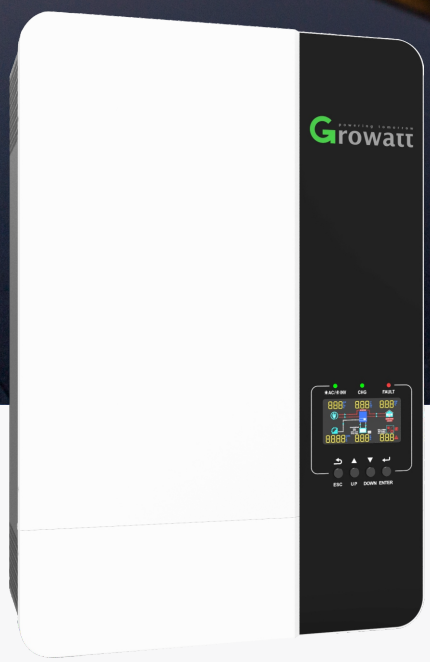
SPF 3500~5000 ES

- Integrated MPPT charge controller.
- Equalization charging function.
- Work with battery or without battery.
- Maximum PV input voltage up to 450VDC.
- Configurable grid or solar input priority.
- Optional WIFI/ GPRS remote monitoring.
- Support parallel operation for capacity expansion up to 30kW.
- PV and Grid power the load jointly if PV energy unsufficient.
- Flexibly schedule the Inverter charging and discharging time.



POWER-ING TOMO-RROW

Growatt
powering tomorrow

Datasheet	SPF 3500 ES	SPF 5000 ES
Battery Voltage	48VDC	
Battery Type	Lithium/Lead-acid	
INVERTER OUTPUT		
Rated Power	3500VA/ 3500W	5000VA/ 5000W
Parallel Capability	Yes, 6 units maximum	
AC Voltage Regulation (Battery Mode)	230VAC ± 5% @ 50/60Hz	
Surge Power	7000VA	10000VA
Efficiency (Peak)	93%	
Waveform	Pure sine wave	
Transfer Time	10ms typical, 20ms Max	
SOLAR CHARGER		
Maximum PV Array Power	4500W	6000W
MPPT Range @ Operating Voltage	120VDC ~ 430VDC	
Number of Independent MPP Trackers/ Strings Per MPP Tracker	1/1	
Maximum PV Array Open Circuit Voltage	450VDC	
Maximum Solar Charge Current	80A	100A
AC CHARGER		
Charge Current	60A	80A
AC Input Voltage	230 VAC	
Selectable Voltage Range	170-280 VAC (For Personal Computers) ; 90-280 VAC (For Home Appliances)	
Frequency Range	50Hz/60Hz (Auto sensing)	
PHYSICAL		
Protection Degree	IP20	
Dimension (W/H/D)	330/485/135mm	330/485/135mm
Net Weight	11.5kgs	12kgs
OPERATING ENVIRONMENT		
Humidity	5% to 95% Relative Humidity(Non-condensing)	
Altitude	<2000m	
Operating Temperature	0°C - 55°C	
Storage Temperature	-15°C - 60°C	

Rosen Solar Energy Co., Ltd.

