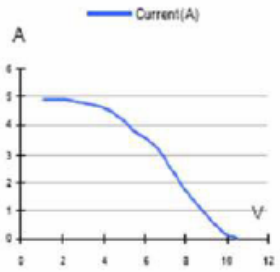
Anexo II: Especificaciones de los SPC

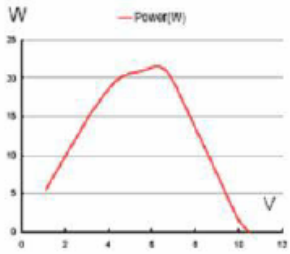
II.I SPC 20 W

H-20 Fuel Cell System

20 Watt H_2/Air PEM Fuel Cell Stack incl. fans, Metal Hydride Storage tank (20 sl) with refueling adapter, pressure regulator, control electronics and miniature electronic valve.

Leightweight, compact, and easy to operate fuel cell stack with integrated fan and casing. Single air flow for both cooling and air breathing function.





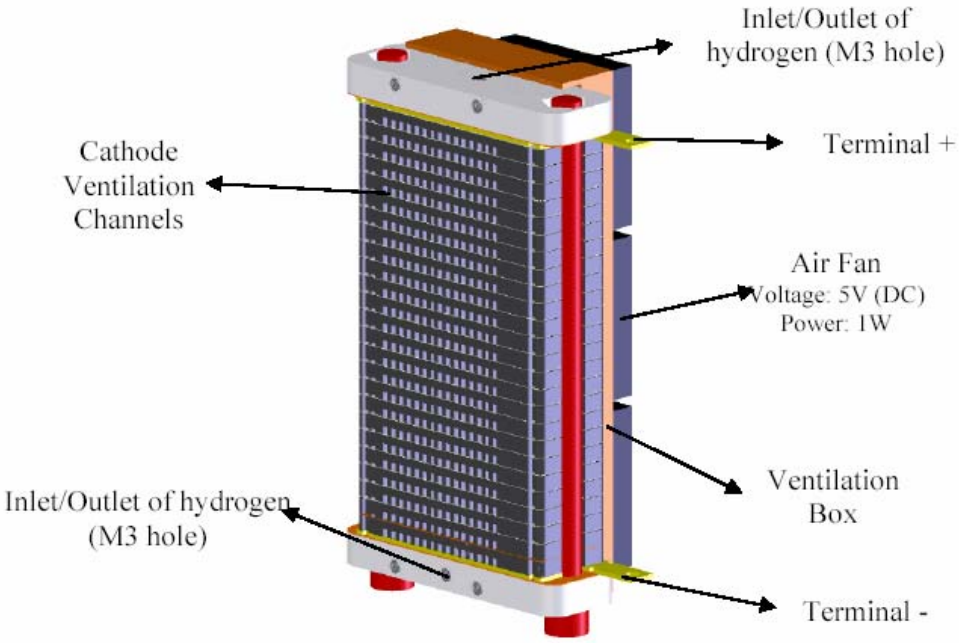
Technical Specifications	
Number of cells	11
Active area/cell	7cm²
Power	20 Watt (22Wp)
Operation	H_2/Air
Weight	230g
Dimensions	76 x 56 x 47mm
H_2 pressure	2.9-4psi 0.2-0.3bar
External temp.	5 to 40°C
Stack operating temp.	45-50°C
Humidification	self humidified
Cooling	air (integr. fan)
Flow rate	220sml/min max.
Startup time	immediate
Efficiency	45%el max.
Product description	**Part#**
FuelCell System 20W	H-20

Specifications may change without prior notice.

II.II SPC 25 W

User's manual

System Description



Scheme of a stack Model 25 SR 4-A.

The stack Model 25SR4-A is made by 25 bipolar plates, 2 collector plates, 24 membrane/electrode assemblies, 2 structural plates, ventilation box and 3 air fans. The hydrogen is fed in the M3 holes (figure 3). If one of the holes of the structural plate is used for fuel inlet or outlet, the other hole of the plate should be sealed. The air fan works at 5V (DC). The terminals + and – are used to connect the stack to the charge.

