PRODUCT SPECIFICATIONS

CELL

Hydrogen fuel cell power module

Vertical, dock-mounted PEM fuel cell power generation with liquid hydrogen storage and an 800 VDC electrical interface.



24 in / 2 ft diameter

100 kW

MAXIMUM NORMAL GROSS STACK POWER

800 VDC
Nominal dock voltage

23.3 kg
Liquid-hydrogen inventory

150 A
Maximum interface current

24 VDC / 10 A
Control supply input

POWER & CONNECTIONS

DC dock / control power / CAN / hardwired safety

1 hydrogen fill / 2 air / 2 coolant connections

Dedicated outdoor hydrogen relief / purge route

0 AC outlets; external site inverter and distribution

EXPLORE THE SPECIFICATION

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02 Product & fuel cell

PRODUCT

Manufacturer / brand	ZAZA Engineer Evolution
Model	CELL
Product type	Hydrogen fuel cell power module
Installation	Vertical; base dock mounted

FUEL CELL

Technology	Proton exchange membrane (PEM)
Stack quantity	1
Stack module	Replaceable commercial S3-family PEM
Stack fuel	Conditioned gaseous hydrogen
Cooling	Liquid cooled
Startup	Controller sequence; purge before load

03 Electrical & AC loads

ELECTRICAL

Output type	DC
Maximum normal gross stack power	100 kW
Nominal output voltage	800 VDC
AC supply / outlets / protection	Site inverter and distribution

ELECTRICAL INTERFACE

Dock connector	Stäubli CombiTac uniq; blind-mate
Interface current limit	150 A maximum
Control supply input	24 VDC; 10 A; control circuits only
Control supply conductors	2 × 2.5 mm² copper
CAN interface	Isolated; 500 kbit/s; 120 Ω shielded pair
AC outlets	0; external site inverter

ELECTRICAL CONNECTIONS

Function	Connection
DC power	2 power poles; blind-mate
Protective earth	Dedicated leading earth contact
Control power	24 VDC input and 0 V return
CAN data	3 signal conductors and cable shield
Emergency stop	2 monitored hardwired channels
Remote reset	Momentary dry-contact input
Status	Diagnostic dry-contact output
Site isolation	Power-enable contact; 2 contactor-feedback loops
Dock safety	Monitored series loop; 3 mating positions

04 Hydrogen & fuel systems

HYDROGEN STORAGE

Stored fuel	Liquid hydrogen (LH2)
Hydrogen inventory	23.3 kg / 51.4 lb
Tank geometric volume	346 L / 91.4 US gal
Inner vessel	304L stainless steel
Insulation	Vacuum-insulated Dewar
Maximum liquid fill	95% of tank geometric volume
Static heat-leak	6 W maximum

FUEL SYSTEM

Vaporizer	Printed-circuit heat exchanger (PCHE)
Level sensing	Continuous capacitive
Level limits	Independent high-fill / low-liquid switches
Tank sensing	Pressure and temperature
Pressure control	Proportional heater
Heater protection	Hardwired high-pressure cutout; software limit
Liquid withdrawal	Pump; top-head dip tube; lower sliding guide
Gas delivery	Vaporization and pressure regulation

FUEL-SYSTEM

Internal LH2 bore	1/2 in nominal; 12.7 mm minimum
Internal hydrogen gas header	3/4 in nominal
Conditioning flow	10 kg/h
Vaporizer thermal	5 kW
Heater power limit	1.5 kW maximum

05 Cooling & site equipment

AIR & COOLING

Air supply	6,500 NL/min at 0°C and 1 atm
Coolant flow	200 L/min / 52.8 US gal/min
Temperature-rise allowance	10 K / 18°F
Heat-rejection	115 kW; stack only

EXTERNAL SITE EQUIPMENT

Electrical equipment	DC collection, protection and isolation; inverter and AC distribution for AC loads
Air equipment	Shared air supply and cathode exhaust routing
Cooling equipment	External coolant circulation and heat rejection
Hydrogen vent equipment	Dedicated outdoor relief and purge discharge
Control equipment	24 VDC supply; CAN controller; hardwired safety interface

