
GOODWE
YOUR SOLAR ENGINE
Power Whenever You Need
Residential & Small Commercial Energy Storage Solutions
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1. Hybrid Solutions

On-grid & backup function integrated **Especially designed for newly installed systems**

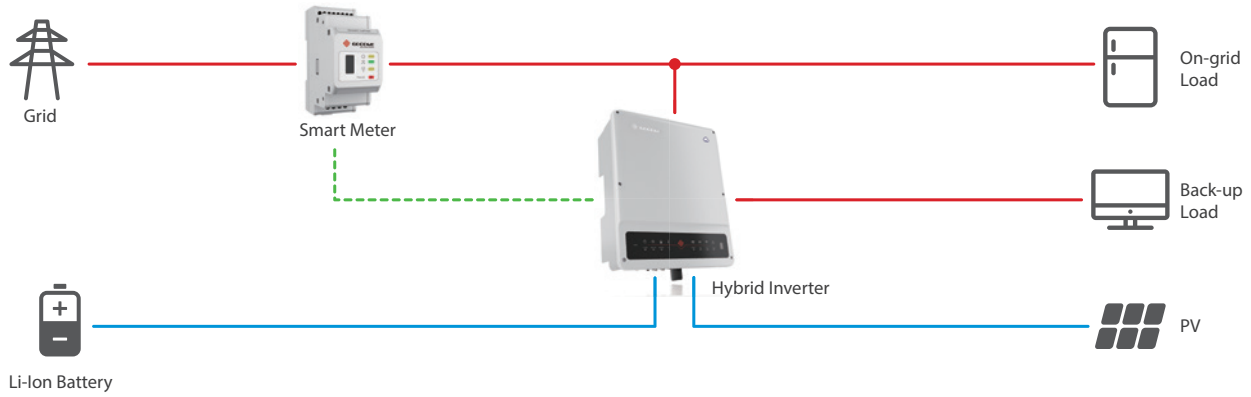
1.1 Typical Application

- Enhance self-consumption: During the day, the electricity from the PV array is used to optimize self-consumption. The excess power charges the the batteries, whose power supplies the loads at night. By utilizing storage, the self-consumption can reach up to 95%.
- Benefit from peak shaving: By setting the charging and discharging time, the battery can be charged using the electricity generated at off-peak rates and discharged to fulfill the loads during peak hours (if the grid regulations allow it).
- Provide backup for critical loads: Connected to the backup side of the inverter, loads such as refrigerators, routers, lamps, computers and other critical appliances can be powered when the grid fails. The system can automatically switch to backup mode within 10 milliseconds.

System Wiring and Operation

AC cable DC cable COM cable

The hybrid inverters are the core of the energy storage systems and they are integrated following elements into one unit: MPP trackers, power inverter, battery charging & discharging function, BMS communication & by-pass & backup function. GoodWe´s hybrid portfolio is a perfect fit for a great number of residential and small commercial scenarios.



Operation Modes

There are three basic modes that end users can choose from the PV Master App.

- General Mode: At daytime, the power generated by the PV system is used in the following order: First, feed the home loads; second, charge the battery and third, export the surplus power to the grid. At night, the battery powers the loads. If the power supply from the batteries is not sufficient, the system is designed to switch automatically to the grid in order to keep the loads supplied.
- Backup Mode: Under this mode, the battery is only used as a backup power supply when the grid fails and as long as the grid works, the batteries won't be used to power the loads. The battery will get charged with the power generated by the PV system or from the grid.
- Economic Mode: The customer is able to set the battery charging and discharging times according to the grid peak and off-peak tariffs and the household power consumption habits.

GoodWe Hybrid Portfolio

	ES	EM	EH	ET
Power Range	5kW	3-5kW	3.6-6kW	5-10kW
Grid Type	Single-phase	Single-phase	Single-phase	Three-phase
Lithium Battery	Low Voltage	Low Voltage	High Voltage	High Voltage

