

LW Series Product Inverter/Charger Functional Specification

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Document History

REV	Date	Description	Author
0.01	2007.10.24	Initial release for Sterling	Jack.he
0.02	2008-1-11	Change "EN60950" to "EN62040-1"	Jack.he
0.03	2008-2-26	<ol style="list-style-type: none"> Delete "Low DC input recovery" Item "High DC input alarm & fault", change the voltage 15.5V->16V, 31V->32V Item "Over-Load Protection (SMPS load)", change the spec from " >110% ±10%: Fault (shutdown output) after 60s;>150% ±10%: Fault (shutdown output) after 20s" to "(110%<load<125%) ±10%: Fault (shutdown output) after 15 minutes;(125%<load<150%) ±10%: Fault (shutdown output) after 60s;>150% ±10%: Fault (shutdown output) after 20s" Item "audible alarm (invert mode over-load)", change the spec from " 110% load, beeps 0.5s every 1s; and Fault after 60s.150% load, beeps 0.5s every 1s, and Fault after 20s." to "110%< load<125%, no audible alarm in 14 minutes, beeps 0.5s every 1s in 15th minute, and Fault after 15 minutes.125% <load<150%, beeps 0.5s every 1s, and Fault after 60s.Load>150%, beeps 0.5s every 1s, and Fault after 20s." Item "Appendix: 1. Indicator and Buzzer setting->fault mode" change item "Back EMF" to "Back feed short" "Protection", change the item "Back-EMF Protection" to "Back-FEED Protection" 	Jack.he
0.04	2008-4-23	<ol style="list-style-type: none"> Change Fan operation condition by charge current. Change the content of "Appendix: 1. Indicator and Buzzer setting". 	Jack.he
0.05	2009-2-21	Per meeting with sterling, reduce fan operation temp stop setting from 60°C to 50°C,	Jack.he
0.06	2009-10-13	Per sterling request For HV(2009/9/29 yen,Carry's mail, Per sterling request For LV(2010/1/8 sterling's mail and 2009/10/5 Promariner's mail) <ol style="list-style-type: none"> Low Line Frequency Re-connect/disconnect modify Add V/F limit 	Jack.he
0.07	2010-1-28	<ol style="list-style-type: none"> Add 2012/2024 model, combine 32xxE 32xxE 3D drawing revised, 32xx dimension revised P7,overload description revised to align with firmware. over temp description 105c→95c to align with firmware 	Jack.he
0.08	2013-6-26	<ol style="list-style-type: none"> ADD Two kinds of overload logic super strong overload model R01(OK) R10(NC) Standard overload model R01(OK) R10 (OK) 	Jack.he

Figures of Unit:

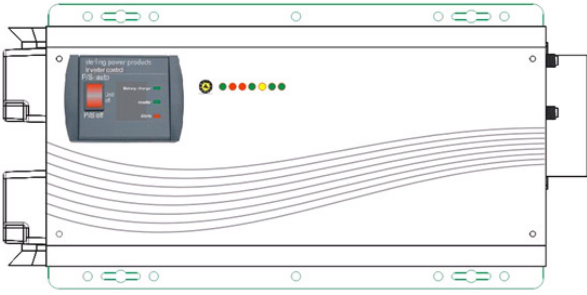


Figure 1 top view(LW1-3KW)



Figure 2 top view(LW4-6KW)