INSTALLATION & ACCESS

Service access	Hydrogen transfer, inspection and stack replacement
Installation area	Enclosure footprint plus service access, utilities and vent routing
AC voltage / phase / frequency	Set by the external site inverter and distribution

06 Dimensions & mounting

DIMENSIONS

Outside diameter	24 in / 2 ft
Overall height	15 ft / 180 in
Frame	8 longitudinal CFRP members
Enclosure plan area	3.14 sq ft

VESSEL DIMENSIONS

Dewar maximum diameter	22 in / 1 ft 10 in
Dewar maximum length	93 in / 7 ft 9 in
Inner vessel internal diameter	18 in / 1 ft 6 in

MECHANICAL MOUNTING

Dock pins	4; titanium
Pin diameter	25 mm / 0.984 in
Pin pitch-circle diameter	440 mm / 17.32 in
Minimum pin engagement	50 mm / 1.97 in

07 External connections

Interface	Connection	Size / value	Site equipment
DC output / PE	CombiTac blind-mate dock	DC+, DC-, leading protective earth	DC collection, protection and isolation
Control power	CombiTac; facility supplied	24 VDC; 10 A maximum; control only	24 VDC control supply
Data	CombiTac CT-NET	Isolated CAN; 500 kbit/s	Supervisory CAN controller
Safety	CombiTac; hardwired	2 stop channels; reset; status; site isolation interlock	Emergency stop and site interlocks
LH2 fill	1 cryogenic quick disconnect	Separate from utility block	Hydrogen filling system
Cathode air supply	1 blind-mate air coupling	4 in nominal	Air supply and filtration
Cathode exhaust	1 blind-mate air coupling	4 in nominal	Cathode exhaust and water management
Coolant supply	1 quick disconnect	1.25 in nominal	Cooling-loop supply
Coolant return	1 quick disconnect	1.25 in nominal	Cooling-loop return and heat rejection
Hydrogen relief / purge	Outdoor vent route	Separate from cathode exhaust	Dedicated outdoor hydrogen vent
Mechanical dock	Base mounted	Four-pin dock	Mating dock and supporting structure

08 Protection & wiring

ELECTRICAL PROTECTION

DC fuses	2 × 200 A, 1,000 VDC; one per pole
DC contactors	2 × Schaltbau C310K/300; one per pole
Manual isolation	2 poles; 200 A; lockable
Insulation monitoring	500 kΩ warning; 125 kΩ latched trip
Overcurrent control	Converter limit; independent abnormal-current shutdown
Dock interlock	3 mating-position sensors; CELL and site source isolation

WIRING & GROUNDING

HV conductors	2 × 95 mm² copper; 1,500 VDC
Protective earth	25 mm² copper; first-mate / last-break
Safety conductors	0.75 mm² copper
CAN conductors	3 × 0.5 mm²; shielded; 120 Ω at bus ends
DC grounding	Floating DC bus; bonded metalwork; no DC-to-PE bond
Pressure heater supply	Separate 1.5 kW maximum branch; excluded from 24 V input

09 Controls & service

CONTROLS & PROTECTION

Hydrogen alarm / trip settings	0.4% / 1.0% H2 by volume; trip latched
Fuel shutoff valves	2 in series; fail-closed
Trip action	Fuel isolated; HV open; converter off; alarm and vent command
Trip reset	Latched; verified purge and manual reset; automatic restart inhibited
Dock permissives	Mechanical lock; dock safety interlock; site permissives; HV isolated during mating
Undock condition	CELL and host HV isolated; both-side residual voltage verified; hydrogen isolated
Trip inputs	Hydrogen detection; E-stop; pressure; temperature; flow; stack signals
Stack monitoring	Voltage, temperature, flow, status, faults and derating

RELIEF

Relief protection	Vapor-space pressure relief; trapped-liquid thermal relief

MAINTENANCE

Maintenance isolation	Electrical / hydrogen isolation; verified warm purge; lockout
Stack service	Replaceable module; supplier commissioning procedure

10 Ordering & documents

OPTIONS & SERVICE

Hydrogen refill service	Optional; 10 years; purchased separately
CELL Conduit Network	Optional; free for 2 or more nearby CELLs
Contracted service term	10 years from commercial operation; maintenance, repair, replacement, support
Contracted system availability	99.99%; subject to the Power & Service Agreement

