

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>[Signature]</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Test Package History

Created By	Reviewed By	Original Version	Original Date	Revision
Xingxin Tian		1.0	2022.07.02	

Note/注: Definition of Power Sign Convention/功率方向定义:

- Grid port: Positive values of power indicate current flow towards the grid/流向电网为正
- EUT Output port: Positive values of power indicate current flow towards AC side/DC流向AC为正
- Generation port: Positive values of power indicate current flow towards AC side/发电为正
- PV port: Positive values of power indicate generation/发电为正
- ESS port: Positive values of power indicate discharging/放电为正
- Load port: Positive values of power indicate current flow towards load/流向负载为正

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Model No:	60K-3P-480V, [REDACTED]	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

General description of the products	<p>The PCEs 60K-3P-480V, [REDACTED] under test (EUT) are Grid Support Utility Interactive Hybrid Inverters which utilize the advanced power electronics conversion components such as MOSFET, IGBT, IPM to convert the variable DC power generated from the photovoltaic (PV) arrays and batteries to the stable utility AC power which can be fed into the commercial electrical grid.</p> <p>The PCEs under test are three phase grid-connected bi-directional inverters, direct current from PV arrays and alternating current from AC grid also can be converted for charging the batteries.</p>
Model and/or type reference..... :	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V
Certification mark to be applied.....:	cTUVus
Manufacturer (name and address).....:	Portable Solar LLC (dba Sol-Ark) 1100 Professional Dr, Plano, Texas, 75074, United States of America
Factory (name and address).....:	[REDACTED]
Battery DC Port.....:	See model list
Solar DC Port	See model list
Electrical Data (AC)	See model list
AC continuous current	See model list
Voltage and Frequency Accuracy.....:	See model list
Installation mode..... :	Wall mounted
Rated ambient temperature range ... :	-40°C to +60°C (>45°C derating)
Enclosure index / type	TYPE 3R
Mass of equipment (lbs/kg)	80
Overall size (W x H x D)..... :	527mm*894mm*294mm
Firmware Version..... :	1020
Unit Serial Number..... :	NA
Date(s) of performance of tests	2022.12.14-2023.04.20
Place(s) of performance of tests	TÜV Rheinland (Shanghai) Co., Ltd. No.177, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China

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Test Item Summary:

Clause	Description	Applicable	Remarks / Comments
UL 1741 CRD	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems (PCS)		
203.5	<i>Step Change in Load Test</i>	Y	Tested on 60K-3P-480V
203.6	<i>Step Change in Generation Test</i>	Y	Tested on 60K-3P-480V
204	<i>Optional Tests</i>	Y	Tested on 60K-3P-480V
205	<i>Abnormal Tests</i>	Y	See UL 1741 report.
NOTE:			

Test Result Summary: See page 27 in this test package.

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201 General Requirements

201.5 Scope of EUT - The EUT referenced in all tests may consist of:

- A single integrated device which includes all of the PCS functionality in a single device; or
- A system with multiple devices operating together; or
- A separate PCS controller intended for use with external devices.

In following tests, the EUT is hybrid inverter with integrated PCS functionality intended for use with external current sensors.

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202 EUT Construction and Configuration

202.4 Where specific devices are required for proper functionality of the PCS, those devices (e.g. external current sensors) shall be specified in the manufacturer's instructions. Other examples of devices required for proper functionality include power converters or inverters, PCS controllers, and controllable AC or DC loads. When specified by the manufacturer, the PCS may optionally be evaluated with a larger number of devices.

In following tests, the EUT is tested with external current sensor of model CTSA035-300A/150mA

202.10 During all tests, power and current levels, including associated tolerances, are specified as a percentage or the EUT nameplate ratings. Where multiple EUT sources are present the power and current levels shall be calculated using the sum of the nameplate ratings of the individual applicable devices.

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203 Normal Operating Tests

203.1 Normal Operating Tests record and characterize the performance of the PCS during normal operation. These tests monitor currents flowing in PCS controlled conductors in response to step changes in load with generation held constant and in response to step changes in generation with load held constant.

203.2 For testing any required overcurrent devices shall be installed as required in the PCS instructions for the end application. During all tests in Section 203 the EUT shall not result in the opening of any overcurrent protective device. Ratings of overcurrent protective devices used during the testing shall be as specified in the manufacturer's instructions.

203.3 No specific pass / fail criteria currently exist for the temporal response of the PCS. Until standardized temporal requirements are developed, the maximum open loop response shall be less than or equal to 30 seconds. Faster PCS response times are allowed and may be required to meet specific utility requirements.

203.4 The Normal Operation Tests shall use the test setup shown in Figure 203.1 for AC coupled systems or Figure 203.2 for DC coupled systems. For hybrid systems which are capable of combined AC and DC coupled systems the EUT shall be evaluated both as an AC coupled system and as a DC coupled system.

In following tests, DC coupled system used.