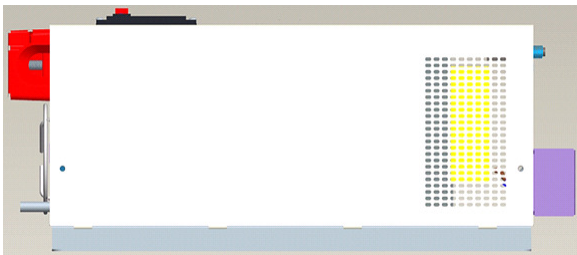


Figure 3 front view
LW1-3KW: 470mm*223mm*185mm

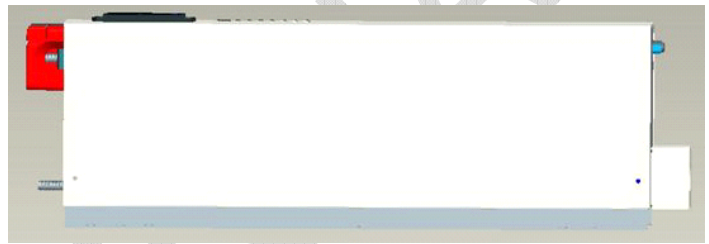


Figure 4 front view
LW4-6KW: 650mm x 223mm x 185mm



Figure 5 DC side

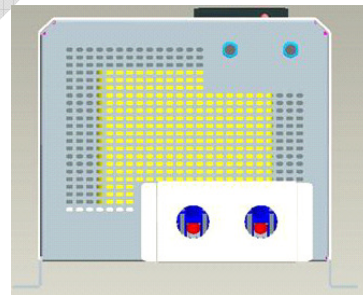


Figure 6 AC side

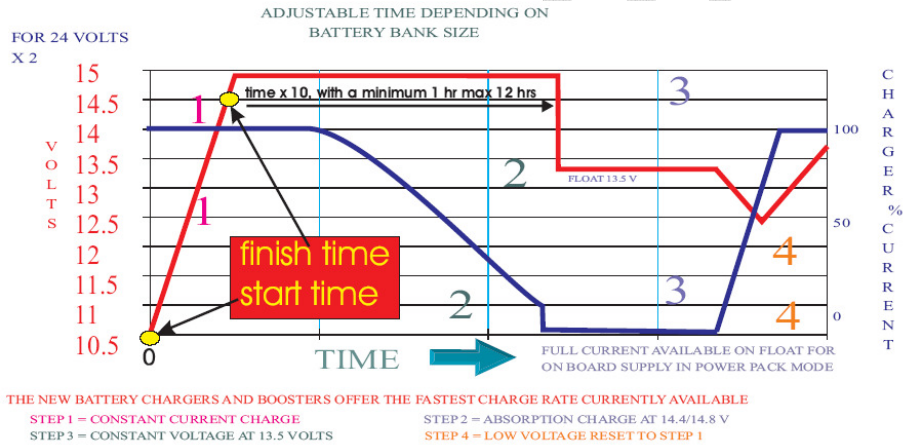
MODEL (LW Series)	LV Model	HV Model
	LW1-6KW LV(120V)	LW1-6KW HV(230V)
Line Mode Specifications:		
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	120Vac	230Vac
Low Line Disconnect	85Vac±4%	184Vac±4%
Low Line Re-connect	95Vac±4%	194Vac ±4%
High Line Disconnect	136Vac±4%	263Vac±4%
High Line Re-connect	126V±4%	253Vac±4%
Max AC Input Voltage	140Vrms	270Vrms
Nominal Input Frequency	50Hz/ 60Hz (Auto detection)	
Low Line Frequency Re-connect	51±0.3Hz for 60Hz; 41±0.3Hz for 50Hz;	
Low Line Frequency Disconnect	50±0.3Hz for 60Hz; 40±0.3Hz for 50Hz;	
High Line Frequency Re-connect	64±0.3Hz for 60Hz; 54±0.3Hz for 50Hz;	
High Line Frequency Disconnect	65±0.3Hz for 60Hz; 55±0.3Hz for 50Hz;	
V/F Limit	<2.9 note: when V/F>2.9, unit will transfer to inverter mode	<5.40 note: when V/F>5.40, unit will transfer to inverter mode
Output Voltage Waveform	As same as Input Waveform	
Over-Load Protection (SMPS load)	Circuit breaker	
Output Short Circuit Protection	Circuit breaker	
Efficiency (Line Mode)	>95%	
Transfer Switch Rating	30A	
Transfer Time (Ac to Dc)	20ms (typical)	
Transfer Time (Dc to Ac)	20ms (typical)	
Pass through without Battery	Yes	
Max Bypass Overload Current	30A	

Invert Mode Specifications:		
MODEL (LW Series)	LV Model	HV Model
	1000W/1500W/2000W 2500W/3000W/4000W	1000W/1500W/2000W/2500W/ 3000W/4000W/5000W/6000W
Output Voltage Waveform	Sine wave	
Rated Output Power (W)	1000W/1500W/2000W 2500/3000W/4000W	1000W/1500W/2000W/2500W/ 3000W/4000W/5000W/6000W
Power Factor	0~1.0	
Nominal Output Voltage (V)	120Vac	230Vac
Minimum Peak Output Voltage at Rated Power (Nominal input)	>140V	>260V
Nominal Output Frequency (Hz)	60Hz ± 0.3Hz	50Hz ± 0.3Hz
Auto tracking Main Frequency (Hz)	Yes (Following Main first connection) 50Hz @48-54Hz 60Hz @58-64Hz	
Output Voltage Regulation	±10% rms	
Nominal Efficiency	>80%	
Over-Load Protection (SMPS load)	super strong overload model (3KW under) 110% < load < 125%, no audible alarm in 14 minutes, beeps 0.5s every 1s in 15th minute, and Fault after 15 minutes. 125% < load < 150%, beeps 0.5s every 1s, and Fault after 60s. Load > 150%, beeps 0.5s every 1s, and Fault after 20s. Standard overload model (3KW Add 3KW more than) 110% < load < 150%, beeps 0.5s every 1s, and Fault after 60s. Load > 150%, beeps 0.5s every 1s, and Fault after 20s.	
Surge rating (10s)	1:3 (VA)	
Capable of starting electric motor	1 HP	1½ HP
Output Short Circuit Protection	Current limit (Fault after 10s)	
Bypass Breaker Size	30A	
Nominal DC Input Voltage	12V / 24V/48V	
Min DC start voltage	10V/20V/40v	