2. AC coupled retrofit solution

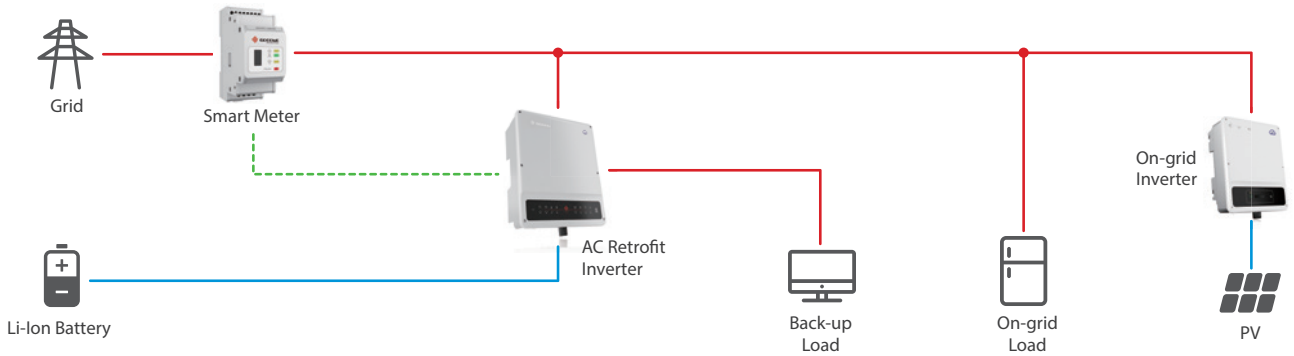
On-grid & backup function integrated **Converting on-grid systems into hybrid systems**

2.1 Typical Application

- Enhancing Self-Consumption: At daytime, the electricity from the PV array is used for self-consumption. The surplus is used to charge the batteries, which in turn can power the loads at night. The utilization of energy storage technologies can bring the self-consumption rate up to 95%.
- Provide Backup to Critical Loads: When the grid fails, the backup function of the hybrid inverter can feed power to critical loads such as refrigerators, routers, lamps, computers and other key appliances. The system automatically switches to backup mode within 10 milliseconds.

System Wiring and Operation

The GoodWe AC-coupled retrofit inverters are formed by the following key elements into one single unified unit: power inverter, the battery charging & discharging function, the BMS communication and the by-pass & backup function. This kind of inverter is designed to make it easy to convert and upgrade existing grid-tied systems into hybrid ones. It is suitable for both single-phase and three-phase systems, and it is also compatible with various power sources including solar and wind generators of different brands in both residential and commercial scenarios.



Operation Modes

In a similar way to the hybrid system, the default setting in the AC coupled retrofit inverter prioritizes the PV generation to power the loads, then charge the battery and finally export any surplus power to the grid. There are also three basic operation modes available in the PV Master App.

One major difference to a newly installed hybrid system is that PV will not work during the day time if there is an outage. This is because the original grid-tied inverter does not work when the grid fails and it is only the battery that powers the critical loads during the time that the outage lasts.

GoodWe Retrofit Family

	SBP
Power Range	3.6-5kW
Grid Type	Single-phase
Lithium Battery	Low Voltage

3. Extended Operation Scenarios

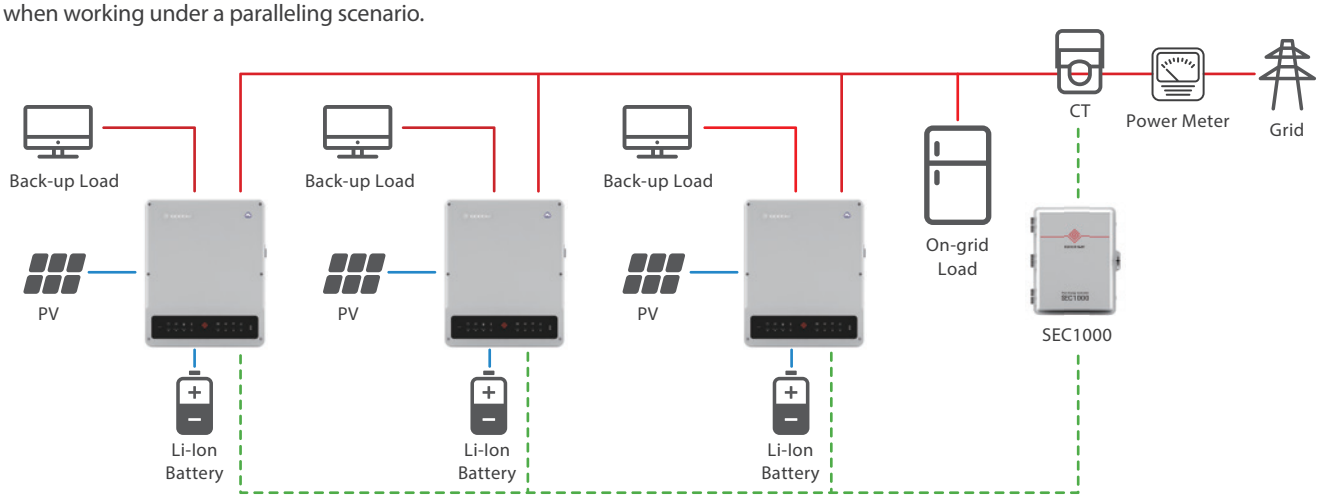
Based on their key functions and capabilities, the GoodWe energy storage inverters can be displayed on multiple scenarios. Below are some of the most frequent.