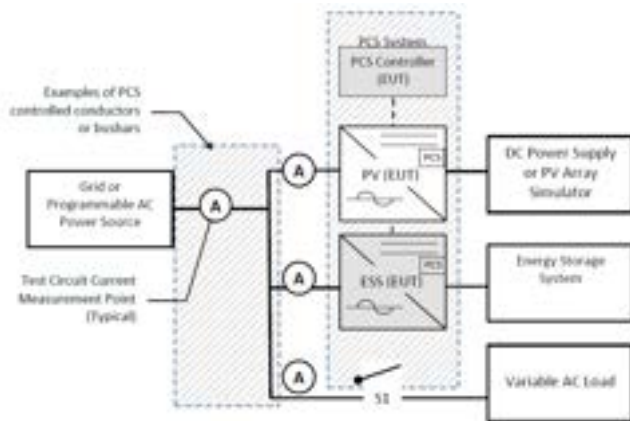


Figure 203.1 – Test Circuit AC Coupled System

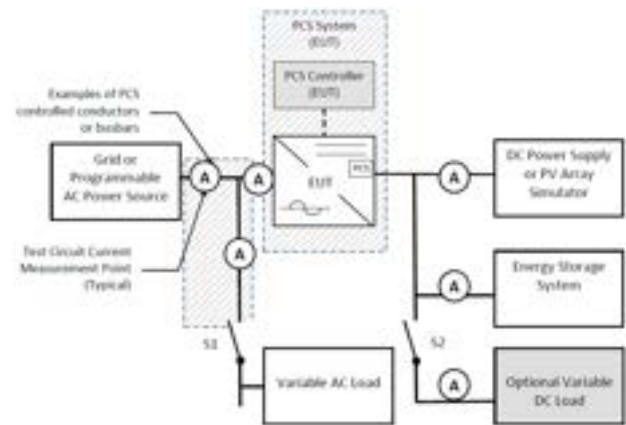


Figure 203.2 – Test Circuit Setup DC Coupled System

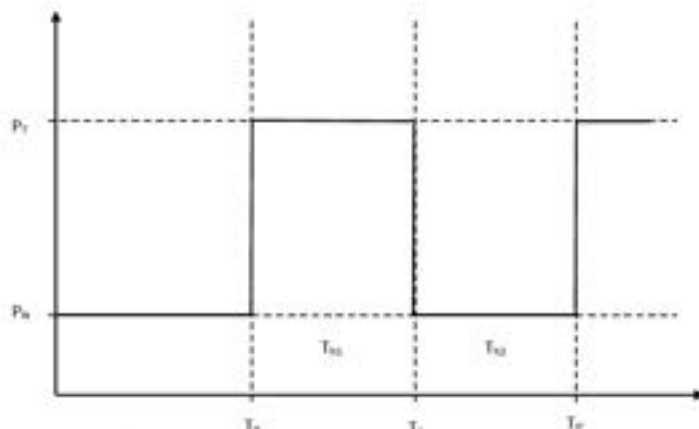


Figure 203.3 – Step Change Test Signal (step function)

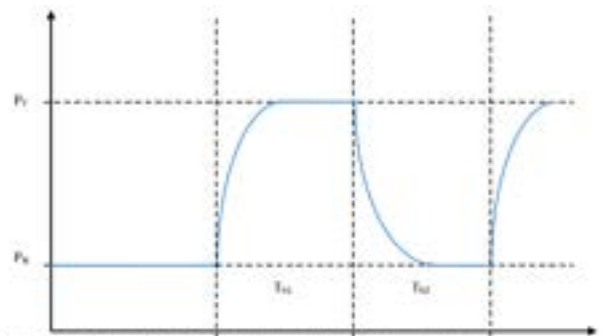


Figure 203.4 - Example EUT response (current) at the measurement point

Where:
Pn = Nominal Condition
Pt = Test Condition

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203. 5 Step Change in Load Test

Testing date: See page 2.

203.5.1 This procedure uses the step change test signal (step function) defined in Figure 203.3. These tests shall be performed at the terminals of the EUT and/or at an external reference point where the current is controlled. Signal injection test methods may be used for evaluation of Supplemental PCS but shall not be permitted for evaluation of Branch Circuit PCS.

203.5.2 The step change in test loads records the behavior of the PCS to variations in parallel connected loads when operating at constant generation levels. The test may be performed at any convenient voltage and frequency within the continuous operating region. The EUT(s) shall be connected in accordance with the relevant test circuit in Figure 203.1 or 203.2, and in accordance with the manufacturer's instructions.

Test Method:

- a) Set the EUT operating parameters to nominal.
- b) Record the state and settings of any grid support functions of the EUT(s)
- c) Set EUT output current level to rated current, **100% +/- 5%**
- d) Close Switch S1 and adjust the variable load to draw EUT power output at **100% +/- 2%**. Record the value of the current flowing to the grid or programmable ac power supply
- e) Open Switch S1 and wait for the grid current to reach a new steady state value at EUT rated current. Record the currents flowing in all test circuit current sensors.
- f) Close Switch S1 and wait for the grid current to reach a new steady state value at EUT rated current. Record the currents flowing in all test circuit current sensors. Repeat steps e) and f) two times for **a total of three samples**. The timing of the step transitions used in steps e) and f), shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors.
- g) Repeat steps d) through f) with **load** tuned to **66% +/- 5%** and **33% +/- 5%** of EUT output current.
- h) Repeat steps d) through g) with the **EUT output limit** set to:
 - i. **50% +/- 5%** and **0% + 5%/-0%** of nameplate current rating, and;
 - ii. Optionally, at the maximum negative range of current supported by the system¹.
- i) For three phase units repeat steps c) through h) opening switch S1 on **only one phase** and again **with two phases simultaneously**.
- j) For single phase units connected line to line, repeat steps c) through h) opening switch S1 on only one line.

¹ Apparent current may be limited to negative values if the system is to be evaluated for capability to maintain a load bias rather than a zero-current setting.

Criteria:

No specific pass / fail criteria currently exist for the temporal response of the PCS. Until standardized temporal requirements are developed, the maximum open loop response shall be less than or equal to 30 seconds. Faster PCS response times are allowed and may be required to meet specific utility requirements.

