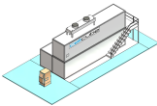

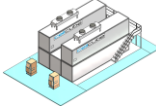
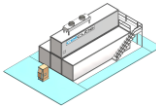
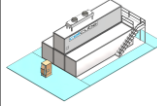
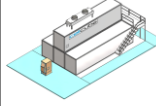
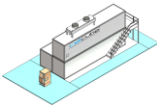

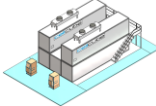
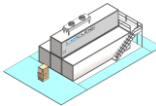
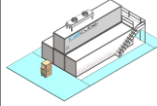
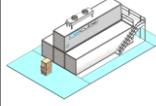


# Preliminary AC Data Sheet - CellCube Series Release 4.2

Technical Data							
Type		FB 333-4	FB 667-4	FB 500-5	FB 333-8	FB 250-10	FB 200-14
No. of Power Units (top containers)		1	2	2	1	1	1
No. of Energy Units (bottom containers)		2	3	3	3	3	3
Number of inverters rated / incl. over-rating		1 / 1	1 / 2	1 / 2	1 / 1	1 / 1	1 / 1
Inverter type		Exemplary 700 kVA Inverter					
Battery technology		Vanadium Redox Flow Battery					
Technical performance data	1)						
Power Ratings AC	2)						
Rated charge / discharge AC power		333 kW	667 kW	500 kW	333 kW	250 kW	200 kW
Max. continuous charge / discharge AC power (Overrating)		666 / 500 kW	1,334 / 1,000 kW	1,334 / 1,000 kW	666 / 500 kW	666 / 500 kW	666 / 500 kW
Energy Ratings AC	3)						
Max. Usable energy at AC POC @ 50% constant AC power							
Auxiliary energy deducted		1,473 kWh	2,945 kWh	2,945 kWh	2,945 kWh	2,945 kWh	2,945 kWh
Usable energy at AC POC @ 100% constant rated AC power							
Auxiliary energy not deducted		1,330 kWh	2,660 kWh	2,857 kWh	2,660 kWh	2,857 kWh	3,004 kWh
Auxiliary energy deducted	4)	1,293 kWh	2,585 kWh	2,755 kWh	2,585 kWh	2,755 kWh	2,876 kWh
Discharge time AC, Begin-of-life		3.9 hrs	3.9 hrs	5.5 hrs	7.8 hrs	11.0 hrs	14.4 hrs
Usable energy at AC POC @ const. max. AC power (Overrating)							
Auxiliary energy not deducted		1,075 kWh	2,150 kWh	2,150 kWh	2,150 kWh	2,150 kWh	2,150 kWh
Auxiliary energy deducted		1,050 kWh	2,100 kWh	2,100 kWh	2,100 kWh	2,100 kWh	2,100 kWh
Discharge time AC, Begin-of-life		2.1 hrs	2.1 hrs	2.1 hrs	4.2 hrs	4.2 hrs	4.2 hrs
Battery performance AC							
Max. RTE (AC) excl. Aux	11)	78%	78%	78%	78%	78%	78%
Max. RTE (AC) incl. Aux	11)	74%	74%	74%	74%	74%	74%
Typ. RTE (AC) incl. Aux @ rated AC power		68%	68%	71%	68%	71%	71%
Typ. RTE (AC) incl. Aux @ max. AC power (Overrating)		63%	63%	63%	63%	63%	63%
Cycle life		> 20,000 @ 100% DOD					
Annual energy degradation		Average <0.5%/year; max. 10% over 30 years lifetime					
Energy storage interface							
Max. power per inverter		700 kVA					
Max. AC current per inverter		1,255 A					
AC connection		325 V, 50 or 60 Hz, IT-Grid					
Grid voltage levels	5)	via Transformer up to 30 kV					
Protection AC side		Fuses, Type 2 Surge Protection, Automatic AC disconnection					
Response time (time to accomplish full power step)		< 5 ms					
AC auxiliary connection (Inverter + CellCube)		380 ... 415 V, 50/60 Hz, 3P+N+PE, TN-S-grid					
Auxiliary power incl. inverter (average / max.)	6)	10 / 28 kW	20 / 56 kW	18 / 56 kW	10 / 28 kW	9 / 28 kW	9 / 28 kW
Communication		MODBUS TCP/IP					
Operational functionalities		Grid Forming, Grid Following, UPS, Fast Frequency Response, Synthetic Inertia, Blackstart					

# Preliminary AC Data Sheet - CellCube Series Release 4.2

Technical Data							
Type		FB 333-4	FB 667-4	FB 500-5	FB 333-8	FB 250-10	FB 200-14
General							
Design lifetime CellCube		30 years; > 20,000 cycles @ 100% DOD					
Design life inverter		20 years					
Electrolyte solution		Water based vanadium electrolyte, non-flammable, re-usable					
Cellcube noise emission	7)	< 45 dB(A)	< 48 dB(A)	< 48 dB(A)	< 45 dB(A)	< 45 dB(A)	< 45 dB(A)
Max. elevation CellCube		up to 2,000m, others on request					
Max. elevation inverter		up to 1,000 m without derating, 1,000 to 2,000 m with derating, others on request					
Compliance Battery	8)	CE, IEC/EN 62932; UL 1973 (pending); UL9540A					
Compliance Inverter		UL 1741; C22.2 No. 107.1-16; IEC 62477-1; IEC 62909-1; FCC Part 15 subpart B; IEC/EN 61000-6-2, 6-4; EN 55011; CISPR 32; CISPR 11; IEEE C37.90.2					
Compliance BESS	8)	CE, UL 9540 (pending)					
Utility interconnect		UL 1741 (SA); IEEE 1547-2003; CA Rule 21; Hawaii Rule 14; AS4777.2; VDE-AR-N 4110/4120; EN 50549-2					
Ambient temperature range CellCube		-15 °C ... + 45 °C ; optional: +10 °C ... + 35 °C					
Temperature management CellCube (depending on 24 hrs daily average ambient temperature)	9)	< 27 °C @ 2 cycles per day, Power < 150 % 27-29 °C @ 1 cycles per day, Power < 150 %  < 26 °C @ 2 cycles per day, Power ≥ 150 % 26-28 °C @ 1 cycles per day, Power ≥ 150 %		≤ 27 °C @ 1 cycle per day, Power < 150 % ≤ 26 °C @ 1 cycle per day, Power ≥ 150 %			
Temperature derating inverter		1.7% per degree C from +40 to +55 °C					
Mechanical data							
Enclosure type	10)	40' ISO HC-containers with C3 coating Inverter: Cold-rolled steel, CS type B, e-coated and powder painted (C2 coating)					
Footprint for exemplary layout incl. inverter		21.3 m x 9.9 m	21.3 m x 12.3 m				
Height with cooling system		7.5 m					
Total weight in operation		136 t	266 t	266 t	246 t	246 t	246 t
Degree of protection		IP 54					
1) All data measured at an average electrolyte temperature of 35 °C and an ambient air temperature of 25 °C. Data measured with a tolerance of ±5%.				6) Depending on SOC, power, temperature			
2) Power ratings at nominal voltage and PF = 1				7) Sound pressure level at 10 m distance			
3) POC = Point of connection = AC terminals of inverter (w/o transformer)				8) Other compliances or Field Evaluations available on request			
4) Refers to "rated energy"				9) Other temperature management options available on request. One cycle is equivalent to the turnover of rated energy			
5) Project specific design, optionally available on request				10) Other coating options available on request			
11) Operation between 30-80% SOC range							