HYDROGEN GAS GENERATOR

H2F-100 | H2F-165 | H2F-260 | H2F-510 User Guide

Table of Contents

Safety Information 4

Markings and Symbols 5

Description 5

Technical Specification 6

Materials of Construction 7

Weight and Dimensions 8

Receiving and Inspecting the Equipment 8

Storage 8

Unpacking 8

Overview of the equipment 9

Locating the Equipment 10

Environment 10

Space Requirements 10

Ventilation Requirements 10

Water Supply Requirements 10

Electrical Supply Requirements 10

Installation & Commissioning 11

Recommended system layout 11

Installation Parts. 12

Installation Kit 12

Connecting the generator 13

Environmental filters 13

Hydrogen outlet port 13

Drain ports 13

Electrical supply 13

Filling the water bottle 13

Water supply (generators fitted with Auto Water Fill) 14

Options Board Accessory 14

Fitting the Options Board 14

Wiring the Options Board 14

Commissioning the Generator 15

Operating the equipment 17

Overview of controls 17

Starting the equipment 17

Operating Menus 17

Default Menu 17

Eroor Condition or Standby State 17

General Settings 18

System Parameters 18

Error Log 18

Cell Hydration Sequence X

Table of Contents

Stopping the equipment and depressurizing 19

Servicing 20

Cleaning 20

Service Intervals 20

Service Kits 21

Recommended Service A - Required every 4000Hrs (6 months) 21

Recommended Service B - Required every 16000Hrs (24 months) 21

Recommended Service C - As required 22

Consumable Replacement Procedures 22

Draining the water bottle (A) 22

Replacing the deioniser cartridge and 100 micron water filter (B) 22

Replacing the Environmental Filters (C) 22

Replacing the Desiccant Cartridge (D) 22

Filling the water bottle (E) 22

Service Record 23

Error Messages 24

WARRANTY

This warranty applies to ChromGas H2F generators manufactured by Parker Industrial Gas Filtration & Generation Division (Parker IGFG).

Parker warrants that ChromGas H2F 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. To guarantee the optimum efficiency of the PEM cell, this generator must be installed and running within 3 months of dispatch from Parker IGFG. Failure to do this may invalidate the warranty.

ChromGas H2F 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.

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 and naked flames.

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 i validate 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:

Marking	Description
	Caution, Read the User manual.
	Risk of electric shock.
 Warning	Highlights actions or procedures which, if not performed correctly, may lead to personal injury or death.
 Caution	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)
 Warning	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.

DESCRIPTION

This generator will produce a constant stream of high purity hydrogen at a predetermined flow rate and pressure when connected to a suitable power supply and fed with a suitable quality of deionized water. It is suitable 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 running 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 Specification

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

	Units	H2F-100	H2F-165	H2F-260	H2F-510
Water quality	Deionized, ASTM II, >1 MOhm, <1µS, filtered to <100µm				
Consumption (Approximate)[1]	L/week	0.750	1.25	2	4
Outlet flow rate	cc/min	100	165	260	510
Outlet pressure	psi g (bar g)	5 -100 ± 0.5 (0.3 -6.89 ± 0.034)()			
Purity[3]	%	> 99.999%			
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 (factory installed only)	H_2O 40 PSIG MAX. (2.8 BARG)	1/4" female npt			
Overflow drain		Quick release push in fitting			
Spillage drain		1/2" Barbed push on fitting			
Connection type		IEC320			
Supply voltage range	Vac	100-230 50 / 60 Hz			
Power consumption[4]	W	90	125	185	235
Fuse[5]	A	5	5	5	5
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			

1. Based on full flow with 24 hour 7 day operation at 22°C (72°F) ambient temperature.
2. Applies to generators with auto water fill only.
3. The balance is O^2 and moisture.
4. The power consumption when in standby mode is 20W.
5. Anti Surge (T), 250V, 5 x 20mm HBC, Breaking Capacity 1500A @ 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	Polyethylene
Float	
Floats	Polyvinyl Chloride
Manifold, Bowl and Spigot	Natural Polycarbonate
JG Fittings	Acetyl
Conductivity Probes	316SS
Pressure Switch	316SS
PEM Cell	Platinum and Titanium
Desiccant Cartridge (adsorbent)	Molecular Sieve / SIlica Gel / Clear Polycarbonate
Mounting Feet	Polyamide reinforced nylon and plated mild steel

Weight and Dimensions

The dimensions and weight of the equipment are specified below.