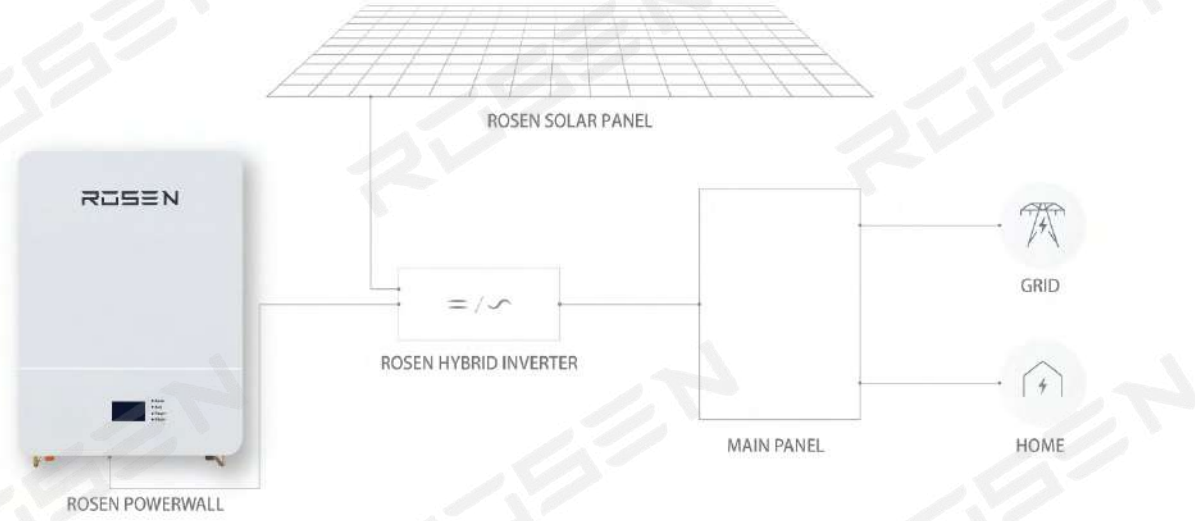
Powerwall

LiFePo4 Battery Specification

Model: LFP48V100AH

Modified Record

Revision	V.006	Draft	Chuanjun Bao
Date	2021-09-23	Checked	Chuanqiang Yao
File No.	LF48100-210901	Approved	Jack Tian



1. General Information

This specification is suitable for the 48v 100ah battery pack, and describes its dimensions, characteristics, technical requirements and precautions for use.

2. Battery Specification（@ 25±5℃）

NO	Items		Characteristics
System specification			
2.1	Battery Cell		3.2V 50AH, Prismatic, LiFePo4
2.2	Nominal capacity		100AH
2.3	Total energy		4.8KWh
2.4	Nominal voltage		48Vdc
2.5	Cell compose method		15S2P
2.6	End of discharge voltage		40.5V
2.7	Charging voltage		52.5~54.75V
2.8	Max. charging current		100Adc
2.9	Max. discharging current		100Adc
2.10	Max. power		4800W
2.11	Pulse discharge current		150A@1S
2.12	Display method and language		LCD，English
2.13	Communication interface		CAN and RS485
2.14	BMS parallel supports		Yes, Max. 14units
2.15	BMS series support		Not support
2.16	Cooling method		Natural cooling
2.17	Dimension		W 495±5mm
			H 190±5mm
			L 680±5 mm
2.18	IP rating		IP21
2.19	Net Weight		About 67 Kg
2.20	Cycle life (80% DOD, 25℃)		≥6000 times
2.21	Life time(25℃)		10 years
2.22	Protection		Over voltage, Low voltage, Over current, Over temperature, Low temperature, Short circuit.
2.23	Operation Humidity		0~95% RH (No condensing)
2.24	Operation temperature	Charge	0～50℃
		Discharge	-15～55℃
2.25	Self-discharge rate	Residual capacity	≤3%/Month; ≤15%/ Year
		Recover capacity	≤1.5%/Month; ≤8%/ year

3. Electrical Characteristics & Test Condition

Testing Conditions: Environment Temperature: 25±5℃; Humidity:45%~75%.

Normal charge：Charge battery under CC(0.5C)/CV(54V) mode until over charge protection or the charge current reduce to 0.05C, and then rest for 1h.

NO	Items	Criterion		Condition
3.1	Normal Capacity	100AH		After Normal charge, discharge @0.33C current to the end of discharge voltage.
3.2	Internal Impedance	≤22mΩ		@50% SOC @1kHz AC internal resistance test instrument.
3.3	Short circuit protection	Auto cut off load when short circuit		Connect the positive and negative of this battery pack through a lead with 0.1Ω resistance.
3.4	Cycle life	≥6000 cycles		After Normal charge，discharge @0.5C current to the end of discharge voltage. Repeat above process until discharge capacity reduce to 80% of initial value.
3.5	Discharge temperature characteristic @0.2C	-15℃(6h)	≥60%	$\frac{\text{Capacity @specified temperature}}{\text{Capacity @ 25℃}}$ the percentage accord with criterion
		0℃(6h)	≥80%	
		25℃(4h)	≥100%	
		55℃(4h)	≥95%	
3.6	Capacity retention rate	Remain capacity ≥96%		After normal charge, store the battery @25±5℃ for 28days, then discharge capacity @0.2C，the retention capacity accord with criterion.

