

Parker Balston® H2-90 and Parker ChromGas 9090, 9150, 9200 and 9400 Hydrogen Generator Models



Figure 1 - Hydrogen Generator with flow bar graph and water check— Models 9150, 9200 and 9400 only.



THIS PRODUCT IS SHELF LIFE SENSITIVE. DO NOT STORE FOR MORE THAN 3 MONTHS PRIOR TO INSTALLATION AND OPERATION. These instructions must be thoroughly read and understood before installing and operating this product. Any modification of the product will void the warranty. Failure to operate this product in accordance with the instructions set forth in this manual could jeopardize the safety of the operator.

If you have any questions or concerns, please call Technical Services Department at 800-343-4048, 8AM to 5PM Eastern Time (North America only) or email at: balstontechsupport@parker.com. For other locations, please contact your local representative or email at pagservicesupport@parker.com.

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



Normal precautions for any hydrogen supply should be taken when using the hydrogen generator. **DO NOT USE IN A SEALED OR UNVENTED ROOM.**



CAUTION: DO NOT USE AN OPEN FLAME OR OTHER IGNITION SOURCE WITHIN 10 INCHES (25cm) OF THE OXYGEN VENT!

General Description

The Hydrogen Generator Models H2-90, 9090, 9150, 9200, and 9400 (see Figure 1), are completely engineered systems designed to produce ultra-pure, dry hydrogen gas from deionized water using a Proton Exchange Membrane Cell. The hydrogen generator utilizes the principle of electrolytic dissociation of water and hydrogen proton conduction through the membrane. The hydrogen stream is dried using a coalescing filter, a drying tube, and desiccant. The outlet pressure of the unit is 90 psig (6.2 barg) with a maximum hydrogen delivery flow rate of 90 cc/min for Models H2-90 and 9090, 160 cc/min for Model 9150, 250 cc/min for Model 9200, and 500 cc/min for Model 9400.

The hydrogen generators are ideal for use as fuel gas in Flame Ionization Detectors (FIDs), Trace Hydrocarbon Analyzers, and other general laboratory equipment requiring a source of pure hydrogen.

Regulatory Compliance

The H2-90, 9090, 9150, 9200, and 9400 Hydrogen Generators are certified to the electrical safety requirements as specified by the IEC, CSA, and UL standards. These units bear both the CSA and UL markings on the product label. Product supplied to Europe carries the CE mark (230 VAC units only). The generators meet EMC compliance.

Bulletin TI-H2-90H

Installation

General

Note: All installation, operation and maintenance activities for the hydrogen generators should be performed by suitable personnel using reasonable care.

The hydrogen generators are free-standing bench-top units. **Do not suspend the 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 40 - 100°F (4 - 38°C). **Do not place the generator in an area where there is a chance of freezing.** 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 hydrogen.

Symbols

See end of Manual for a list of the symbols displayed on the generator and referred to in this Manual.

Transporting

The hydrogen generator weighs 40 lbs (19 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. If necessary, the generator may be transported over short distances when filled. Do not grasp the front panel when moving the generator, **lift only from the bottom.** Keep the generator in an upright position.

Preparation

Remove all red tape from the top cover, the back panel and on any other surfaces. Remove the red cap sealing the hydrogen outlet fitting on the back of the unit.

Desiccant - Wipe any drops of moisture with a lint-free cloth or paper towel from the desiccant cap and housing. Remove the desiccant cartridge from the sealed bag. Use a drop of deionized water to wet the o-rings. Insert the cartridge into the housing, nipple end first (see Figure 3). Firmly push down on the cartridge to create a hydrogen-tight seal at the bottom of the housing (see Figure 4), making sure the cartridge is seated.

Before replacing the desiccant cartridge cap, make sure the large Vitor® o-ring is centered inside the cap (See Figure 5). Screw the cap on and tighten securely by hand. Make sure that the o-ring is still centered and that the o-ring has created a dark ringed seal.

Note: Most leaks occur due to improper sealing of the cap to the housing on the desiccant cartridge.

Deionized Water Bags - Remove the deionizer bags from the plastic shipping container and inspect for holes or tears. Insert the "T" end of the plastic cable running through the deionizer bag into the hole of one of the water reservoir caps (see Figure 6). Pull the "T" end through the hole to the outside of the cap. Repeat for the other cap. Do not let any foreign material fall into the water bottles. Insert one bag into each water reservoir.