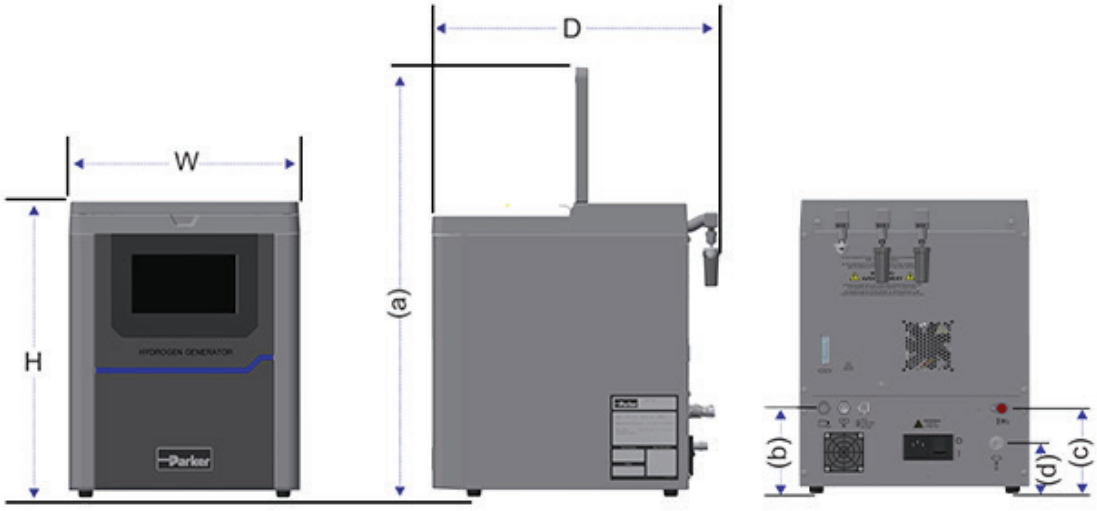


Figure A

Weight and Dimensions

Dimension	Units	H2F-100	H2F-165	H2F-260	H2F-510
H	in (mm)	17.1 (435)	17.1 (435)	17.1 (435)	17.1 (435)
W	in (mm)	13.5 (342)	13.5 (342)	13.5 (342)	13.5 (342)
D	in (mm)	18 (457)	18 (457)	18 (457)	18 (457)
(a)	in (mm)	25.4 (645)	25.4 (645)	25.4 (645)	25.4 (645)
(b)	in (mm)	5 (127)	5 (127)	5 (127)	5 (127)
(c)	in (mm)	5 (127)	5 (127)	5 (127)	5 (127)
(d)	in (mm)	3 (76.2)	3 (76.2)	3 (76.2)	3 (76.2)
Weight					
Water bottle empty	lb (Kg)	41.9 (19)	41.9 (19)	41.9 (19)	41.9 (19)
Water bottle full	lb (Kg)	50.7 (23)	50.7 (23)	50.7 (23)	50.7 (23)

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
[1]Water fill tube	1
Deionizer cartridge	1
Environmental filters	2
O2 vent cap	1
Electrical supply cable	1

[1]Supplied only with generators fitted with the water fill option.