Low Battery Alarm	10.5Vdc \pm 0.3Vdc for 12V battery 21.0Vdc \pm 0.6Vdc for 24V battery 42.0Vdc \pm 1.2Vdc for 48V battery													
Low DC input Shut-down	10.0Vdc \pm 0.3Vdc for 12V battery 20.0Vdc \pm 0.6Vdc for 24V battery 40.0Vdc \pm 1.2Vdc for 48V battery													
High DC input Alarm & Fault	16Vdc \pm 0.3Vdc for 12V battery 32Vdc \pm 0.6Vdc for 24V battery 64Vdc \pm 1.2Vdc for 48V battery													
High DC input Recovery	15.5Vdc \pm 0.3Vdc for 12V battery 31.0Vdc \pm 0.6Vdc for 24V battery 62.0Vdc \pm 1.2Vdc for 48V battery													
Power saver	Load \leq 25W (Enabled on "P/S auto" setting of Remote control)													
Charge Mode Specifications:														
MODEL (LW Series)	LV Model						HV Model							
	1.0 kw	1.5 kW	2.0 kW	2.5 kW	3.0 kW	4.0 kW	1.0 kw	1.5 kw	2.0 kw	2.5 kw	3.0 kw	4.0 kw	5.0 kw	6.0 kw
Nominal Input Voltage	120Vac						230Vac							
Input Voltage Range	95 ~ 132 Vac						194~253Vac							
Nominal Output Voltage	According to the battery type													
Nominal Charge Current	12V50A 24V30A 48V15A	12V70A 24V35A 48V20A	12V90A 24V50A 48V35A	12V50A 24V30A 48V15A	12V70A 24V35A 48V20A	12V90A 24V70A 48V35A	24V70A 48V40A							
Charge Current Regulation	\pm 5A _{dc}													
Battery initial voltage	10-16Vdc for 12V; 20-32Vdc for 24V; 40-62Vdc for 48V													
Charger Short Circuit Protection	Circuit breaker													
Breaker Size	30A													
Over Charge Protection	Bat. V \geq 16Vdc / 32Vdc / 62Vdc, beeps 0.5s every 1s & fault after 60s													
Charge Algorithm														
Algorithm	Three stage: Boost CC (constant current stage) \rightarrow Boost CV (constant voltage stage) \rightarrow Float (constant voltage stage)													

Charge Stage
Transition
Definitions

- ◆ **Boost CC Stage:** If A/C input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- ◆ Software timer will measure the time from A/C start until the battery charger reaches 0.3V below the boost voltage, then take this time as T_0 and $T_0 \times 10 = T_1$.
- ◆ **Boost CV Stage:** Start a T_1 timer; the charger will keep the boost voltage in Boost CV mode until the T_1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
- ◆ **Float Stage:** In float mode, the voltage will stay at the float voltage.
- ◆ If the A/C is reconnected or the battery voltage drops below 12Vdc/24Vdc, the charger will reset the cycle above.
- ◆ If the charge maintains the float state for 10 days, the charger will reset the cycle.