Utilities

Power - The hydrogen generators may be operated by a 100-120 / 200 -240 VAC, 50-60 Hz single phase power supply. To connect the generator to the power supply, simply plug the female end of the electrical cord into the receptacle on the back of the generator, and the opposite end into a three-pronged grounded power receptacle. **The power receptacle must be protected from voltage surges.**



Deionized Water - The hydrogen generator must be supplied with deionized water with a resistivity of at least 2 MegOhm/cm. The use of water with a value less than 2 megOhm/cm will damage the cell and void the warranty. Parker Hannifin provides a point of use accessory, the HydroGen™ Mate (P/N 72-230), that produces high purity water (>5 MegOhm/cm) from tap water for manually filling the generator.



Caution: Cell contamination is a cumulative and irreversible process, which will eventually cause an over-voltage, automatically shutting down the generator. The deionizer bags are for a final decontamination stage and should not be used to purify low grade water.

Piping - The outlet connection for the hydrogen generator is 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 hydrogen generator.

Pressure Regulator - The pressure is controlled using the **Pressure Adjust** control knob located on the front panel, exposed when opening the front gray panel door (see Figure 7). The pressure can be monitored using the gauge located on the front. **Do not set pressure regulator higher than 90 psi.** There is a **Pressure Relief** valve that is set for 125 psig (8.6 barg) in case of internal pressure build up. The expelled gas is channeled through the Pressure Relief Port located on the back of the unit.

Shutoff Valve - The generator includes a shutoff valve located on the front panel behind the gray door (see Figure 8). Use this valve to shut the unit off when not in use. In case of extended periods of downtime see the Operation / Shutdown / Storage sections of this manual.



Figure 2 - Unscrew cap to the desiccant cartridge housing.



Figure 3 - Insert new desiccant cartridge into housing, nipple end first.



Figure 4 - Press down firmly on the top of the desiccant cartridge to seat the o-ring on the bottom of the housing.



Figure 5 - Make sure the o-ring is centered in the cap before replacing it.



Figure 6 - Insert the "T" end of the deionizer bag through the bottom of the water bottle cap.

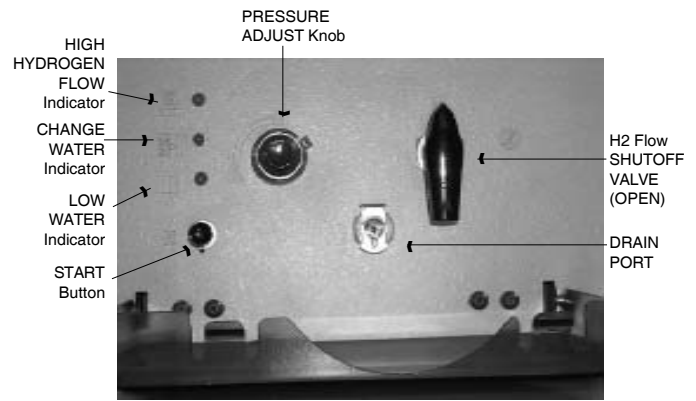


Figure 7 - Control and Fault Indicator lights located behind the front gray panel.

Startup

Water Reservoir

After carefully following all the preparation procedures in the Installation section, open the top panel and remove the water reservoir caps with the deionizer bags already attached. Fill both reservoirs with deionized water until the level in the tank reaches the "Full" mark. It will take approximately 4 liters of deionized water to fill the generator.

Remove the plug on the drain port located behind the gray front panel of the generator (see Figure 7). Insert the drain tube fitting (with drain tube attached) into the drain port and remove about 100 ml of water to test the check valve (see Figures 8, 9).

Note: The generator will automatically shut down if the water level becomes too low, or the water quality is not sufficient.

Make sure that the deionizer bags are fully immersed in the water and that they do not block the outlet port on the bottom. Do not block the small vent hole in the water reservoir cap with the "T" fitting or anything else. Be sure to remove all of the red tape that was applied to the unit for shipping purposes. **Do not let the deionizer bags dry out.**

Initial Startup

Open the gray panel door on the front of the generator to expose the generator controls (See Figure 8).