4. Circuit Protection

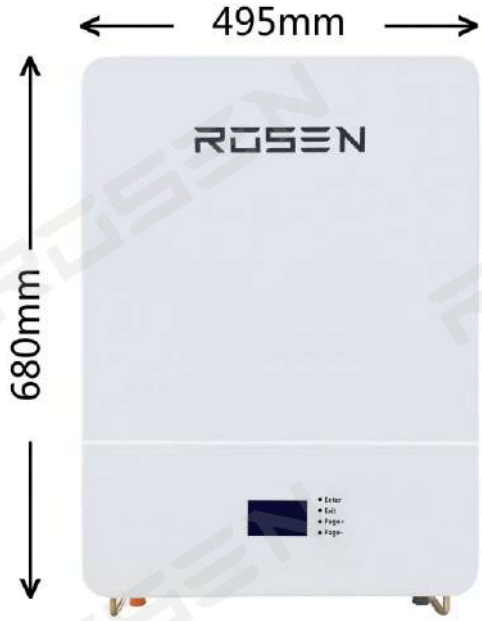
The batteries are supplied with a LiFePo4 Battery Management System (BMS)that can monitor and optimized each single prismatic cell during charge & discharge, to protect the battery pack over charge, over discharge, short circuit. Overall, the BMS helps to ensure safe and accurate running.

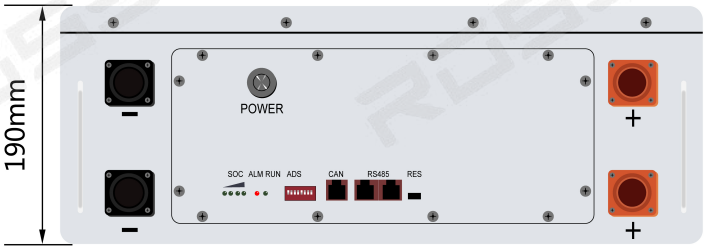
No	Item	Content	Criterion
4.1	Over charge	Over-charge protection Alarm for each cell	3.5±0.05V
		Over-charge protection for each cell	3.65±0.05V
		Over-charge protection delay time	0.5~1.5s
		Over-charge release for each cell	3.4±0.05V
		Over-charge protection Alarm for system	52.5±0.5V
		Over-charge protection for system	54.75±0.5V
		Over-charge protection delay time	0.5~1.5s
		Over-charge release for system	51±0.5V
		Over-charge release method	Under the release voltage than 60s
4.2	Over discharge	Over-discharge alarm for each cell	2.90±0.05V
		Over-discharge protection each cell	2.70±0.05V

		Over-discharge protection delay time	0.5~1.5s
		Over-discharge release for each cell	3.0±0.05V
		Over-discharge alarm for system	43.5±0.5V
		Over-discharge protection system	40.5±0.5V
		Over-discharge protection delay time	0.5~1.5s
		Over-discharge release for each cell	45±0.5V
		Over-discharge release method	Higher the release voltage than 60s
4.3	Over current	Charge over current protection alarm	100±5A
		Charge over current protection	120±5A
		Charge over current protection delay time	0.5~1.5s
		Charge over current release method	Auto release after 1min
		Discharge over current protection alarm	100±5A
		Discharge over current protection	120±5A
		Discharge over current protection delay time	0.5~1.5s
		Discharge over current release	Auto release after 1min
		Short circuit protection	Yes
		Short circuit protection release	cut-off download or exchange fuse
4.4	Temperature	Charge over temperature protection	Protect@55±3℃; Release@50±3℃;
		Charge under temperature protection	Protect@-10±3℃; Release@5±3℃
		Discharge over temperature protection	Protect@55±3℃; Release@50±3℃;
		Discharge under temperature protection	Protect@-15±3℃; Release@-0±3℃;