3.1 Paralleling Scenario (Only ET Series)

The new three-phase ET inverters paralleling solution is particularly designed to meet the increasing demand for PV storage systems with higher capacity, which is completely suitable for installation such as small commercial storage systems. This kind of solution involves the integration on the AC side of multiple hybrid inverters (maximum 10 units) into one unified system.

System Wiring and Operation

The use of the SEC1000 (GoodWe's Smart Energy Controller) is recommended to achieve a smooth interconnection of all the units when working under a paralleling scenario.

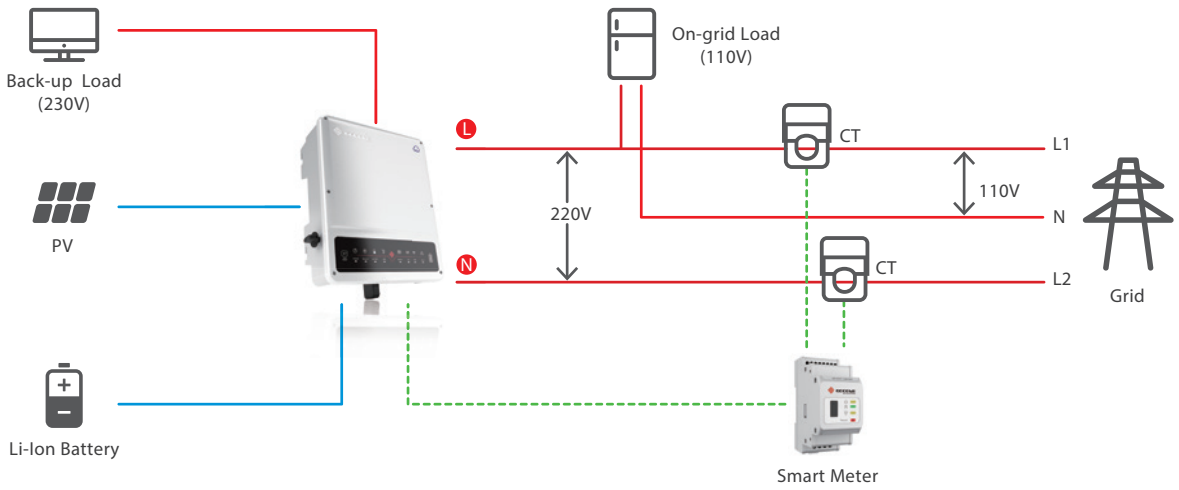


Operation Modes

It follows the same principal of the inverter paralleling scenario: when the grid is available, the PV system, the batteries and the loads share the energy in a united system. In contrast, when outage occurs, the paralleled system breaks into independent units in which the PV and the batteries supply backup power only to the corresponding loads.

3.2 Split-phase System Solution

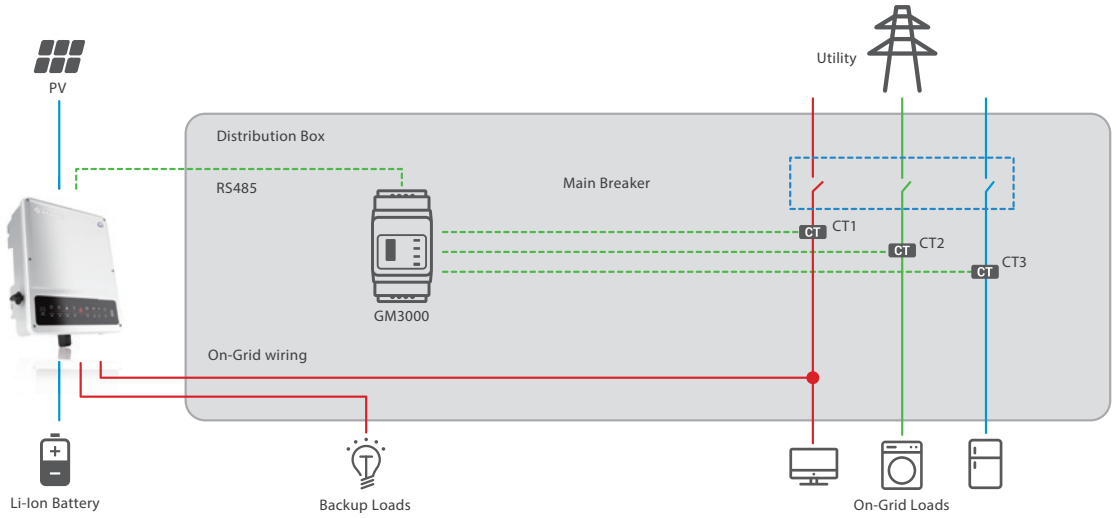
A split-phase system, which differentiates from most European standards systems, has completely different application scenario. For such a grid, GoodWe provides a solution of a smart meter with two CTs to integrate both 110V and 220V loads on the grid side (see below).



