



HYDROGEN GENERATOR FOR CARRIER GAS

H2C Series: 150, 300, 500, 700, 1000 & 1300
Installation, Operation and Maintenance Manual



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WARRANTY

This warranty applies to ChromGas H2C generators manufactured by Parker Industrial Gas Filtration & Generation Division (Parker IGFG).

Parker warrants that ChromGas H2C generators shall be free from defects in materials and workmanship for a period of (i) 12 months after the date of installation or (ii) 18 months after date of shipment, whichever comes first.

The PEM cell is warranted for a period of 36 months after shipment.

ChromGas H2C generators must be installed, commissioned, operated, and maintained in accordance with Parker IGFG recommendations as documented within this user manual. Warranty will be voided if the Product is installed and/or stored in a poor environment, installed and/or operated improperly, subject to conditions outside of its operating limitations, serviced with non-genuine Parker parts, and/or improperly maintained in accordance with Parker's recommended preventative maintenance guidance and service intervals.

Should any defect occur during the warranty period, contact Parker IGFG's Technical Support team.

In order to guarantee the optimum efficiency of the Hydrogen cell, this generator must be installed and operational within three months of dispatch from Parker Hannifin. Failure to do this may invalidate the warranty. The generator will perform a 4 hour initialization sequence when powered for the first time. This sequence, which cannot be aborted, is necessary to guarantee the correct hydration of the cell.

SAFETY INFORMATION

Do not operate this equipment until the safety information and instructions in this user guide have been read and understood by all personnel concerned.

User Responsibility

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety, and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Only competent personnel trained, qualified, and approved by Parker Hannifin should perform installation, commissioning, service and repair procedures.

This equipment is for indoor use only. Do not operate outdoors.

This equipment is not suitable for use in any hazardous, flammable, or explosive environments. Hydrogen is a highly flammable gas. Keep the generator away from excessive heat, naked flames, or any possible ignition source.

With the exception of oxygen, any gas can cause asphyxiation in high enough concentrations. In most scenarios, however, because hydrogen rises and disperses so rapidly, it is unlikely to be confined where asphyxiation might otherwise occur. Always ensure that the generator is operated in a well-ventilated area and all of the vent ports on the rear of the generator are kept clear and free from blockages.

Use of the equipment in a manner not specified within this user guide may result in an unplanned release of pressure, which may cause serious personal injury or damage.

When handling, installing or operating this equipment, personnel must employ safe engineering practices and observe all related regulations, health & safety procedures, and legal requirements for safety.

Ensure that the equipment is depressurized and electrically isolated, prior to carrying out any of the scheduled maintenance instructions specified within this user guide.

Parker Hannifin can not anticipate every possible circumstance which may represent a potential hazard. The warnings in this manual cover the most known potential hazards, but by definition can not be all-inclusive. If the user employs an operating procedure, item of equipment or a method of working which is not specifically recommended by Parker Hannifin the user must ensure that the equipment will not be damaged or become hazardous to persons or property.

Most accidents that occur during the operation and maintenance of machinery are the result of failure to observe basic safety rules and procedures. Accidents can be avoided by recognizing that any machinery is potentially hazardous.

NOTE: Any interference with the calibration warning labels will invalidate the gas generator's warranty and may incur costs for the recalibration of the gas generator.

Should you require an extended warranty, tailored service contracts or training on this equipment, or any other equipment within the Parker Hannifin range, please contact your local Parker Hannifin office.

MARKINGS AND SYMBOLS

The following markings and international symbols are used on the equipment or within this manual:

MODEL	
	Caution, Read the User manual.
	Risk of electric shock.
	Highlights actions or procedures which, if not performed correctly, may lead to personal injury or death.
	Highlights actions or procedures which, if not performed correctly, may lead to damage to this product.
	Wear disposable gloves.
	DO NOT OBSTRUCT VENT PORTS LEAVE OPEN TO ATMOSPHERES OR PIPE TO VENTILATED AREA WARNING GENERATOR MUST BE SHUTDOWN AND DEPRESSURIZED BEFORE PERFORMING ANY MAINTENANCE (REFER TO USER manual)
	Highlights actions or procedures which, if not performed correctly, could lead to electric shock.
	When disposing of old parts always follow local waste disposal regulations.
	Waste electrical and electronic equipment should not be disposed of with municipal waste.
	Do not expose to naked flame.
	Caution, Hot surface. Do not touch

DESCRIPTION

The following markings and international symbols are used on the equipment or within this manual:

This generator will produce a constant stream of high purity hydrogen (suitable for carrier gas) at a set pressure and a maximum flow rate determined by model. The generator must be connected to a suitable power supply and fed with a suitable quality of deionized water. It is ideal for use in laboratories and light industrial environments and is non-hazardous for transportation purposes.

In order to guarantee the optimum efficiency of the PEM cell, this generator must be installed and operational within three months of dispatch from Parker Hannifin. Failure to do this may invalidate the warranty. The generator will perform a 240 minute (4 hours) initialization sequence when powered for the first time. This sequence, which cannot be aborted, is necessary to guarantee the correct hydration of the cell.

Technical Specifications

This specification is valid when the equipment is located, installed, operated, and maintained as specified within this user guide.

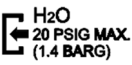
	Units	H2C-150	H2C-300	H2C-500	H2C-700	H2C-1000	H2C-1300
Water Quality	Deionized, ASTM II, >1 MOhm, <1μS, filtered to <100μm						
Consumption (Approximate) ¹	L/week	1.2	2.4	4.1	5.7	8.1	10.5
Outlet Flow Rate	cc/min	150	300	500	700	1000	1300
Outlet Pressure	psi g (bar g)	5 -120 ± 0.5 (0.3 -8.3 ± 0.034)()					
Purity ³	%	> 99.99999%					
Hydrogen Outlet	 H ₂ 100 PSIG MAX. (6.9 BARG)	1/8" Compression fitting					
Water Drain		Quick release push in fitting					
Automatic Water Fill Inlet	 H ₂ O 20 PSIG MAX. (1.4 BARG)	Quick release push in fitting 20 PSIG (1.4 BARG) Max input pressure Deionized water (Deionized, ASTM II, >1 MOhm, <1μS, filtered to <100μm)					
Overflow Drain		Quick release push in fitting					
Spillage Drain		1/2" Barbed push on fitting					
Electrical Connection Type		IEC320					
Supply Voltage Range	VAC	100-240 (50 / 60 Hz)					
Power Consumption ⁴	WATT	80	160	240	280	320	400
Fuse ⁵	A	8	8	8	8	8	8
Ambient Temperature	°F (°C)	41–104 (5–40)					
Relative Humidity	-	50% @ 104°F (40°C) (80% MAX < 87.8°F (31°C))					
IP Rating	-	IP20, NEMA 1, indoor use only					
Pollution Degree	-	2					
Installation Over Voltage Category	-	II					
Maximum Altitude	ft. (m)	<6562 (2000)					
Noise	dB(A)	< 60					

Table 1.1

- Based on full flow with 24 hour 7 day operation at 22°C (72°F) ambient temperature.
- The balance is O₂ and moisture.
- The power consumption when in standby mode is 20W.
- Anti Surge (T), 250V, 5 x 20mm HBC, Breaking Capacity 8A @ 250V, IEC 60127, UL R/C Fuse