General Features

Technology

Type	Proton Exchange membrane, PEM
Membrane	Nafion® 111
Fuel	High purity hydrogen
Oxidant	Oxygen (from air)
Cooling	Air (forced ventilation)
Ventilation	Air fan
H_2 pressure	250 mbar relative
Fuel cell stack	24 membranes (membrane electrode assembly, MEAs)
Reaction Area	3,8 cm^2 by MEA
Working temperature	30 to 40ºC

4.2. Electrical Specifications

Nominal power (theoretical)	25W
Output voltage	8 to 24V
Power density	370 mW/cm^2
Volume power density	325 mW/cm^3
Ohmic resistance per MEA	446 $mohm/cm^2$
Voltage decay at 0,5A	3 mV/hr
Useful functioning lifetime	1500 hr

4.3. Other Specifications

Dimensions	95x55x20 mm
Weight	196 g
Room temperature	Temperatures between 5 and 40ºC.

4.4. Characteristic Power Curve

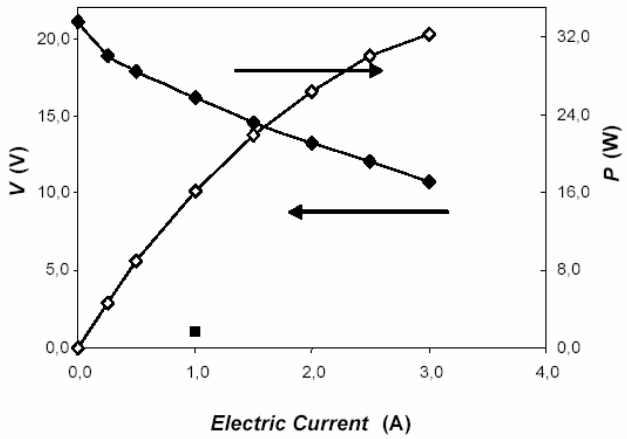


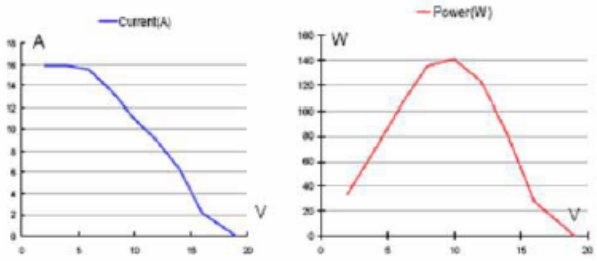
Figure 4 –Voltage-current and power-current plots of the stack Model 25SR4-A.

II.III SPC 100 W

H-100 Fuel Cell System

100 Watt H_2/Air PEM Fuel Cell Stack incl. integrated fan and casing, electronic valves, control electronics and tubing (supplied as a complete system integration kit).

Leightweight, compact, and easy to operate fuel cell stack with integrated fan and casing. Single air flow for both cooling and air breathing function.



Technical Specifications	
Number of cells	20
Active area/cell	19.4 cm^2
Power	100 W (150Wp) 12V@8.5A
Operation	H_2/Air
Weight	835g
Dimensions	105x86x134mm
H_2 pressure	2.9-4.35psi 0.2-0.3bar
External temp.	5 to 40°C
Max. stack temp.	65°C
Humidification	self humidified
Cooling	air (integrated fan)
Flow rate	1,67sl/min max.
Startup time	immediate
Efficiency	50%el max.
Product description	**Part#**
Fuel Cell System 100W	H-100

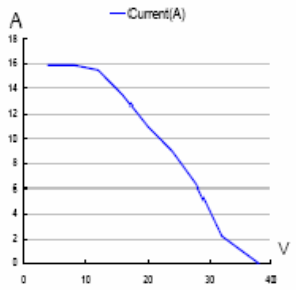
Specifications may change without prior notice.