GoodWe energy storage ES, EM, and EH series are applicable.

3.3 Single-phase Inverter in three-Phase Utility Solution

GoodWe single-phase hybrid inverters can work on three-phase grid systems where a three-phase smart meter is adopted to monitor load consumption on all three phases (net zero). The system can implement data-driven decisions to control battery charge or discharge power. This solution is applicable in three-phase home connections where there is no phase-level zero export requirement



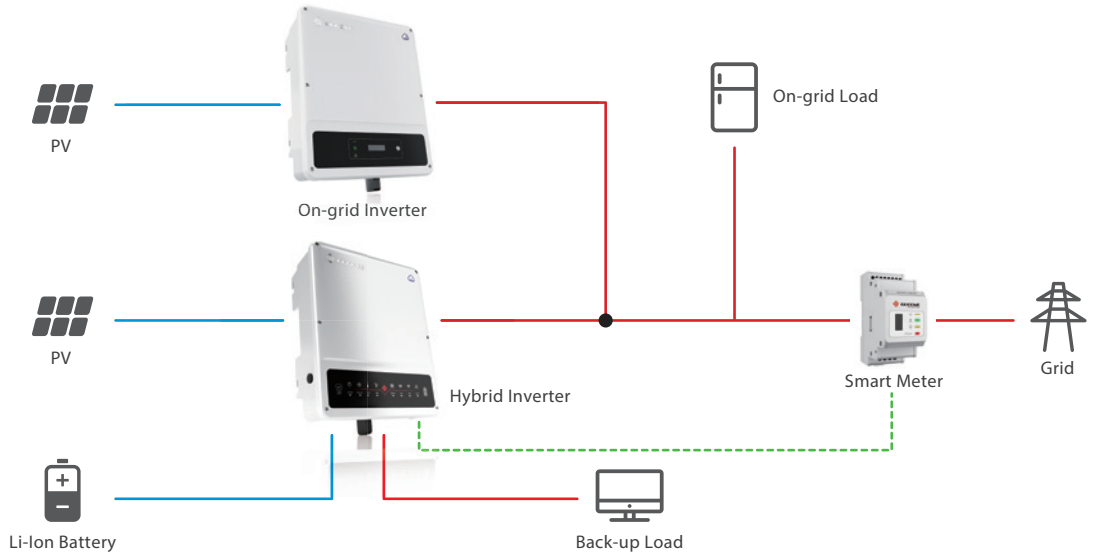
GoodWe energy storage ES, EM, and EH series are applicable.

3.4 Solution to achieve solar capacity extension

The extension of solar capacity is a characteristic that makes solar energy storage systems very attractive because they help reduce the required investment , also allowing adaptation to higher power consumption patterns in both single and three phase systems.

This kind of solution is suitable for the GoodWe ES, EM, EH and ET Series. It can also work with any brand of solar inverters.

System Wiring and Operation



This solution integrates both hybrid and retrofit functions into a single system. In both on-grid systems as well as hybrids, the solar energy is used to supply electricity to both back-up loads and to charge the battery before the power is injected into the grid. By adopting such a solution, the system provides a more reliable source of supply for the loads, while ensuring a sufficient supply of green energy to charge the battery.

