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# TECHNICAL INFORMATION

## Installation, Operation and Maintenance
## Parker Balston® H2-150 and H2-300 Hydrogen Generators

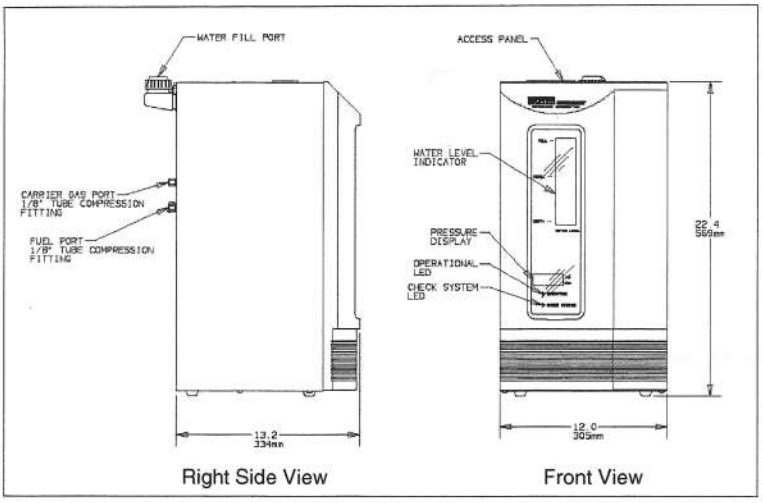



*Figure 1 - Overall Dimensions*

**These instructions must be thoroughly read and understood before installing and operating the Parker Balston Hydrogen Generator. Follow the safety standards for handling hydrogen gas as set forth by the National Fire Protection Agency (NFPA) Standard 50A, the Compressed Gas Association (CGA) Pamphlet G15, OSHA Regulation 29CFR-1910.103, and other safety governing bodies. Modifications made to this unit will void the warranty. Failure to operate this product in accordance with the instructions set forth in this manual and by other safety governing bodies will void the safety certification of this product. If you have any questions or concerns, please call the Technical Services Department at 800-343-4048, 8AM to 5PM Eastern Time (North America only) For other locations, please contact your local representative.**

**Parker does not recommend the use of a hydrogen gas storage vessel in conjunction with the hydrogen generator. Stored quantities of hydrogen pose an explosion hazard.**

**Please save product packaging for future shipment or storage of generator.**

⚠ **Normal precautions for any hydrogen supply should be taken when using the hydrogen generator. Do not use in a sealed or unvented room. Do not use in close proximity to an open flame or other ignition source.**

⚠ **CAUTION: DO NOT USE A FLAME OR OTHER IGNITION SOURCE WITHIN 10 INCHES (25 CM) OF THE OXYGEN VENT!**

### General Description

The Parker Balston H2-150 and H2-300 Hydrogen Generators are completely engineered systems designed to produce ultra-pure[1], dry hydrogen gas from deionized water and electricity. The hydrogen generator utilizes the principle of electrolytic dissociation of water and subsequent diffusion through a palladium membrane to generate ultra-pure hydrogen gas. The outlet pressure of the hydrogen generator is adjustable, and the generator can deliver hydrogen at pressures up to 60 psig (4.1 barg). The H2-150 has a hydrogen delivery capacity of 150 cc/min., and the H2-300 has a hydrogen delivery capacity of 300 cc/min. The high quality of the hydrogen produced by the Parker Balston Hydrogen Generators makes them a valuable addition to the analytical laboratory. The generators are ideal for use with high sensitivity Flame Ionization Detectors (FID's), Thermal Conductivity Detectors (TCD's), Trace Hydrocarbon Analyzers, and air pollution monitors. The ultra-pure hydrogen produced by the Parker Balston Hydrogen Generator may also be used to replace helium as a carrier gas in many GC applications.

The Parker Balston Hydrogen Generator has been certified to IEC 1010 Standards (CSA 22.2 No.1010.1-92) and UL standards (UL 3101-1). The generators bear the CSA and UL safety markings on the product label.

Note: Generators rated for 230 VAC service, carry the CE mark in addition to the CSA and UL marks.

1 The purity of the hydrogen gas produced by the Parker Balston Hydrogen Generator is in excess of 99.99998%.

The Parker Balston H2-150 and H2-300 Hydrogen Generators incorporate all the components necessary to convert deionized water into ultra high purity hydrogen gas using a nominal amount of electricity. The key operating components of the hydrogen generators are the electrolytic cell, the palladium membrane, and the pressure controller (see Flow Schematic, Figure 2).

## Electrolytic Cell

The electrolytic dissociation of water to produce hydrogen and oxygen takes place in the electrolytic cell of the Parker Balston Hydrogen Generator. The operational components of the cell are the anode and cathode. The anode is nickel. The cathode is palladium, formed into tubes. (See "Palladium Membrane" section below for further details.) The electrolysis reaction:

$$H_2O \longrightarrow H_2 + (1/2)O_2$$

takes place in the cell as electricity passes through the deionized water. During electrolysis, oxygen and other impurities collect at the anode and are subsequently vented from the generator. Hydrogen ions collect at the cathode and pass through the palladium tubes, driven by the applied electric potential. Inside the palladium tubes, the hydrogen recombines to form purified molecular hydrogen. The newly formed, ultra-pure hydrogen is under pressure and ready to deliver, in a controlled flow, to the required usage point.

