

Hybrid Cooling Grid Forming ESS Performance Guide

(For LUNA2000-241-2S1)



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About this Document

Purpose

This document describes the performance baseline of Huawei LUNA2000-241-2S1 Hybrid Cooling Grid Forming ESS. Before designing a BESS project, please ensure that you are familiar with the performance features of this solution.

Revise History

The revision history accumulates descriptions of each document update, and the latest version of the document includes all updates from previous versions.

Date	Version	Revise content	Reviser
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1 Round Trip Efficiency

Round-Trip Efficiency (RTE) is the percentage of electricity put into storage that is later retrieved. The higher the round-trip efficiency, the less energy is lost in the storage process.

This section demonstrates the Round Trip Efficiency (RTE) at the AC side of PCS (including auxiliary power) of different models.

1.1 Life Cycle RTE @ambient temperature 25°C

1.1.1 RTE(241kWh)

Model: LUNA2000-241-2S1

DOD	100%	100%	100%	100%	100%	100%
Cycle per day	1	1.5	2	1	1.5	2
Number of working days per year	365			330		
End of Year	RTE	RTE	RTE	RTE	RTE	RTE
0	90.0%	90.0%	90.0%	90.0%	90.0%	90.00%
1	89.5%	89.5%	89.5%	89.5%	89.5%	89.40%
2	89.3%	89.2%	89.1%	89.3%	89.3%	89.10%
3	89.1%	89.0%	88.9%	89.2%	89.1%	88.80%
4	89.0%	88.8%	88.6%	89.0%	88.9%	88.50%
5	88.8%	88.6%	88.4%	88.9%	88.7%	88.30%
6	88.6%	88.4%	88.1%	88.7%	88.5%	88.10%
7	88.5%	88.2%	87.9%	88.6%	88.3%	87.90%

8	88.4%	88.0%	87.7%	88.4%	88.1%	87.70%
9	88.2%	87.8%	87.5%	88.3%	87.9%	87.50%
10	88.1%	87.6%	87.3%	88.2%	87.7%	87.30%
11	88.0%	87.4%	87.1%	88.0%	87.5%	87.20%
12	87.8%	87.3%	87.0%	87.9%	87.4%	87.10%
13	87.7%	87.2%		87.8%	87.3%	86.90%
14	87.6%	87.1%		87.7%	87.2%	86.80%
15	87.5%	87.0%		87.6%	87.1%	
16	87.4%	86.9%		87.5%	87.0%	
17	87.3%			87.4%	86.9%	
18	87.2%			87.3%	86.8%	
19	87.1%			87.2%		
20	87.0%			87.1%		

1.1.2 Test Conditions and Remarks

1. Test conditions for RTE: Ambient temperature 25°C, full-load operation, 3 full charge cycles + 3 full discharge cycles, calculating the average efficiency value. A 10-minute interval is maintained between charge and discharge processes, with a voltage of 400 Vac.
2. In the table, "Year" and "0" represent the time when the ESS was manufactured, "1" represents one year after manufacturing, and other years follow this pattern accordingly.
3. The lower deviation of the above data is 2%.
4. In consideration of potential testing errors and measurement uncertainties, the lower deviation of the above data is 2%.

2 SOH Degradation & Cycles

This section demonstrates Huawei LUNA2000-241kWh Hybrid Cooling Grid Forming ESS SOH Degradation at rating working condition.

2.1 Storage Degradation

Cell 50% SOC Storage					
Months After Huawei Delivery	SOH@25°C	SOH@30°C	SOH@35°C	SOH@40°C	SOH@45°C
0	0.38%	0.41%	0.47%	0.52%	0.56%
1	0.56%	0.60%	0.72%	0.82%	0.97%
2	0.73%	0.77%	0.96%	1.08%	1.32%
3	0.90%	0.91%	1.19%	1.33%	1.68%
4	1.05%	1.06%	1.41%	1.57%	1.97%
5	1.20%	1.21%	1.61%	1.79%	2.15%
6	1.29%	1.35%	1.81%	2.00%	2.40%
7	1.38%	1.48%	2.00%	2.21%	2.66%
8	1.49%	1.64%	2.18%	2.40%	2.91%
9	1.61%	1.74%	2.35%	2.59%	3.15%
10	1.70%	1.86%	2.51%	2.77%	3.36%