EH Series

Single Phase Hybrid Inverter (HV Battery)

Technical Data		GW3600-EH	GW5000-EH	GW6000-EH
Battery Input Data	Battery Type		Li-Ion	
	Battery Voltage Range(V)		85~450	
	Start-up Voltage (V)		90	
	Max. Charging/Discharging Current (A)		25/25	
	Max. Charging/Discharging Power (W)	3600	5000	6000
	Battery Ready Optional Function	YES	YES	YES
PV String Input Data	Max. DC Input Power (W)	4800	6650	8000
	Max. DC Input Voltage (V)		580	
	MPPT Range (V)		100~550	
	Start-up Voltage (V)		90	
	Nominal DC Input Voltage (V)		380	
	Max. Input Current (A)		12.5/12.5	
	Max. Short Current (A)		15.2/15.2	
	No. of MPP Trackers		2	
	No. of Strings per MPP Tracker		1	
AC Output/Input Data (On-grid)	Nominal Apparent Power Output to Utility Grid (VA)*2	3600	5000	6000
	Max. Apparent Power Output to Utility Grid(VA)*2	3600/3960*1	5000/5500*1	6000/6600*1
	Max. Apparent Power from Utility Grid (VA)	7200 (Charging 3.6kw,back-up output3.6kw)	10000 (Charging 5kw,back-up output 5kw)	12000 (Charging 6kw,back-up output 6kw)
	Nominal Output Voltage (V)		230	
	Nominal Ouput Frequency (Hz)		50/60	
	Max. AC Current Output to Utility Grid (A)*2	16/18*1	21.7/24*1	26.1/28.7*1
	Max. AC Current From Utility Grid (A)	32	43.4	52.2
	Output Power Factor		~1 (Adjustable from 0.8 leading to 0.8 lagging)	
	Output THDi (@Nominal Output)		<3%	
Back-up Output Data (Back-up)	Max. Output Apparent Power (VA)	3600	5000	6000
	Peak Output Apparent Power (VA)	4320 ,60sec	6000 ,60sec	7200 ,60sec
	Max. Output Current (A)	15.7	21.7	26.1
	Nominal Output Voltage (V)		230 (±2%)	
	Automatic Switch Time (ms)		<10	
	Nominal Ouput Frequency (Hz)		50/60 (±0.2%)	
	Output THDv (@Linear Load)		<3%	
Efficiency	PV Max. Efficiency		97.6%	
	PV Europe Efficiency		97.0%	
	PV Max. MPPT Efficiency		99.9%	
	Battery Charged by PV Max. Efficiency		98.0%	
	Battery Charge/Discharge from/to AC Max. Efficiency		96.6%	
Protection	Anti-Islanding Protection		Integrated	
	Battery Input Reverse Polarity Protection		Integrated	
	Insulation Resistor Detection		Integrated	
	Residual Current Monitoring Unit		Integrated	
	Output Over Current Protection		Integrated	
	Grid Output Short Protection		Integrated	
	Output Over Voltage Protection		Integrated	
General Data	Operating Temperature Range (°C)		-35~60	
	Relative Humidity		0~95%	
	Operating Altitude (m)		4000	
	Cooling		Natural Convection	
	Noise (dB)		<35	
	User Interface		LED & APP	
	Communication with BMS*3		RS485; CAN	
	Communication with Meter		RS485	
	Communicaiton with Portal		Wi-Fi*5/Ethernet(Optional)	
	Weight (kg)		17	
	Size (Width*Height*Depth mm)		354*433*147	
	Mounting		Wall Bracket	
	Protection Degree		IP65	
	Standby Self-Consumption (W)*4		<10	
	Topology		Battery Non-Isolation	

*1: For CEI 0-21.
*2: The grid feed in power for VDE-AR-N 4105 and NRS097-2-1 is limited 4600VA, for AS/NZS 4777.2 is limited 4950VA & 21.7A.
*3: No back-up output.
*4: CAN communication is configured by default. If 485 communication is used, please replace the corresponding communication line.
*5: Only compatible with 2.4Ghz network.
*: Please visit GoodWe website for the latest certificates.