- 1 Turn the **Shutoff Valve** to the closed position (see Figure 7 showing the valve in the Open position).
- 2 Connect the electrical power cord to the generator receptacle, and connect the other end to a surge protected wall receptacle. Turn the **Power Switch ON** (located in the rear of the generator, in the power receptacle).
- 3 Set the **Pressure Adjust** control (see Figure 7) to the desired pressure setting using Table 1 as an approximate guide.

Note: The **Pressure Adjust** control is marked in divisions from 1 to 1000. The hundreds are read in the window on top of the control, the tens are read from the numbers on the dial face, and the single units are interpolated using the hash marks between the tens. Use the small lever on the side of the control to lock the dial.

TABLE 1- Pressure Adjust Knob Settings

Desired Pressure	Typical settings (Divisions)
20 psig	185 - 210
30 psig	280 - 310
40 psig	375 - 410
50 psig	470 - 515
60 psig	565 - 615
70 psig	655 - 720
80 psig	750 - 820
90 psig	845 - 925

- 4 Press the **Start** button located in the lower left hand corner of the front panel (see Figure 8). The **Hydrogen Flow Indicator** light will illuminate on the front panel.

Note: The generator is now producing hydrogen at the requested pressure. As the unit approaches the desired pressure, the **Hydrogen Flow Indicator** light may flicker, dim or even go out. This is normal operation. It will take approximately 15 minutes to reach full operating pressure internally.

- 5 Connect the external piping to the generator. While monitoring the **Output Pressure Gauge** on the front panel, slowly turn the **Shutoff Valve** to the OPEN position (see Figure 7).
- 6 The pressure will drop initially, the magnitude of which is dependent upon the length and diameter of tubing used, and volume of the connected equipment downstream. After a short time the pressure should begin to recover. Once pressure has recovered, open the outlet valve a little more and wait for pressure to recover again. Eventually the outlet valve will be fully open and the pressure will be at the setpoint.

Mass Leak

Follow the instructions listed in the Initial Startup section. If the pressure continues to drop, the **High Hydrogen Flow** (Mass Leak) light will illuminate (see Figure 7). A Mass Leak may be caused either from a leak in the piping to the equipment or it may indicate that the volume being filled is too large for the generator. If it is determined that a Mass Leak is present, please follow the procedure below:

- 1 Close the **Shutoff Valve** (see Figure 7, shown in the OPEN position).
- 2 Press the **Start** switch to reset the Mass Leak detector which is indicated by the High Hydrogen Flow indicator light turning off (see Figure 7).
- 3 Re-pressurize the generator.
- 4 Repeat the Initial Startup procedure three times to verify the leak.

If the system continues to detect a leak, check all the external tubing connections and make sure that the volume is not too large for the generator purchased. If the leak persists, check the fittings inside the generator, especially the o-ring seal on the desiccant cap. Make sure the desiccant cap is tight.

If there are no leaks found in internal or external connections, install a flow control valve or needle valve downstream from the generator, as close to the outlet as possible. Set the flow control for the desired flow rate making sure not to exceed the maximum flow rate of the generator.



Caution: Do not use commercial leak detection fluids on any Lexan® plastic parts in the generator. These fluids may cause cracking and crazing which results in leaks. Use a solution of 4-5 ml of liquid dish soap in one liter of water.



Caution: Use extreme care when checking for internal leaks. Due to the nature of the gases involved use a protective face shield or other appropriate equipment whenever servicing or troubleshooting the generator with the cover removed.



Figure 8 - Insert the Drain Port Insert along with a length of tubing into the Drain Port in the Front



Figure 9 - To remove the Drain Port Insert, press down on the metal clip to release the insert, and pull.

Controlled Venting After replacing any parts downstream from the generator, or upon initial startup, the system will need to be purged in order to achieve the final purity. To avoid contaminating the downstream equipment, the user should install a three way valve in-line, nearest to the equipment, and install a variable restrictor (such as a needle valve) on the outlet port of the generator. Follow the simple procedure below:

- 1 Close the **Shutoff Valve** (see Figure 7, shown in the Open position).
- 2 Set the **Pressure Adjust** knob to the desired pressure (see Figure 7).
- 3 Press **Start** and wait until the internal pressure reaches the desired pressure (approximately 15 minutes).
- 4 Set the output flow rate to 50 cc/min by using the downstream equipment or if a three-way valve was installed then switch the flow to the outlet (or purge port) and set the flow rate using a needle valve. **Use the downstream equipment for flow control only if impure hydrogen will not ruin the equipment.**
- 5 Allow the system to vent in this manner for 30 minutes. The generator and lines should now be purged of air and ready for use.