Overview of the equipment

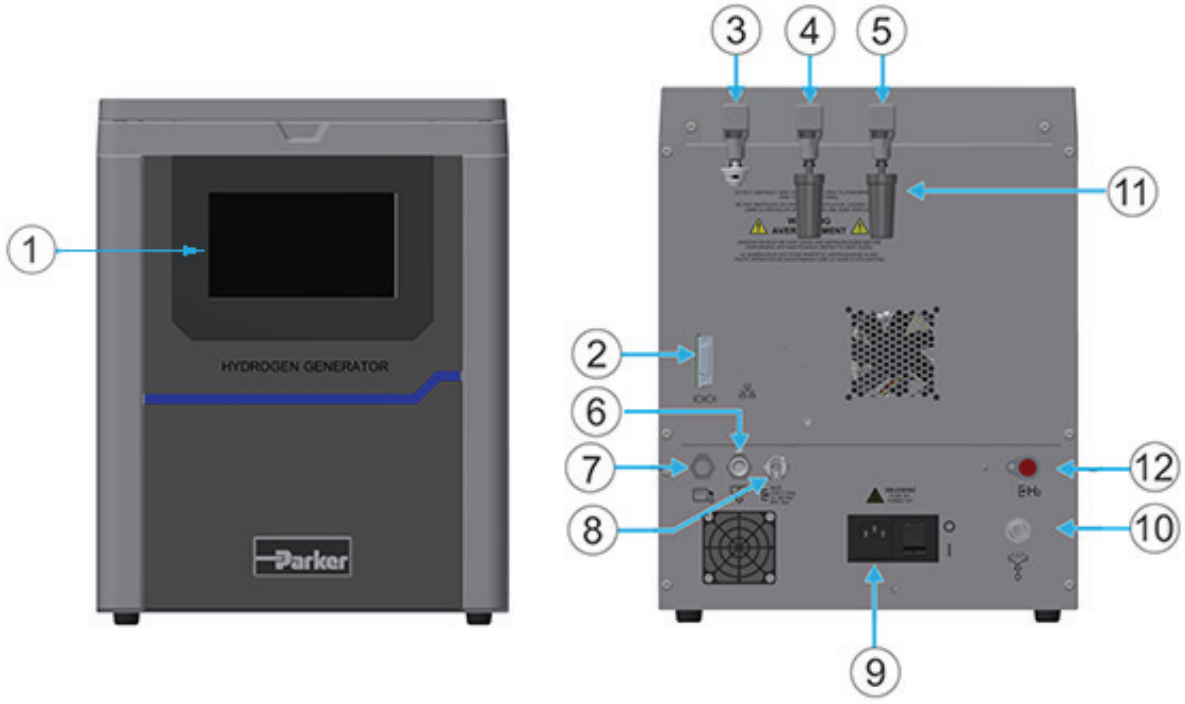


Figure B

Key:

1	Control panel	7	Overfill Drain
2	Options board connection port	8	Auto water fill connection factory installed
3	O2 Vent (<250 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 customers' responsibility to ensure that the environmental conditions specified in table 2.1 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 2.2 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 and asphyxiation hazard. Always ensure that the equipment is operated in a well-ventilated area.

Water Supply Requirements

Generators fitted with automatic water fill system maintain the water level from a gravity fed fresh deionized water supply. Refer to "Technical Specification" on page 3 for the 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 reduce the lifetime of the hydrogen cell.

The generator should be connected to the supply using 1/4" Tygon or PTFE tubing (not supplied).

NOTE: The automatic water fill system is available as a factory or field fit optional extra. Contact Parker Hannifin for further details.

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 2.1 for the electrical specification). It is recommended that this supply have surge protection.

INSTALLATION & COMMISSIONING

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

Recommended system layout

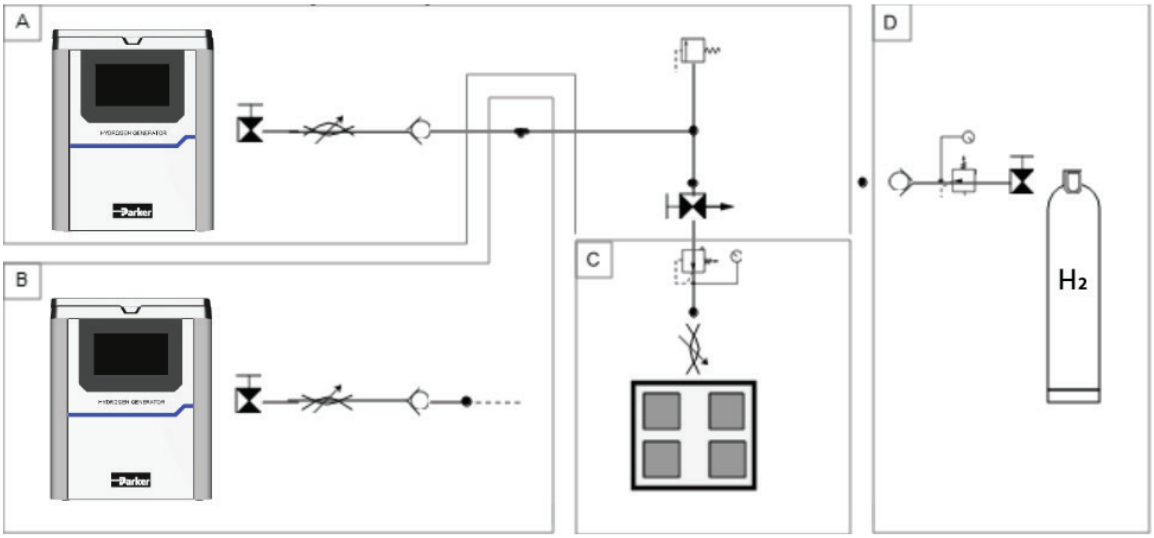


Figure C

Key:

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

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

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)

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 02 vent cap as shown.

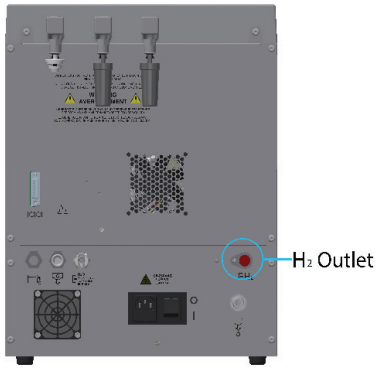


Figure D

Hydrogen outlet port

Refer to “Recommended system layout” on page 8 for the desired system configuration.