## Palladium Membrane

The palladium membrane consists of bundles of palladium tubes. Because of its small atomic size, only hydrogen and its isotopes can pass through the palladium membrane; therefore, the hydrogen produced by the Parker Balston Hydrogen Generator is ultra-pure.

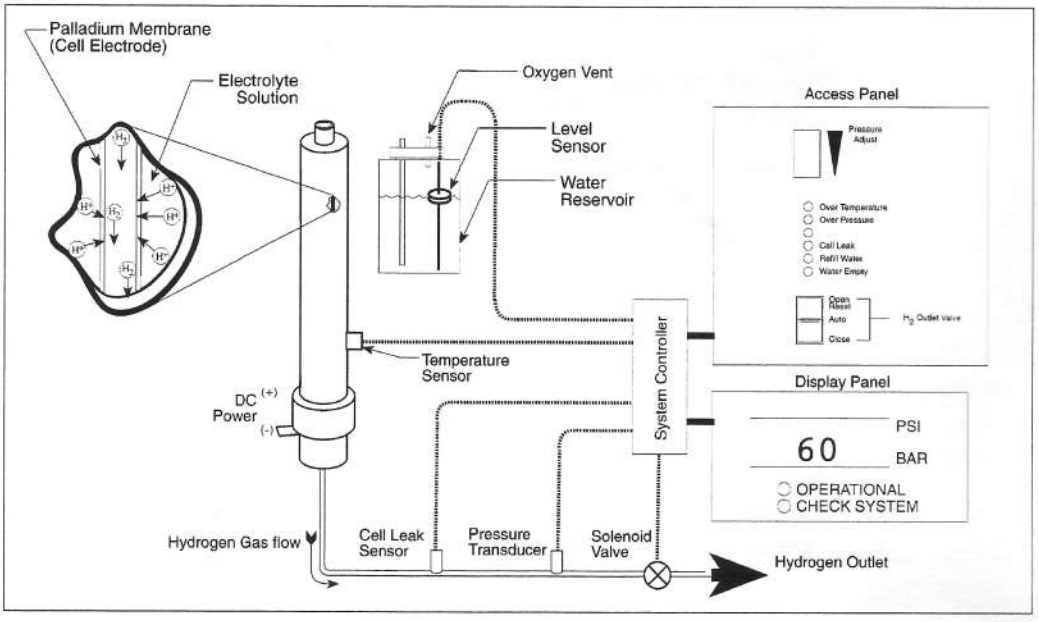



*Figure 2 - Flow Schematic*

## Pressure Controller

The hydrogen pressure at the outlet is regulated by an electronic pressure control circuit. A pressure transducer monitors the hydrogen pressure at a point between the cell and the outlet of the hydrogen generator. The control circuit adjusts the electrical current to the cell as needed to maintain the hydrogen set pressure.

# Safety Features/Diagnostics

The Parker Balston H2-150 and H2-300 Hydrogen Generators have been designed with great attention to safety. The key safety features include: minimal hydrogen storage capacity (only 50 ml), a hydrogen production control circuit, an electrolyte leak detector, an over temperature switch, a pressure sensor, and a low water shut-off control (see Figure 2). As a result of the minimal storage capacity and other safety features (detailed later in this text), the Parker Balston Hydrogen Generators comply with OSHA hydrogen safety requirements.

The Parker Balston Hydrogen Generators also have built-in system diagnostics to monitor the operation of the generator and to alert the operator in case of failure. There is an "Operating" indicator light and a "Check System" indicator light on the front panel of the generator to signal the operational status of the generator. When the system is operating properly, the "Operational" indicator light on the front panel is illuminated. If a system fault occurs, the "Operational" indicator light turns off, and the "Check System" indicator light illuminates. When the "Check System" indicator light is illuminated, one of the fault LED indicator lights (located under the top access panel, see Figure 3) will also be illuminated (see descriptions below). Refer to the Troubleshooting section (page 10) for actions to be taken in the event of a fault.

**Control Circuit**

The internal circuitry of the Parker Balston Hydrogen Generator controls the electrolytic cell current to a safe level, eliminating the possibility of excessive hydrogen production.

**Check Cell Indicator Light**

If electrolyte solution should pass through the system into the hydrogen output stream, the "Check Cell" indicator light (see Figure 3) will illuminate and the outlet solenoid valve will close, preventing damage to equipment installed downstream from the Parker Balston Hydrogen Generator.

**Over Temperature Indicator Light**

If the electrolytic cell exceeds its maximum temperature safety setpoint, the generator will shut down until the cell cools. When the generator shuts down as a result of excessive cell temperature, the "Over Temperature" LED indicator will illuminate.

**Over Pressure Indicator Light**

If the hydrogen supply line is over pressurized, the generator will shut down. When the generator shuts down as a result of excessive pressure in the hydrogen supply line, the "Over Pressure" LED indicator will illuminate.

**Refill Water Indicator Light**

If the water supply in the feed water bottle reaches a preset **refill** level (3-1/2 day supply), the "Refill Water" LED will illuminate and a slow, audible signal will sound. The system remains operational, and the "Operational" LED remains illuminated. The signal will be reset when the water bottle is completely refilled. (Press the red button under the cover to reset.)