ET Series

Three Phase Hybrid Inverter (HV Battery)

Technical Data		GW5KL-ET	GW6KL-ET	GW8KL-ET	GW10KL-ET
Battery Input Data	Battery Type	Lithium-ion only			
	Battery Voltage Range (V)	180~600			
	Max. Charging Current (A)	25			
	Max. Discharging Current (A)	25			
	Charging Strategy for Li-Ion Battery	Self-adaption to BMS			
PV String Input Data	Max. DC Input Power (W)	6650	8000	10650	13300
	Max. DC Input Voltage (V)*1	1000			
	MPPT Range (V)*2	200~850			
	Start-up Voltage (V)	180			
	Nominal DC Input Voltage (V)*3	620			
	Max. Input Current (A)	12.5/12.5		12.5/22	
	Max. Short Current (A)	15.2/15.2		15.2/27.6	
	No. of MPP Trackers	2			
	No. of Strings per MPP Tracker	1/1		1/2	
AC Output Data (On-grid)	Nominal Apparent Power Output to Utility Grid (VA)	5000	6000	8000	10000
	Max. Apparent Power Output to Utility Grid (VA)*4	5500	6600	8800	11000
	Max. Apparent Power from Utility Grid (VA)	10000	12000	15000	
	Nominal Output Voltage (V)	400/380, 3L/N/PE			
	Nominal Ouput Freqency (Hz)	50/60			
	Max. AC Current Output to Utility Grid (A)	8.5	10.5	13.5	16.5
	Max. AC Current From Utility Grid (A)	15.2	18.2	22.7	22.7
	Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)			
	Output THDi (@Nominal Output)	<3%			
AC Output Data (Back-up)	Max. Output Apparent Power (VA)	5000	6000	8000	10000
	Peak Output Apparent Power (VA)*5	10000, 60sec	12000, 60sec	16000, 60sec	16500, 60SEC
	Max. Ouput Current (A)	8.5	10.5	13.5	16.5
	Nominal Output Voltage (V)	400/380			
	Nominal Ouput Frequency (Hz)	50/60			
	Output THDv (@Linear Load)	<3%			
Efficiency	Max. Efficiency	97.6%			
	Max. Battery to Load Efficiency	97.5%			
	European Efficiency	96.8%			
Protection	Anti-Islanding Protection	Integrated			
	PV String Input Reverse Polarity Protection	Integrated			
	Insulation Resistor Detection	Integrated			
	Residual Current Monitoring Unit	Integrated			
	Output Over Current Protection	Integrated			
	Output Short Protection	Integrated			
	Battery Input Reverse Polarity Protection	Integrated			
	Output Over Voltage Protection	Integrated			
General Data	Operating Temperature Range (°C)	-35~60			
	Relative Humidity	0~95%			
	Operating Altitude (m)	≤4000			
	Cooling	Nature Convection			
	Noise (dB)	<30			
	User Interface	LED & APP			
	Communication with BMS	RS485; CAN			
	Communication with Meter	RS485			
	Communication with EMS	RS485 (Insulated)			
	Communicaiton with Portal	Wi-Fi*7			
	Weight (kg)	24		25	
	Size (Width*Height*Depth mm)	415*516*180			
	Mounting	Wall Bracket			
	Protection Degree	IP66			
	Standby Self Consumption (W)*6	<15			
	Topology	Transformerless			

*1: For 1000V system, Maximum operating voltage is 950V. For AustraliaL safety, there will be a warning if PV voltage > 600V.
*2: For AustraliaL safety, MPPT range is 200~550V.
*3: For AustraliaL safety, nominal DC input voltage is 450V.
*4: According to the local grid regulation.
*5: Can be reached only if PV and battery power is enough.
*6: No Back-up Output.
*7: Only compatible with 2.4Ghz network.
*: Please visit GoodWe website for the latest certificates.

ES Series

Single Phase Hybrid Inverter (LV Battery)

