

# Freedom Power™ Systems - Engines

Fuel cells produce power by chemically converting hydrogen into electricity. The supply of hydrogen is abundant, and virtually inexhaustible. The process is inherently efficient and environmentally clean. There is no combustion and water is the only by product. Fuel cells are ideal replacements for existing power generation solutions.

Altergy's Freedom Power™ Systems (FPS) line of fuel cell engines are available in sizes from 500 watts to 7.5 kW. The heart of Altergy's FPS is an advanced, fuel cell engine offered in various sizes, voltage outputs and configurations. The cells that make up a fuel cell stack are constructed from durable stainless steel and polymer. The fuel cell stack is integrated with the balance of plant including thermal, fuel, power and voltage management, creating a complete FPS Engine. The engines are designed with a plug-n-play feature that allows them to operate in a stand-alone mode or to be combined with additional engines to produce a range of power outputs up to 100 kW. Altergy's plug-n-play design also allows optional peripherals to interface seamlessly with the FPS.

Each engine features an integrated supervisory control system that manages the function of the fuel cell, including output currents and voltages. It communicates with users via a Graphic User Interface (GUI) providing system and site status and allows user input of operating parameters. Power conditioning and regulation is performed by a fully digital, multi-phase, interleaved DC/DC converter that delivers precisely regulated DC power output.

Freedom Power™ Systems - Fuel Cell Engines

Model No.	Description	Wattage	Voltage
FPS .5	Fuel Cell Engine, Freedom Power™ Systems	500	12
FPS .5	Fuel Cell Engine, Freedom Power™ Systems	500	24
FPS 1	Fuel Cell Engine, Freedom Power™ Systems	1,000	12
FPS 1	Fuel Cell Engine, Freedom Power™ Systems	1,000	24
FPS 1.5	Fuel Cell Engine, Freedom Power™ Systems	1,500	24
FPS 1.5	Fuel Cell Engine, Freedom Power™ Systems	1,500	48
FPS 2.5	Fuel Cell Engine, Freedom Power™ Systems	2,500	24
FPS 2.5	Fuel Cell Engine, Freedom Power™ Systems	2,500	48
FPS 2.5C	Fuel Cell Engine, Freedom Power™ Systems, standalone	2,500	24
FPS 2.5C	Fuel Cell Engine, Freedom Power™ Systems, standalone	2,500	48
FPS 2.5M	Fuel Cell Engine, Freedom Power™ Systems, methanol	2,500	24
FPS 2.5M	Fuel Cell Engine, Freedom Power™ Systems, methanol	2,500	48
FPS 5	Fuel Cell Engine, Freedom Power™ Systems	5,000	24
FPS 5	Fuel Cell Engine, Freedom Power™ Systems	5,000	48
FPS 5C	Fuel Cell Engine, Freedom Power™ Systems, standalone	5,000	24
FPS 5C	Fuel Cell Engine, Freedom Power™ Systems, standalone	5,000	48
FPS 5M	Fuel Cell Engine, Freedom Power™ Systems, methanol	5,000	24
FPS 5M	Fuel Cell Engine, Freedom Power™ Systems, methanol	5,000	48
FPS 7.5	Fuel Cell Engine, Freedom Power™ Systems	7,500	24
FPS 7.5	Fuel Cell Engine, Freedom Power™ Systems	7,500	48



5 kW Engine  
(Front View & Rear View)



## Product Information

# Freedom Power™ System - Fuel Cell Engine<sup>1</sup> Specifications\*

		500 Watt		1.0 kW		2.5 kW		5.0 kW		7.5 kW	
Voltage	Rated (VDC)	+12 / +24		+12 / +24 / +48		+24 / +48		+24 / +48		+24 / +48	
	Dimensions <sup>2</sup> (w x d x h in.)	9.72 x 14.5 x 11		11.6 x 16.5 x 11		13.25 x 16 x 11		21 x 21 x 20		30 x 32 x 22	
Physical (Engines Only)	Weight (lbs)	35		105		149		165		280	
	Mounting	Standard 23" rack, shelf mount or Altergy approved enclosure									
Fuel	Type and Grade	Gaseous hydrogen, industrial grade, 99.95 % pure (CGA G-5.3 Type I, Grade B)									
	Supply Pressure	40 to 100 psig / 2.75 to 6.89 bar									
Operational	Ambient Temperatures <sup>3</sup>	-40 °C to 50 °C / -40 °F to 122 °F									
	Relative Humidity	5 % to 100 % non-condensing									
Environmental	Location	Indoors with suitable air management or outdoors with suitable enclosure									
	Altitude	10,000 ft									
Control Electronics	Clean	California Air Resources Board (CARB) certified as a zero emission electrical power generator. By-product is water									
	Green	Can recycle residual heat to increase fuel and system efficiency. Can use "Green" hydrogen fuel (generated from biomass, hydroelectric, solar or wind powered electrolysis)									
Safety/Certification/Compliance <sup>4</sup>	Noise	<60dBA @ 1 meter									
	Supervisory Control	32-Bit Digital Signal Controller w/on-board, real time diagnostics, communications, thermal & systems management. Sensorless brushless direct current motor control									
	Power Conditioning	Fully digital, multi-phase, interleaved DC/DC converter									
	Monitoring Software	Real time control communicates with GUI to provide system and site status and allow user input of operating parameters. Field upgrades through communication port									
Sensors	I/O Interfaces	USB, RS-232, RS-485 and Ethernet supported. Four user defined dry contacts. Optional wireless									
	Sensors	Fuel pressure, leak detection, ambient temperature & humidity, stack & electronics temperatures, fan & filter conditions, stack & output currents and voltages, lampering									
		ANSI FC 1-2012 Standard, FCC 47CFR Part 15, Subpart B, Class A,									

\* 1. FPS Engines can be combined to achieve up to 100 kW of output.

2. Dimensions include additional clearance to assure proper airflow and cooling in an enclosure. See Altergy installation manual for details.

3. 10 °C (50 °F) and below requires low temperature configuration, 40 °C (104 °F) or higher requires high temperature configuration.

4. Some certifications pending.

Specifications subject to change without notice



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