5. User guide

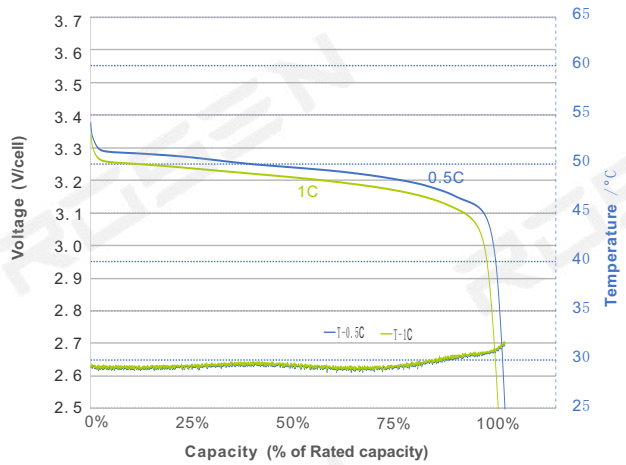
5.1 Product dimension(mm)



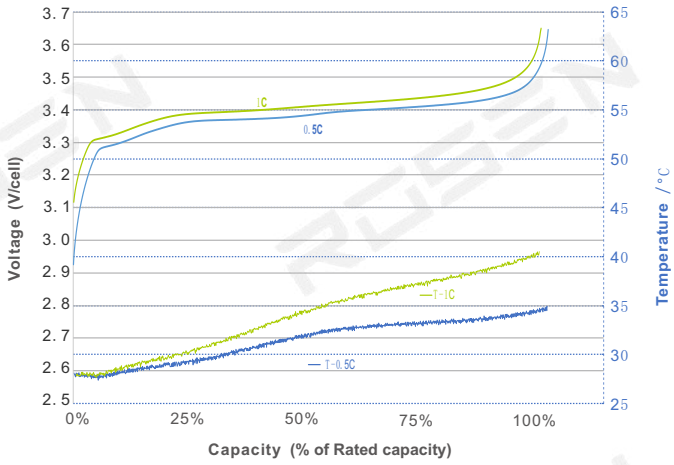


48V POWERWALL LITHIUM BATTERY

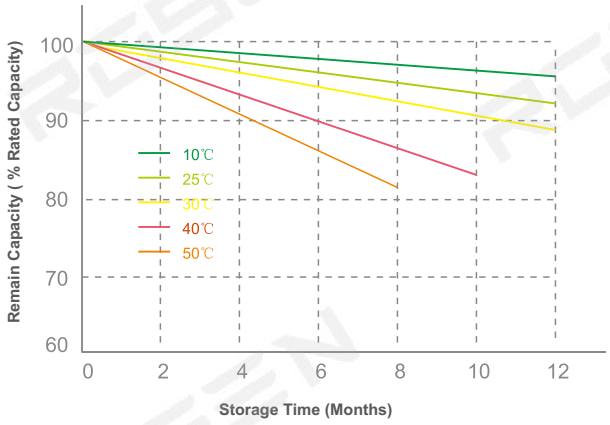
Different Discharge Rate and Temperature Characteristic



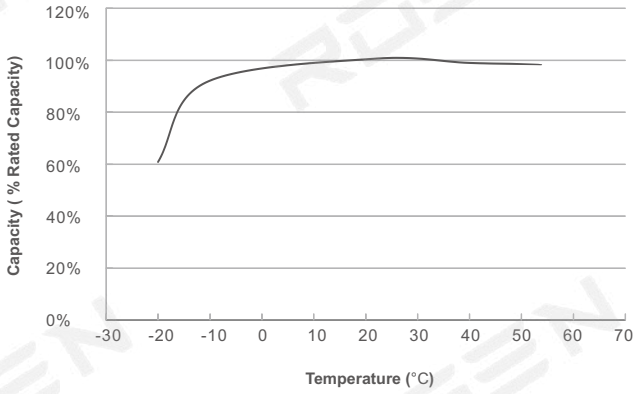
Different Charge Rate and Temperature Characteristic