Note:

- The above storage degradation data is obtained at a constant temperature ranging. For the column 'Months After Huawei Delivery', 0 indicates the delivery time of ESS from factory, and 1 indicates 1 month after delivery.
- Huawei's delivery time of ESS from factory is based on the time indicated by the product's SN code.
- The above specifications are obtained by testing cells under characteristic conditions. During the actual operation, the specifications may be affected by environmental factors and do not represent the final specifications of the product.
- The SOH value displayed on the grid forming ESS interface serves primarily as a reference indicator for aging, reflecting only the trend of battery degradation. SOH validation for ESSs requires standardized capacity testing, using the actual measured capacity as the baseline for evaluation.

2.2 Recharge Period

Storage Temperature Requirement	Recharge Period	Note
-30°C ~ 30°C	15 months	During the recharge period, there is no need to recharge, however, the battery should be consumed as soon as possible. It should recharge the battery When reach the recharge time.

Note:

1. The storage temperature refers to the average temperature during the storage period.
2. Calculate the time starting from the initial time indicated on the ESS cabinet's recharging label.
3. Problems caused by long-term storage include irreversible capacity attenuation, low charging and discharging efficiency, low safety, and high failure rate.

2.3 SOH Degradation Performance

2.3.1 SOH Degradation (241kWh)

Model: LUNA2000-241-2S1

DOD	100%	100%	100%	100%	100%	100%
Cycle per day	1	1.5	2	1	1.5	2
Number of working days per year	365			330		
End of Year	SOH	SOH	SOH	SOH	SOH	SOH
0	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	97.1%	96.3%	95.5%	97.3%	96.6%	95.8%
2	94.8%	93.3%	91.7%	95.1%	93.7%	92.3%
3	92.7%	90.5%	88.2%	93.1%	91.1%	89.1%
4	90.7%	87.8%	84.9%	91.3%	88.7%	86.0%
5	88.8%	85.2%	81.6%	89.5%	86.3%	83.0%
6	87.0%	82.7%	78.5%	87.8%	84.0%	80.1%
7	85.2%	80.2%	75.5%	86.2%	81.7%	77.3%
8	83.4%	77.8%	72.6%	84.5%	79.5%	74.5%
9	81.7%	75.5%	69.7%	82.9%	77.3%	71.9%
10	79.9%	73.3%	67.0%	81.3%	75.2%	69.4%
11	78.3%	71.1%	64.4%	79.8%	73.2%	66.9%
12	76.6%	68.9%	61.9%	78.2%	71.2%	64.5%
13	75.0%	66.8%		76.7%	69.2%	62.2%
14	73.4%	64.8%		75.2%	67.3%	60.0%
15	71.8%	62.9%		73.8%	65.4%	
16	70.3%	60.9%		72.3%	63.6%	
17	68.8%			70.9%	61.9%	
18	67.3%			69.5%	60.1%	
19	65.9%			68.2%		
20	64.5%			66.8%		
Years @80%SOH	9	7	5	10	7	6
Years @70%SOH	16	11	8	17	12	9
Years @60%SOH	20	16	12	20	18	14
Cycles @80%SOH	3285	3833	3650	3300	3465	3960
Cycles @70%SOH	5840	6023	5840	5610	5940	5940
Cycles @60%SOH	7300	8760	8760	6600	8910	9240

2.3.2 Test Conditions and Remarks

1. The above SOH degradation is based on an ambient temperature range of -30°C to 40°C. In the table, "Year" represents the time since the ESS was manufactured, where "0" indicates the time at the time of manufacture, "1" indicates one year after manufacture, and so on for other years.
2. The annual SOH degradation above is based on the current battery cells used and does not consider storage-induced degradation.
3. Huawei does not guarantee any safety or performance for batteries with an SOH below 60% or a lifespan exceeding 20 years.
4. The SOH value displayed on the grid forming ESS interface serves primarily as a reference indicator for aging, reflecting only the trend of battery degradation. SOH warranty validation for ESSs requires standardized capacity testing, using the actual measured capacity as the baseline for evaluation.
5. In consideration of potential testing errors and measurement uncertainties, the lower deviation of the above data is 2%.