Battery Type Setting

BATTERY TYPE SELECTOR

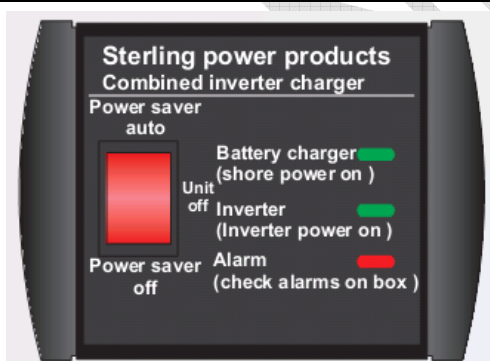
Switch setting	Description	Boost			Float		
		Voltage			Voltage		
		12V	24V	48V	12V	24V	48V
0	To be used by factory for set up	-	-		-	-	
1	Gel USA	14.0	28.0	28	13.7	27.4	54.8
2	AGM 1	14.1	28.2	56.4	13.4	26.8	53.6
3	AGM 2	14.6	29.2	58.4	13.7	27.4	54.8
4	Sealed lead acid	14.4	28.8	57.6	13.6	27.2	54.4
5	Gel EURO	14.4	28.8	57.6	13.8	27.6	55.2
6	Open lead acid	14.8	29.6	59.2	13.3	26.6	53.2
7	Calcium	15.1	30.2	60.4	13.6	27.2	54.4
8	De sulphation	15.5	31.0	62	4 hours then off		
9	Not used	-	-		-	-	

Other:
Indicator

- SHORE POWER ON
- INVERTER ON
- FAST CHARGE
- FLOAT CHARGE
- OVER TEMP TRIP
- OVER LOAD TRIP
- POWER SAVER ON

SHORE POWER ON	GREEN LED lighting on AC Mode
INVERTER ON	GREEN LED lighting on Inverter Mode
FAST CHARGE	Yellow LED lighting on Fast Charging Mode
FLOAT CHARGE	GREEN LED lighting on Float Charging Mode
OVER TEMP TRIP	RED LED lighting on Over Temperature
OVER LOAD TRIP	RED LED lighting on Over Load
POWER SAVER ON	GREEN LED lighting on Power Saver Mode (power saver load \leq 25W)

Remark: Detail indicator setting refers Appendix 1.

Remote Control


LED	Battery Charger (Shore power on)	GREEN LED Lighting on Battery Charger Mode
	Inverter (Inverter power on)	GREEN LED lighting on Inverter Mode
	Alarm (Check alarms on box)	RED LED lighting on Alarm

Switch	Power saver auto	Power on with saver mode (power saver \leq 25W)
	Unit Off	Power totally off
	Power saver off	Power on without saver mode

Remark: Detail Remote control solution refers Appendix 2.

Audible Alarm

Battery Voltage Low	Inverter green LED Lighting, and the buzzer beep 0.5s every 5s.
Battery Voltage High	Inverter green LED Lighting, and the buzzer beep 0.5s every 1s, and Fault after 60s.
Invert Mode Over-Load	110% < load < 125%, no audible alarm in 14 minutes, beeps 0.5s every 1s in 15th minute, and Fault after 15 minutes. 125% < load < 150%, beeps 0.5s every 1s, and Fault after 60s. Load > 150%, beeps 0.5s every 1s, and Fault after 20s.
Over Temperature	Heat sink temp. \geq 95°C, Over temp red LED Lighting, beeps 0.5s every 1s;

Remark: Detail Alarm setting refers Appendix 1.

Protection

Over temperature protection	Heat sink temp. \geq 95°C, Fault (shutdown Output) after 3 seconds
Back-FEED Protection	Yes
Fault recovery	By restart the machine

FAN Operation

Fan Operation	Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temperatures in an operating ambient temperature up to 50°C.			
	<ul style="list-style-type: none"> • Speed to be controlled in a smooth manner as a function of internal temperature and/or current. • Fan only running after heat sink reach 65°C. • Fan should not start/stop suddenly. • Fan should run at minimum speed needed to cool unit. • Fan noise level target <60db. 			
	The fan logic as below(select the maximum of three speed after heat sink temp reach above 65°C,otherwise keep off):			
	Condition	Enter condition	Leave condition	Speed
	HEAT SINK TEMPERATURE (±10°C)	$T \leq 50^{\circ}\text{C}$	$T > 65^{\circ}\text{C}$	OFF
$65^{\circ}\text{C} \leq T < 85^{\circ}\text{C}$		$T \leq 50^{\circ}\text{C}$ or $T \geq 85^{\circ}\text{C}$	50%	
$T > 85^{\circ}\text{C}$		$T \leq 70^{\circ}\text{C}$	100%	
Charge Current (±10%)	$I \leq 15\%$	$I \geq 20\%$	OFF	
	$20\% < I \leq 50\% \text{Max}$	$I \leq 15\%$ or $I \geq 50\% \text{Max}$	50%	
	$I > 50\% \text{Max}$	$I \leq 40\% \text{Max}$	100%	
Load% (Invert mode ±10%)	Load < 30%	Load \geq 30%	OFF	
	$30\% \leq \text{Load} < 50\%$	Load \leq 20% or Load \geq 50%	50%	
	Load \geq 50%	Load \leq 40%	100%	
General Specifications				
MODEL (LW series)	LV Model 1000-4000W	HV Model 1000-6000W		
Safety Certification	Compliance with UL458	Compliance with UL458		
EMC Classification	FCC, CLASS A	FCC, CLASS A		
Operating Temperature Range	0°C to 40°C			
Storage temperature	-15°C ~ 60°C			
Operation humidity	5% to 95%			
Earthing(ABYC standard)	Follow customer requirement: Inverter mode: the neutral and the earth joined ; Line mode: the neutral and the earth separated. Use a 30A Relay to realize the function.			
Audible Noise	60dB max			
Cooling	Forced air, variable speed fan			
Size	LW1-3KW: 470mm*223mm*185mm LW4-6KW: 650mm x 223mm x 185mm			