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Results:

Open loop response time (s)	
Maximum	0.2
Average	0.1

(1) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																		
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
1	100%	100%	d	276.8	71.8	59528.0	276.4	71.7	59445.9	277.1	3.2	88.9	600.2	105.5	63310.8	--		
			e	277.3	71.7	56565.6	277.2	0.9	3.2	277.9	71.7	59705.7	600.2	105.5	63326.3	0.1		
			f	276.4	71.9	59535.2	276.4	71.7	59481.3	277.1	3.2	63.2	600.2	105.5	63304.4	0.1		
			e	277.3	71.6	59520.7	277.3	0.9	3.2	277.9	71.6	59661.3	600.2	105.4	63289.0	0.1		
			f	276.4	71.8	59500.5	276.4	71.7	59470.3	277.1	3.2	40.5	600.2	105.5	63297.2	0.2		
			e	277.3	71.6	59521.9	277.3	0.9	3.2	277.9	71.6	59659.3	600.2	105.5	63301.0	0.1		
2		100%	66%	f	276.4	71.9	59530.5	276.4	71.7	59477.1	277.1	3.2	61.9	600.2	105.5	63325.6	0.2	
				d	276.8	71.8	59559.5	276.8	47.5	39472.0	277.5	24.4	20146.7	600.3	105.6	63362.9	--	
				e	277.4	71.6	59549.1	277.4	0.9	3.4	278.0	71.6	59686.7	600.3	105.5	63345.1	0.2	
				f	276.8	71.8	59573.6	276.8	47.2	39219.4	277.5	24.8	20414.8	600.3	105.6	63369.3	0.1	
				e	277.4	71.7	59565.4	277.4	0.9	3.3	278.0	71.7	59705.5	600.3	105.6	63376.2	0.1	
				f	276.8	71.8	59541.7	276.8	47.2	39219.7	277.5	24.7	20380.2	600.2	105.5	63331.4	0.1	
3	100%		33% ⁽¹⁾	e	277.4	71.6	59530.0	277.3	0.9	3.1	278.0	71.6	59670.0	600.3	105.4	63290.6	0.2	
				f	276.8	71.8	59566.5	276.8	47.3	39242.3	277.5	24.7	20382.3	600.3	105.5	63351.6	0.2	
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
4	50%	100%	d	275.9	36.0	29794.1	275.9	72.6	60058.2	276.5	36.6	-30336.6	600.2	52.1	31289.4	--
			e	276.8	35.9	29806.5	276.7	0.9	3.7	277.4	35.9	29873.4	600.2	52.1	31283.9	0.2
			f	275.9	36.0	29769.5	275.9	71.8	59400.1	276.6	35.8	-29702.8	600.2	52.1	31240.8	0.1
			e	276.8	35.9	29777.2	276.7	0.9	3.4	277.4	35.9	29844.6	600.1	52.0	31219.7	0.2
			f	275.9	36.0	29790.0	275.9	71.8	59430.3	276.6	35.8	-29711.7	600.2	52.1	31268.6	0.1
			e	276.8	35.9	29794.6	276.8	0.9	3.9	277.4	35.9	29860.6	600.2	52.1	31274.9	0.1
5		66%	d	275.9	36.0	29802.7	275.9	71.9	59474.5	276.6	35.9	-2941.7	600.2	52.1	31288.4	0.1
			d	276.1	36.0	29760.5	276.1	47.6	39456.5	276.8	11.8	-9722.7	600.2	52.1	31243.2	--
			e	276.7	35.9	29766.5	276.7	0.9	3.2	277.4	35.9	29834.5	600.2	52.1	31249.4	0.2
			f	276.1	36.0	29756.0	276.1	47.3	39199.3	276.8	11.5	-9468.6	600.2	52.1	31253.4	0.2
			e	276.7	35.9	29764.9	276.7	0.9	3.7	277.4	35.9	29832.3	600.2	52.1	31265.2	0.1
			f	276.1	36.0	29776.0	276.1	47.4	39215.1	276.8	11.5	-9464.5	600.2	52.1	31295.0	0.1
6	33% ⁽¹⁾	e	276.7	35.9	29777.9	276.7	1.1	3.5	277.4	35.9	29844.7	600.2	52.1	31296.5	0.2	
		f	276.1	36.0	29759.0	276.1	47.4	39221.4	276.8	11.5	-9485.9	600.2	52.1	31267.8	0.1	
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	0%	100%	d	275.4	0.5	121.8	275.4	72.8	60129.5	276.1	72.6	-60144.6	600.1	0	53.1	--
			e	276.4	0.5	116.0	276.3	1.0	3.6	277.0	0.6	110.1	600.0	0	52.5	0.2
			f	275.4	0.5	121.0	275.4	71.9	59431.8	276.1	71.8	-59445.6	600.0	0	44.2	0.2
			e	276.3	0.5	115.7	276.3	1.0	3.6	277.0	0.6	109.8	600.1	0	41.6	0.1
			f	275.4	0.5	122.1	275.4	71.9	59414.9	276.1	71.7	-59427.3	600.1	0	50.0	0.1
			e	276.4	0.5	115.5	277.0	1.0	3.3	277.0	0.6	109.8	600.1	0	50.9	0.1
8	66%	66%	d	275.5	0.5	121.6	275.4	71.9	59419.2	276.1	71.7	-59433.1	600.1	0	57.5	0.2
			d	275.7	0.8	461.6	275.7	47.9	39582.4	276.4	47.3	-39211.8	600.0	0	250.7	--

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203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
9			e	276.3	0.7	437.9	276.3	1.0	3.4	277.0	0.78	432.9	600.0	0	299.1	0.2	
			f	275.7	0.7	393.0	275.7	47.5	39239.5	276.4	47.0	-38936.8	600.1	0	187.6	0.1	
			e	276.3	0.6	360.8	276.3	1.0	3.3	277.0	0.7	355.9	600.1	0	145.0	0.2	
			f	275.7	0.6	325.9	276.4	47.0	39224.7	275.7	47.4	-38989.3	600.1	0	126.3	0.1	
			e	276.3	0.5	244.9	276.3	1.0	3.3	277.0	0.6	239.1	600.1	0	244.9	0.1	
			f	275.7	0.5	145.6	275.7	47.4	39220.8	276.4	47.2	-39165.3	600.1	0	41.6	0.2	
		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	100%	d	276.4	71.9	59582.4	276.4	72.4	60064.4	277.1	3.3	-474.9	600.2	105.6	63378.7	--
			e	276.7	71.8	59526.8	276.7	49.0	40065.2	277.4	25.9	19600.5	600.2	105.5	63327.4	0.2
			f	276.4	71.9	56566.5	276.4	72.8	60326.7	277.1	3.3	-756.6	600.2	105.6	63359.7	0.2
			e	276.7	71.8	59520.2	276.7	49.0	40050.8	277.4	25.9	19608	600.2	105.5	63294.9	0.1
			f	276.4	71.9	59546.5	276.4	72.7	60314.6	277.1	3.4	-764.3	600.2	105.5	63324.8	0.1
			e	276.7	71.8	59531.3	276.7	49.0	40044.3	277.4	25.9	19624.6	600.2	105.5	63297.7	0.1
			f	276.4	71.8	59515.2	276.4	72.7	60309.4	277.1	3.4	-790.5	600.2	105.4	63279.3	0.1
2		66%	d	276.7	71.8	59536.9	276.6	47.5	39383.9	277.3	24.5	20208.6	600.0	105.2	63115.4	--
			e	276.8	71.8	59584.7	276.8	32.4	26408.2	277.5	40.0	33317.1	600.0	105.3	63180.6	0.2

