

## Operating Hydrogen Fuel system

### Generation 10, 15, 20 Hydrogen Fuel system – December 26 2024

The Hydrogen system should be operated at between 25 and 35 amp. For this reason a 40 amp circuit breaker must be used in the System and a 40 amp relay unit controlling the system operation

### **Configuration With Pulse width 3 kW Modulator device - Prefered configuration for all model systems (2024)**

#### Materials required

30 amp circuit breaker, 40 amp relay unit, “Bubbler” Unit, 4 m length 10 mm pneumatic tubing, 5 m double insulated 8 mm twin core cable, 12 volt master switch, 500 gram potassium hydroxide , Distilled water, 3 kW Pulse width modulator Unit fitted.

This configuration is used with the 3 kWatt Pulse width Modulator power supply, running at 12 volts. – 24 volt vehicles must use an inverter to power the system at 12 olt

#### **Gen 10 Systems Use a 30 amp circuit breaker**

#### **Gen 15 and Gen 20 systems use a 40 amp circuit breaker**

1. Fill the system so that the 3 litre recycling tank is holding 2.5 litres of distilled water.
2. Measure 15 grams of potassium hydroxide = three level teaspoon full - and mix this with 100 mls of distilled water.
3. Switch on the system with the pump running and add the small amounts of the 100 ml mixture to the recycling tank. Watch the current rise over the next few minutes stop adding any more mixture once the current reaches 15 amp.
4. Ensure the solution in the 3 litre recycling tank is 200 mm below the top of the tank (AS MARKED ON TANK) . Add distilled water if needed to bring tank to correct level
5. Check the bubbler tank and ensure it is  $\frac{3}{4}$  full of distilled water
6. Check the recycling pump is operating.
7. Measure and record in the chart (below) the current flowing in the system and ambient / environment temperature
8. Current flow should be operating at or below 15 amp. If Current is above 15 amp, syphon 200 mls of electrolyte from tank and replace with distilled water. Drive the vehicle . As solution is used the concentration of the solution increases and current will rise. The system will use 1 litre of water every 10 hours

9. Refill the solution with distilled water every 15 hours of operation or when the circuit breaker switches off .
10. Once the distilled water is replaced , run the system for 3 minutes to allow the solution mixture to return to original concentration
11. The Next time you start the system it will start operating at more than 15 amp and steadily rise to operating current of between 25 and 28 amp.
12. The system will heat as it is being used and may feel “too hot” . The operating current of 28 amp is such that it will be hot , but far from boiling. At 55 Celcius it will feel very hot , the system is working efficiently an using the heat energy to generate extra Hydrogen gas.

## **Configuration 2 without Pulse width Modulator device**

### **Materials required**

**40 amp circuit breaker, 40 amp relay unit, Bubbler Unit, 4 m length 10 mm pneumatic tubing, 5 m double insulated 8 mm twin core cable, 12 volt master switch, 500 gram potassium hydroxide , Distilled water.**

The latest configuration from November 2021 is a modified DC supply that does away with the PWM and uses the extra 1.5 volts used by the PWM to produce more Hydrogen gas.

This new arrangement does away with controlling the current my the electronic circuit and only controls the current flow by adding pure water to the tank .

The circuit / solution concentration is initially set to run 12 amp. Once the current reaches 35 amp or once the solution volume in the tank falls to 1 litre , it is time to refill the recycling tank with water only. , This way there is no wasted heat energy generated by the PWN, there is more gas produced and the systems run more efficiently.

**The electrolyte setup is only done once , adding the Potassium Hydroxide.**

**After the initial setup of solution, only distilled water is added to the recycling tank This system 12 volts only , if alternator or battery voltage is higher the input voltage must be reduced to 12 volts prior to operation.**

### **Setup**

1. Fill the system so that the 3 litre recycling tank is holding 2.5 litres of distilled water.
2. Measure 5 grams of potassium hydroxide = one level teaspoon full - and mix this with 100 mls of distilled water.

3. Switch on the system with the pump running and add the small amounts of the 100 ml mixture to the recycling tank. Watch the current rise over the next few minutes stop adding any more mixture once the current reaches 12amp.
4. Ensure the solution in the 3 litre recycling tank is 150 mls below the top of the tank (AS MARKED ON TANK)`. Add distilled water if needed to bring tank to correct level
5. Check the bubbler tank and ensure it is  $\frac{3}{4}$  full of distilled water
6. Check the recycling pump is operating.
7. Measure and record in the chart the current flowing in the system and ambient temperature
8. Current flow should be operating at or below 12 amp. If Current is above 12 amp, syphon 200 mls of electrolyte from tank and replace with distilled water. If necessary repeat this procedure until starting current is just below 12 amp as shown on the ammeter
9. Drive the vehicle . As solution is used the concentration of the solution increases and current will rise. The system will use 1 litre of water every 10 hours
10. After 10 hours of operation the current will approach 35 amp
11. Refill the solution with distilled water every 10 hours of operation or when the 40 amp circuit breaker switches off
12. Once the distilled water is replaced , run the system for 3 minutes to allow the solution mixture to return to original concentration.

The solution and system is now ready to use .

As the system runs the current flow will increase and eventually reach 39 amp .

The recycling tanks holds 3 litres. The system will consume 1 litre of water every 10 hours. After 10 hours of operation it is time to add water to the system. Adding water dilutes the solution and reduce the current flow. In the case of you forgetting to add water , the auto reset 40 amp circuit breaker opens the circuit and no current will flow telling you its time to add water

Date	Time	Tank Volume (full or empty)	Current flowing	Pump operation (Y/N)



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