Appendix:

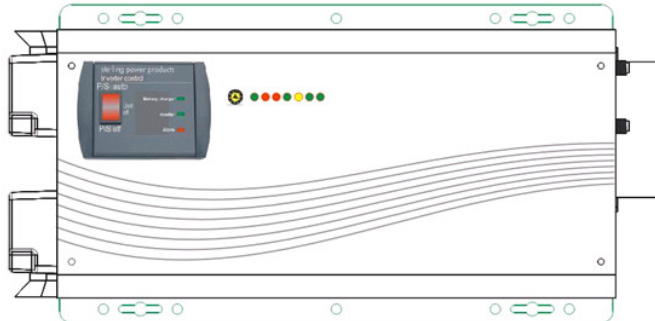
1. Indicator and Buzzer setting.

Status	Item	Indicator on top cover							LED on Remote control			Buzzer
		SHORE POWER ON	INVERTER ON	FAST CHARGE	FLOAT CHARGE	OVER TEMP TRIP	OVER LOAD TRIP	POWER SAVER ON	BATTERY CHARGER	INVERTER	Alarm	
Line Mode	CC	√	×	√	×	×	×	×	√	×	×	×
	CV	√	×	√, blink	×	×	×	×	√	×	×	×
	Float	√	×	×	√	×	×	×	√	×	×	×
	Standby	√	×	×	×	×	×	×	×	×	×	×
Invert Mode	Inverter on	×	√	×	×	×	×	×	×	√	×	×
	Power saver	×	×	×	×	×	×	√	×	×	×	×
Alarm Mode	Battery Low	×	√	×	×	×	×	×	×	√	√	beep 0.5s every 5s
	Battery High	×	√	×	×	×	×	×	×	√	√	beep 0.5s every 1s
	Overload on invert mode	×	√	×	×	×	√	×	×	√	√	Refer to “Audible alarm”
	OverTemp on invert mode	×	√	×	×	√	×	×	×	√	√	Beep 0.5s every 1s
	OverTemp on line mode	√	×	√	×	√	×	×	√	×	√	beep 0.5s every 1s
	Over charge	√	×	√	×	×	×	×	√	×	√	beep 0.5s every 1s
Fault Mode	Fan lock	×	×	×	×	×	×	×	×	×	×	beep continuous
	Battery High	×	√	×	×	×	×	×	×	√	×	beep continuous
	Inverter mode overload	×	×	×	×	×	√	×	×	×	×	beep continuous
	OverTemp	×	×	×	×	√	×	×	×	×	×	beep continuous
	Over charge	×	×	√	×	×	×	×	√	×	×	beep continuous
	Back Feed Short	×	×	×	×	×	×	×	×	×	×	beep continuous

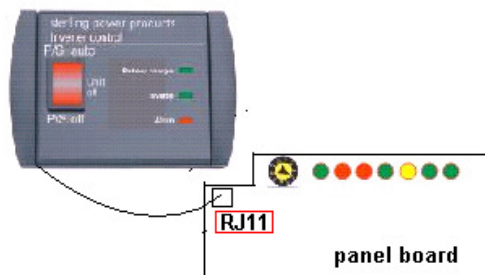
mark: √ shows the indicator on. × shows the indicator off. √, blink shows the indicator blinking about 0.5s on and 0.5s off.

2. Remote control solution:

1). Figure of the Chassis (when the remote panel located in top cover):



2). Connect to the RJ11 that in the panel board by a short cable when the Remote control located in the chassis.



3). When you remove the control panel, use a Blank panel to cover the hole and a long cable through the RJ11 connect to the chassis.