Materials of Construction

Front Panel Assembly	Steel / ABS Plastic / Aluminum
Top Cover	ABS Plastic
Chassis	Mild Steel (Epoxy Powder Coated)
Seal Materials	Nitrile, Viton, EPDM, PTFE (tape)
LCD Touch Screen	Glass / Steel
Deionised Water Circuit Tubing	Tygon
Hydrogen Circuit Tubing	Polypropylene
Outlet Circuit Tubing	Polypropylene
Satellite filter	Polypropylene
Barbed Fittings	
Water Reservoir	Polyvinyl
Float	
Floats	Ployvinyl Chloride
Manifold, Bowl and Spigot	Natural Polycarbonate
JG Fittings	Acetyl
Conductivity Probes	316SS
Pressure Switch	316SS
PEM Cell	Platinum, Titanium, Nafion
Purifier adsorbent	Molecular Sieve, proprietary adsorbent
Mounting Feet	Polyamide reinforced nylon and plated mild steel

Table 1.2

Regulatory Approvals

Safety	UL/CSA/EN 61010-1, 61010-2
EMC / EMI	IEC 61326-1:2020 Ed.3, FCC pt15, IC ICES-003:2020 Ed.7, J55011
Environmental	RoHS 3, REACH, California Proposition 65

Table 1.3

Weight and Dimensions

The dimensions and weight of the equipment are specified below.

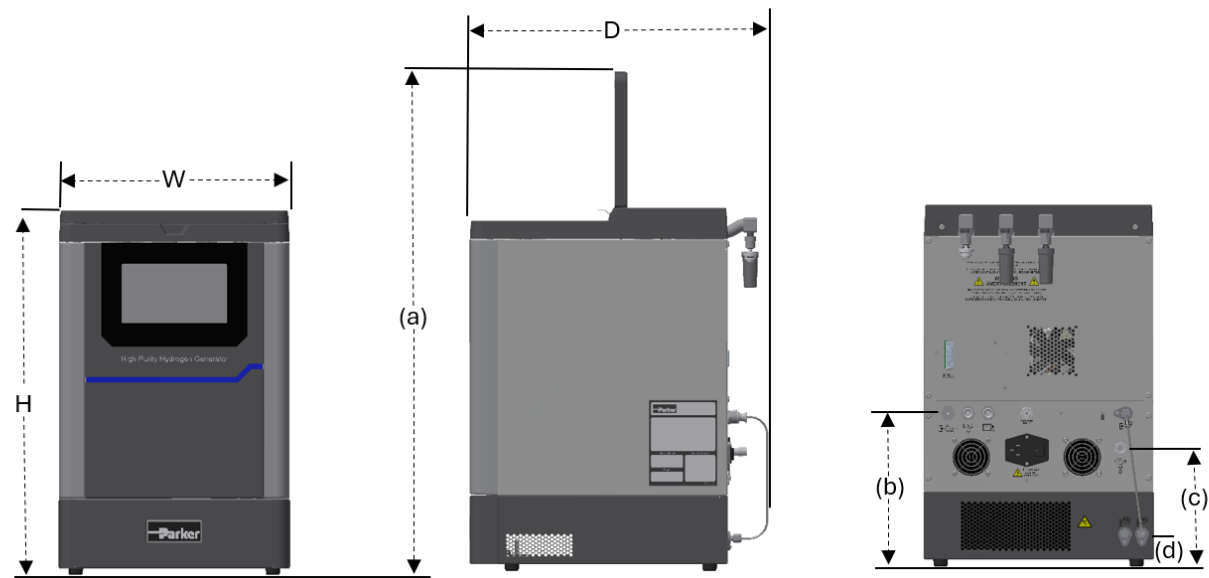


Figure A

Weight and Dimensions

Dimension	Units	H2C
H	in (mm)	21.25 (565)
W	in (mm)	13.5 (342)
D	in (mm)	18 (457)
(a)	in (mm)	29.25 (743)
(b)	in (mm)	9 (229)
(c)	in (mm)	7(178)
(d)	in (mm)	2(50.8)
Water bottle empty	lb (Kg)	60 (27.2)
Water bottle full	lb (Kg)	68.8 (31.2)

Table 1.4

Receiving and Inspecting the Equipment

On receipt of the equipment carefully inspect the packaging for damage. If the packaging is damaged inform the delivery company immediately and contact your local Parker Hannifin office.

Storage

If the equipment is to be stored prior to installation, do not remove it from the packaging. Ensure that it is stored in an upright position as indicated by the arrows on the packaging.

Do not attempt to lift the generator by yourself. It is recommended that the generator be carried by a minimum of two persons or transported on a pallet truck.

NOTE: The storage area should be secure and the environmental conditions should fall within those specified in the technical specification. If the generator is stored in an area where the environmental conditions fall outside of those specified, it is essential that it be moved to its final location (installation site) and left to stabilize prior

to unpacking. Failure to do this could cause condensing humidity and potential failure of the generator.

Unpacking

Once ready to install, remove the equipment from the packaging and check for signs of damage. Verify that the following items have been included with the shipment:

If any items are missing or damaged, please contact your local Parker Hannifin office. Do not attempt to power up the generator.

Description	Qty
Water drain tube	1
1Water fill tube	1
Deionizer cartridge	1
Environmental filters	2
O2 vent cap	1
Electrical supply cable	1
CPI single ferrule fitting	1
Rotating Plug Valve	1

Overview of the Equipment

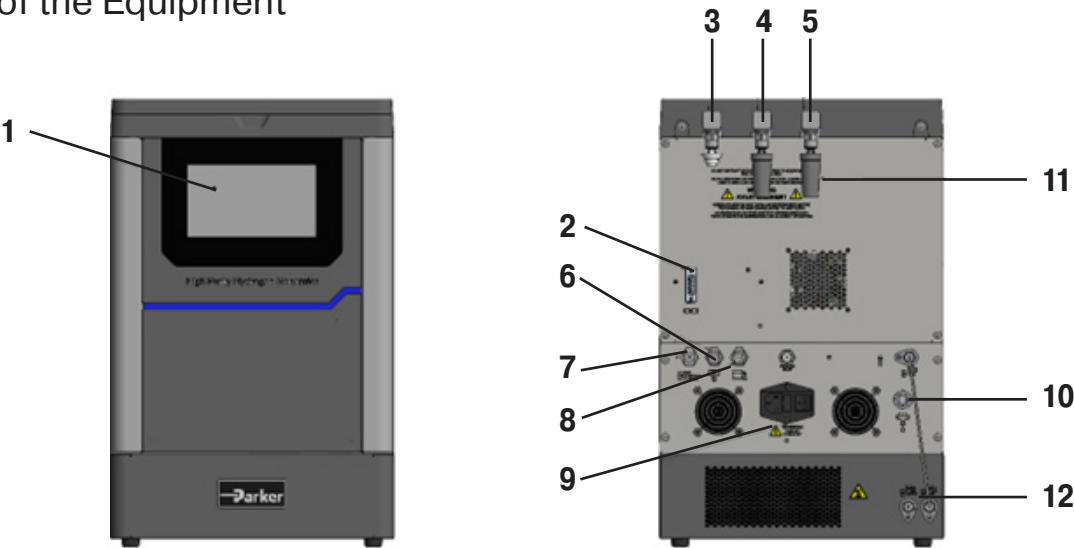


Figure B

1	Control panel	7	Auto water fill connection factory installed
2	Options board connection port	8	Overfill Drain
3	O2 Vent (<650 ml/min)	9	Fused IEC 320 inlet socket and ON/OFF switch
4	Excess H2 vent (<1ml/min)	10	Water bottle spillage drain
5	Water bottle vent	11	Environmental filter
6	Water drain	12	Hydrogen Outlet

Locating the Equipment

Environment

The equipment should be located indoors in an environment that protects it from direct sunlight, moisture, and dust. Changes in temperature, humidity, and airborne pollution will affect the environment in which the equipment is operating and consequently may impair safety and operation.