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
3	50%	33% ⁽¹⁾	f	276.6	71.8	59552.5	276.6	47.7	39544.1	277.3	24.3	20066.5	600.1	105.3	63154.8	0.2		
			e	276.8	71.8	59585.0	276.8	32.3	26388.7	277.5	40.1	33338.3	600.1	105.3	63190.1	0.1		
			f	276.7	71.9	59582.3	276.6	47.7	39550.5	277.3	24.4	20087.4	600.1	105.3	63192.3	0.1		
			e	276.8	71.9	59616.6	276.8	32.3	26385.3	277.5	40.1	33373.9	600.1	105.4	63232.6	0.2		
			f	276.7	71.8	59547.0	276.6	47.6	39531.7	277.3	24.4	20070.6	600.1	105.3	63169.1	0.1		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		4	50%	100%	d	276.0	36.0	29798.8	276.0	72.6	60137.1	276.7	36.7	-30409.3	600.3	52.1	31292.9	--
					e	276.3	36.0	29813.1	276.2	49.1	40121.5	276.9	36.6	-10241.7	600.3	52.2	31304.9	0.2
f	276.0				36.1	29827.4	276.0	72.9	60360.5	276.7	36.9	-30605.0	600.3	51.2	31325.8	0.1		
e	276.3				36.1	29839.7	276.3	49.1	40082.2	276.9	36.5	-10175.5	600.3	52.2	31355.5	0.2		
f	276.0				36.1	29833.1	276.0	72.9	60330.8	276.7	36.9	-30568.9	600.3	52.2	31347.8	0.1		
e	276.3				36.0	29830.1	276.3	49.1	40062.4	276.9	36.5	-10165.0	600.2	52.2	31333.1	0.2		
f	276.0				36.1	29819.8	276.0	72.8	60315.0	276.7	36.9	-30566.0	600.2	52.2	31331.5	0.2		
5	66%	d		276.3	36.0	29809.7	276.3	47.7	39489.9	277.0	11.8	-9705.6	600.4	52.1	31265.9	--		
		e		276.5	36.0	29789.1	276.5	32.3	26401.0	276.2	20.0	3256.2	600.4	52.0	31232.1	0.2		
		f		276.3	36.0	29812.4	276.3	47.8	39605.2	277.0	11.9	-9818.4	600.4	52.1	31264.1	0.1		
		e		276.5	36.0	29812.4	276.5	32.5	26387.3	277.2	20.0	3292.3	600.3	52.1	31262.3	0.1		
		f		276.3	36.0	29819.6	276.3	47.8	39600.7	277.0	11.9	-9808.0	600.3	52.1	31286.9	0.1		
		e		276.5	36.0	29830.3	276.5	32.5	26379.3	277.2	20.0	3518.4	600.3	52.2	31310.3	0.2		
6	33% ⁽¹⁾	f		276.3	36.0	29828.5	276.3	47.8	39597.1	277.0	11.9	-9794.8	600.3	52.2	31312.0	0.1		
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	275.4	0.5	289.0	275.4	72.7	60066.7	276.1	72.3	-59914.9	600.1	0	-117.9	--	
			e	275.7	0.7	198.3	275.7	49.1	40051.8	276.4	48.7	-39860.0	600.1	0	-130.4	0.2	
			f	275.4	0.5	128.9	275.4	73.0	60286.5	276.1	72.8	-60294.9	600.1	0	-135.5	0.1	
			e	275.7	0.7	125.9	275.7	49.1	40018.1	276.4	48.7	-39898.5	600.1	0	-140.0	0.2	
			f	275.4	0.5	126.4	275.4	73.0	60276.6	276.1	72.8	-60287.6	600.1	0	-154.6	0.1	
			e	275.7	0.7	126.4	275.7	49.1	40005.9	276.4	48.7	-39886.4	600.1	0	-154.5	0.2	
				f	275.4	0.5	127.1	275.4	73.0	60627.6	276.1	72.8	-60278.4	600.1	0	-157.0	0.1
8		0%	66%	d	275.9	0.7	472.0	275.8	47.9	39607.7	276.5	47.3	-39227.9	600.1	0	176.1	--
				e	276.0	0.8	447.1	276.0	32.6	26464.9	276.7	32.0	-26023.5	600.1	0	147.5	0.2
				f	275.8	0.7	422.2	275.8	48.0	39690.4	276.5	47.4	-39359.6	600.1	0	124.9	0.1
				e	276.0	0.7	390.4	276.0	32.5	26426.7	276.7	32.0	-26041.7	600.1	0	108.3	0.1
				f	275.8	0.6	361.9	275.8	47.9	39662.5	276.5	47.5	-39391.8	600.1	0	88.2	0.2
	e			276.0	0.7	312.5	276.0	32.5	26405.0	276.7	32.0	-26097.7	600.1	0	26.7	0.2	
				f	275.8	0.5	217.3	275.8	47.9	39645.1	276.5	47.6	-39519.3	600.1	0	-9.4	0.1
9	0%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--
		e		--	--	--	--	--	--	--	--	--	--	--	--	--	
				f	--	--	--	--	--	--	--	--	--	--	--		