**Empty Water Indicator Light**

If the deionized water supply in the feed water bottle reaches the preset **minimum** level, the "Empty Water" LED will illuminate, and the hydrogen generator will shut down. A rapid, audible signal will sound when the minimum water condition occurs. The generator will re-start and the audible signal will be reset as soon as deionized water is added and the water level reaches "Refill" or higher (after refilling, press the outlet valve switch to the "Reset" position). The Parker Balston Hydrogen Generator will run for 8-10 days (depending on ambient temperature, flow demand, etc.) at maximum flow on a full water bottle, before the "Empty Water" LED illuminates.

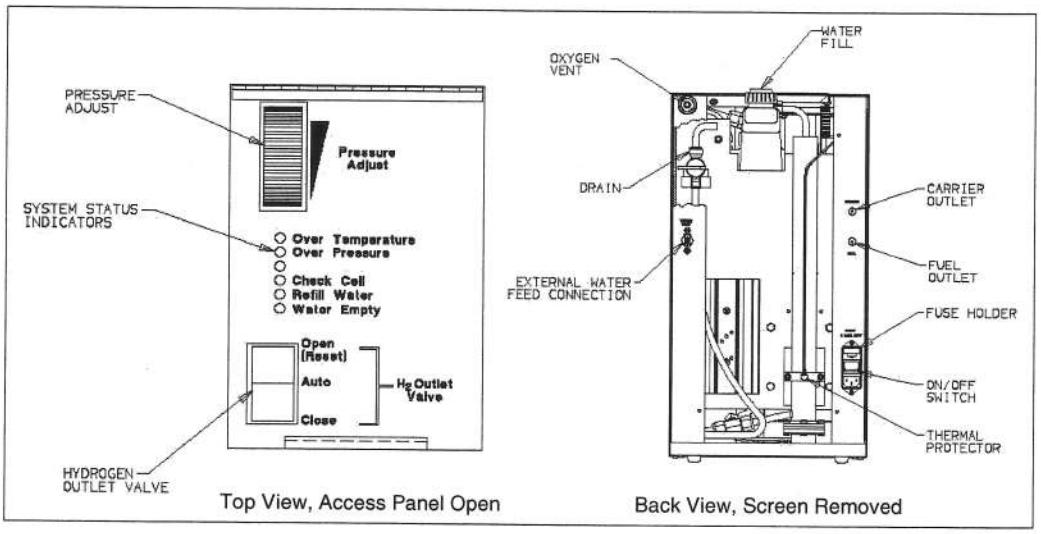



*Figure 3 - Detailed Views*

# Installation

**All installation, operation, and maintenance procedures for the Parker Balston Hydrogen Generator should be performed by suitable personnel using reasonable care.**

## Location

The Parker Balston H2-150 and H2-300 Hydrogen Generators are free-standing bench-top units. **Do not suspend the hydrogen generator from the wall or ceiling. Its weight and size could pose a falling hazard.** The generator should be located indoors, protected from severe weather conditions, and free from excessive ambient dust or dirt. **Do not install the generator outdoors.** The ambient temperature of the air surrounding the generator must be between 50°F and 104°F (10°C and 40°C). Place the hydrogen generator in an upright position, on a level surface, in close proximity to both the electrical power supply and the equipment requiring the hydrogen supply.

## Transporting

The Parker Balston Hydrogen Generator weighs 58 lbs. (26 kg.) Use proper equipment and lifting techniques for transporting this equipment to its installation location. The hydrogen generator is intended to remain stationary when filled with water and electrolyte. If necessary, the generator may be relocated over **short** distances when filled. **Do not grasp the front panel when moving the hydrogen generator.** Lift the generator by the metal case only. The generator should remain upright when moved. For long distance moves, the generator must be shut down and drained. (See Shutdown section of this manual.)

## Utilities

**Power** - The Parker Balston Hydrogen Generator may be operated by a 120 VAC or a 230 VAC, 50/60 Hz power supply. **(Note: Main supply line voltage must be within ±10% of the nominal rated voltage for the generator.)** See product label on the rear panel of the hydrogen generator for factory voltage setting. To connect the generator to the power supply, simply plug the female end of the electrical cord into the receptacle on the right side of the generator, and the opposite end into a three-pronged earthed power receptacle.

**Note: Protect the generator from sudden, transient fluctuations in electrical power by using a surge suppressor, line conditioner, or uninterruptible power supply. Parker recommends using a surge suppressor meeting the following specifications:**

| | |
|---|---|
| **Joule Rating** | **1000 or greater** |
| **Surge Amps** | **84,000 or greater** |
| **Max Noise Reduction** | **80+ (db)** |

**Deionized Water** - The Parker Balston Hydrogen Generator must be supplied with deionized water on a regular basis. The water should be **5 Megohm-cm**, or better quality deionized water.



**Caution: Do not use tap water or deionized water with less than 5 Megohm-cm resistivity. Metallic ions and suspended solids present in substandard water may poison the palladium membrane, rendering the cell inoperable. If the generator is operated with any liquid other than 5 Megohm-cm (or better) deionized water, the warranty will be void.**

**Piping** - The outlet connections for the Parker Balston Hydrogen Generators are a 1/8" compression fitting. All tubing and fittings downstream from the hydrogen generator should be clean stainless steel to minimize contamination of the hydrogen stream. If copper tubing has been used with hydrogen in the past and has yielded acceptable results, there is no need to alter an existing piping configuration to install the Parker Balston Hydrogen Generator. The piping configuration for the hydrogen delivery system should include a means for venting subpurity hydrogen generated during system warm-up. This may also be accomplished by disconnecting the downstream instruments.