It is the customer's responsibility to ensure that the environmental conditions specified in Table 1.1 are maintained.

Space Requirements

The equipment should be mounted on a flat surface, capable of withstanding the weight of the equipment and all ancillary parts. A minimum clearance of 150mm (5.9in) should be provided on all sides of the generator for air flow. Additional space should be provided so that the generator can be moved to allow unrestricted access to the generator during servicing and maintenance.

Do not block the side vents or the fans located on the rear panel of the generator.

When considering the vertical clearance, you must take into account the height required when the front upper access panel is in the open position. Refer to table 1.4 for overall dimensions of the equipment.

Do not position the equipment so that it is difficult to operate or disconnect from the electrical supply.



WARNING

The accumulation of hydrogen can displace oxygen thereby creating an asphyxiation hazard. Always ensure that the equipment is operated in a well-ventilated area.

Water Supply Requirements

The generator should only be filled with high quality deionized water with a resistivity greater than 1 MOhm (conductivity < 1 uS, ASTM II).

If the built-in automatic water system is used, refer to the technical specification on page 8 for supply requirements.



CAUTION

The use of any water, other than deionized water (Deionized, ASTM II, >1 MOhm, <1µS, filtered to <100µm), within this generator will damage and potentially void any PEM cell warranties.

Electrical Supply Requirements

The equipment should be connected directly from the fused IEC 320 inlet socket to the electrical supply using the power cord supplied. The equipment should be positioned so that it can be connected to the electrical supply without the use of an extension cord.



WARNING

The equipment is connected to protective earth (ground) through the power cord. It is essential that electrical supply is equipped with a protective earth (ground) terminal. If an alternative power cord is used to connect the equipment to the electrical supply, ensure that it is suitably rated for the application and contains a protective earth (Ground) conductor.

It is the customer's responsibility to provide a fused electrical supply to the equipment (Refer to table 1.1 for the electrical specification). It is recommended that this supply have surge protection.

INSTALLATION AND COMMISSIONING



WARNING

Only competent personnel trained, qualified, and approved by Parker Hannifin should perform commissioning and service procedures.

Recommended System Layout

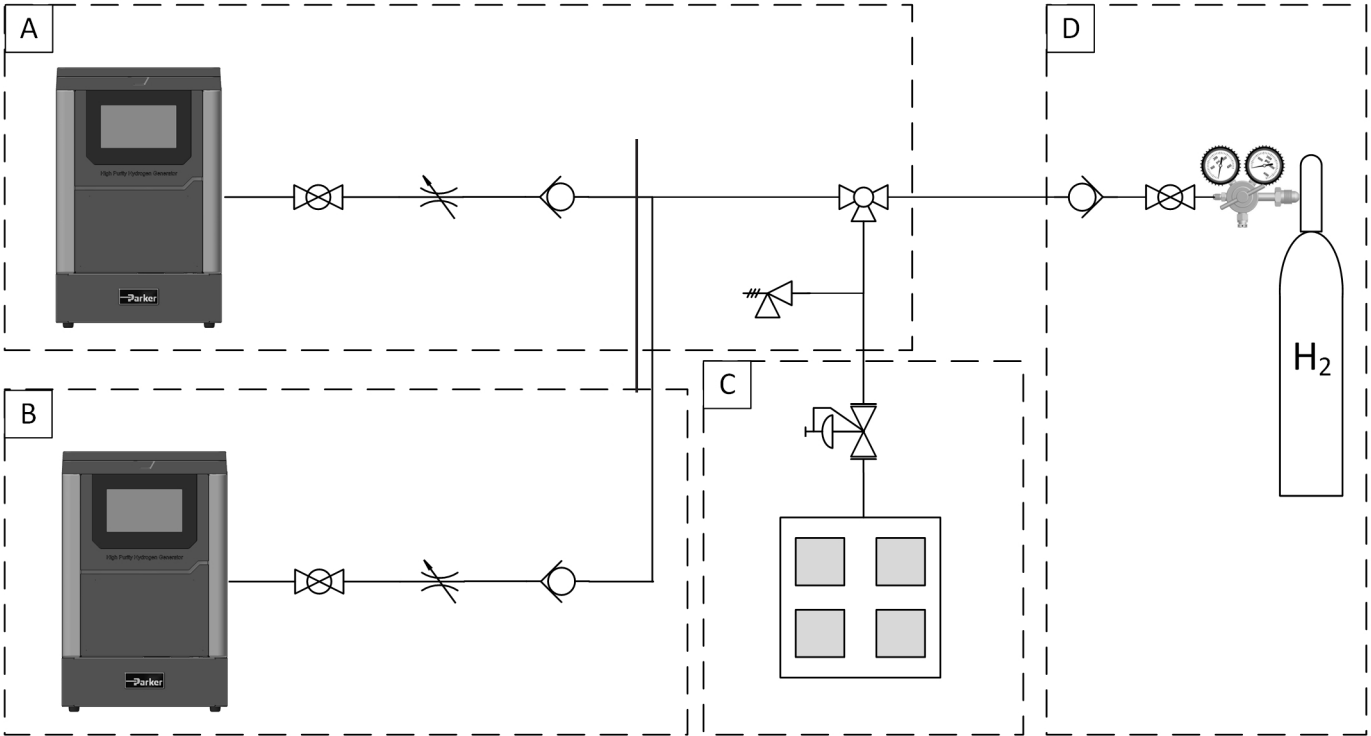


Figure C

A	Single generator	C	Application instrument		3-way ball valve with vent line
B	Multiple generator	D	Back up supply		Pressure regulator
	Isolation valve		Flow controller	NOTE: The pressure regulator shown in C is recommended to account for pressure drop across the piping. This may be integrated in to the application instrument.	
	Non return valve		Pressure relief valve		