Operation

To maintain the highest gas purity, the hydrogen generator should be run continuously.

Monitor the hydrogen consumption of the downstream equipment to ensure flow is within the capacity of the generator (see the Systems Specification section for rated flows). Both the **Power** Indicator light and the **Hydrogen Flow** Indicator light should be illuminated (see Explanation of Symbols at the back of the manual).

The water level should be monitored regularly and refilled as necessary. The reservoirs hold enough water for at least a week of continuous operation. Water can be added by removing the cap of the water reservoir (do not pull the deionizer bag out) and adding enough water to reach the Full mark on the front view port. Replace the cap making sure the deionizer bag does not block any of the ports.

To maintain the integrity of the hydrogen cell, follow the guidelines listed below:

- Keep a supply of deionized water in the reservoir above the Refill line at all times.
- Minimize the “dead volume” in the piping between the generator and the downstream equipment.
- Never expose the unit to temperatures below freezing.
- Never abruptly open the **Shutoff Valve** to large volumes. The large hydrogen demand can trigger the Mass Leak safety feature and possibly damage the cell.

If the built-in diagnostics trigger a fault LED to illuminate, consult the Troubleshooting section of this manual for further instructions. The generator is designed to be run continuously 24 hours, 7 days per week.

Shutdown

Storage

If the unit is to be idle for more than 24 hours, the generator should be turned off.

To store the unit:

- 1 Turn the **Pressure Adjust** knob to zero (see Figure 8). Wait until the outlet pressure gauge reads zero.
- 2 Cap the Hydrogen Outlet on the back of the generator or leave it connected to the downstream equipment.
- 3 Fill the tanks at least half full with deionized water. Make sure that the cell has at least 2" (5 cm) of water showing in the cell assembly tube. This can be viewed from the hole in the back of the generator.
- 4 Remove the desiccant cartridge and store it in a moisture proof container.
- 5 During long periods of shutdown or storage (>3 months), the generator should be run for 1-2 days every 3 months to ensure that the cell remains hydrated and the water quality intact.

Shipping

If the generator is being returned to Parker, contact the Technical Support Services Department at 800-343-4048 for a Return Authorization (RA) number and new packaging if the original is no longer available (NO. America only). Email at: balstontechsupport@parker.com. For other locations, email at pagsservicesupport@parker.com.

- 1 Turn the **Pressure Adjust** knob to zero (see Figure 7). Wait until the outlet pressure gauge reads zero.
- 2 Drain most of the water from the water reservoirs using the Drain Port Insert (connected to a length of tubing). Leave a half inch of water in the reservoirs to ensure that the cell remains hydrated. Connect the drain port insert to the **Drain Port** located on the front panel behind the gray door (see Figure 8). Drain the deionized water into a 4 liter container.
- 3 After the unit has been drained, press down on the metal tab on the top of the **Drain Port** connector to remove the Drain Port insert and tube (see Figure 9).
- 4 Remove the desiccant cartridge and store it in a moisture proof container. Replace desiccant vessel cap.
- 5 Pack the generator carefully in the original packing box or request new packaging from Parker Hannifin. Be sure to display the RA number on the outside of the box for prompt response.
- 6 In order to maintain the warranty on the generator, **ship the generator in a manner that will prevent freezing**. Freezing temperatures will cause irreparable damage to the hydrogen cell assembly.



Diagnostics

The Parker ChromGas models 9090, 9150, 9200 and 9400 and the Parker Balston model H2-90 hydrogen generators have built-in system diagnostics to monitor the operation of the generator and alert the operator in case of failure. There is a **Power Indicator** light on the front panel of the generator to signal the operational status of the system (see Figure 10).

The control circuitry restricts the membrane cell current to a safe level and eliminates the possibility of excessive hydrogen production. If a fault occurs and an indicator is illuminated, follow the instructions in the Troubleshooting section to clear the fault.

Note: See the Explanation of Symbols section on the loose sheet in this manual to match the symbols on the generator to the descriptions listed below.

Hydrogen Flow Indicators

Hydrogen Flow Indicator - The Hydrogen Flow Indicator light illuminates to indicate the cell is generating hydrogen (see Figure 10).