Parker strongly recommends the installation of a shutoff valve and pressure regulator at the process or instrument being supplied with hydrogen from the generator. (If the process or instrument has its own internal shutoff valve and pressure regulator to isolate it from the hydrogen line, this installation is unnecessary.)

## Piping for Carrier Gas and Fuel Applications

For convenience, the hydrogen stream from the Parker Balston Hydrogen Generator is manifolded for carrier and fuel gas applications. There is no difference in hydrogen quality between the two ports. The generator is shipped with a 1/8" ferrule fitting on the fuel gas port and a pipe plug on the carrier gas port. If hydrogen is being used as a carrier gas, simply remove the pipe plug from the carrier port and replace with the nut and ferrule supplied in the accessories bag. **(Note: If one port is not being used, it must be capped.)** The combined flow from the carrier and fuel gas ports must not exceed the capacity of the generator.

# Installation

## Oxygen Venting

Parker recommends venting the oxygen port on the generator to the room. If the exhaust from the generator must be piped to an exhaust hood, the line from the generator exhaust should have a continuous upward or downward slope. Piping in this manner will prevent potential damage to the cell resulting from backpressure buildup in the exhaust line. **Under no circumstances should the generator exhaust be exposed to an open flame. This could pose a fire hazard. Also, if an exhaust hood is used, the hood should be equipped with an explosion-proof fan to prevent the explosion hazard of a spark.**

**Warning: Do not block oxygen vent. Blockage may cause excess internal pressure which will seriously damage the unit and void the warranty. To ensure safe operation of and prevent potential damage to the Parker Balston Hydrogen Generator, do not vent multiple generators in a common line to an exhaust hood. Pipe each generator vent separately to the exhaust hood.**

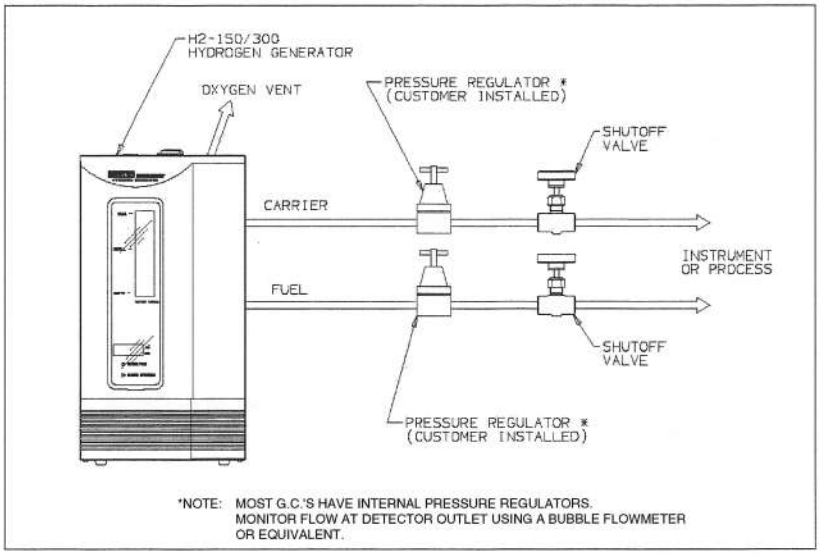



*Figure 4- Recommended Installation*

# Operation

**Caution: Electrolyte solution is a specially prepared solution of sodium hydroxide and may be dangerous if handled improperly. Read the Material Safety Data Sheet (MSDS) which is shipped with the Electrolyte solution prior to handling it. Always use eye protection and neoprene or butyl gloves when handling the electrolyte solution. A source of cool, clean, running water should be in close proximity to the area where electrolyte solution is being handled. In the event of a spill or splash, refer to the MSDS for remedial action procedures.**

**All preparation and start-up activities should be performed before the hydrogen generator is connected to the electrical supply and the downstream equipment or process.**

## Preparation

Remove adhesive label (on water bottle cap) and plastic cap (on oxygen vent port) from generator and discard. Open the bottle of Electrolyte Solution (P/N 920071, shipped with the generator) and set aside. Next, remove the water fill cap (on the back of the generator). Slowly pour the electrolyte solution into the feed water opening using a funnel. **Use extreme care to avoid spills when pouring electrolyte solution** (see warning message, above, for proper handling of electrolyte solution and possible spills). Allow the electrolyte to settle, and fill the generator with 3.0 liters of deionized water **(5 Megohm-cm or higher).** The level indicator on the front panel should be approximately 1" above the "Refill" level. Maintaining a high concentration of electrolyte in the cell during the first 48 hours of operation will minimize the start-up time of the generator and improve performance of the cell during use. During the initial 48 hours of operation, fill the generator with deionized water, if needed, but only to 1" above the "Refill" level. Press the red button under the cover to reset. After the initial 48 hour warm-up period, fill the generator to the "Full" level and continue operation.

**Note: Failure to use a funnel may result in caustic spills and damage to the hydrogen generator. If the funnel is used for chemicals other than the Electrolyte Solution and deionized water, contamination of the deionized water, electrolyte solution, or hydrogen generator may occur. If the generator fails as a result of contamination, the warranty will be void.**

Connect the generator to its electrical supply and turn the power switch on.

## Filling the Water Tank

If the water level becomes too low or the water quality is insufficient, the generator will automatically shut down. Water quality is determined by the electrical conductivity of the water, and should have an initial resistivity of at least 5 meg-ohms/cm, with several meg-oms desirable.