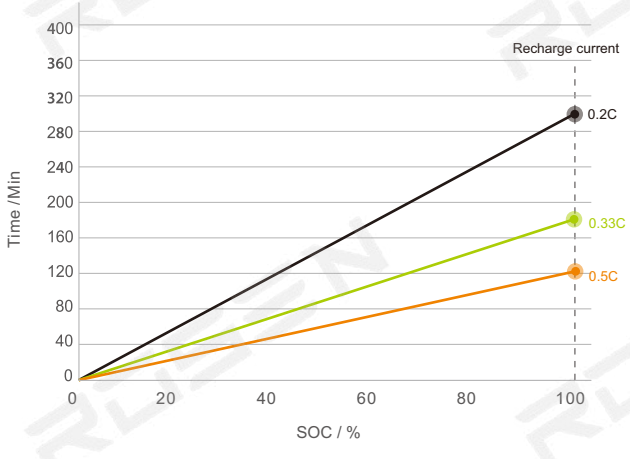
Different Temperature Self Discharge Curve



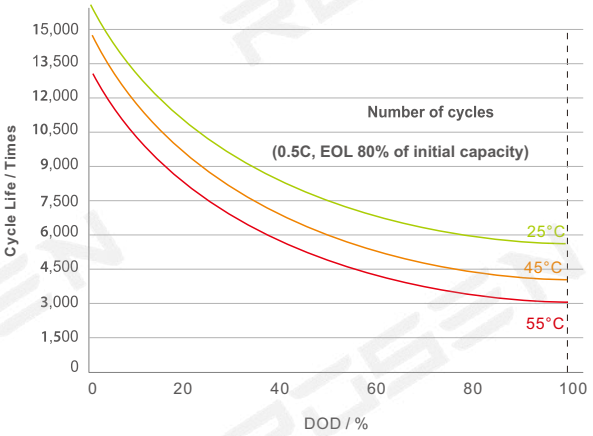
Capacity with Different Temperature



Typical Recharge Time



Typical Cycle Life



GOODWE

ES Series

3.6-5kW I Single Phase Hybrid Inverter

The GoodWe ES series bi-directional energy storage inverter can be used for both on-grid and off-grid PV systems, with the ability to control the flow of energy intelligently. During the day, the PV array generates electricity which can be provided either to the loads, fed into the grid or charge the battery, depending on the economics and set-up. The electricity stored can be released when the loads require it during the night, including inductive loads such as air conditioners or refrigerators. Additionally, the power grid can also charge storage devices via the inverter. An all-round intelligent system for maximum energy flexibility.

- Charge controller and inverter integrated
- Maximum charge and discharge up to 100A
- Export control (Zero export)
- IP65 dustproof and waterproof
- 8 ms UPS-level Switching
- Fanless design, long lifespan

ES Series

GOODWE

Technical Data	GW3648D-ES	GW5048D-ES
Battery Input Data		
Battery Type	Li-Ion	Li-Ion
Nominal Battery Voltage (V)	48	48
Max. Charging Voltage (V)	≤60 (Configurable)	≤60 (Configurable)
Max. Charging Current (A)*1	75	100
Max. Discharging Current (A)*1	75	100
Battery Capacity (Ah)*2	50~2000	50~2000
Charging Strategy for Li-Ion Battery	Self-adaption to BMS	Self-adaption to BMS
PV String Input Data		
Max. DC Input Power (W)	4600	6500
Max. DC Input Voltage (V)	580	580
MPPT Range (V)	125~550	125~550
Start-up Voltage (V)	125	125
Min. Feed-in Voltage (V)*3	150	150
MPPT Range for Full Load (V)	170~500	215~500
Nominal DC Input Voltage (V)	360	360
Max. Input Current (A)	11 / 11	11 / 11
Max. Short Current (A)	13.8 / 13.8	13.8 / 13.8
Number of MPPTs	2	2
Number of Strings per MPPT	1	1
AC Output Data (On-grid)		
Nominal Apparent Power Output to Utility Grid (VA)*8	3680	4600
Max. Apparent Power Output to Utility Grid (VA)*4*9	3680	5100
Max. Apparent Power from Utility Grid (VA)	7360	9200
Nominal Output Voltage (V)	230	230
Nominal Output Freqency (Hz)	50 / 60	50 / 60
Max. AC Current Output to Utility Grid (A)	16	24.5*5
Max. AC Current from Utility Grid (A)	32	40
Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)	
Output THDi (@Nominal Output)	<3%	<3%
AC Output Data (Back-up)		
Max. Output Apparent Power (VA)	3680	4600
Peak Output Apparent Power (VA)*6	5520,10sec	6900,10sec
Max. Output Current (A)	16	20
Nominal Output Voltage (V)	230 (±2%)	230 (±2%)
Nominal Output Freqency (Hz)	50/60 (±0.2%)	50/60 (±0.2%)
Output THDv (@Linear Load)	<3%	<3%
Efficiency		
Max. Efficiency	97.6%	97.6%
Max. Battery to Load Efficiency	94.0%	94.0%
European Efficiency	97.0%	97.0%
Protection		
Anti-Islanding Protection	Integrated	Integrated
PV String Input Reverse Polarity Protection	Integrated	Integrated
Insulation Resistor Detection	Integrated	Integrated
Residual Current Monitoring Unit	Integrated	Integrated
Output Over Current Protection	Integrated	Integrated
Output Short Protection	Integrated	Integrated
Output Over Voltage Protection	Integrated	Integrated
General Data		
Operating Temperature Range (°C)	-25~60	-25~60
Relative Humidity	0~95%	0~95%
Operating Altitude (m)	≤4000	≤4000
Cooling	Natural Convection	Natural Convection
Noise (dB)	<25	<25
User Interface	LED & APP	LED & APP
Communication with BMS*7	RS485; CAN	RS485; CAN
Communication with Meter	RS485	RS485
Communicaiton with Portal	Wi-Fi	Wi-Fi
Weight (Kg)	28	30
Size (Width × Height × Depth mm)	516 × 440 × 184	516 × 440 × 184
Mounting	Wall Bracket	Wall Bracket
Protection Degree	IP65	IP65
Standby Self-Consumption (W)	<13	<13
Topology	Battery Isolation	Battery Isolation