Flow Check Bar Graph - In normal operating mode (the side Mode Button is out), the bar graph displays the percentage of flow produced by the system (see Figure 10). Only the Parker ChromGas models 9150, 9200 and 9400 series have the Bar Graph feature where the flow is displayed from High (160, 250, or 500cc/min, depending on the model number) to Low (less than 5 cc/min).

No Hydrogen Flow Indicator - The No Hydrogen Flow Indicator light illuminates to indicate the cell is no longer generating hydrogen (see Figure 10).

High Hydrogen Flow Indicator (Mass Leak) - The High Hydrogen Flow Indicator (or Mass Leak detector) illuminates to warn the user that the hydrogen demand is exceeding the system capacity. This may be caused either from a leak in the piping to the equipment or it may indicate the volume that is being filled is too large for the generator. The High Hydrogen Flow Indicator will stay illuminated for approximately 10 seconds, then the unit will shut down and the no hydrogen flow indicator will be illuminated. Once the fault has been corrected, press the START button to reset the generator and initiate hydrogen flow (see Figure 7).

Water Quality Indicators

Change Water Indicator - If the water quality in the reservoir reaches the Low level, the Change Water Indicator (see Figure 7) will illuminate. The water in the unit must be changed and the deionizer bags must be replaced.

Water Check Bar Graph - If the Mode Button is pressed in on the Parker ChromGas models 9150, 9200 and 9400, the Bar Graph will display the Water Check quality (see Figure 10). The Bar Graph indicates the water quality level from High (>2 MegOhm/cm) to Low. This quality level corresponds to the changes in the current going through the water.

Low Water Indicator - If the water level drops too low in the water reservoir, the generator will stop producing hydrogen.

Hydrogen Purity

Blue (or orange) colored indicator beads are located in the bottom half of the desiccant cartridge. The blue beads turn gray or beige (the orange beads turn clear) as water is adsorbed in the cartridge. When this happens, the desiccant should be changed immediately, or the water content in the hydrogen stream will increase dramatically.

Note: *If low moisture (1 ppm or less) is required, the desiccant cartridge must be replaced before all the indicator beads change color. An external water trap can be used downstream from the generator for increased water removal.*