You may be using one of these three methods of supplying water to the generator:

- Use Parker Balston HydroGenMate for automatic water feed
- Manually filling tanks
- Gravity feed from an external reservoir

Follow the directions below that apply to the method that you are using.

## Manual Feed

For manual water feed installations, no plug/fitting is required for the water feed port.

1. Unscrew the fill cap on the water tank at the rear of the unit.
2. Fill the tank with deionized water until the water is at the "FULL" line.

Note: Follow "Preparation" instructions on first time startup.

***Caution:*** *Do not overfill the water tanks. The water level should be kept below the port on the top inside of the tank.*

## Gravity Feed from External Reservoir

1. With the round external water fitting connected to the Water Inlet Port on the back of the generator (see Figure 5), fill the external reservoir with deionized distilled water. The "external water insert" is supplied with a length of Tygon™ tubing for connection to the reservoir.
2. Check to make sure that the water level in the generator is initially steady at the "FULL" line.

## External Pressurized Source

When connected to a pressurized water source (maximum pressure is 100 psig), you must use a recirculating loop at the generator to ensure that only fresh deionized, distilled water is used.

1. With the hexagonal external water fitting connected to the Water Inlet Port on the back of the generator (see Figure 5), connect the generator to the pressurized source and turn on the water supply. The "external water insert" is supplied with a length of Tygon™ tubing for connection to the water source.
2. Check to make sure that the water level in each tank in the generator is initially steady at the "FULL" line. Approximately four liters of water are required to completely fill the generator.

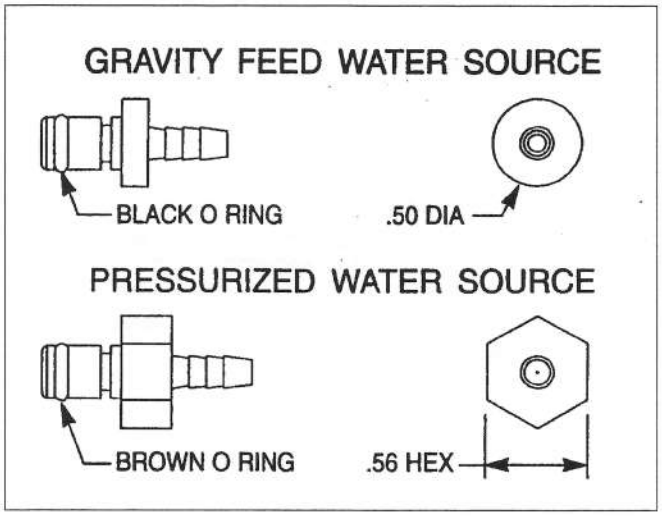



*Figure 5- External Water Fittings for Gravity or Pressure Feed*

## Controls

**Hydrogen Pressure -** The hydrogen delivery pressure may be adjusted using the pressure adjust knob located beneath the access panel on the top of the generator (see Figure 3). During pressure adjustment, the pressure LED display will show the pressure setting and the units LED display will flash ("PSI" or "BAR"). The LED will stop flashing approximately 20 seconds after pressure adjustment. The digital pressure display will automatically switch to display the actual system pressure after the flashing stops.

**Hydrogen Flow -** The hydrogen outlet valve is controlled by a switch located beneath the access panel on the top of the generator. To open the outlet valve and initiate flow, simply press the switch to the "OPEN" position. When the switch is released, it will move to the "AUTO" position. While operating in the "AUTO" position, the hydrogen outlet valve will remain open. If a fault in the operation of the system occurs, the "Check System" light on the front panel will illuminate and a system diagnostic light beneath the top panel will also illuminate (see the Troubleshooting section of this manual for procedures to follow in the event of a system fault). For temporary shutdowns, move the switch to the "CLOSED" position. When the switch is closed in this manner, the generator will maintain its internal pressure.

## Startup

Set the hydrogen pressure adjust knob to the desired output pressure and set the hydrogen output switch (see Figure 3) to the "OPEN" position. The solenoid valve will open, and the "Operational" indicator light will illuminate. Using a flow controller or needle valve, set the warmup flow to 80-85% of the total generator capacity. Open the downstream vent valve(s) to purge the lines (see Figure 4). Hydrogen output will begin approximately 10 minutes after powering the unit on, and will increase to its rated capacity and purity in 2 to 4 hours. Over this period of time, the cell will warm up and all piping will be purged to prepare for high purity hydrogen delivery.
During warm-up, the digital pressure display will show zero psi (or bar) because there is no backpressure in the hydrogen line until the output valve is closed.

After the generator has warmed up (2 hours minimum) and the lines have been purged, connect the piping to the instrument or process which requires high purity hydrogen. Allow pressure to build in the line before initiating flow through the instrument or process. The digital pressure displayed slowly increases until the hydrogen lines reach the set pressure. The amount of time required to fill the line is dependent on the length and diameter of the piping used.

**Note:** The quality of the delivered hydrogen gas depends on the cleanliness of the delivery lines and accessories, both internal and external to the Parker Balston Hydrogen Generator. Leaks, traces of moisture, air, reducible oxides, and other contaminants must be flushed out of the system before the purity of the delivered hydrogen meets specifications.