Installation Parts

Description	Part Number		
	Stainless Steel	Brass	Copper
1/8" OD Tube Ball Valve	2A-MB2LPFA-SSP	2A-MB2LPFA-BP	--
1/4" OD Tube Ball Valve	4A-MB4LPFA-SSP	4A-MB4LPFA-BP	--
1/8" OD Tube 3 Way Ball Valve	2A-MB2XPFA-SSP	2A-MB2XPFA-BP	--
1/4" OD Tube 3 Way Ball Valve	4A-MB4XPFA-SSP	4A-MB4XPFA-BP	--
1/8" OD Tube Flow Controller (0-1200 ml/min)	VCD-SVS-1500	--	--
1/8" OD Tube Non-Return Valve	2A-C2L-1-BN-SS	2A-C2L-1-BN-BP	--
1/4" OD Tube Non-Return Valve	4A-C4L-1-BN-SS	4A-C4L-1-BN-B	--
1/8" OD Tube Equal Tee	2ET2-316	2ET2-B	--
1/4" OD Tube Equal Tee	4ET4-316	4ET4-B	--
1/4" OD Tube Tee with 1/8" Side Port	4-4-2 JLZ-SS	4-4-2 JLZ-B	--
1/8" OD Tube Pressure Relief Valve	This relief valve should be sized by the installer to suit the installation		
1/4" BSPP Pressure Regulator	IR4003SK3SP24B		
1/8" BSPT (R1/8") to 1/8" OD Tube Connector	2MSC2K-316	2MSC2K-B	--
1/4" BSPT (R1/4") to 1/4" OD Tube Connector	4MSC4K-316	4MSC4K-B	--
1/8" OD Copper Tube (Grade B-280) (50 FT)	--	--	X50CT-2-30
1/4" OD Copper Tube (Grade B-280) (50 FT)	--	--	X50CT-4-30

Table 2.1

Installation Parts display Parker Master Catalog part number and may ordered through your local authorized Parker Sales Company. Please note gas bottle and/or gas bottle regulator are not supplied by Parker Hannifin.

Installation Kit

Kit Number	Description	
IK7532	Installation Kit including:	Copper tube (50 ft), 1 8 tube nuts (x3), Front and back ferrules (x3), 1 8 tube T-pieces (x1)
B02-1156	Installation Kit including:	Particulate filter Kit

Table 2.2

The ChromGas H2C hydrogen generator meets all specified gas purity requirements for GC and GC-MS applications.

An optional 1-micron outlet particulate filter (P/N B02-1156) is available to provide additional downstream particulate protection. The filter is intended as a safeguard against contamination from external connections or downstream components.

The optional particulate filter is not required to achieve the specified hydrogen purity performance of the H2C.

Connecting the Generator

Environmental filters

Remove the transit plugs from the vent ports, on the rear of the generator, and fit the environmental filters and O2 vent cap as shown.



Figure D

Hydrogen outlet port

Refer to “Recommended system layout” on page 13 for the desired system configuration.

First, connect the CPI single-ferrule fitting and the rotating plug valve supplied with the installation kit to the hydrogen outlet port. Ensure the fitting and valve are assembled and tightened. Using a spanner (wrench), tighten the nut a further one and one-quarter (1¼) turns.

Once the fitting and valve are installed, connect the outlet tube to the valve outlet. Use either high-quality stainless-steel tube or refrigeration grade copper tube. Remove any protective dust caps from the relevant compression fittings. Insert the tube fully into the fitting and rotate the tube nut until finger tight. Using a spanner (wrench), tighten the nut a further one and one-quarter (1¼) turns.

When cutting the tube, always use the correct tools to ensure a clean, perpendicular cut. Cutting tubes will generate debris that, if not removed, may damage downstream instrumentation. It is recommended that alpipes are purged to remove any debris that may exist. When routing the tubes, ensure they are adequately supported to prevent damage and leaks in the system.

All components used within the system must be rated to at least the maximum operating pressure of the equipment. Always protect the system by installing suitably rated pressure relief valves.

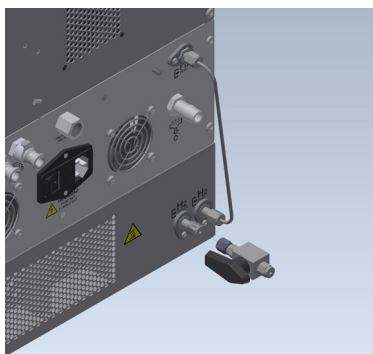


Figure D.2

WARNING

To prevent injury, and damage to the application instrument, the system piping will require purging for at least 15 minutes to remove any trapped oxygen. If using a 3-way ball valve with vent line, as recommended on page 8, ensure that the valve is open to the vent line and not to the application instrument. If a ball valve is not being used, ensure that the application instrument is not connected to the system piping. Refer to “Commissioning the Generator” on page 11 for details on purging.

Drain ports

The overflow drain and the water bottle spillage drain must be permanently piped away using 1/2” and 1/4” Tygon or PTFE tubing respectively. The tube connected to the overflow drain should have a u-bend to prevent contamination of the internal water bottle. Always check with local guidelines for disposing of deionized water.

Electrical supply

Check the rating plate for the correct supply voltage and frequency. Select the required power cord and connect it to the switched IEC 320 socket on the generator. Connect the plug directly to the electrical supply. Do not use an extension cord.

Filling the water bottle

WARNING

The use of any water, other than deionized water (Deionized, ASTM II, >1 MOhm, <1µS, filtered to <100µm), within this generator will damage and potentially void any PEM cell warranties.

Fill the water bottle using fresh deionized water to a level approximately 15mm below the upper lip of the neck of the bottle. If the generator is powered up an audible and visual indication will be given when the correct level is reached.

Wearing powder-free latex or nitrile disposal rubber gloves to prevent contamination, insert the deionizer cartridge into the water bottle and fit the cap securely.



Figure E

Water Supply for Auto Water Fill

Connect the deionized water supply to the automatic water fill inlet (1/4" female npt) using the fittings and tubing rated for the maximum pressure of the DI water system. It is recommended that a balance line is fitted at the inlet to prevent air locks. Flush the line through to remove any trapped air. Refer to "Technical Specification" on page 8 for water supply requirements.

Run appropriate tubing from overflow port below the machine and connect to proper drainage in case of auto water feed failure.

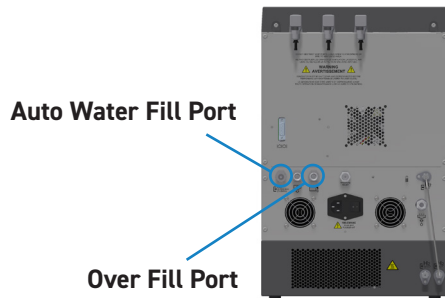


Figure F

Options Board Accessory



WARNING

The options board is designed for connection to Safe Extra Low Voltage (SELV) systems only. Maximum 12vdc 50mA.

The options board accessory allows direct communication with a PC via the USB port, and connection of water monitoring, remote alarm, and remote stop circuits.

NOTE: Options Board is not supplied with the generator, you can order through your authorized parker sales.

Description	Catalog Number
H2 SERVICE BOARD KIT	604970903

Fitting the Options Board

Plug the options board into the 15-way D-type connector on the rear of the generator. The board should be secured in place using the retaining screw and spacer provided.

Place the cover over the options board and secure in place using the 2 retaining screws provided.

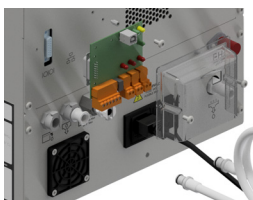


Figure G

Wiring the Options Board

JP3 Remote Stop: Options board is not supplied with the generator. They can be ordered through your authorized Parker sales.

RS485	JP1_1	NOT USED (DO NOT CONNECT)
RS485	JP2_1	NOT USED (DO NOT CONNECT)
Remote Stop	JP3_1	Switched input
	JP3_2	GND
Alarm Output	JP4_1	Open collector output
	JP4_2	
Water Fill Output	JP5_1	Open collector output
	JP5_2	
USB	JP6	

JP3 Remote Stop: The remote stop function allows the generator to be connected to an external stop circuit. Press to reset the generator.