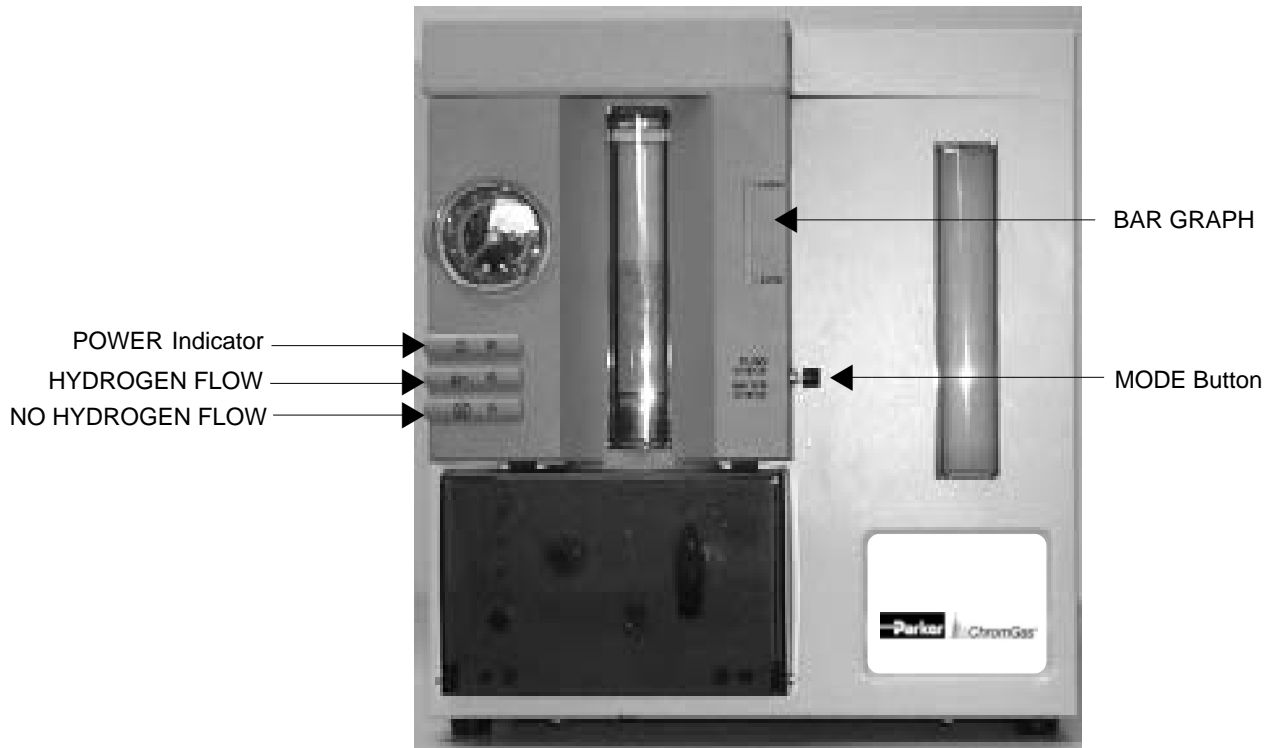


Figure 11: Diagnostic indicators (bar graph and mode button are not available on Models H2-90 and 9090.)

Maintenance



When performing routine maintenance, carefully follow the instructions provided in this section to avoid injury or damage. Service should be performed by persons familiar with the service and safety requirements of electromechanical / electrochemical devices.

General

With proper care and maintenance the hydrogen generator will provide years of trouble free operation. No adjustments or calibrations need to be made to the generator. Only routine service is needed to maintain peak operational conditions.

The primary maintenance tasks required are changing the desiccant cartridge (when the beads turn color or clear), replacing the deionizer bags (approximately every 6 months), and refilling the water reservoirs (weekly). See page 11 for replacement part numbers and recommended service frequency.



Do not use water, aerosols, or other cleaning agents on the unit. If necessary, the generator can be wiped down with a clean dry cloth on an as needed basis. Use of any liquid detergent to clean the generator could present an electrical hazard.

Do not use commercial leak detection fluids on any Lexan® plastic parts in the generator. These fluids may cause cracking and crazing which leads to component failure. Use a solution of 4-5 ml of liquid dish soap in one liter of water.

Water Refill

Refill the water in the generator whenever the water level reaches the **Refill** level displayed on the front panel (see Explanation of Symbols at the back of the manual). The water reservoirs should last approximately 1 week when the reservoirs are filled to the **Full** level. Water must have a minimum resistivity of 2 MegOhm/cm.

If the **Low Water** indicator (see Figure 7) illuminates, the generator will stop producing hydrogen to safeguard the cell from permanent damage. Add water to the generator until the Full level is reached and press the **Start** button to generate hydrogen.

Desiccant Cartridge

No tools are needed to change the desiccant cartridge (P/N 1647727). The cartridge should be replaced when the color of the indicator beads changes. The blue beads turn to beige or gray and orange beads turn clear. After all the indicating beads have turned color, the cartridge will have approximately 2 days of life left at 90 cc/min flow and 8 hours left at 500 cc/min flow.

- 1 Turn the Power switch OFF and leave the Shutoff valve in the OPEN position (see Figure 8, valve is in the OPEN position) to vent the hydrogen from the unit. Ensure that 0 psig is shown on the pressure gauge.
- 2 Lift the top cover and unscrew the cap covering the desiccant cartridge (see Figure 2). Remove the cartridge from the generator.
- 3 Remove the new desiccant cartridge from the moisture proof bag. Add a small amount of deionized water to wet the o-rings on the nipple end of the desiccant cartridge. Push down firmly to seat the o-rings at the bottom of the housing (see Figure 3).
- 4 Replace and center the large o-ring inside the desiccant cap (see Figure 4). Tighten the cap securely by hand. Be sure the o-ring seal remains centered and the seal is visible as a black ring around the top and sides.

Note: Most internal leaks are found at the desiccant housing cap o-ring seal, due to improper sealing of the cap. Be sure to seal the cap tightly.

- 5 Turn the Power switch ON and perform the controlled venting purge as described in the Startup section, then begin using the generator.

Note: For best results, purge the system for one hour to remove any residual oxygen and moisture from the instrument and piping downstream.

Cartridge Regeneration

When the desiccant becomes saturated with moisture the blue indicating color will turn beige or gray or the orange indicating color will turn clear. If the expended desiccant cartridge will be regenerated for later use, it must be stored in a moisture-proof container.