Technical Data		GW5048D-ES
Battery Input Data	Battery Type	Li-Ion
	Nominal Battery Voltage (V)	48
	Max. Charging Voltage (V)	≤60 (Configurable)
	Max. Charging Current (A)*1	100
	Max. Discharging Current (A)*1	100
	Battery Capacity (Ah)*2	50~2000
	Charging Strategy for Li-Ion Battery	Self-adaption to BMS
PV String Input Data	Max. DC Input Power (W)	6650
	Max. DC Input Voltage (V)	580
	MPPT Range (V)	125~550
	Start-up Voltage (V)*3	150
	Nominal DC Input Voltage (V)	360
	Max. Input Current (A)	11/11
	Max. Short Current (A)	13.8/13.8
	No. of MPP Trackers	2
	No. of Strings per MPP Tracker	1
AC Output Data (On-grid)	Nominal Apparent Power Output to Utility Grid (VA)	4600
	Max. Apparent Power Output to Utility Grid (VA)	4950
	Max. Apparent Power from Utility Grid (VA)	9200
	Nominal Output Voltage (V)	230
	Nominal Output Freqency (Hz)	50/60
	Max. AC Current Output to Utility Grid (A)	21.7
	Max. AC Current from Utility Grid (A)	40
	Output Power Factor	~1(Adjustable from 0.8 leading to 0.8 lagging)
	Output THDi (@Nominal Output)	<3%
AC Output Data (Back-up)	Max. Output Apparent Power (VA)	4600
	Peak Output Apparent Power (VA)*4	6900,10sec
	Max. Output Current (A)	20
	Nominal Output Voltage (V)	230 (±2%)
	Nominal Output Freqency (Hz)	50/60 (±0.2%)
	Output THDv (@Linear Load)	<3%
Efficiency	Max. Efficiency	97.6%
	Max. Battery to Load Efficiency	94.0%
	European Efficiency	97.0%
Protection	Anti-Islanding Protection	Integrated
	PV String Input Reverse Polarity Protection	Integrated
	Insulation Resistor Detection	Integrated
	Residual Current Monitoring Unit	Integrated
	Output Over Current Protection	Integrated
	Output Short Protection	Integrated
	Output Over Voltage Protection	Integrated
General Data	Operating Temperature Range (°C)	-25~60
	Relative Humidity	0~95%
	Operating Altitude (m)	≤4000
	Cooling	Natural Convection
	Noise (dB)	<25
	User Interface	LED & APP
	Communication with BMS*5	RS485; CAN
	Communication with Meter	RS485
	Communicaiton with Portal	Wi-Fi*6
	Weight (kg)	30
	Size (Width*Height*Depth mm)	516*440*184
	Mounting	Wall Bracket
	Protection Degree	IP65
	Standby Self-Consumption (W)	<13
	Topology	High Frequency 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: Can be reached only if PV and battery power are enough.
*5: The standard configuration is CAN.
*6: Only compatible with 2.4Ghz network.
*: Please visit GoodWe website for the latest certificates.

EM Series

Single Phase Hybrid Inverter (LV Battery)

Technical Data		GW3048-EM	GW5048-EM
Battery Input Data	Battery Type	Li-Ion	
	Nominal Battery Voltage (V)	48	
	Max. Charging Voltage (V)	≤60 (Configurable)	
	Max. Charging Current (A)*1	50	
	Max. Discharging Current (A)*1	50	
	Battery Capacity (Ah)*2	50~2000	
	Charging Strategy for Li-Ion Battery	Self-adaption to BMS	
PV String Input Data	Max. DC Input Power (W)	4000	6650
	Max. DC Input Voltage (V)*3	550	
	MPPT Range (V)	100~500	
	Start-up Voltage (V)*4	150	
	Nominal DC Input Voltage (V)	360	
	Max. Input Current (A)	11	11/11
	Max. Short Current (A)	13.8	13.8/13.8
	No. of MPP Trackers	1	2
	No. of Strings per MPP Tracker	1	
AC Output Data (On-grid)	Nominal Power Output to Utility Grid (W)	3000	5000
	Max. Apparent Power Output to Utility Grid (VA)	3000	5000
	Max. Apparent Power from Utility Grid (VA)	5300	
	Nominal Output Voltage (V)	230	
	Nominal Output Freqency (Hz)	50/60	
	Max. AC Current Output to Utility Grid (A)	13.6	21.7
	Max. AC Current From Utility Grid (A)	23.6	
	Output Power Factor	~1(Adjustable from 0.8 leading to 0.8 lagging)	
	Output THDi (@Nominal Output)	<3%	
AC Output Data (Back-up)	Max. Output Apparent Power (VA)	2300	
	Peak Output Apparent Power (VA)*5	3500,10sec	
	Automatic Switch Time (ms)	10	
	Max. Output Current (A)	10	
	Nominal Output Voltage (V)	230 (±2%)	
	Nominal Output Freqency (Hz)	50/60 (±0.2%)	
	Output THDv (@Linear Load)	<3%	
Efficiency	Max. Efficiency	97.6%	
	Max. Battery to Load Efficiency	94.5%	
	European Efficiency	97.0%	
Protection	Anti-Islanding Protection	Integrated	
	PV String Input Reverse Polarity Protection	Integrated	
	Insulation Resistor Detection	Integrated	
	Residual Current Monitoring Unit	Integrated	
	Output Over Current Protection	Integrated	
	Output Short Protection	Integrated	
	Output Over Voltage Protection	Integrated	
General Data	Operating Temperature Range (°C)	-25~60	
	Relative Humidity	0~95%	
	Operating Altitude (m)	4000	
	Cooling	Natural Convection	
	Noise (dB)	<25	
	User Interface	LED & APP	
	Communication with BMS*6	RS485; CAN	
	Communication with Meter	RS485	
	Communicaiton with Portal	Wi-Fi*7	
	Weight (kg)	16	17
	Size (Width*Height*Depth mm)	347*432*175	
	Mounting	Wall Bracket	
	Protection Degree	IP65	
	Standby Self-Consumption (W)	<13	
	Topology	High Frequency 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: Maximum operating DC voltage is 530V.
*4: When there is no battery connected, inverter starts feeding in only if string voltage is higher than 200V.
*5: Can be reached only if PV and battery power are enough.
*6: The standard configuration is CAN.
*7: Only compatible with 2.4Ghz network.
*: Please visit GoodWe website for the latest certificates.