## Operation



**Operate the Parker Balston Hydrogen Generator continuously for optimal hydrogen output and cell longevity.** On a regular basis, monitor the water level and operational status. After the initial 48 hours of operation, fill the generator with deionized water (**5 Megohm-cm or higher**), on an as needed basis, filling until the level indicator on the front panel is at or slightly beyond the "Full" level. **Do not overfill.** Monitor the hydrogen consumption of the downstream equipment to ensure flow is within the capacity of the generator (i.e., 150 cc/min. for the H2-150, and 300 cc/min. for the H2-300). The "Operating" LED indicator light should be illuminated while the solenoid valve switch is in the "Open" position.

**Note:** It is not unusual for a faint mist to vent from the generator vent port during operation.

If there is a power interruption during operation, the generator will power up in the "OFF" position when power is restored. If the built-in system diagnostics trigger a fault LED to illuminate, consult the Troubleshooting and Service section of this manual for further instructions.

## Temporary Shutdown

To maximize the life of the palladium membrane, the Parker Balston Hydrogen Generator should be run continuously. If the hydrogen generator must be shut down for **short periods** of time (e.g., **overnight**), leave the power switch in the "on" position, set the output pressure to 30 to 40 psig (2.0 to 2.7 Bar) psig, and move the hydrogen output switch to the "closed" position. Shutting the unit down in this manner will minimize water and energy consumption.

**Note: When the hydrogen outlet valve is closed, the pressure inside the generator (and the digital pressure display) may increase to 75 psig to 80 psig (5.1 to 5.5 bar).**

## Shutdown

If the hydrogen pressure exceeds 80 psig (5.5 bar), when the outlet valve is closed, turn the pressure control knob until the pressure display reads 30 to 40 psig (2.0 to 2.7 bar). This pressure adjustment will release the residual hydrogen trapped in the palladium wall and the pressure will drop to be below 80 psi (5.5 bar). If the "Overpressure" LED illuminates, see the Troubleshooting section at the end of this manual.

To re-start the Parker Balston Hydrogen Generator after a temporary shutdown, switch the hydrogen outlet valve to "Open", set the hydrogen output pressure to the desired reading, and adjust the flow using the (customer-provided) flow control device. If the cell has cooled during the shutdown period, the hydrogen generator will require 2 to 4 hours to achieve its specified hydrogen flow rate.

### Long Term Shutdown/ Product Shipment

If the Parker Balston Hydrogen Generator is being shut down for shipment or for storage for an extended period, then the system must be drained and plugged. Instructions for long term shutdown and plugs may be requested from Parker Hannifin Corporation. **Failure to drain the generator prior to long term shut down will damage the electrolytic cell and void the warranty.**

## Maintenance



**All maintenance activities should be performed by suitable personnel using reasonable care.**

**To avoid electrical shock, disconnect power before servicing the generator.**

The primary maintenance activities required by the Parker Balston Hydrogen Generator are filling the feed water bottle and changing the electrolyte solution. If necessary, the Parker Balston Hydrogen Generator may be wiped clean with a dry cloth on an as needed basis. **Do not use water, aerosols, or other cleaning agents to clean the unit.** Use of any liquid detergent to clean the generator could present an electrical hazard.

### Water

If the Parker Balston Hydrogen Generator is operated 24 hours per day at its rated maximum flow rate, the water in the feed water bottle should last for 8 to 10 days. Parker Balston recommends checking the water consumption rate on a routine basis until a filling schedule can be established. (Note: If auto water fill is used this is not necessary.) Ambient temperatures will affect water consumption, and these conditions should be taken into consideration when planning a refill schedule for the hydrogen generator.

As needed, slowly refill the water reservoir with deionized water, using a funnel, to the "Full" mark. Do not overfill. Use deionized water with a rating of **5 Megohm-cm** or better. Failure to use a funnel may result in spills and subsequent damage to the generator (see warning on page 5). If the water supply is depleted beyond the refill level, the "Refill Water" LED will illuminate and the hydrogen generator will generate an audible signal.

**Note: If the audible alarm does not stop beeping after refilling, depress the hydrogen outlet valve switch to the "Reset" position.**

If the water is not refilled before it drops to the minimum level, the "Water Empty" light will illuminate and the system will safely shut down and a more rapid audible signal will sound.

### Electrolyte Solution

The electrolyte solution must be changed once each year to maintain efficient operation of the hydrogen generator. If the electrolyte is not changed at this interval, the gradual formation of sodium carbonate ($Na_2CO_3$) and the contamination of the electrolyte by trace impurities in the deionized water could adversely affect the operational characteristics and life of the electrolytic cell.



**Caution:** The electrolyte is a specially prepared solution of sodium hydroxide and may be dangerous if handled improperly. **Read the MSDS accompanying the electrolyte solution for proper handling and disposal procedures. Always use eye protection and neoprene or butyl gloves when handling the electrolyte solution. In the event of a spill or splash, refer to the MSDS accompanying the electrolyte solution for remedial actions.**

**Electrolyte solution drained from the generator must be disposed of according to the standards defined in the MSDS.**

**Note: Before changing the electrolyte, turn the Parker Balston Hydrogen Generator off and disconnect it from its power source and all downstream equipment. Allow the unit to cool at least 4 hours, preferably overnight**. If the cell is drained too soon after shutdown, the hydrogen which saturates the palladium membrane will be released too quickly and will react with the oxygen in the air. This is a vigorous reaction which will heat the palladium and permanently damage the cell. If the cell is allowed to cool slowly, however, the hydrogen will be gradually released from the palladium and the threat of cell damage will be eliminated.