JP4 Alarm Output: The alarm output is designed for remote alarm indication. When an error occurs on the generator, the output switching circuit is activated causing the remote circuit to be complete.

The remote alarm circuit will be reset when the generator error has been reset.

JP5 Water Fill Output: The water fill output allows for remote monitoring of the water bottle level. When the water level drops below the mid-point in the water bottle the output switching circuit is activated. The circuit will only be de-energized when the water bottle is filled to its upper limit.

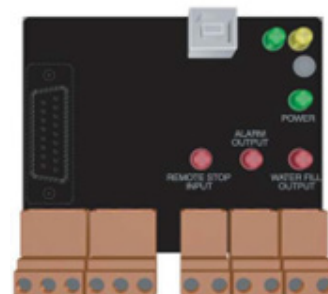


Figure H



WARNING

Ensure that a suitable vent line is provided during the initialization stage as hydrogen will flow from the unterminated system piping.



WARNING

In order to guarantee the optimum efficiency of the PEM cell, this generator must be installed and running within three months of dispatch from Parker Hannifin. Failure to do this may invalidate the warranty. The generator will perform a 4 hour initialization sequence when powered on for the first time. This sequence, which cannot be aborted, is necessary to guarantee the correct hydration of the cell.

Initializing the Generator

Upon first installation, the generator will go through a system setup and cell Hydration.

Connect the generator to the electrical supply and switch it on at the wall socket. Turn the generator on at the power switch (located on the rear of the generator)

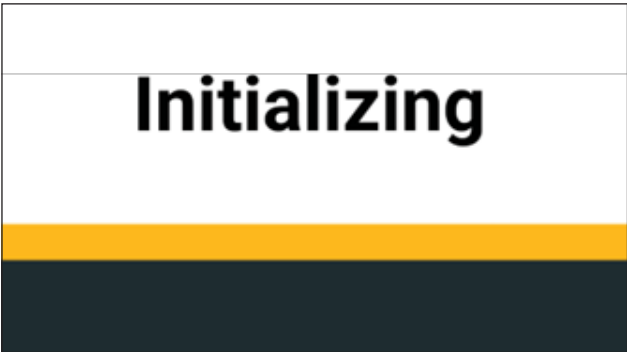


Figure I

Choose desired system units.

Pressure Settings: PSI, BAR, kPa

Water Quality Units: $\mu\text{s}/\text{cm}$, $\text{M}\Omega/\text{cm}$

Flow Rate Units: ml/min , cc/min , %

Then hit Adjust Time + Date

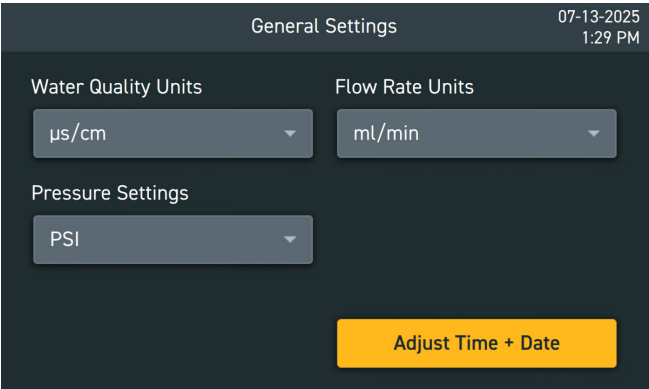


Figure J



WARNING

If the pressure envelope of the system has been breached it will be necessary to run through this procedure when starting the generator.

Set the date and time

Then hit Cell Hydration

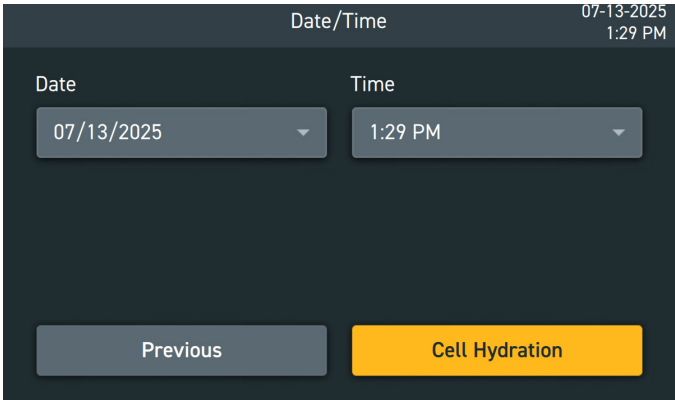


Figure K

Upon first installation, the generator will go through a system setup and cell hydration.

Cell Hydration Procedure

The Generator will automatically go into cell hydration normally during first use or if the generator has been shut off for more than three months. This procedure is important to slowly run and rehydrate the cell before running at 100%. Once the cell hydration routine is started this way, you will have to wait 4 hours until the generator is ready to be used.

After first use, if the unit has been stored in a dry environment for more than a month, it is good practice to manually run a cell hydration before using the generator for normal operation. To do this, tap the main menu icon , select "Cell Hydration," and then tap "Start Hydration." Once hydration is complete, the unit is ready for normal use. Follow Display Prompts to continue with the Cell Hydration Process. Refer to Figure L and Figure M on the next page.

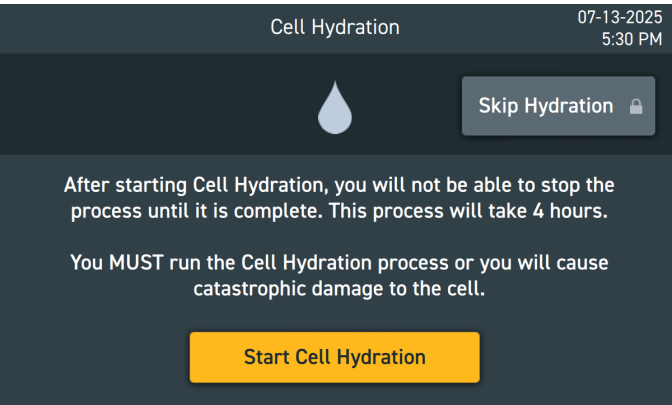


Figure L

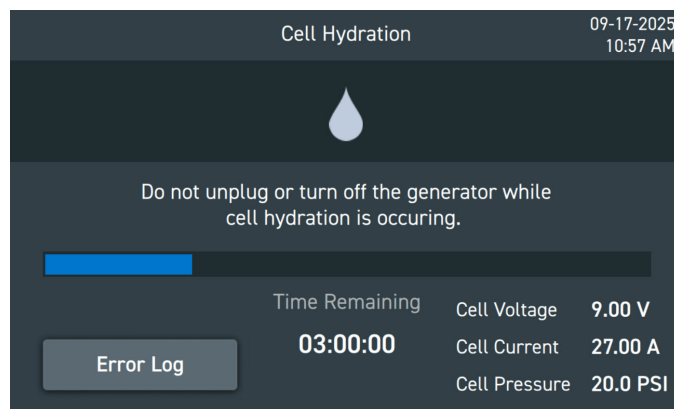


Figure M

NOTE: Upon first use the generator may appear to stop building pressure while the separation chamber fills with water. Should this happen, restart the generator.