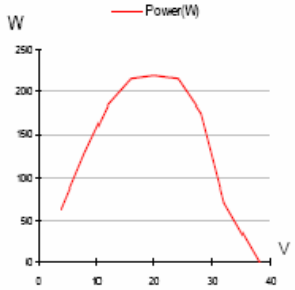
II.IV SPC 200 W y 300 W

H-200 Fuel Cell System

200 Watt H_2/Air PEM Fuel Cell Stack incl. integrated fan and casing, electronic valves, control electronics and tubing (supplied as a complete system integration kit).

Leightweight, compact, and easy to operate fuel cell stack with integrated fan and casing. Single air flow for both cooling and air breathing function.
Includes control board and solenoid valves.



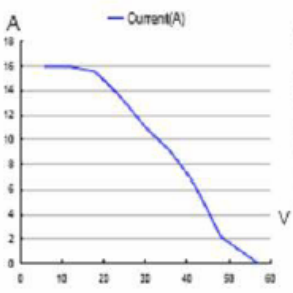


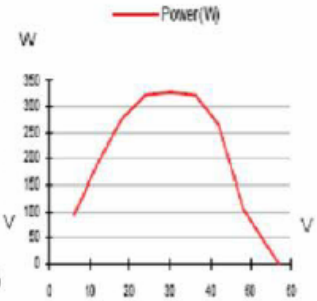
Technical Specifications	
Number of cells	40
Active area/cell	19.4cm^2
Power	200 Watt (220Wp) 24V@8.5A
Operation	H_2/Air
Weight	1,25kg
Dimensions	105x70x152mm
H_2 pressure	2.9-4.35psi 0.2-0.3bar
External temp.	5 to 40°C
Max. stack temp.	65°C
Humidification	self humidified
Cooling	air (integrated fan)
Flow rate	3.33sl/min max.
Startup time	immediate
Efficiency	50%el max.
Product description	**Part#**
Fuel Cell System 200W	H-200

Specifications may change without prior notice.

H-300 Fuel Cell System

300 Watt H_2/Air PEM Fuel Cell Stack incl. integrated fan and casing, electronic valves, control electronics and tubing (supplied as a complete system integration kit).
Leightweight, compact, and easy to operate fuel cell stack with integrated fan and casing. Single air flow for both cooling and air breathing function.





Technical Specifications	
Number of cells	60
Active area/cell	19.4 cm^2
Power	300 W (330Wp) 36V@8.5A
Operation	H_2/Air
Weight	1.7kg
Dimensions	105x70x220mm
H_2 pressure	2.9-4.35psi 0.2-0.3bar
External temp.	5 to 40°C
Max. stack temp.	65°C
Humidification	self humidified
Cooling	air (integrated fan)
Flow rate	4.5sl/min max.
Startup time	immediate
Efficiency	50%el max.
Product description	**Part#**
FuelCell System 300W	H-300

Specifications may change without prior notice.

II.V SPC 1 kW

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- 1kW 16V, 1.4 kW 14V Fuel Cell Stack

1kW 16V, 1.4 kW 14V Fuel Cell Stack

Item Number	540310
Unit Price	Contact Us

Order

PRODUCT OVERVIEW

Forced Flow Fuel Cell Stack Features: Stacks operate with hydrogen/air and reformate (with 10-15 ppm CO)/air.
Self-Humidified Membrane and Electrode Assemblies.
Hydrogen can be kept dead-ended.
Water is removed continuously from the stack.
The maximum operating temperature can be from 70-75?C.
There is no cell failures at higher temperatures.
The stacks can operate at ambient temperature.
No special startup procedure is required.
Warranty is offered on all products.
Control System available separately.

TECHNICAL SPECIFICATIONS

1-1.4 kW Stack
Number of cells: 24
Area: 245 cm2
Power: 1kW at 16V, 1.4 kW at 14V
Reactants: H2/air, reformate/air
Temperature Ambient-70oC
Pressure (Air): about 1-5 psi, P (Hydrogen): 1 - 3 psi
Humidification: self-humidified
Cooling: Water
Weight (approx.): ~ 30 pounds
Dimension (approx.): 14 cm x 24 cm x 24 cm
Type of fuel cell: PEM
Flow rate at max output About 12 liters per minute of hydrogen
Start up time: Instantaneous

