1.0 Reference and Address			
Report Number	160114055GZU-001	Original Issued: 16-Jul-2016	Revised: 10-Apr-2017
Standard(s)	UL SUBJECT 9540 Issued: 2014/06/30 Ed: 1 Outline Of Investigation Energy Storage Systems And Equipment UL 1741:2010 Ed.2 +R:07 Sep 2016 Inverters, Converters, Controllers And Interconnection System Equipment For Use With Distributed Energy Resources CSA C22.2#107.1:2016 Ed.4 Power Conversion Equipment		

Applicant	Shenzhen Sinexcel Electric Co., Ltd	Manufacturer	**Shenzhen Sinexcel Electric Co., Ltd**
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2.0 Product Description	
Product	Single-stage Storing Device（Grid supprot utility interactive inverter)
Brand name	Sinexcel
Description	The unit under test are an Single-stage Storing Device. It can invert the power from energy storing device such as batteries to grid, also can changering energy storing device from grid. The Single-stage Storing Device in this report are composed of 1 or multiple set(s) of PCS-AC modules. The modules identify master-slave systems through the dial-up codes on the panel. #1 is a master system, while other modules track the master system. The energy storing device cabinet is equipped with lightning protector, AC/DC breaker and distribution units. If on/off-grid switching is to be achieved, extra power distribution unit needs to be added. The topological graph for its composition and structure refer to Section 7 Illustration 2. The installation should be in pollution II environment and accordance with the National Electrical Code, NFPA 70 and and the Canadian Electrical Code (CEC).
Models	PWS1-150K-NA, PWS1-100K-NA, PWS1-50K-NA, PWS1-250K-NA
Model Similarity	All models have identical mechanical and electrical construction except composed of different sets of PCS-AC modules : For PWS1-150K-NA is composed of 3 sets of PCS-AC modules For PWS1-100K-NA is composed of 2 sets of PCS-AC modules For PWS1-50K-NA is composed of 1 set of PCS-AC modules For PWS1-250K-NA is composed of 5 set of PCS-AC modules PWS1-250K-NA is equipped with two cooling fans.

2.0 Product Description

Ratings	Model	PWS1-150K-NA	PWS1-100K-NA	PWS1-50K-NA
	Operating temp.	-20℃ to+50℃（>45℃ power derating)		
	Protective Class	Class I		
	Type of enclosure	Type 1		
	Charger Mode			
	AC input voltage	480Vac(423Vac- 528Vac)		
	AC input current	180A(198A max)	120A(132A max)	60A(66A max)
	AC input power	150kW(165kW max)	100kW(110kW max)	50kW(55kW max)
	AC frequency	60Hz(59.5Hz-60.5Hz)		
	Battery charge voltage	650Vdc(500Vdc-850Vdc）		
	Battery charge current	231A(300A max)	154A(200A max)	77A(100A max)
	Utility Interactive Mode			
	Battery discharge voltage	650Vdc(500Vdc-850Vdc)		
	Battery discharge current	231A(300A max)	154A(200A max)	77A(100A max)
	AC output voltage	480Vac(423Vac- 528Vac)		
	AC output current	180A(198A max)	120A(132A max)	60A(66A max)
	AC output power	150kW(165kW max)	100kW(110kW max)	50kW(55kW max)
	AC frequency	60Hz(59.5Hz-60.5Hz)		
	AC output PF	0.8leading to 0.8lagging		
	Stand-alone Mode			
	Battery discharge voltage	650Vdc(500Vdc-850Vdc）		
	Battery discharge current	231A(300A max)	154A(200A max)	77A(100A max)
	AC output voltage	480Vac		
	AC output current	180A(198A max)	120A(132A max)	60A(66A max)
	AC output power	150kW(165kW max)	100kW(110kW max)	50kW(55kW max)
	AC frequency	60Hz		
	AC output PF	0.8leading to 0.8lagging		
	Model	PWS1-250K-NA		
	Operating temp.	-20℃ to+50℃（>45℃ power derating)		
	Protective Class	Class I		
	Type of enclosure	Type 1		