Once the required pressure is reached, the outlet valve of the generator will be opened, as indicated completes its cycle. When the cell hydration routine has completed, connect the hydrogen outlet fitting to the instrument. On the display hydrogen will flow through the system piping and out through the atmosphere vent line

Close the 3-way ball valve to pressurize the system piping. Check for leaks and repair as required.

Open the 3-way ball valve to divert the flow to the application instrument.

OPERATING THE EQUIPMENT

Overview of Controls

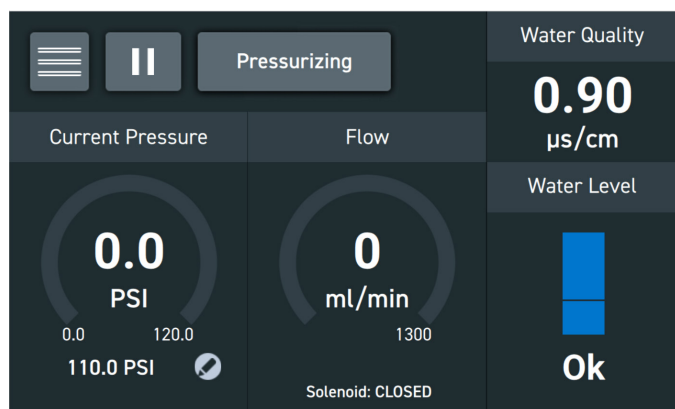


Figure N

NOTE: An external flow controller or downstream equipment must limit the H₂ gas demand to $\leq$ the max flow of the generator or an "overflow" condition may be created and cause the generator to shut down due to this error.

NOTE: when the H₂C unit is operating, an air purging sound is normal and indicates proper system function.

Once the required pressure is reached, the outlet valve of the generator will be opened, as indicated by "FLOW" on the display, and hydrogen will be supplied to the application instrument.



WARNING

If the generator is being powered for the first time, it will take approximately 48 hours for the generator to reach the purity specified.

Starting the Equipment

Connect the generator to the electrical supply and switch it on at the wall socket. Turn the generator on at the power switch (located on the rear of the generator) and wait.

The generator will perform a system check and initialize. The blue or green LED on the front of the unit will illuminate.

On completion, the generator will revert to the default menu as shown.

During start-up the generator may revert to the last error mode it experienced. When the error is cleared the generator will continue with the startup procedure.

If the error cannot be cleared by this method, follow the fault-finding procedure in section :ERROR AND MESSAGES* of this user guide.

Operating Menus

Default Menu

The default menu displays the following data:

Operational State

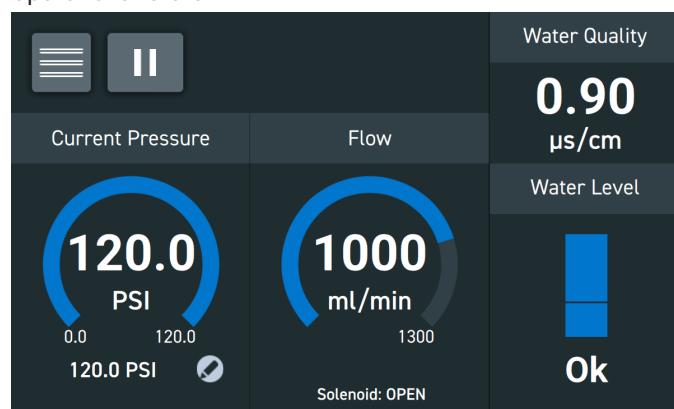


Figure O

Error Conditions or Standby State

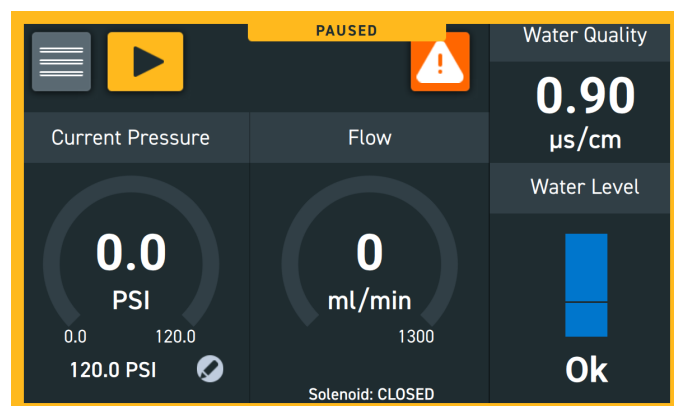


Figure P

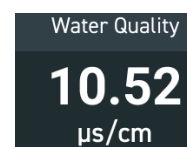
Standby Mode: The flow of hydrogen to the application can be interrupted by switching the generator into stand-by mode.

Press "Pause" icon  on the screen to go into standby, the screen will indicate that it's paused

To return to normal operation, press the "Play" icon 

Water Quality: The Water Quality is displayed in the main window Top right side.

When the water quality is OK, it will display the numerical value that the conductivity probes measure. When the water quality is below the system's specification, an error will be displayed in the main screen. You can change the units, by going into the System Settings -> General Settings and switching from either µs/cm or MΩ-cm.



WARNING

The water bottle should be drained and refilled with deionised water, ASTM II, >1 MOhm, <1µS, filtered to <100µm at the earliest convenient time.

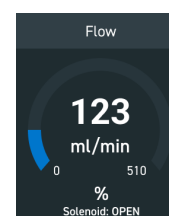
Current Pressure: Displays the set and actual outlet pressure.

Click on Set Pressure icon  to change the outlet pressure. Units can be changed via General Settings, discussed later in this manual.

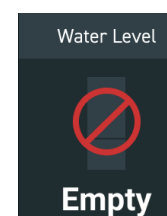
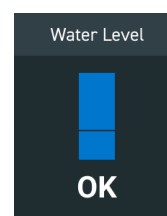


Current H2 Flow: Displays a calculated outlet flow. Units can be changed under the General Settings Menu.

Units can be changed via General Settings, discussed later in this manual.



Water Level: Graphical Display of the DI water level in the reservoir. When refilling with DI water, unit beeps when full.



General Settings

Touch Main Menu icon  then System Settings icon:

Pressure Settings: The units of pressure measurement may be changed between bar, psi and Mpa. Press the "Main Menu" icon. Then go into "System Settings" then "General Settings". Touch the drop-down menu to change the Pressure measurement display. You can display the following PSI, BAR, kPa

Water Quality Units: $\mu\text{s}/\text{cm}$, $\text{M}\Omega/\text{cm}$

Flow Rate Units: ml/min, cc/min, %

System Parameters

Touch Main Menu icon  then System Parameters icon:

Cell Current: Displays the current Cell Current value.

Cell Voltage: Displays the current Cell Voltage value.

Cell Pressure Actual: Displays the current Cell/Outlet pressure is.

Outlet Pressure Set: Displays what the Outlet set pressure is.

Flow Rate: Displays the calculated Flow rate that the generator is running.

Water Quality: Displays the water quality, via what the probes are reading.

Total Run Hours: Displays the total hours the generator has been running.

Pump Service Hours: Total of operational hours to service the Pump.

Filter Service Hours: Total of operational hours to service the filter.