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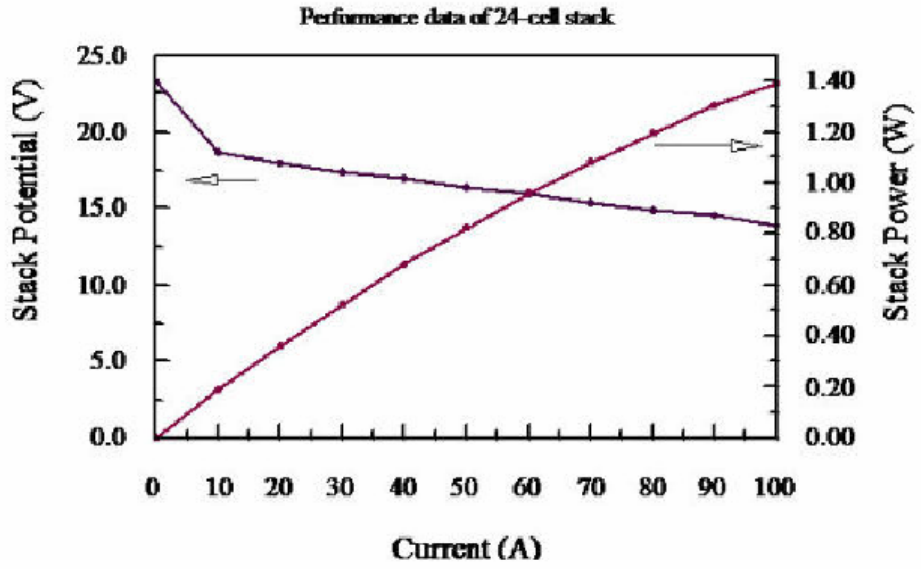
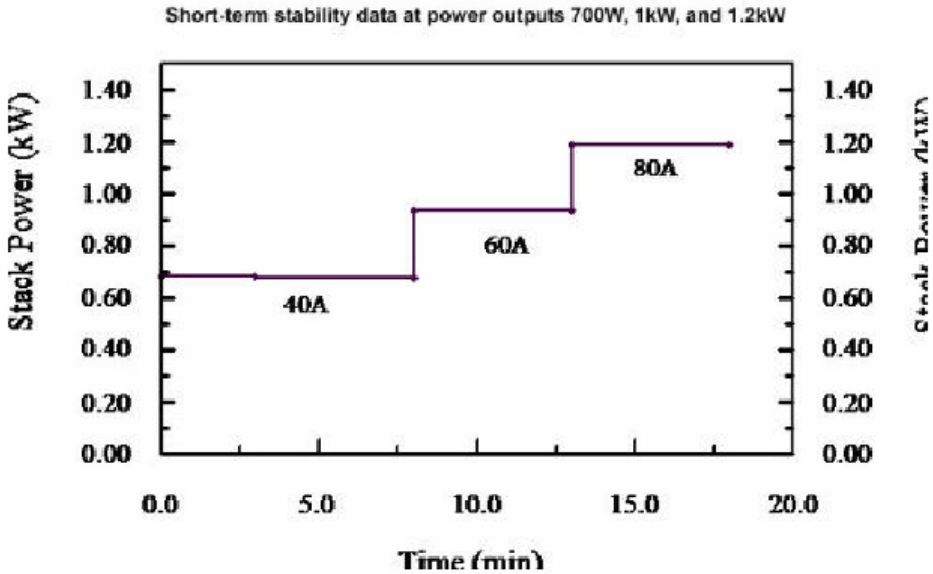
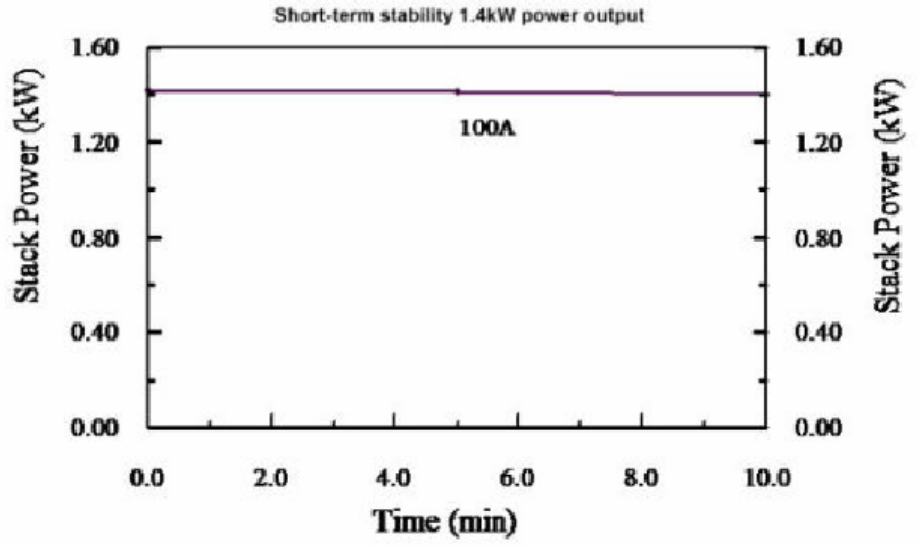
Efficiency of stack: 50% at full power