2.0 Product Description		
	Charger Mode	
	AC input voltage	480Vac(423Vac- 528Vac)
	AC input current	300A(330A max)
	AC input power	250kW(275kW max)
	AC frequency	60Hz(59.5Hz-60.5Hz)
	Battery charge voltage	650Vdc(500Vdc-850Vdc)
	Battery charge current	385A(500Amax)
	Utility Interactive Mode	
	Battery discharge voltage	650Vdc(500Vdc-850Vdc)
	Battery discharge current	385A(500Amax)
	AC output voltage	480Vac(423Vac- 528Vac)
	AC output current	300A(330A max)
	AC output power	250KW(275KW max)
	AC frequency	60Hz(59.5Hz-60.5Hz)
	AC output PF	0.8leading to 0.8lagging
	Stand-alone Mode	
	Battery discharge voltage	650Vdc(500Vdc-850Vdc)
	Battery discharge current	385A(500Amax)
	AC output voltage	480Vac
	AC output current	300A(330A max)
	AC output power	250KW(275KW max)
	AC frequency	60Hz
	AC output PF	0.8leading to 0.8lagging
	Software Version	AC module DSP:1320, CPLD:130, U2 DSP:1420

2.0 Product Description

These units have many built-in grid support fuctions and complied correspond to the CPUC ELECTRIC RULE NO. 21 and HECO Rule 14:2016, and that have been verified through the standard UL 1741 Supplement A; these functions can be setting or parameter modifications, activation and deactivation of various Advanced Inverter functions in units display screen or Remote Configurability, the setting and accuracy as following :

Low and High Voltage Ride-Through (L/HVRT) :

Operating Region	Voltage at Point of Interconnection (% Nominal Voltage)	Ride-Through Until (Seconds)	Maximum Trip Time (Seconds)	Return To Service after trip (% Nominal Voltage)	Time Delay (Seconds)
Over-Voltage 2	V≧120 (CPUC) V>120 (HECO)	Trip	0.16	110≧V≧88	300~600 adjustable
Over-Voltage 1	120>V>110 (CPUC) 120≧V>110 (HECO)	0.92~12 adjustable	1~13 adjustable	110≧V≧88	300~600 adjustable
Normal Operation High	110≧V≧100	Continuous Operation	Continuous Operation	Continuous Operation	Continuous Operation
Normal Operation Low	100>V≧88	Continuous Operation	Continuous Operation	Continuous Operation	Continuous Operation
Under-Voltage 1	88>V≧70	20	21	110≧V≧88	300~600 adjustable
Under-Voltage 2	70>V≧50	10~20 adjustable	11~21 adjustable	110≧V≧88	300~600 adjustable
Under-Voltage 3	50>V	0~1 adjustable	0.5~1.5 adjustable	110≧V≧88	300~600 adjustable

Low and High Frequency Ride-Through (L/HFRT):

Operating Region	Minimum Range of Adjustability (Hz)	Ride-Through Until (Seconds)	Maximum Trip Time (Seconds)
Over-Frequency 2	> Over-Frequency 1	Trip	0.16
Over-Frequency 1	60.1~65	20~299 adjustable	21~300 adjustable
Normal Operation High	60~ Over-Frequency 1	Continuous Operation	Continuous Operation
Normal Operation Low	Under-Frequency 1~60	Continuous Operation	Continuous Operation
Under-Frequency 1	50~59.9	20~299 adjustable	21~300 adjustable

Other Ratings

Normal Ramp Rate and Soft-Start Ramp Rate (RR，SS):
PR:The default value is 100% of maximum current output per second with a range of adjustment between 1% to 100%.
SS:Current output per second with a range of adjustment between 0.1% to 100%.
Specified Power Factor (SPF) :
Adjustable range (0.80 Lagging to 0.80 Leading) down to 20% rated power.
Volt/VAr Mode (Q(V)):
The inverter supplies or absorbs reactive power as a function of voltage known as a Q(V) function or Volt-VAr mode.
V1（80%~100% of rated output voltage，adjustable）
V2（90%~100% of rated output voltage，adjustable）
V3（100%~110% of rated output voltage，adjustable）
V4（100%~120% of rated output voltage，adjustable）
Q1（0~60% of rated output apparent power，leading，adjustable）
Q2（0）
Q3（0）
Q4（0~60% of rated output apparent power，lagging，adjustable）

2.0 Product Description

Frequency-Watt (FW):

Parameter	Default Setting	Minimum Range of Adjustability
Start Frequency (Hz)	60.5	60.1 to 65.0
Reduction Gradient ($\%P_M/\%Hz$)	0	0 to -100

Volt-Watt (VW:

Parameter	Default Setting	Minimum Range of Adjustability
Start Voltage (% of nominal)	106	105 to 120
Reduction Gradient ($\%P_{nom}/\%V$)	0	0 to -100

Accuracy:

Voltage:+-1%, Frequency:+-0.2Hz, Time: +-100ms
Ramp rate:10%
PF:+-2%
Attive power:5%
inaattive power:8%