The generator should be connected to the application instrument using either high-quality stainless-steel tube or refrigeration grade copper tube. Remove the protective dust cap from the hydrogen outlet port compression fitting. Insert the tube into the outlet port fitting and rotate the tube nut until finger tight. Using a spanner (wrench) tighten the nut one and one-quarter (1 1/ 4) turns. When cutting the tubes always use the correct tools to allow a clean perpendicular cut. Cutting tubes will cause debris that, if not removed, may damage the downstream instrumentation. It is recommended that all pipes are purged to remove any debris that may exist. When routing the tubes ensure that 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.

⚠ 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 reduce the lifetime of the hydrogen cell.

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 suitable gloves to prevent contamination, insert the deionizer cartridge into the water bottle and fit the cap securely.

Figure F

Water supply (generators fitted with Auto Water Fill)

The optional water fill allows the generator's water bottle to be gravity fed from a suitable deionized water supply. When the water level falls below the mid-point, the water bottle will be replenished from the deionized water supply.

Connect the deionized water supply to the automatic water fill inlet (¼" 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 3 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.

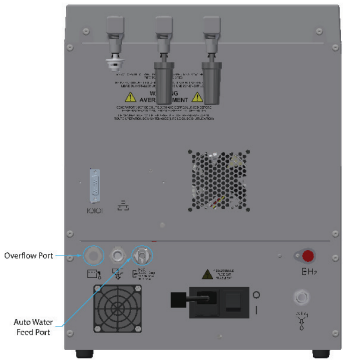


Figure G

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.

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.

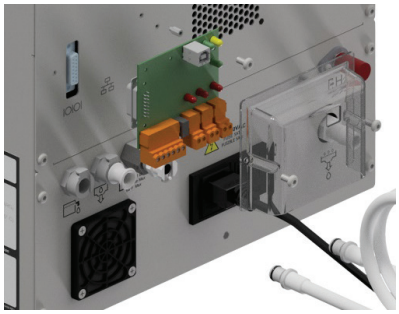


Figure H

Wiring the Options Board

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.

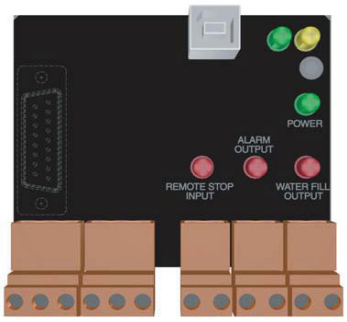


Figure I

Description	Catalog number
H2 SERVICE BOARD KIT	604970903

Commissioning the Generator

WARNING
Ensure that a suitable vent line is provided during the commissioning 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 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.

1 Referring to the recommended set up, use the 3-way ball valve to isolate the application instrument from the system and divert the flow to the vent line.

   If a 3-way ball valve has not been installed, disconnect the application instrument from the system and connect the open-ended piping to a suitable vent line.

2 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 a bootup Screen will be displayed.

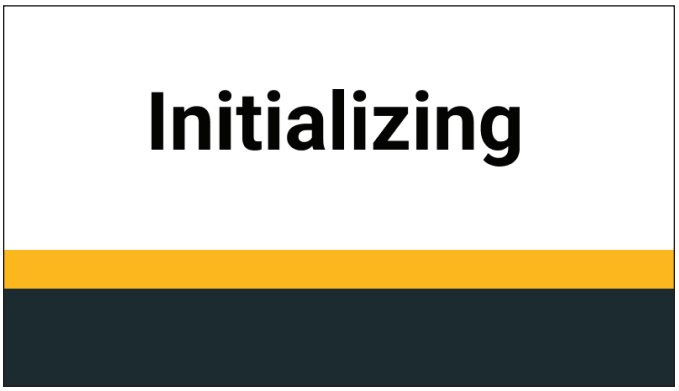


Figure J

On completion the generator will revert to the default menu as shown in Figure K or the generator will go into a Cell Hydration screen Figure N.