Cold Vacuum Oven - For best results place the desiccant cartridge in a **cold vacuum oven** and ramp the temperature at 2°C/minute to 150°C while supplying a vacuum. **Do not exceed 175°C.** Regeneration will be complete in 8 hours.

Conventional Oven - If only a **conventional oven** is available, place the cartridge upright inside the oven to allow the moisture to leave from the top of the cartridge. Apply the following ramp rate and procedure:

- 2°C/min from room temperature to 90°C, hold at 90°C for two hours.
- 2°C/min from 90°C to 150°C and hold at 150°C for 24 hours.
- Cool the cartridge in a desiccator or low moisture environment until needed in the hydrogen generator.

For either method, do not exceed 175°C. The temperature will not affect the desiccant performance; however, once the beads turn black (for the blue indicator) or remain clear (for the orange indicator), they can no longer be used as a color indicator.

Apply a light coat of water to the o-rings prior to inserting the cartridge into the generator plastic housing.

Deionizer Bag Replacement

The water reservoirs should be rinsed and the deionizer bags replaced every six months, or whenever the **Change Water** light illuminates (see Figure 7). No tools are necessary to change the deionizer bags.

- 1 Turn the **Power Switch** to OFF and make sure the **Shutoff Valve** is in the OPEN position (see Figure 8) in order to vent the hydrogen from the generator.
- 2 Lift the top cover and unscrew the water reservoir caps. Lift the deionizer bag out of the reservoir along with the cap. Disconnect the deionizer bags from the caps and discard.
- 3 Inspect the new deionizer bags (P/N 7601132) for holes or tears and return to Parker for credit if damaged. Insert the "T" end into the cap until it secures the bag to the cap (see Figures 2 and 3). Repeat for second bag.
- 4 Use the Drain Port Insert with the 1/4" tube connected to it to drain the water reservoirs. There is approximately 4 liters of water in the generator when full. Connect the Insert to the **Drain Port** located on the front panel behind the gray door (see Figure 7) and drain the unit (see Figure 8).
- 5 Remove the Drain Port Insert by pressing down on the metal tab and pulling the fitting out (see Figure 9). Refill the reservoirs with deionized water. Repeat steps 4 and 5 several times.
- 6 Finally, remove the Drain Port Insert and fill the reservoirs completely with approximately 4 liters of deionized water.
- 7 Replace the caps, with the new deionizer bags attached, being careful to avoid blocking any of the ports in the generator.

Note: Do not allow the deionizer bags to dry out, they must be immersed in water to perform.

- 8 Start the generator in the same manner found in the *Startup* section.

Fuse Replacement

Occasionally, the fuse in the hydrogen generator may burn out. The fuse is located in the power receptacle on the back side of the generator. **Before servicing the fuse, turn the generator off and disconnect the power cord from both the power supply and the generator power receptacle.**



To access the fuse, use a small screwdriver to remove the fuse holder located in the back of the generator and in the power receptacle. Replace with the appropriate fuse and re-assemble.



To maintain the safety and performance integrity of the product, use only the fuse of the size and type detailed in the Specifications, Parts, and Accessories sections of this bulletin.



System Specifications

Hydrogen Purity (1)	99.9995%
CSA Safety Standard	CAN/CSA 22.2 No. 1010.1- 92
IEC 1010 Safety Standard	IEC1010-1:1990+A1 1992+A2:1995/EN61010-1:1993
IEC 1010	Installation Category II, Pollution Degree 2
UL Safety Standard	UL 3101-1, First Edition
EMC Compliance	CISPR11:1190/EN55011:1991/EN50082-1:1992
Maximum Flow Rate (@90 psig/6.2 barg)	
H2-90, 9090	90cc/min.
9150	160cc/min.
9200	250cc/min.
9400	500cc/min.
Discharge Pressure	0-90 psig (0-6.2 barg)
Hydrogen Outlet Port	1/8" Compression
Hydrogen Relief Port	1/4" Female NPT
Water Requirements	Deionized Water (≥5 MegOhm/cm)
Maximum Ambient Relative Humidity	80%
Min/Max Ambient Temperature	40/100°F (4/38°C)
Electrical Requirements (2)	100-120/200-240 VAC, 47-63 Hz
Power Consumption	
H2-90, 9090, 9150, 9200	480 Watts@ 110 VAC / 460 Watts @ 220 VAC
9400	600 Watts@ 110 VAC / 575 Watts @ 220 VAC
Fuse 110 VAC	T 4 Amp 125 V
Fuse 220 VAC	T 2 Amp 250 V
Product Dimensions	13"h x 14.8"w x 14"d (33cm x 37.6cm x 35.6cm)
Product Weight/Shipping Weight	40 lbs./50 lbs. (18kg / 23 kg)

