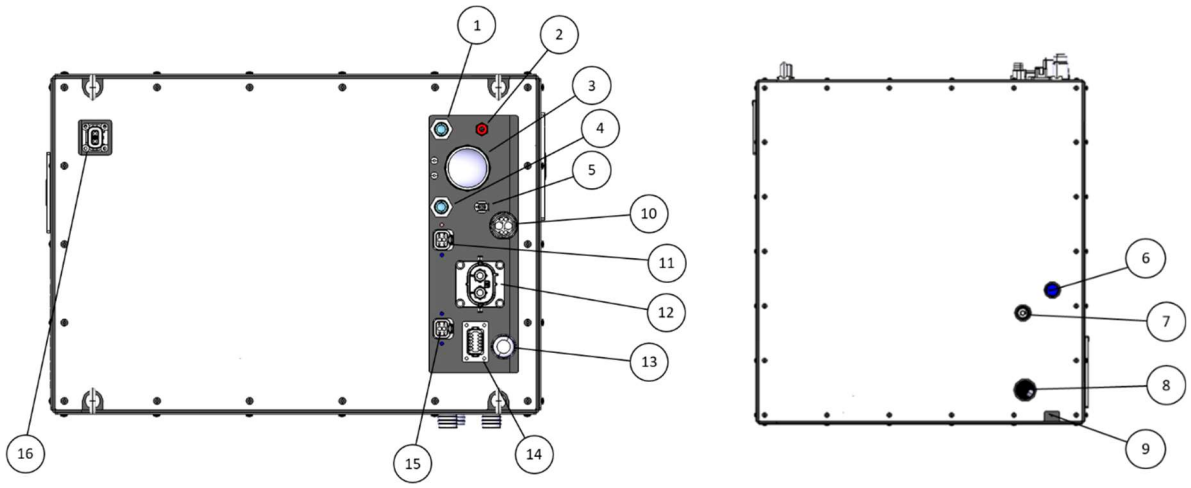
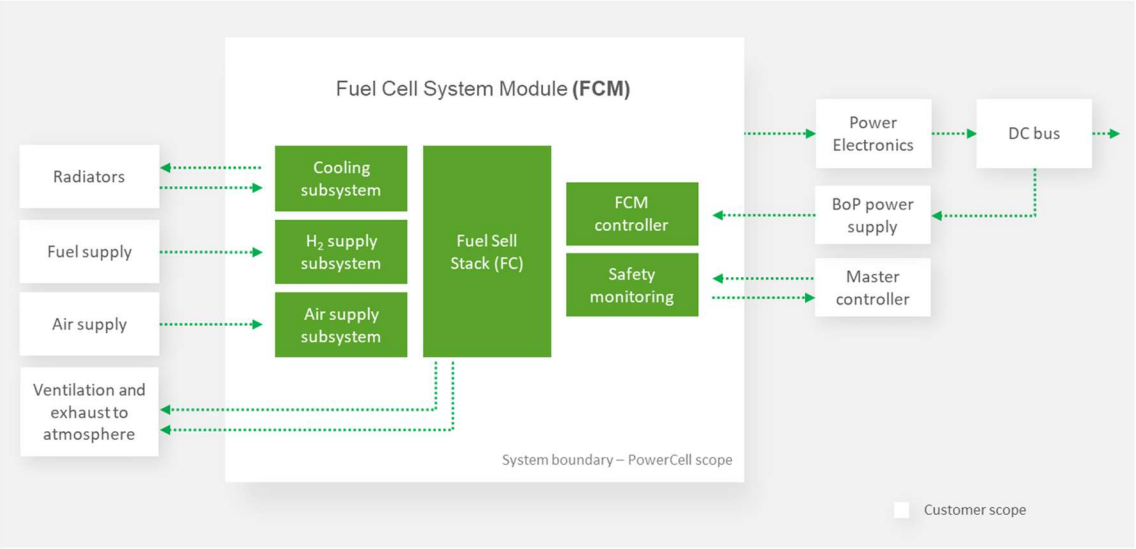
MS-30 Fuel Cell System

Technical description

Interface description



Mechanical connections		Electrical connections	
1	Components cooling inlet	9	Ground
2	Fuel inlet	10	24 voltage supply
3	Air inlet	11	Radiator fan control I
4	Components cooling outlet	12	Power output terminals
5	Fuel cell stack cooling vent line	13	Ethernet
6	Fuel cell stack cooling outlet	14	External signal interface
7	Fuel cell stack cooling inlet	15	Radiator fan control II
8	Exhaust	16	HV supply