DETAILS

Also available:
Control unit which drives the cooling fans and can regulate the hydrogen flow for dead-ended operations with the help of an electronic timer and a solenoid valve, all inclusive in the unit
Air Compressor
Air filtration unit
Cooling unit: automatic cooling at set temperatures
Flow meters for hydrogen and air
Control valves for hydrogen and air
Panel containing voltmeter, ammeter, and temperature measuring device
Fittings and tubings

Recommended Accessories

Item	Image	Description	Price	Order
595613		**High Pressure Regulator 3910-15-350** Regulator to get the psi down to that required by your application	**$324.00**	Order
590610		**Control Unit**	**$795.00**	Order

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- I-1000 1kW fuel cell system

I-1000 1kW fuel cell system

Item Number	540195
Unit Price	**$9,995.00**

Order

PRODUCT OVERVIEW

Superior performance and extended run-time
1 kilowatt (kW) (1 -50 kW available)
Remote Monitoring Capability
Never requires gasoline or diesel
Rack-mounted (19 or 23 rack mountable)
Modular design
This fuel cell will provide the redundancy you expect from battery strings, along with the extended runtime you seek from generators, without the drawbacks associated with either of these technologies. The I-1000 is quiet & generates electricity using standard industrial grade hydrogen, with heat and water as the only by-products -- ideal for any backup power application. This fuel cell is also scalable & multiple units can be grouped together to address larger loads. ReliOn's patented Modular Cartridge Technology llows maintenance to be performed by replacing cartridges in minutes using no tools and without an interruption of power. The I-1000 has received CE declaration of conformity for European standards as well as CSA certification.

Imagine how many homeowners will want this fuel cell system to power their home during hurricane outages.Tim Martin, Real Estate Broker, Palm Beach FL

TECHNICAL SPECIFICATIONS

- Physical Dimensions 44.5cm x 69cm x 51cm, Weight 146 lbs / 66 kg
- Rated current 40A, 20A or 8A, depending on voltage; DC voltage range 24, 48, or 125 VDC nominal
- Performance Rated net power Continuous 1000 Watts
- Estimated MTBF 40,000 hours; Altitude - 197 ft. to 13,800 ft.
- Fuel: standard industrial grade hydrogen (99.95%); Safety Compliance UL, CE
- Supply pressure: 25-100 psig; 172-689 Kpag; 1.72-6.89 bar
- Consumption 7.7 slpm at 500 Watts; 15 slpm at 1000 Watts
- H2 Storage Capacity: none; Location Indoors or installed in Outdoor Enclosure
- Operation Ambient temperature 32-115F (0-46C); Relative humidity 0-90%

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- Emissions Water Max. 30mL / kWh; Noise 53 dBA at 1 meter

Hydrogen is 27 times less explosive than gasoline vapor. Amory Lovins, Executive Director, Rocky Mountain Institute

II.VI SPC 2 kW

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- 1.5kW 24V, 2.1kW 21V Fuel Cell Stack

1.5kW 24V, 2.1kW 21V Fuel Cell Stack

Item Number	541110
Unit Price	Contact Us

Order

PRODUCT OVERVIEW

Forced Flow Fuel Cell Stack Features: Stacks operate with hydrogen/air and reformate (with 10-15 ppm CO)/air.
Self-Humidified Membrane and Electrode Assemblies.
Hydrogen can be kept dead-ended.
Water is removed continuously from the stack.
The maximum operating temperature can be from 70-75?C.
There is no cell failures at higher temperatures.
The stacks can operate at ambient temperature.
No special startup procedure is required.
Warranty is offered on all products.
Control System available separately.