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(3) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																	
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.4	71.9	59559.0	276.4	72.5	60174.9	277.1	3.3	-612.2	600.2	105.2	63191.7	--	
			e	277.1	71.8	59570.8	277.1	24.7	19612.4	277.8	48.5	40091.4	600.0	105.3	63174.4	0.2	
			f	276.4	71.9	59526.9	276.4	73.4	60840.6	277.1	3.6	-1275.6	600.2	105.3	63181.0	0.1	
			e	277.1	71.8	59583.6	277.1	24.7	19606.1	277.8	48.5	40109.5	600.2	105.3	63170.7	0.1	
			f	276.4	71.9	59598.7	276.4	73.4	60851.3	277.1	3.6	-1250.8	600.3	105.4	63250.7	0.2	
			e	277.1	71.8	59585.3	277.1	24.7	19609.2	277.8	48.5	40110.2	600.2	105.3	63188.9	0.2	
2		100%	66%	f	276.4	71.9	59596.9	276.4	73.4	60840.2	277.1	3.6	-1240.1	600.2	105.4	63235.3	0.1
				d	276.7	71.8	59509.1	276.7	47.9	39769.8	277.4	24.0	19798.3	600.1	105.0	63013.4	--
				e	277.2	71.7	59540.9	277.1	16.7	13110.0	277.8	55.9	46568.3	600.1	105.0	63026.6	0.2
				f	276.7	71.8	59550.8	276.7	47.9	39769.3	277.4	24.1	19840.0	600.1	105.1	63049.6	0.2
				e	277.2	71.7	59559.4	277.1	16.7	13101.0	277.8	55.9	46597.1	600.1	105.1	63041.9	0.1
				f	276.7	71.8	59575.7	276.7	47.9	39767.3	277.4	24.1	19864.7	600.1	105.1	63081.1	0.2
3	100%		33% ⁽¹⁾	e	277.1	71.7	59550.2	277.1	16.7	13097.4	277.8	55.9	46588.7	600.1	105.1	63084.3	0.2
				f	276.7	71.8	59539.4	276.7	47.9	39764.2	277.4	24.1	19830.1	600.1	105.1	63063.2	0.1
				d	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--
4		50%	100%	f	--	--	--	--	--	--	--	--	--	--	--	--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	
				d	275.9	36.0	29782.2	275.9	72.6	60130.6	276.6	36.7	-30419.8	600.3	51.8	31061.7	--
				e	276.7	35.9	29779.2	276.6	24.7	19637.1	277.3	35.8	10205.9	600.3	51.8	31063.2	0.2
				f	276.0	36.0	29796.4	275.9	73.5	60814.5	276.6	37.5	-31093.5	600.3	51.8	31077.3	0.1
				e	276.6	35.9	39773.7	276.6	24.7	19620.0	277.3	35.8	10217.7	600.3	51.7	31048.1	0.1
4	50%		100%	f	276.0	36.0	29774.1	275.9	73.4	60782.6	276.6	37.5	-31082.8	600.3	51.7	31041.4	0.2
				e	276.6	35.9	29778.6	276.6	24.7	19610.3	277.3	35.7	10232.8	600.2	51.7	31045.1	0.1

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
5	0%	66%	f	276.0	36.0	29790.9	276.0	73.4	60777.1	276.6	37.5	-31059.6	600.3	51.7	31050.8	0.1
			d	277.1	36.7	29785.3	276.3	47.5	39390.8	277.0	11.7	-9630.7	600.2	51.7	31014.4	--
			e	276.7	35.9	30995.5	276.7	16.7	13087.7	277.4	27.8	16745.2	600.2	51.7	30995.5	0.2
			f	276.3	36.0	29791.1	276.3	48.0	39753.2	277.0	12.1	-9987.0	600.2	51.7	31023.6	0.1
			e	276.7	35.9	29763.8	276.7	16.7	13083.2	277.4	27.8	16746.4	600.2	51.6	30973.1	0.1
			f	276.3	36.0	29803.1	276.3	48.0	39769.2	276.9	12.1	-9993.2	600.2	51.7	31031.8	0.1
			e	276.7	35.9	29785.4	276.7	16.7	13080.3	277.4	27.8	16767.9	600.2	51.7	31006.4	0.1
6	0%	33% ⁽¹⁾	f	276.3	36.0	29806.5	276.3	48.0	39795.4	277.0	12.2	-10015.4	600.2	51.7	31048.3	0.1
			d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
7	0%	100%	d	275.5	0.6	347.1	275.4	72.9	60214.8	276.1	72.4	-60004.7	600.1	0	-121.7	--
			e	276.2	0.7	2775	276.1	24.7	19716.9	276.8	24.3	-19447.7	600.1	0	-157.3	0.2
			f	275.5	0.5	180.0	275.4	73.6	60807.8	276.1	73.4	-60766.3	600.1	0	-170.6	0.1
			e	276.2	0.6	122.9	276.1	24.7	19674.2	276.8	24.3	-19559.6	600.1	0	-174.4	0.2
			f	275.5	0.5	126.9	275.4	73.5	60765.4	276.1	73.4	-60776.1	600.1	0	-167.4	0.1
			e	276.2	0.6	122.8	276.1	24.7	19649.6	276.9	24.3	-19535.2	600.1	0	-171.0	0.2
			f	275.5	0.5	127.1	275.4	73.5	60739.5	276.1	73.3	-60749.7	600.1	0	-170.2	0.2
8	0%	66%	d	275.8	0.7	429.6	275.8	47.8	39572.8	276.5	47.3	-39234.3	600.0	0	-30.1	--
			e	276.2	0.7	390.7	276.2	16.7	13156.5	276.9	16.3	-12773.4	600.0	0	-69.5	0.2
			f	275.8	0.6	360.2	275.8	48.1	39824.7	276.5	47.7	-39556.3	600.0	0	-92.6	0.2
			e	276.2	0.6	307.7	276.2	16.7	13125.1	276.9	16.3	-12824.2	600.0	0	-118.0	0.1
			f	275.8	0.5	211.0	275.8	48.1	39793.1	276.5	47.8	-39673.9	600.0	0	-161.4	0.1
			e	276.2	0.5	126.3	276.2	16.6	13105.1	276.9	16.3	-12986.8	600.0	0	-171.9	0.2
			f	275.8	0.4	123.6	276.5	48.1	39791.6	276.5	47.9	-39759.4	600.0	0	-174.5	0.1