WARRANTY

Warranty / remedies	Signed agreement

ORDERING & DELIVERY

Availability	Made to order
Standard freight	Included: accessible commercial docks, contiguous 48 states and Washington, DC
Customer receiving	Unloading equipment, personnel and access
Hardware-only exclusions	Hydrogen fuel, installation, permits, site utilities and AC conversion
Damage / defect return request	30 calendar days from delivery; hardware return policy
Delivery hydrogen inventory	None, unless specified in the Order Summary
Special delivery	Separate quote: residential, liftgate/crane, inside delivery, storage, extraordinary access

DOCUMENTATION

Brochure / specification sheet	This specification sheet (PDF)
Ordering, delivery and return terms	Ordering and return policy
Power & Service Agreement	Power & Service Agreement
Service agreement download	Service terms (TXT)
Product and order support	Jupiter@engineerevolution.com

11 LH_2 Refilling

Equipment / specification	Value
Refill cycle	10 min; connection through disconnection
Refill quantity	23.3 kg LH_2
Net transfer flow	Above 140 kg/h; sized for the complete refill cycle
Supply equipment	External LH_2 transfer unit; pump, meter, fill control and emergency isolation
Fill connection	Dedicated receptacle; V-102 isolation; direct to Dewar
Manual nozzle	MannTek N-LH2; DN15; approximately 9.5 kg
Tank receptacle	MannTek R-LH2; DN15 matched interface
Insulated hose	LH2-20-LXXm; DN15 or DN20; length per installation
Dispenser coupling	JC-LH2-20-f/m-xx; DN15
Nozzle parking	HP-LH2-20 heated adapter
Nozzle weld ends	Inner 22 × 2 mm ; outer 35 × 2.5 mm
Receptacle weld ends	Inner 48.3 × 3 mm ; outer 60.3 × 2 mm
Manual nozzle/receptacle specifications	PN25; −253°C to +50°C; manufacturer-listed flow 150 L/min
Vapor-return option	Separate cryogenic connection; independent of relief/purge

Weld-end dimensions: outside diameter × wall thickness.

Safety standards

Pressure containment, hydrogen handling and electrical protection.

SOURCE	SAFETY / EVIDENCE
ASME VIII-1 (2025) Official reference	Pressure-vessel design, external-pressure stability, welds, examination and testing. Vessel calculations and records must close before release.
ASME B31.12 (2023) Official reference	Parts GR and IP: hydrogen piping materials, joining, thermal contraction, inspection and testing.
OSHA 1910.103 / 1910.399 Official reference	LH2 relief, venting, vaporizer protection, bonding and installation. Confirm hazardous-location classification and suitable electrical equipment.
CGA S-1.3 (2024) Official reference	Relief devices for stationary storage containers. Size for credible cases and vent backpressure; confirm the correct rule for the container classification.
NASA TM-112540 Official reference	Engineering guidance on hydrogen hazards, materials compatibility, detection, storage and facility safety. Published 1997.
NIST 304L properties Official reference	Cryogenic thermal properties and contraction. Component cold qualification, leakage and thermal-cycle evidence remain necessary.

Hydrogen accumulation and overpressure

Hydrogen accumulation: a 2.14 g/s release into a 0.15 m3 unvented space reaches 1% H2 in approximately 0.063 s under uniform-mixing conditions. Containment, ventilation and safe venting are primary protections. Detection alone cannot prevent rapid accumulation.

Overpressure: a continuously energized 1.5 kW heater can vaporize approximately 12.1 kg/h of LH2 at 445.8 kJ/kg latent heat. Relief sizing must cover the governing fault, including fire, loss of vacuum, blocked outlet and trapped liquid, with vent backpressure included.

Flow reference: EVERYWH2ERE S3 report, pp. 13-14. LH2 latent heat: NASA Loci-Stream report, Table 1. Fault values apply to the stated conditions.

Installation includes applicable ASME B31.3, NFPA 2 / 70 / 853 and CGA G-5.4 / G-5.5 provisions. Adopted editions, container classification and site conditions determine applicability.