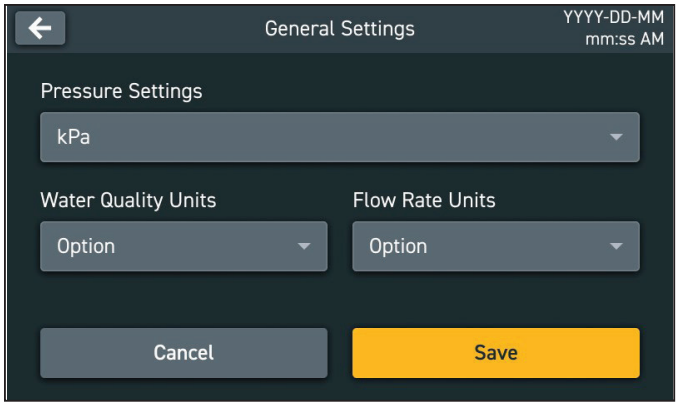


Figure K

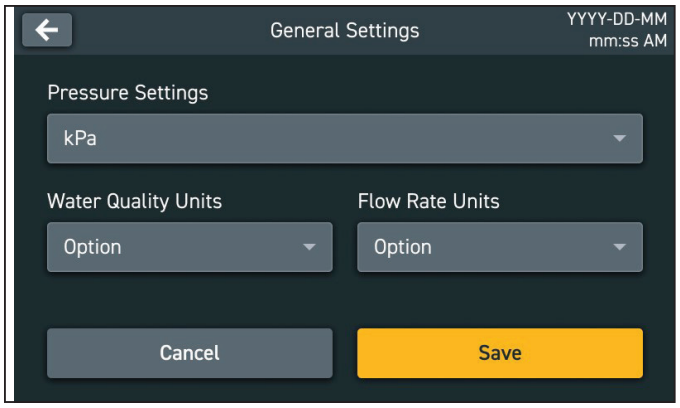


Figure L

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.

3 Once the required pressure is reached, the outlet valve of the generator will be opened, as indicated by on the display hydrogen will flow through the system piping and out through the atmospheric vent line.

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

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

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

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 it completes its cycle.

1 Install the Cell Hydration tube that came with the generator and install it into the Hydrogen Outlet Port.

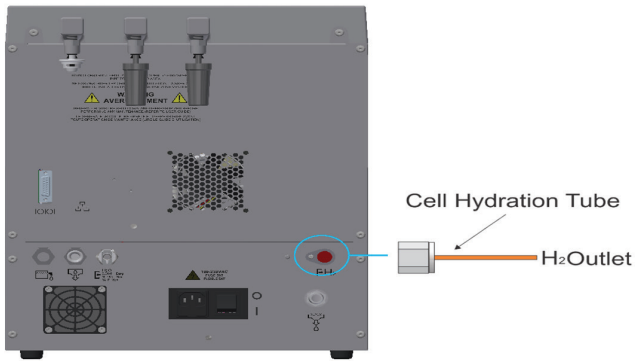


Figure M

2 Follow Display Prompts to continue with the Cell Hydration Process.

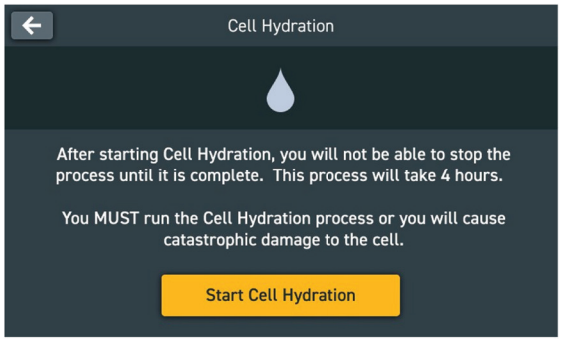


Figure N

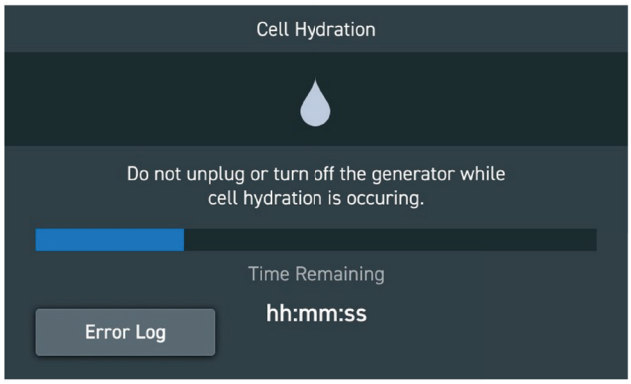


Figure O

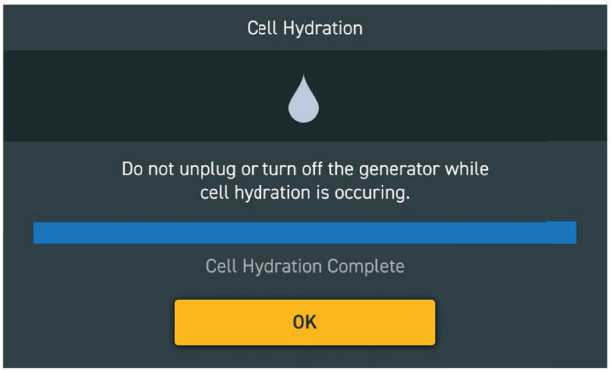


Figure P

2 When the cell hydration routine has completed, disconnect the cell hydration tube and save for future use. Connect the hydrogen outlet fitting to the instrumentation.

