and do not consume.