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	<i>UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)</i>		

203.6 Step Change in Generation Test

Testing date: See page 2.

203.6.1 This procedure uses the step change test signal (step function) defined in Figure 203.3. These tests shall be performed at the terminals of the EUT or an external reference point where the current is controlled. Signal injection test methods may be used.

203.6.2 The step change in generation test records the behavior of the PCS to variations in generation levels when connected in parallel with constant loads. For a PCS which includes an ESS device the step change in generation tests do not apply to the ESS source. The step change in generation test shall be applied only for variable input power sources, e.g. PV or Wind.

203.6.3 The test may be performed at any convenient near nominal voltage and frequency within the continuous operating region. Connect the EUT(s) in accordance with the relevant test circuit in Figure 203.1 or 203.2 and following the manufacturers supplied instructions

Test Method:

- a) Set or verify that the EUT operating parameters are set to nominal.
- b) Record the state and settings of any grid support functions of the EUT(s)
- c) Set **EUT output** current level to rated current, **100% +/- 5%**
- d) Close Switch S1 and tune the variable **load** to **33% +/- 2%** of EUT nameplate active current output rating. Record the apparent currents flowing in all test circuit current sensors.
- e) Reduce the current of the DC source to a level which results in an EUT active output current **between 5% and 10%** of EUT's nameplate current rating. Record the currents flowing in all test circuit current sensors.
- f) Increase the DC source to **full** power and record the value of the current flowing to the grid or programmable ac power supply.
- g) Repeat steps e) and f) two times for a total of **three** samples.
- h) Repeat steps e) through g) with the reduced value of the dc source set to a level which results in an EUT active output current **between 33% and 66%** of EUT nameplate rating. Record the currents flowing in all test circuit current sensors.
- i) Repeat e) through h) with the EUT output current level set to **66% +/-5%** and **33% +/-5%** of EUT nameplate rating. Record the currents flowing in all test circuit current sensors. The timing of the step transitions used in steps e) through h) shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors.

Criteria:

No specific pass / fail criteria currently exist for the temporal response of the PCS. Until standardized temporal requirements are developed, the maximum open loop response shall be less than or equal to 30 seconds. Faster PCS response times are allowed and may be required to meet specific utility requirements.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																	
Load level: 33%																	
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	277	72.2	59954.1	277.0	24.0	19797.2	277.1	48.4	40207.9	600.1	104.3	62595.9	--	
			e	277.1	3.6	3004.2	277.1	24.0	19801.2	277.1	20.2	-16784.2	600.3	5.3	3193.5	0.2	
			f	277.0	72.2	599455.1	277.0	24.0	19797.3	277.1	48.4	40201.5	600.1	104.3	62594.2	0.3	
			e	277.1	3.6	3004.2	277.1	24.0	19802.8	277.1	20.2	-16784.5	600.3	5.3	3193.6	0.2	
			f	277.0	72.2	59932.7	277.0	24.0	19798.4	277.1	48.4	40190.2	600.2	104.2	62547.7	0.1	
			e	277.1	3.6	3005.3	277.1	24.0	19802.6	277.1	20.2	-16791.1	600.3	5.3	3196.9	0.1	
2		100%	33%-66%	f	277.0	72.2	59929.2	277.0	24.0	19798.9	277.1	48.4	40187.8	600.2	104.2	62553.4	0.1
				d	277.0	72.2	59968.7	277.0	24.0	19792.6	277.1	48.4	40190.3	600.2	104.2	62568.7	--
				e	277.0	47.9	39730.9	277.1	24.1	19817.9	277.1	23.8	19754.9	600.4	68.6	41216.2	0.2
				f	277.0	72.2	59946.9	277.0	24.0	19792.6	277.1	48.4	40203.1	600.2	104.2	62562.0	0.1
				e	277.0	47.9	39758.1	277.1	24.1	19833.4	277.1	23.8	19769.4	600.4	68.7	41253.6	0.2
				f	277.0	72.2	59923.9	277.0	24.0	19794.1	277.1	48.4	40183.8	600.2	104.2	62563.4	0.1
3	66%		5%-10%	e	277.0	47.9	39757.1	277.1	24.1	19840.4	277.1	23.8	19767.3	600.4	68.7	41227.6	0.1
				f	277.0	72.2	59963.3	277.0	24.0	19794.6	277.1	48.5	40214.2	600.2	104.3	62601.4	0.2
				d	277.1	47.9	39772.2	277.2	23.9	19812.5	277.2	23.8	19780.1	600.3	68.6	41199.1	--
				e	277.0	3.6	3003.9	277.1	24.0	19801.0	277.1	20.2	-16782.0	600.3	5.3	3191.7	0.2
				f	277.1	47.9	39773.3	277.2	23.9	19814.7	277.1	23.8	19780.7	600.3	68.7	41210.3	0.1
				e	277.1	3.6	3004.4	277.1	24.0	19800.4	277.1	20.2	-16786.1	600.3	5.3	3192.1	0.1
4		66%	33%-66%	f	277.1	47.9	39752.0	277.2	23.9	19812.1	277.2	23.8	19768.3	600.3	68.6	41187.0	0.2
				e	277.1	3.6	3003.6	277.1	24.0	19800.6	277.1	20.2	-16780.5	600.3	5.3	3192.8	0.2
				f	277.1	47.9	39750.3	277.2	23.9	19820.0	277.2	23.7	19717.0	600.3	68.6	41197.8	0.2
				d	277.1	47.9	39785.1	277.2	23.9	19814.4	277.2	23.8	19787.6	600.3	68.7	41221.9	--
				e	277.1	23.8	19787.9	277.1	23.9	19810.2	277.2	0.0	11.6	600.2	34.4	20655.9	0.2