OPERATING THE EQUIPMENT

Overview of controls

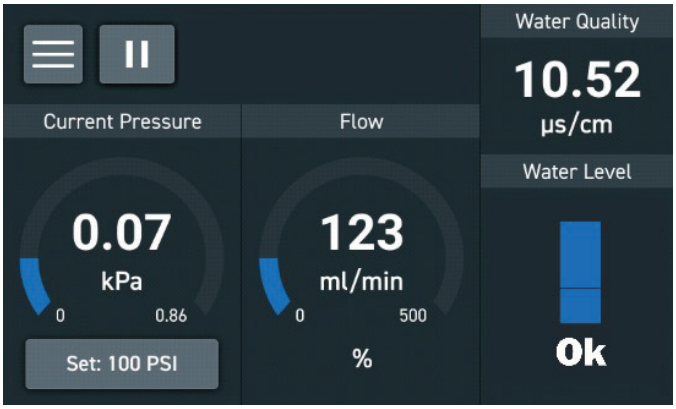


Figure Q

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 and the blue LED on the front of the unit will illuminate.

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

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 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.

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 6 of this user guide.

Operating Menus

Default Menu

The default menu displays the following data:

Operational State

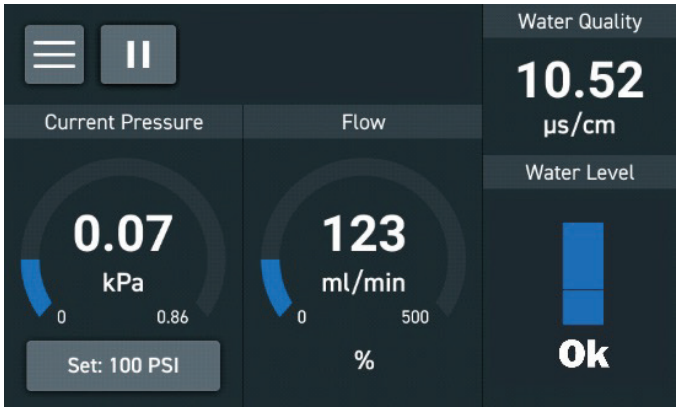


Figure R

Error Condition or Standby State

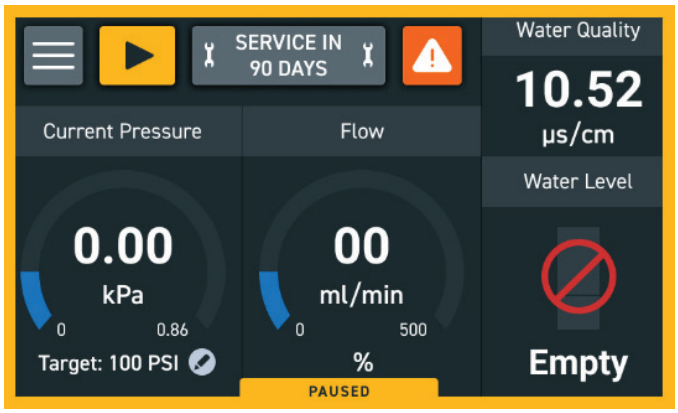


Figure S

1. **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 ▶

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

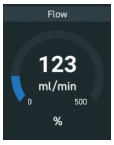
   When the water quality is OK, it will display the numerical value that the conductivity probes measure. When the water quality is below the system’s specification, an error will be displayed in the main screen. You can change the units, by going into the System Settings -> General Settings and switching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

3. **Current Pressure:** Displays the set and actual outlet pressure.

   a. Click on Set Pressure icon to 

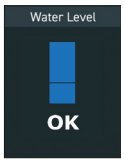
change the outlet pressure. Units can be changed via General Settings, discussed later in this manual.

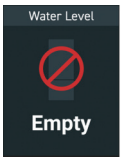
4. **Current H2 Flow:** Displays a calculated outlet flow. Units can be changed under the General Settings Menu.



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

5. **Water Level:** Graphical Display of the DI water level in the reservoir.





⚠ 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.

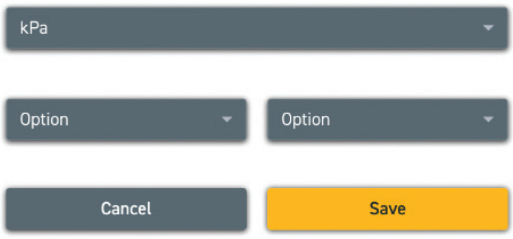


Figure T

General Settings

Touch Main Menu icon ☰ then General 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

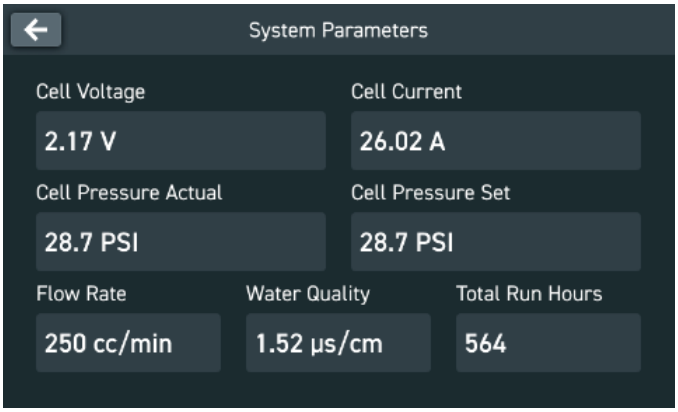
Water Quality Units: µs/cm, MΩ/cm

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

System Parameters

Touch Main Menu icon ☰ then System Parameter icon:

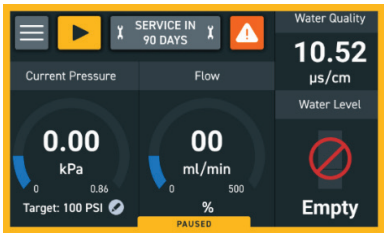
- **Cell Current:** Displays the current Cell Current value.
- **Cell Voltage:** Displays the current Cell Voltage value.
- **Cell Pressure Actual:** Displays the current Cell/Outlet pressure is.
- **Cell Pressure Set:** Displays what the Cell /Outlet set pressure is.
- **Flow Rate:** Displays the calculated 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.



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.



Error Log – 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 the all the errors from the register.

The icon will scroll within a page.

The icon will scroll through all the pages.

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 240 minutes (4 hours) to complete.

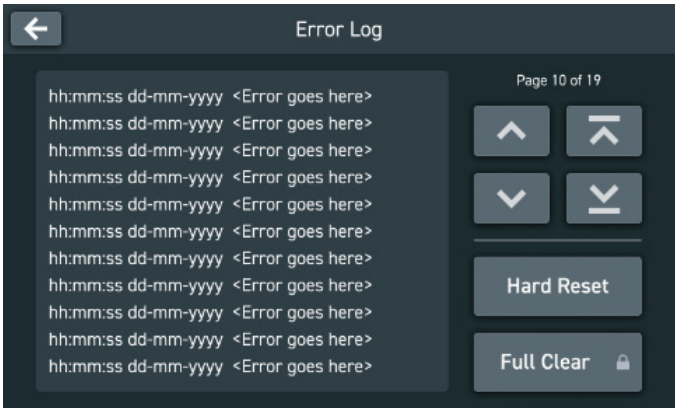


Figure U

Stopping the equipment and depressurizing

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

1. Ensure that the application instrumentation no longer requires hydrogen.
2. Switch the generator off at the mains power switch and disconnect it from the electrical supply.
3. 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.

4. The generator is now shut down.
5. 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 02 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 undertaken 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.

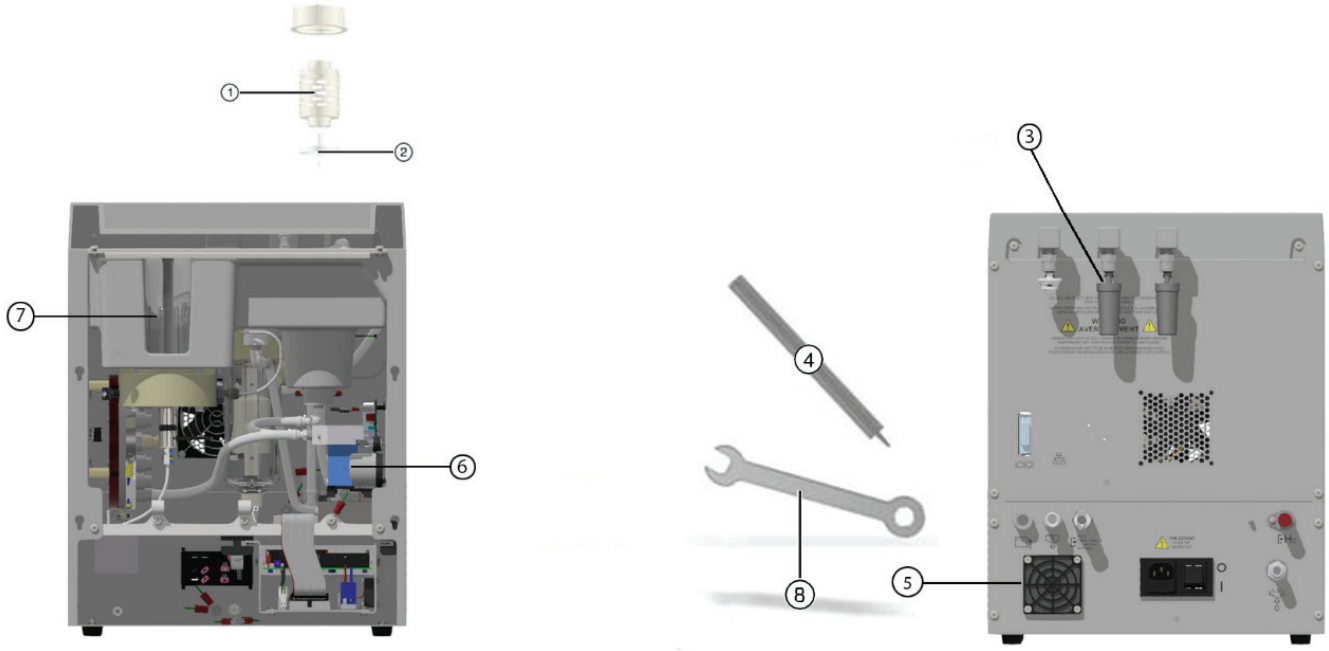
Component	Operation	Daily	Weekly	6 Months	12 Months	24 Months (16000Hrs.)
Generator	Check the power ON indicator is illuminated.	✓				
Generator	Check the STATUS / FAULT Indicator on the control panel.	✓				
Generator	Check the water level.	✓				
Generator	Check the water conductivity.	✓				
Generator	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 Check the desiccant cartridge and consider replacement if the orange indicator has turned clear.		✓			