SBP Series (AC-Coupled)

Single Phase AC Retrofit Storage Solution (LV Battery)

Technical Data		GW3600S-BP	GW5000S-BP
Battery Input Data	Battery Type	Li-Ion	
	Nominal Battery Voltage (V)	48	
	Max. Charging Voltage (V)	≤60 (Configurable)	
	Max. Charging Current (A)*1	75	100
	Max. Discharging Current (A)*1	75	100
	Battery Capacity (Ah)*2	50~2000	
	Charging Strategy for Li-Ion Battery	Self-adaption to BMS	
AC Output Data (On-grid)	Nominal Power Output to Utility Grid (W)	3680	5000
	Max. Apparent Power Output to Utility Grid (VA)	3680	5000
	Max. Apparent Power from Utility Grid (VA)	7360	9200
	Nominal Output Voltage (V)	230	
	Nominal Ouput Frequency (Hz)	50/60	
	Max. AC Current Output to Utility Grid (A)	16	21.7
	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%	
AC Output Data (Back-up)	Max. Output Apparent Power (VA)*3	3680	5000
	Peak Output Apparent Power (VA)*3	4416, 10sec	5500, 10sec
	Automatic Switch Time (ms)	<10	
	Nominal Output Voltage (V)	230 (±2%)	
	Nominal Output Freqency (Hz)	50/60 (±0.2%)	
	Max. Output Current (A)	16	22.8
	Output THDv (@Linear Load)	<3%	
Efficiency	Max. Efficiency	95.5%	
Protection	Anti-Islanding Protection	Integrated	
	Output Over Current Protection	Integrated	
	Output Short Protection	Integrated	
	Output Over Voltage Protection	Integrated	
General Data	Operating Temperature Range (°C)	-25~60	
	Relative Humidity	0~95%	
	Operating Altitude (m)	4000	
	Cooling	Nature Convection	
	Noise (dB)	<25	
	User Interface	LED & APP	
	Communicaiton with BMS*4	RS485; CAN	
	Communicaiton with Meter	RS485	
	Communicaiton with Portal	Wi-Fi*5	
	Weight (kg)	18.5	
	Size (Width*Height*Depth mm)	347*432*190	
	Mounting	Wall Bracket	
	Protection Degree	IP65	
	Standby Self-Consumption (W)	<15	
	Topology	High Frequency Isolation	

*1:The actual charge and discharge current also depends on the battery.
*2: Battery capacity could be not less than 100Ah where the back-up function is to be applied.
*3: Can be reached only if battery capacity is enough, otherwise will shut down.
*4: The standard configuration is CAN.
*5: Only compatible with 2.4Ghz network.
*: Please visit GoodWe website for the latest certificates.

Product Strengths

Save money up to
zero cost

Uninterrupted power supply function,
10ms reaction

UPS

Up to 10 years warranty supported
by strong bankability

10 YEARS

Easy WiFi setup via remote
APP settings

Fanless design,
long lifespan

Charge battery
@ off-peak price

Project Cases

International Awards and Rankings

EUPD RESEARCH
TOP BRAND PV
INVERTERS
NETHERLANDS
AUSTRALIA
2020 2019 2018 2017

2017-2020

NO.7
Wood Mackenzie
POWER & RENEWABLES

2018

String
NO.4
3-Phase
IHS Markit

2018

TÜVRheinland®
Precisely Right.
ALL QUALITY MATTERS AWARD

2015-2018

reddot Design

2018