## Supplies

**Protection -** Eye protection and neoprene or butyl gloves (see warning notice above.)

**Electrolyte -** One bottle of Parker Balston Electrolyte Solution (P/N 920071).



**Note: Use only Electrolyte Solution from Parker Balston to replace electrolyte. Use of any substitute will damage the unit and void the Parker Balston warranty.**

**Miscellaneous -** Phillips head screwdriver, polyethylene catch basin (3-5 liter capacity), and funnel.

## Procedure



**NOTE: TO MINIMIZE EXPOSURE OF THE PALLADIUM MEMBRANE TO AIR, STEPS 2 THROUGH 5 (BELOW) MUST BE PERFORMED WITHOUT INTERRUPTION. ALLOW ENOUGH TIME (10 MINUTES) TO FINISH THIS PROCEDURE WITHOUT A BREAK.**

**PLEASE REVIEW THE FOLLOWING PROCEDURE AND HAVE ALL SUPPLIES READILY AVAILABLE PRIOR TO CHANGING ELECTROLYTE. FAILURE TO FOLLOW THE ELECTROLYTE CHANGE PROCEDURE AS DOCUMENTED WILL DAMAGE THE HYDROGEN CELL AND VOID THE WARRANTY.**

The procedure for changing the electrolyte is as follows:

1. Turn off the Parker Balston Hydrogen Generator, disconnect it from the power supply, and allow it to cool for four hours, preferably overnight. Remove the back panel from the unit by removing the four panel screws.
2. Open electrolyte solution. Remove water fill cap from generator and insert funnel.
3. Remove the drain valve assembly from its holder and open the drain valve to empty contents to the catch basin. Close the drain valve when draining is complete. Quickly replace the drain assembly into its holder.



**It is against federal regulations to dispose of the sodium hydroxide waste by dilution. Consult federal, state, and /or local guidelines for acceptable disposal methods.**

4. **Immediately**, pour one bottle of Electrolyte Solution (P/N 920071) into the generator through the funnel.
5. Fill the generator with deionized water, until the level indicator on the front panel is 1" above the "Refill" level (approximately 3 liters), as detailed in Preparation section (page 5) of this manual. Do not overfill.
6. Restart the generator following the instructions detailed in the Start-up section of this bulletin (page 6). Allow 2 to 4 hours for generator to reach flow and pressure specifications. During the first 48 hours of operation, add deionized water, if needed, filling only until the level indicator is 1" above the "Refill" level.



**This equipment has fuses in both neutral and phase lines. Use care when servicing.**

## Fuse Replacement

Occasionally, one or both of the fuses in the generator may burn out. The fuses are located in the power receptacle on the left hand side of the generator. **Before servicing the fuses, turn the generator off and disconnect the power cord from the power supply and the generator power receptacle.** Both fuses should be checked each time fuse replacement is warranted. To access the fuses, use a small screwdriver to remove the holder located in the power receptacle of the generator. Replace either one or both fuses as necessary and re-assemble.



**For continued protection against risk of fire, replace only with fuse of specified rating.**

| Replacement Parts | P/N |
|---|---|
| Electrolyte Solution | 920071 |
| Fuses | 13216 |

# Specifications and Ordering

## Principal Specifications

| Model Number | H2-150 Hydrogen Generator | H2-300 Hydrogen Generator |
|---|---|---|
| **CSA Certification Standard** | CAN/CSA C22.2 No.1010.1-92 → | |
| **IEC Certification Standard** | IEC 1010-1/EN61010-1 → | |
| **IEC 1010 Installation Category** | Category II → | |
| **IEC 1010 Pollution Degree** | Degree 2 → | |
| **UL Certification Standard** | UL3101-1 → | |
| **EMC Standards** | CISPR11/EN55011/EN50082-1 → | |
| **Hydrogen Purity** (see footnote, page 1) | 99.99999% | 99.99999% |
| **Max Flow Rate** (@ 60 psig) | 150 cc/min | 300 cc/min |
| **Discharge Pressure** | 0 to 60 psig (0-4.1 barg), regulated | 0 to 60 psig (0-4.1 barg), regulated |
| **Outlet Ports** | 1/8" compression | 1/8" compression |
| **Water Requirements** | Deionized Water, 5 Megohm-cm or higher → | |
| **Altitude** | 2000 m | 2000 m |
| **Max Ambient Relative Humidity** | 80% | 80% |
| **Min/Max Ambient Temperature** | 50°F/104°F (10°C/40°C) | 50°F/104°F (10°C/40°C) |
| **Electrical Requirements** (1) | See table below | See table below |
| **Power Consumption** (@ max. flow) | 3.15 Amps @ 120 VAC / 1.8 Amps @ 230 VAC → | |
| **Dimensions** | 22"h x 12"w x 12"d (56 cm x 30 cm x 30 cm) → | |
| **Shipping Weight** | 58 lbs (26 kg) | 58 lbs (26 kg) |
| **Fuse Type-NA, 120 VAC units** | Type T, 3.15 amp → | |
| **Fuse Type-UK, EU, 220 units** | Type T, 3.15 amp → | |