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				🔧				🔧				🔧

Key:

✓	Check	🔧	Essential Procedure

Service Kits



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

Description	Catalog Number	Contents
Filter Service	MKH2F-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	MKH2F-24M	(1) Deioniser cartridge (2) 100 micron water filter (3) Environmental filters (x2) (4) Filter replacement tool (5) Fan guard (6) Water pump (7) Desiccant cartridge (8) Cartridge spanner (wrench)

Recommended Service C - As required or when the system totalizer has been reached.

NOTE: The desiccant cartridge should be changed as required. The system has a built-in totalizer which keeps track of the total volume of H2 that has flowed through the desiccant cartridge. The totalizer setpoint is optimized based on laboratory testing of H2 outlet dewpoint. However, it is recommended that the cartridge is changed at least every 6 months on H2F-100 and H2F-165, 4 months on H2F-260, and 2 months on H2F-510.

Description	Catalog Number	Contents
Replace Cartridge	MKH2F-D	(7) Desiccant cartridge (8) Cartridge spanner

Consumable Replacement Procedures

Draining the water bottle (A)

Ensure that unit is shutdown then locate the drain port on the rear of the generator and insert the drain line (1) 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 (2) 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 (3) and discard. Extract the 100-micron water filter (4) using the H2 filter replacement tool (5). 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 (6) from the vent ports by pushing the push in fitting (7) 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.

Replacing the Desiccant Cartridge (D)

Depressurize the generator as specified in “Stopping the equipment and depressurizing” on page 15.

Remove the top front cover. Break the seal of the cartridge using a size 19mm open ended spanner (wrench) (8) and then unscrew it by hand. Remove the cartridge and fit the replacement. The new cartridge should be tightened by hand and then nipped up, by a further 1/8th of a turn, using the 19mm spanner (wrench).

Refit the top front cover and the outlet fitting. Restart the generator.

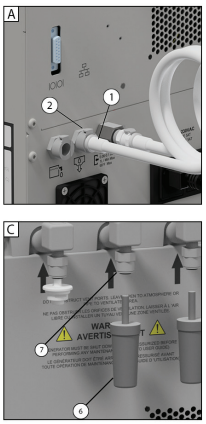
Filling the water bottle (E)

⚠ WARNING
The use of any water, other than deionized water (ASTM II, >1 Mn, <1µS, filtered to <100µm) within this generator will damage and reduce the life time of the hydrogen cell.

Remove the top front cover and the water bottle cap (9). 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 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:	

Service Interval Months (Hours)	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	Check that the drying cartridge is fitted correctly. Check the internal pressure circuit. If the problem persists, contact Parker Hannifin for advice.
10	H2 Outlet	Massive Pressure loss	NO	
11	Over Run	The generator is operating above 100% rated capacity or running to atmosphere	NO	Verify that the generator is specified correctly for the application. If the problem persists, contact Parker Hannifin for advice. Depressurize the generator and perform a hard reset.
12	Hydrogen Leak	Internal Leak	NO	Check the internal pressure circuit. If the problem persists, contact Parker Hannifin for advice. Check for external leaks on the outlet of the generator.
13	Over Pressure	Maximum internal pressure is exceeded	NO (System Locked)	If the problem persists contact Parker Hannifin for advice.
14	Conduct Trans	There's a fault with the conductivity sensor	NO	Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
15	Pressure Trans	There's is a fault with the pressure transducer	NO	
16	Water Pump	There's 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	
21	Service Required	A service is required	YES	Perform required service
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	Reset / Hard reset the generator. If the problem persists, contact Parker Hannifin.
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.

Parker Hannifin Corporation
Industrial Gas Filtration and Generation Division
242 Neck Road
Haverhill, MA 01835
phone 800 343 4048
www.parker.com/labgas

TI-H2F Rev-