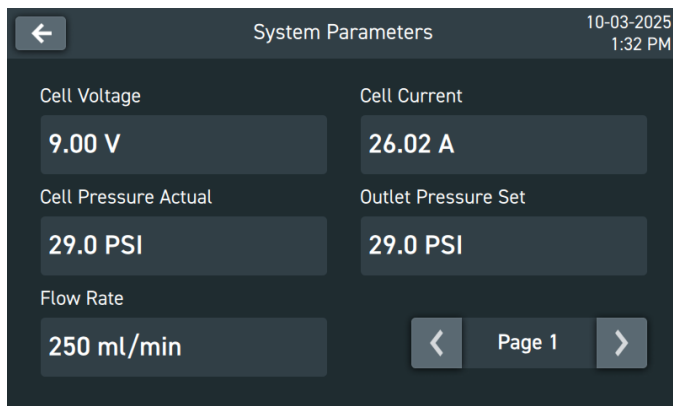


Figure Q

Error Log

The Error Log menu allows the user to access the error messages.

NOTE: The current error will be displayed on the main screen along with the attention icon displayed as well.

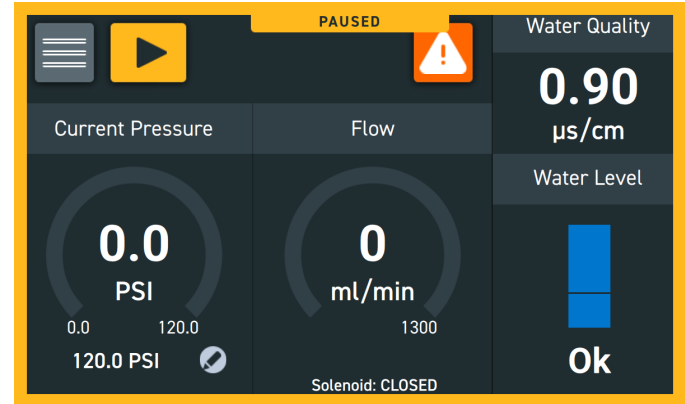


Figure R

Main Menu Icon  - **Error Log Icon:** To clear a system error, click on the "Hard Rest" icon and follow the screen prompts. The Full clear icon will clear all the errors from the register.

The  icon will scroll within a page.

The  icon will scroll through all the pages.

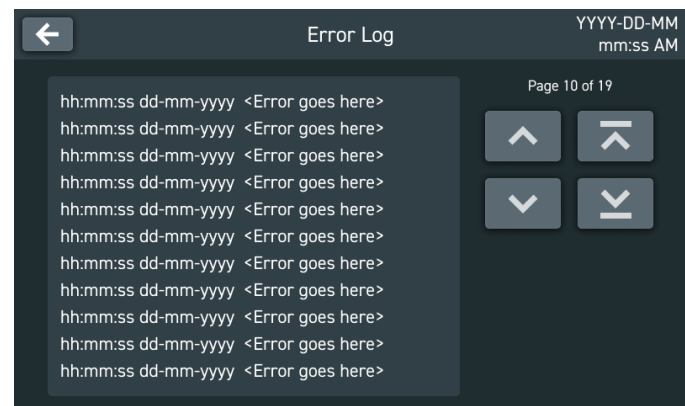


Figure S

Cell Hydration Sequence

The cell hydration sequence should be run if the generator has not been powered up for 90 days or more.

From the main menu press the main menu  icon, then press the "Cell Hydration" icon. Press the Start Cell Hydration icon and follow the screen prompts to run this task.

The sequence takes approximately 4 hours to complete.

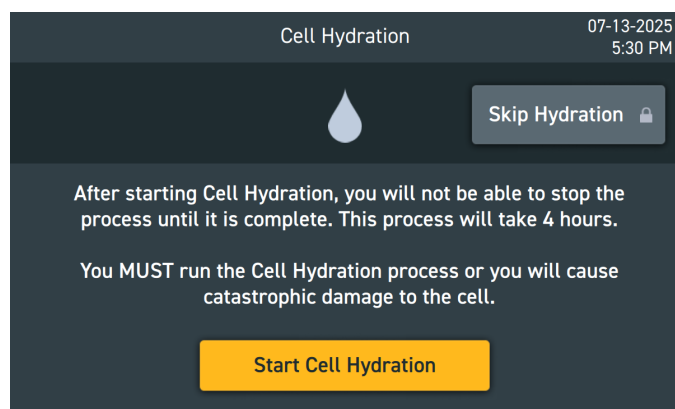


Figure T

Pressure Performance Test

If a leak is suspected, stop the hydrogen generator and disconnect the hydrogen outlet. From the main menu, press the main menu icon , then select the "Pressure Performance Test" icon and follow the instructions.

The unit will perform a generator pressure test followed by a purifier performance test. If both tests pass, a "Test Passed" screen will appear. You can then reconnect the hydrogen outlet and use the generator normally.

If either test fails, a "Test Failed" screen will appear, indicating a leak in the hydrogen generator. Please contact Parker Hannifin for assistance.

Purifier State

For more detailed information on the purifier cycle, you can access the Purifier State window at Main Menu Icon  - Purifier State. This window displays all live data related to the purifier's performance, including cycle time, power consumption, valve states, and other relevant operational parameters. Monitoring these metrics in real-time allows for better understanding and management of the purifier's efficiency and helps in diagnosing any issues promptly.

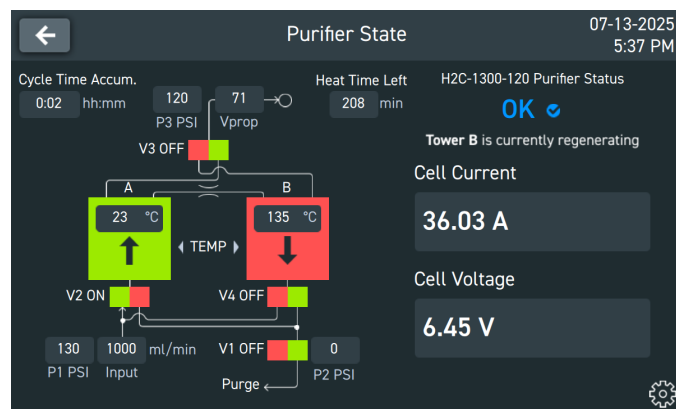


Figure U

Operating Menus



WARNING

Ensure that the generator is fully depressurized prior to shipment or servicing.

Ensure that the application instrumentation no longer requires hydrogen.

Switch the generator off at the mains power switch and disconnect it from the electrical supply.

Slowly disconnect the Hydrogen outlet connection pipe from the back of the generate or allowing the system to depressurize.



WARNING

Hydrogen gas will escape under pressure when the piping is disconnected.

The generator is now shut down.

If the generator is to be transported, drain the water from the generator as described in section 6. Refit the hydrogen outlet port cover and the three transit plugs to the O2 vent, excess H2 vent and the water bottle vent.

SERVICING

The recommended service procedures identified below, along with all other repair and calibration work, should be done by a Parker Hannifin approved engineer.

Cleaning

Clean the equipment with a damp cloth only and avoid excessive moisture around any electrical sockets. If required you may use a mild detergent, however, do not use abrasives or solvents as they may damage the warning labels on the equipment.