## Ordering Information

| Model Number | Description |
|---|---|
| **H2-150NA** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 120 VAC 50/60 Hz (1) |
| **H2-300NA** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 120 VAC 50/60 Hz (1) |
| **H2-150UK** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 230 VAC 50/60 Hz, UK cord set (1) |
| **H2-300UK** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 230 VAC 50/60 Hz, UK cord set (1) |
| **H2-150EU** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 230 VAC 50/60 Hz, European cord set (1) |
| **H2-300EU** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 230 VAC 50/60 Hz, European cord set (1) |
| **H2-150-220** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 230 VAC 50/60 Hz, IEC connector (1) |
| **H2-300-220** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 230 VAC 50/60 Hz, IEC Connector (1) |
| **H2-150JA-100** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 100 VAC, 50/60 Hz, JA 100 cord set (1) |
| **H2-300JA-100** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 100 VAC, 50/60 Hz, JA 100 cord set (1) |
| **H2-150JA-200** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 200 VAC, 50/60 Hz, JA 200 cord set (1) |
| **H2-300JA-200** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 200 VAC, 50/60 Hz, JA 200 cord set (1) |
| **H2-150AU** | Parker Balston Hydrogen Gas Generator, 150 cc/min, 230 VAC, 50/60 Hz, Australian cord set (1) |
| **H2-300AU** | Parker Balston Hydrogen Gas Generator, 300 cc/min, 230 VAC, 50/60 Hz, Australian cord set (1) |

(1) Main supply line voltage must be within ±10% of nominal rated voltage for the generator.

# Troubleshooting and Service

**All troubleshooting activities should be performed by suitable personnel using reasonable care.**



**Warning: Any troubleshooting or service activity which requires removal of the generator cover should be done using extreme caution. Exposed AC may be present.**

| Symptom | Course of Action |
|---|---|
| **No Power** | Check power source and connection to power source.<br>Check internal connections: power switch, terminal connections, power cord, and IEC fuses. Replace fuses if necessary (P/N 13216). Use only fuses with the proper rating. |
| **Refill Water Indicator Light Illuminated** | Completely fill feed water bottle with deionized water. |
| **Empty Water Indicator Light Illuminated** | Fill generator with deionized water and re-start. Press Reset button.<br>Water level sensor inoperative or control board failure.(1) |
| **Low Output Pressure or Capacity** | Hydrogen demand exceeds generator capacity, check capacity of unit and install flow control device.<br>Check external system piping for leaks.<br>Check internal system piping for leaks. |
| **No Hydrogen Delivered** | Check power (see above).<br>Check water level. Generator may have run out of water and shut down.<br>Check generator and piping for leaks. |
| **Moisture or Impurities in Output** | Check for leaks (could cause impurities up to 1000 ppm).<br>Gross moisture (visible drops in system, after warm-up) could indicate cell rupture.(1) |
| **Electrolyte Seeping from Cell Flange** | Call Parker Balston for service .(1) |
| **Over Temperature Indicator Light Illuminated** | Change electrolyte if generator is within 3 months of annual electrolyte replacement date.<br>Consult factory. |
| **Over Pressure Indicator Light Illuminated after shutdown** | Open the output valve. Set pressure to zero, wait 1-2 minutes. Close the output valve (if shutting down). Press the reset button (if restarting generator). |
| **Check Cell Indicator Light Illuminated** | Consult factory. |

**Notes**
**1** To arrange for system service, contact the Technical Services Department at 1-800-343-4048, 8AM-5PM Eastern Time (North America only). For other locations, please contact your local representative.

## Don't Forget To:

1 Complete and mail your registration card.

2 Keep your product certification in a safe place.

3 Call the Technical Services Department at **800-343-4048,** 8AM to 5PM Eastern Time (North America only) with any questions. For other locations, please contact your local representative.

## Serial Numbers

The serial number for the unit is attached to the back panel. For your own records, and in case service is required, please record the following:

DATE IN SERVICE _____ SERIAL NO._____

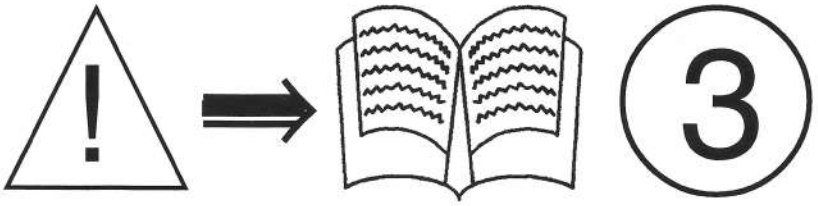
**Please have the serial number available when calling for assistance.**

## WARRANTY (NORTH AMERICA ONLY)

**(FOR INFORMATION CONTACT YOUR LOCAL REPRESENTATIVE)**

Parker Hannifin guarantees to the original purchaser of this product, that if the product fails or is defective within 12 months from the date of purchase, when this product is operated and maintained according to the instructions provided with the product, then Parker guarantees, at Parker's option, to replace the product, repair the product, or refund the original price for the product. This warranty applies only to defects in material or workmanship and does not cover: ring and valve wear on compressors, routine maintenance recommended by the instructions provided with this product, or filter cartridges. Any modification of the product without written approval from Parker will result in voiding this warranty. Complete details of the warranty are available on request. This warranty applies to units purchased and operated in North America.

## Explanation of Warning Symbols

| Symbol | Description |
|---|---|
|  | Caution, refer to accompanying documents for explanation. |
|  | Refer to Installation and Operation Manual, warning note #3 for explanation. |
|  | Caution, risk of electric shock. |
|   | Surface may be hot and could cause burns to the skin (found on inside of some units). |
|  | Under certain conditions, metal cabinet will be warm to touch (70°C). |

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Printed in U.S.A. Bulletin TI-H2-150/300A

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