*1: The actual charge and discharge current also depends on the battery.
*2: Under off-grid mode, then battery capacity should be more than 100Ah.
*3: When there is no battery connected, inverter starts feeding in only if string voltage is higher than 200V.
*4: 4600 for VDE 0126-1-1 &VDE-AR-N4105, 4950 for AS4777.2(GW5048D-ES), 4050 for CEI 0-21 (GW3648D-ES).
*5: 21.7A for AS4777.2.
*6: Can be reached only if PV and battery power are enough.
*7: CAN communication is configured by default. If 485 communication is used, please replace the corresponding communication line.
*8: For Belgium Nominal Apparent Power Output to Utility Grid (VA): GW3648D-ES is 3600.
*9: For Belgium Max. Output Apparent Power (VA): GW3648D-ES is 3600.
*: Please visit GoodWe website for the latest certificates.

GOODWE
YOUR SOLAR ENGINE

SECU-A Series

Low Voltage Battery

GoodWe's SECU-A Series is a low voltage lithium battery, which is made from safe and durable lithium iron phosphate. The battery follows a modular design, making it extendable. As a plug and play device, it can be installed easily and quickly. Thanks to their safe design, the batteries can be connected together in parallel.

Safe & Reliable

Expandable Modular Design

Long Lifespan

SECU-A Series

Technical Data	SECU-A5.4L
Model	
Battery Type	$LiFePO_4$
System Weight	49Kg
Dimensions (W × D × H)	400 × 226.2 × 484.2mm
Protection	IP20 (indoor)
Warranty	10 years (performance warranty)
Installed Capacity	5.4 kWh
Usable Energy	4.8 kWh
DoD	90%
Nominal Voltage	51.2 V
Operating Voltage Range	48 ~ 57.6 V
Internal Resistance	≤ 20 mΩ
Electrical	
Max. Charge Current	50A
Max. Discharge Current	50A
Operating Temperature Range	-10°C ~ 50°C*
Humidity	15% ~ 85%
System Configuration	
Module Connection	6 Parallels
Capacity Range	5.4 / 10.8 / 16.2 / 21.6 / 27 / 32.4 kWh
Usable Energy Range	4.8 / 9.6 / 14.4 / 19.2 / 24 / 28.8 kWh
Max. Charge Current	50A (1 Module) / 100A (2~6 Modules)
Max. Discharge Current	50A (1 Module) / 100A (2~6 Modules)
Monitoring Parameters	system voltage, current, cell voltage, cell temperature, PCBA temperature
Communication	CAN
Certification	UN38.3

*: Do not charge batteries when temperature is below 0°C. Batteries start derating when the temperature is above 40°C.