TECHNICAL SPECIFICATIONS

1.5 kW Stack
Number of cells: 36
Area: 245 cm2
Power: 1.5kW at 22V
Reactants: H2/air, reformate/air
Temperature Ambient-70oC
Pressure air about 1-10 psi, hydrogen 1-5psi
Humidification: self-humidified
Cooling: Water
Weight (approx.): ~ 38 pounds
Dimension (approx.): 24 cm x 25 cm x 25 cm
Type of fuel cell: PEM
Flow rate at max output About 18 liters per minute of hydrogen
Start up time: Instantaneous
Efficiency of stack: 50% at full power

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DETAILS

Also available:
-Control unit which drives the cooling fans and can regulate the hydrogen flow for dead-ended operations with the help of an electronic timer and a solenoid valve, all inclusive in the unit.
-Air Compressor
-Air filtration unit
-Cooling unit: automatic cooling at set temperatures
-Flow meters for hydrogen and air
-Control valves for hydrogen and air
-Panel containing voltmeter, ammeter, and temperature measuring device
-Fittings and tubings

Recommended Accessories

Item	Image	Description	Price	Order
570150		**PowerKnowz hydrogen sensor** Cost effective hydrogen gas detection solution.	**$125.00**	Order
590610		**Control Unit**	**$795.00**	Order

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II.VII SPC 3 kW

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- 2kW 32V, 2.8kW 28V Fuel Cell Stack

2kW 32V, 2.8kW 28V Fuel Cell Stack

Item Number	541210
Unit Price	Contact Us

Order

PRODUCT OVERVIEW

Forced Flow Fuel Cell Stack Features: Stacks operate with hydrogen/air and reformate (with 10-15 ppm CO)/air.
Self-Humidified Membrane and Electrode Assemblies.
Hydrogen can be kept dead-ended.
Water is removed continuously from the stack.
The maximum operating temperature can be from 70-75?C.
There is no cell failures at higher temperatures.
The stacks can operate at ambient temperature.
No special startup procedure is required.
Warranty is offered on all products.
Control System available separately.

TECHNICAL SPECIFICATIONS

2 - 2.8kW Stack
Number of cells: 48
Area: 245 cm2
Power:2kW 32V, 2.8kW 28V
Reactants: H2/air, reformate/air
Temperature Ambient-70oC
Pressure ~ 1-10 psi
Humidification: self-humidified
Cooling: Water
Weight (approx.): ~ 48 pounds
Dimension (approx.): 26 cm x 24 cm x 24 cm
Type of fuel cell: PEM
Flow rate at max output About 24 liters per minute of hydrogen
Start up time: Instantaneous
Efficiency of stack: 50% at full power

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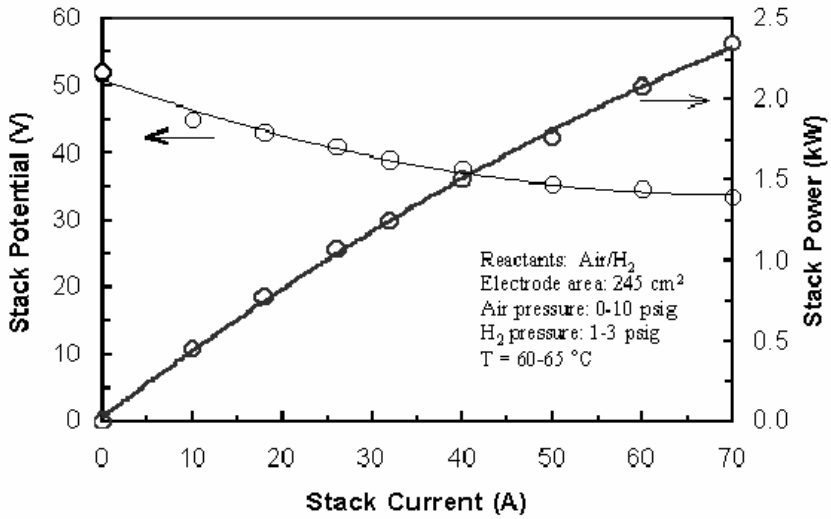