Configuration [1] [2]

Max net power	30 kW
Dimensions	460 x 695 x 665 mm
Volume	210 l
Weight	<150 kg

Performance

Gross output at rated power	145 V / 235 A
Voltage output (peak power EOL to OCV[3] BOL)	Normal operation 120 – 225 V, max 330 V
Current output	20 - 234 A [4]
Ramp-up speed	5 kW/s
System heat output	up to 50 kW + 5 kW [5]
Coolant outlet temperature	80°C
Fuel quality	Hydrogen ISO 14867-2 and SAE J2712
Fuel inlet pressure	8-12 bar(g) [6]
Fuel consumption	325 NLPM [7]
Efficiency (peak, BOL)	57%[8]
Efficiency (rated power, BOL)	37%[8]
Start-up time	Off to standby: 10s, Standby to run: 10s
Lifetime	10 000 h [9]
Communication and control	CAN bus 500 kpbs

Environment

Altitude	0 to 2000 meters
Location	Pollution degree 3 or better
Temperature	- 30 to 45°C [10]
Humidity	5 to 95% relative humidity; non-condensing
Regulation and standards [11]	E/ECE/324/Rev.2, /Add.99/Rev.2, FMVSS 305-01, ISO 23273:2013, SAE J1766:201401, SAE J2578:201408
IP classification	IP54

[1] Target values, the actual value is application dependent.
[2] Customized configurations can be made, feasibility evaluated at request.
[3] OCV = Open Circuit Voltage (i.e. in no load condition, 0 A).
[4] Other limitations might apply from external power electronics.
[5] Fuel cell stack plus BoP components (cathode compressor + intercooler).
[6] 3-8bar(g) is feasible, but low hydrogen feed pressure affects system performance.
[7] Hydrogen consumption at 30kW Beginning of Life.
[8] Excluding losses from DCDC and external cooling system (e.g. radiator fans etc.).
[9] Expected lifetime.
[10] Start-up from sub-zero degrees requires external power assistance.
[11] Designed with respect to the following standards.

Technical specifications

Fuel	
Fuel composition	Pure hydrogen, ISO 14687:2019 and SAE J2719_201511 [1]
Supply pressure	8-12 bar(g), rated 10 bar(g) [2]
Supply temperature	5 - 70°C, rated 10°C
Fuel consumption	17 - 435 NLPM

Cathode inlet	
Quality	Filtered air
Pressure	Atmospheric pressure
Temperature	-30 - 45°C
Flowrate	525 - 2050 NLPM [3]

Exhaust	
Pressure	Atmospheric pressure [4]
Temperature	< 90°C, rated 80°C
Flowrate	< 2085 NLPM [3]

Cooling	**Component cooling**	**Fuel cell stack cooling**
Flowrate	< 13 l/min	< 85 l/min
Quality	50/50% Water/Glycol [5]	Dynalene FC-EG [5]
Inlet pressure	< 1 bar(g)	< 1.4 bar(g)
Inlet temperature	5 - 50°C	5 - 65°C
Outlet temperature	< 65°C, rated 26°C	< 90°C, rated 75°C
Heat exchanger capacity	5 kW [6]	< 50 kW

Electrical	
HV supply	260 – 550 VDC, max. current = 16 Arms, < 5 kW
24 V supply	< 1,5 kW
Load requirements	
Forward leakage current	< 1 µA
Reverse current	< 1 µA
Ripple current	< 5 A, peak to peak
Classification	
Appliance class	Max. class II [7]
Pollution degree	Max. 2 [8]
Overvoltage category	Max. 2 [9]

[1] The fuel quality requirements comply with ISO 14687-2, SAE J2719 and T/CECA-G 0015 2017.
[2] Customized configurations can be made, feasibility evaluated at request, stable pressure required.
[3] Normal conditions at 0°C and 1 atm.
[4] Piping shall be done in a way that atmospheric pressure is not exceeded by 50 mbar at the given flowrate.
[5] The material compatibility in the external cooling loop needs to be verified.
[6] Capacity depends on set-up of external cooling loop, incl. cooling for DCDC converter.
[7] IEC 61140
[8] IEC/EN 60950-1
[9] IEC/EN 60950-1