COMPONENT	OPERATION	DAILY	WEEKLY	6 MONTHS	12 MONTHS	24 MONTHS (16000Hrs.)
Generator	Check the power ON indicator is illuminated					
Generator	Check the STATUS / FAULT Indicator on the control panel.					
Generator	Check the water level.					
Generator	Check the water conductivity.					
Generator	Check the water bottle spillage drains					
Generator	Check for leaks					
Generator	Recommended Service A 6 Month Service.					
Generator	Recommended Service B 24 Month Service.					
Generator	Recommended Service C Replace the towers every 5 years to maintain optimal purity.					

Table 3.1

SERVICE	6 MONTHS	12 MONTHS	18 MONTHS	24 MONTHS	30 MONTHS	36 MONTHS	42 MONTHS	48 MONTHS	54 MONTHS	60 MONTHS	66 MONTHS	72 MONTHS
A												
B												

Table 3.2

	CHECK		ESSENTIAL PROCEDURE
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Service Kits

Clean the equipment with a damp cloth only and avoid excessive moisture around any electrical sockets. If required you may use a mild detergent, however, do not use abrasives or solvents as they may damage the warning labels on the equipment.

Recommended Service A - Required every 4000Hrs (6 months)

DESCRIPTION	CATALOG NUMBER	CONTENTS
Filter Service	MKH2C-6M	(1) Deioniser cartridge (2) 100 micron water filter (3) Environmental filters (x2) (4) Filter replacement tool

Recommended Service B - Required every 16000Hrs (24 months)

DESCRIPTION	CATALOG NUMBER	CONTENTS
Complete Service	MKH2C-24M	(1) Deioniser cartridge (2) 100 micron water filter (3) Environmental filters (x2) (4) Filter replacement tool (5) Water pump

Consumable Replacement Procedures

Draining a water bottle (A)

Ensure that unit is shutdown then locate the drain port on the rear of the generator and insert the drain line and run it below the machine. Ensure that the line is locked in position to obtain a complete seal. Leave the water to drain into a suitable container, then press the lock downwards and remove the line.



WARNING

In order to prevent contamination and prolong the life of the cell do not reuse the old water.

Replacing the deionizer cartridge and 100-micron water filter (B)



WARNING

Change the deionizer cartridge every 4000 hours (6 months), or if it has become contaminated.



Switch the generator into Standby mode and remove the top front cover and the water bottle cap.

Wearing powder-free disposable gloves, remove the deionizer cartridge and discard. Extract the 100-micron water filter using the H2 filter replacement tool. Push the tool over the filter so that

the webs on the filter fit into the slots on the end of the tool. Unscrew the filter and remove it from the water bottle.

Fit the replacement filter and ensure that it is secured into the water bottle. Refill the water bottle with deionized water, ASTM II, >1 MOhm, <1µS, filtered to <100µm, as described below, and fit the replacement deionizer cartridge.

Refit the water bottle cap and the top front cover and restart the generator

Replacing the Environmental Filters (C)

Remove the two environmental filters from the vent ports by pushing the push in fitting upwards to release. Fit the replacement filters and check that they are secure.

NOTE: Environmental filters should be changed every six months as there is no visual indication of exhausted filters.

Filling the water bottle (D)

Remove the top front cover and the water bottle cap .
Fill the water bottle using fresh deionized water to a level approximately 15mm below the upper lip of the neck of the bottle.



WARNING

The use of any water, other than deionized water (ASTM II, $>1 \text{ Mn}$, $<1 \mu\text{S}$, filtered to $<100 \mu\text{m}$) within this generator will damage and reduce the life time of the hydrogen cell.

If the generator is powered during refilling, an audible and visual indication will be given by the generator when the correct level is reached, and the LCD will display "Water Full" message. Once full, replace the water bottle cap and top front cover.



NOTE: If the water has been changed due to high conductivity, the deionizer cartridge must also be changed.

Service Record

GENERATOR DETAILS	
Model Number:	
Serial Number:	
Supply Voltage:	
COMMISSIONED BY:	
Company Name:	
Address:	
Telephone:	
Fax:	
Contact Name:	
Date of Commission	

Description	Date	Serviced By		Comments
		Print	Sign	
6 (4,000)				
12 (8,000)				
18 (12,000)				
24 (16,000)				
30 (20,000)				
36 (24,000)				
42 (28,000)				
48 (32,000)				
54 (36,000)				
60 (40,000)				
66 (44,000)				
72 (48,000)				
78 (52,000)				
84 (56,000)				
90 (60,000)				
96 (64,000)				
102 (68,000)				
108 (72,000)				

ERROR MESSAGES

When an error occurs, it will be displayed on the screen. In addition to the error messages the generator will provide a visual and audible indication.

NO	Error Message	Description	H2 Production	Action
1	Fill Water	The water has dropped below the mid-point	YES	Fill with deionized water, ASTM II, >1 MO, <1µS, filtered to <100µm.
2	Water Empty	Water has dropped below minimum point	NO	
3	Change Water	Water conductivity is high	YES	Fill with deionized water, ASTM II, >1 MO, <1µS, filtered to <100µm.
4	Conductivity	Water conductivity is unacceptably high	NO	
5	High Voltage	The hydrogen cell voltage is too high	NO	Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
6	Low Voltage	The hydrogen cell voltage is too low	NO	
7	Low Current	The hydrogen cell current is too low	NO	
8	High Current	The hydrogen cell current is too high	NO	
9	Internal Leak	Hydrogen leak in the internal pressure system	NO	Verify that the generator is specified correctly for the application. Perform the pressure performance test as explained on page 21. If the problem persists, depressurize the generator and perform a hard reset. If the issue continues, contact Parker Hannifin for assistance. Additionally, if the problem is not caused by the generator, check for external leaks at the generator's outlet.
10	H2 Outlet	Massive Pressure loss	NO	
11	Over Run	The generator is operating above 100% rated capacity or running to atmosphere	NO	
12	Hydrogen Leak	Internal Leak	NO	

NO	Error Message	Description	H2 Production	Action
13	Over Pressure	Maximum internal pressure is exceeded	NO (System Locked)	If the problem persists, contact Parker Hannifin for advice.
14	Conduct Trans	There is a fault with the conductivity sensor	NO	Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
15	Pressure Trans	There is a fault with the pressure transducer	NO	
16	Water Pump	There is a fault with the water pump	NO	
17	Calibration	The calibration is out of date	NO	
18	Watch Dog	Internal Software timeout	NO	
19	Float Trans	There is a fault with the float chamber water level transducer	NO	Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
20	Float Chamber	There is a fault in the float chamber; the water level is too high.	NO (System Locked)	
21	Service Required	A service is required	YES	Perform service required
22	O2 Vent Blocked	The oxygen vent is blocked	NO (System Locked)	Remove the blockage and perform a hard reset. If the problem persists, contact Parker Hannifin for advice.
23	Remote Stop	The terminals on JP3 of the options board are short circuited.	NO	Remove the blockage and perform a hard reset. If the problem persists, contact Parker Hannifin for advice.
24	Lock	Pressure error, O2 vent blocked, or three consecutive errors of the same type have occurred.	NO (System Locked)	Resolve the initial fault and reset the generator
25	Low Temp	Tower temperature is not reaching target	NO	Check Power connections to Purifier, Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
26	High Temp	Tower temperature exceeds target temperature	NO	Make sure ambient temperature does not exceed 40°C, Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
27	O2 Float Connect	Faulty water level reading	NO	Make sure water level is above half way, Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.



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TI-H2C Rev C

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