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DETAILS

Also available:
Control unit which drives the cooling fans and can regulate the hydrogen flow for dead-ended operations with the help of an electronic timer and a solenoid valve, all inclusive in the unit
Air Compressor
Air filtration unit
Cooling unit: automatic cooling at set temperatures
Flow meters for hydrogen and air
Control valves for hydrogen and air
Panel containing voltmeter, ammeter, and temperature measuring device
Fittings and tubings

Recommended Accessories

Item	Image	Description	Price	Order
570150		**PowerKnowz hydrogen sensor** Cost effective hydrogen gas detection solution.	**$125.00**	Order

Home Site Map

II.VIII SPC 5 kW

Specifications

Electrical

▪ Power $_{max}$:	>8000	We	(η=45%)
▪ Power $_{rated}$:	5000	We	(η=54.1%)
▪ Voltage:	30	V	at max power
▪ Voltage:	39	V	at rated
▪ Voltage $_{max}$:	58	V	at OCV (open cell voltage)
▪ Current:	130	A	at rated power
▪ Current $_{max}$:	>270	A	

Mechanical

▪ Weight:	39	kg
▪ Size:	183x263x685 mm	ex connectors

Fuel

▪ Reformat	80/20 H_2/CO_2 100%RH at 60°C
▪ Purity (dry)	<50 ppm CO
▪ Pressure drop	70 mbar at rated power
▪ Stoichiometry	≥1.25 for H_2 (for P>30% of P_{max})
▪ Anode flow	>30 Nl/min (dry)

Air

▪ Filtered	
▪ Purity	instrument air quality, 100%RH at 60°C
▪ Pressure drop	300 mbar at rated power
▪ Stoichiometry	≥ 2 for air (for P>30% of P_{max})
▪ Cathode flow	> 60 Nl/min (dry)

MEA

▪ Pressure difference	<0.3 bar

Stack operating conditions

▪ Temperature	65 °C
▪ Pressure	atmospheric
▪ Stack outlets pressure	ambient

Emissions

▪ Noise	0
▪ Water	12.7 kg/hour (approx.)

Cooling

- Capacity — >5 kW minimum, 10kW prefered
- Medium — demineralised water
- Purity — conductivity < 17μSiemens/cm
- Pressure drop — <0.5 bar
- Operating window — $\Delta T < 10K$

Note that proper material selection in the tempering device is important to avoid release of ions into the coolant.

Connectors

- Coolant — 3/4 inch Swagelok
- Hydrogen — 3/4 inch Swagelok
- Air — 32 mm OD, hose clamp connection
- Current — End contact with 8 mm hole
- Cell voltage slots — 1 mm, accessible from side
- Stack Connection lay-out: — See Annex

Operating conditions:

Stoichiometry	H2	1.25
	Air	2

Current [A]	Stack Voltage [V]	Power [kWe]
0	58.4	0.00
10	51.1	0.51
20	49.4	0.99
30	48.2	1.45
40	47	1.88
50	46.1	2.31
60	45.2	2.71
70	44.3	3.10
80	43.5	3.48
90	42.7	3.84
100	42	4.20
110	41.4	4.55
120	40.7	4.88
130	40.1	5.21
140	39.4	5.52
150	38.7	5.81
160	37.9	6.06
170	37.1	6.31
180	36.2	6.52
190	35.8	6.80
200	35.1	7.02
210	34.5	7.25
220	33.7	7.41
225	33.3	7.49

Date 05-05-06
Place Arnhem