Replacement Parts

Description	P/N	Frequency
Replacement Deionizer Bags	7601132	6 Months
Replacement Desiccant Cartridge	1647727	When Color Changes
Replacement Fuse 110V	8404001	As Needed
Replacement Fuse 220V	13192	As Needed

Optional Accessories

Description	P/N
HydroGen™ Mate	72-230

Notes:

1 The purity of the hydrogen gas produced by the Parker ChromGas or Parker Balston Hydrogen Generator is 99.9995% with respect to oxygen.

2 Main power supply must be between 95 VAC and 250 VAC and 47-63 Hz.

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 with any questions (North America only) or email at balstontechsupport@parker.com. For other locations, please contact your local representative or email at pagservicesupport@parker.com.

Serial Numbers

The serial number for the unit is located on the back of the unit. 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.



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 connections to the power source. Check terminal connections and power cord. Check power source fuses. Check generator fuses.
Refill Water Indicator Light Illuminated	Completely fill water reservoir with deionized water and press the Start button on the front panel. Water reservoir ports are blocked by the deionizer bags or other debris. Remove obstruction. Consult factory if light does not go off. (1)
Change Water Indicator Light Illuminated	Water quality is bad, see Maintenance section for draining and rinsing procedure.
Low Output Pressure	Hydrogen demand exceeds generator capacity. Check capacity of equipment and piping downstream and install a flow control device. Check external system piping for leaks. Check internal system piping for leaks.
High Hydrogen Flow Indicator Light Illuminated	Mass Leak detected in system. Check external piping for leaks. Hydrogen demand exceeds generator capacity. Check capacity of equipment and piping downstream and install a flow control device. Check internal system for piping leaks.
No Hydrogen Delivered	Check power connections (see above). Check water level. Generator will shut down if water level is below the Low Level. Shutoff valve is closed; open Shutoff valve. Check piping for leaks. Consult factory.(1)
Excessive Moisture in the Gas Stream	Desiccant is saturated. Change desiccant. Desiccant seal is bad. Replace O-rings at bottom of the desiccant cartridge (P/N 1610131).

Notes

1 To arrange for system service, contact the Technical Services Department at 1-800-343-4048, 8AM to 5PM Eastern Time or email at balstontechsupport@parker.com. For other locations, please contact your local representative or email at pagservicesupport@parker.com.





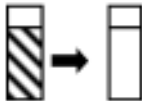





**WARRANTY (NORTH AMERICA ONLY)
(FOR INFORMATION CONTACT YOUR LOCAL REPRESENTATIVE)**

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.


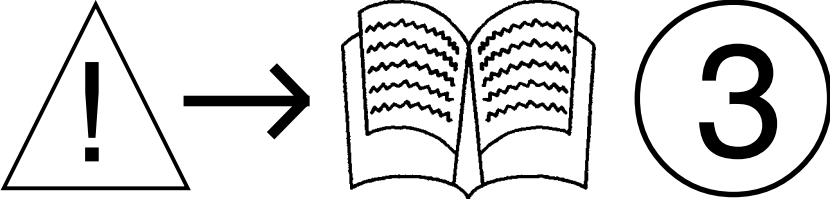





Explanation of Symbols

The symbols listed below are found on the front panel of the Hydrogen Generator.

<u>Symbol</u>	<u>Description</u>
	POWER INDICATOR
	HYDROGEN FLOW INDICATOR
	NO HYDROGEN FLOW INDICATOR
	HIGH HYDROGEN FLOW (MASS LEAK) or EXCESSIVE FLOW RATE INDICATOR
	CHANGE WATER INDICATOR
	LOW WATER INDICATOR
	HYDROGEN FLOW START BUTTON
	FULL WATER TANK INDICATOR
	REFILL WATER TANK INDICATOR
	WATER DRAIN PORT

Explanation of Warning Symbols

<u>Symbol</u>	<u>Description</u>
	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).