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test

Load level: 33%

Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
5	33%	5%-10%	f	277.1	47.9	39753.2	277.2	23.9	19813.8	277.2	23.8	19769.3	600.3	68.6	41179.9	0.2			
			e	277.1	23.8	19787.8	277.1	23.9	19810.2	277.2	0.0	23.9	600.2	34.4	20657.8	0.1			
			f	277.1	47.9	39778.5	277.2	23.9	19813.7	277.2	23.8	19783.9	600.3	68.7	41223.5	0.1			
			e	277.1	23.8	19779.7	277.1	23.9	19810.0	277.2	0.0	11.6	600.2	34.4	20653.0	0.2			
			f	277.1	47.9	39759.5	277.2	23.9	19814.9	277.2	23.8	19773.1	600.3	68.6	41203.2	0.3			
			d	277.1	23.8	19780.8	277.1	23.9	19810.1	277.2	0.0	11.6	600.3	34.4	20635.6	--			
6		33%	5%-10%	e	277.0	3.6	3004.3	277.1	24.0	19800.1	277.1	20.2	-16784.9	600.3	5.3	3190.3	0.2		
				f	277.1	23.8	19780.6	277.1	23.9	19810.0	277.2	0.0	11.6	600.3	34.4	20636.7	0.3		
				e	277.0	3.6	3006.3	277.1	24.0	19800.1	277.1	20.2	-16799.3	600.2	5.3	3194.9	0.2		
				f	277.1	23.8	19773.6	277.1	23.9	19810.1	277.2	0.0	11.5	600.3	34.4	20629.8	0.2		
				e	277.0	3.6	3005.2	277.1	24.0	19800.3	277.2	20.2	-16791.1	600.3	5.3	3193.3	0.1		
				f	277.1	23.8	19787.9	277.1	23.9	19810.0	277.2	0.0	11.6	600.3	34.4	20643.9	0.1		
6	33%		33%-66% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

(1) 33% load test condition is omitted, which has performed on model of 30k.

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>[Signature]</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	<i>UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)</i>		

204 Optional test

204.1 A PCS may optionally be evaluated to control current exchange with the Area EPS at an external reference point of applicability such as the point of common coupling. The PCS may limit current flow from sources to the Area EPS (exporting) or limit current flow from the Area EPS to loads (importing). During these optional tests the current measured at any external reference point shall not cause the PCS to exceed any current limits as defined in Section 201.9. A PCS shall be considered in compliance if the current conducted to any optional external reference point(s) does not result in a steady state current on any PCS controlled conductor greater than the limits set in tests 203.5 and 203.6. The following optional tests shall be conducted as applicable for functionality and system configurations specified by the manufacturer.

Note: These requirements do not presently evaluate the ability of a PCS to comply with the Prioritization of DER Responses contained in IEEE Standard 1547, 2018. Following publication of IEEE P1547.1 these requirements will be revised to align with the 1547.1 testing protocols that are expected to include requirements for active and reactive power control functions for the PCS controlled conductors except where the active or reactive power control function could cause a PCS controlled current to exceed the limits of protected conductors or bus bars.

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204. 1. 1 Export limiting from all sources

Testing date: N/A

Test Method:

204.1.1 Where the PCS uses external current sensors to limit currents at an external reference point, such as at the point of common coupling, repeat the test sequence in 203.5 and 203.6 at the following conditions:

- a) Install the external current sensors in accordance with the instructions supplied by the manufacturer.
- b) Perform test 203.5 and 203.6 and measure current flows, including current flow to the external reference point such as the Area EPS or programmable ac power source. The timing of the step transitions shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors, including the external current sensor at the external reference point.
- c) Repeat step b) above with external current limit set to 50% (+/- 5%) and 0% (+/- 5%) of EUT nameplate rating. If the manufacturer also elects to support a minimum import function, repeat tests 203.5 and 203.6 at the minimum import setting which results in maximum current flow from the Area EPS or programmable ac power source (i.e. at the maximum setting of minimum importlimit - Example: -50% or -100% of EUT nameplate rating).

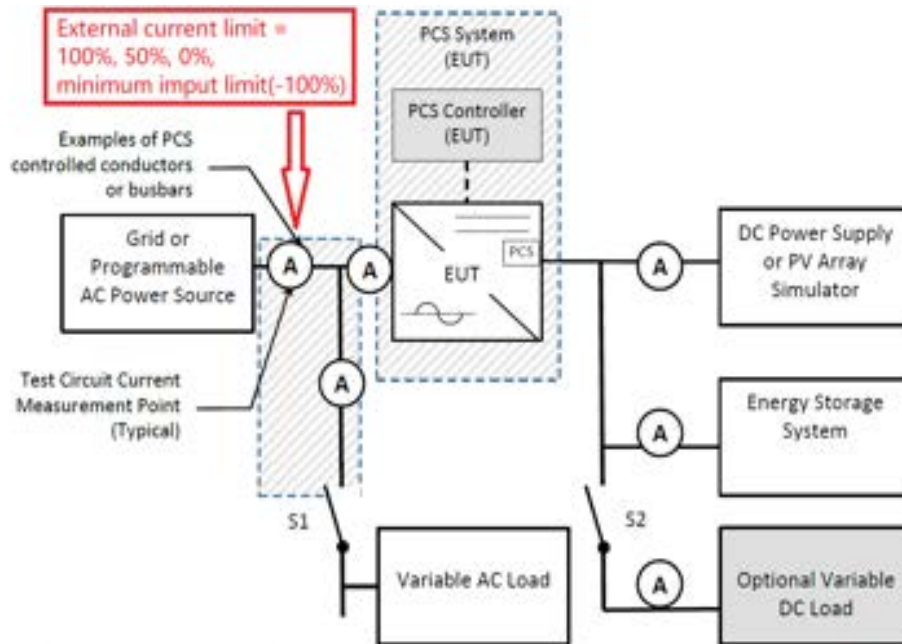


Figure 203.2 – Test Circuit Setup DC Coupled System

Criteria:

204.1.2 An EUT shall be considered in compliance if the current conducted to any optional external reference point(s) does not result in a steady state current on any PCS controlled conductor greater than the limits set in tests 203.5 and 203.6.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results: NA (This function is not claimed by the manufacturer.)

(1) external current limit set to 100% (+/- 5%)

(a) 203.5

Open loop response time (s)	
Maximum	
Average	

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)				
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d													--				
			e																	
			f																	
			e																	
			f																	
			e																	
2		100%	66%	d													--			
				e																
				f																
				e																
				f																
				e																
3			100%	33%	d													--		
					e															
					f															
					e															
					f															
					e															

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
4	50%	100%	e													
			f													
			d													--
			e													
			f													
			e													
			f													
			e													
5	50%	66%	d												--	
			e													
			f													
			e													
			f													
			e													
6	50%	33%	d												--	
			e													
			f													
			e													
			f													
			e													
7	0%	100%	d												--	
			e													
			f													
			e													
			f													
			e													

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>[Signature]</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																		
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
8		66%	f															
			d														--	
			e															
			f															
			e															
			f															
			e															
9		33%	f															
			d														--	
			e															
			f															
			e															
			f															

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(b) 203.6

Open loop response time (s)	
Maximum	
Average	

203.6 Step Change in Generation Test																	
Load level: 33%																	
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d													--	
			e														
			f														
			e														
			f														
			e														
2	100%	33%-66%	d													--	
			e														
			f														
			e														
			f														
			e														
3	66%	5%-10%	d													--	
			e														
			f														
			e														
			f														
			e														
4	66%	33%-66%	d													--	
			e														

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																	
Load level: 33%																	
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
5	33%	5%-10%	f														
			e														
			f														
			e														
			f														
			d														--
6		33%-66%	33%-66%	e													
				f													
				e													
				f													
				e													
				f													

- (2) external current limit set to 50% (+/- 5%)
- (3) external current limit set to 0% (+/- 5%)
- (4) external current limit set to -100% (+/- 5%)

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204.2 ESS Operating Modes

204.2.1 General - Some utility requirements restrict current exchanges between the Area EPS and the energy storage sub-system (ESS). This section includes the requirements for ESS that perform PCS functionality. For example: It may be permissible to export active power from the ESS to the Area EPS but the ESS may not be allowed to import active power from the Area EPS.

204.2.2 ESS is rated to perform PCS control active power exchanges between the Area EPS and the energy storage sub-system (ESS), the manufacturer shall specify which optional functions and ESS operating modes are supported by the PCS. Each supported mode shall be evaluated using the relevant tests described in this Section.

204.2.3 The following terminology shall be used in the test report to identify operating modes which limit the steady state active power flows between the ESS and the Area EPS supported by the PCS.

- a) Unrestricted Mode – The ESS may import active power from Area EPS while charging and may export active power to the Area EPS while discharging.
- b) Export Only Mode – The ESS may export active power to the Area EPS during discharging but shall not import active power from the Area EPS for ESS charging purposes.
- c) Import Only Mode – The ESS may import active power from the Area EPS for charging purposes but shall not export active power from the ESS to the Area EPS.
- d) No Exchange Mode – The ESS shall not exchange active power with the Area EPS for charging or discharging purposes.

Test Result Summary:

ESS Operating Mode	If support?	If only support zero export?	If only support zero charge?	If tested?	Test clause	Maximum open loop response time (s)	Average open loop response time (s)
Unrestricted Mode	Yes	Yes	Yes	Yes	203.5, 203.6	0.3	0.2
Export Only Mode	Yes	Yes	Yes	Yes	204.5	0.3	0.2
Import Only Mode	Yes	Yes	Yes	Yes	204.4	0.3	0.2
No Exchange Mode	Yes	Yes	Yes	Yes	204.4, 204.5	0.3	0.2

Remark(s): See detail test datas in the following test items.

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	<i>UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)</i>		

204.4 Export limiting from Energy Storage Systems

Testing date: See page 2.

Test Method:

204.4.1 Where the PCS includes ability to limit current flow from an ESS to the external reference point such as the point of common coupling to the Area EPS (i.e. ESS grid export limiting). Repeat the test sequence in 203.5 and 203.6 at the following conditions:

- a) Install any external current sensors, if applicable, in accordance with the instructions supplied by the manufacturer.
- b) For EUT's with multiple inputs, such as PV and ESS, set or verify the other, non ESS, inputs are set to 100% +/-5% of their nameplate ratings.
- c) Set or verify that the ESS external export current limit is set to 0% to +5% of EUT nameplate rating.
- d) Run test 203.5 and 203.6 and record current flows including current flow to the Area EPS or programmable ac power source and the output of the ESS. The timing of the step transitions shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors, including the external current sensor at the external reference point and at the output of the ESS.
- e) Where the PCS only supports zero export from the ESS steps f) and g) may be omitted.
- f) Repeat steps c) through e) above with external current limit set to 66% +/- 5% and 33% +/- 5% of EUT nameplate rating.
- g) For EUT's with multiple inputs, such as PV and ESS, repeat steps c) through g) with the other, non ESS, inputs set to 50% +/- 5% and 0% to +5% of their nameplate ratings

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

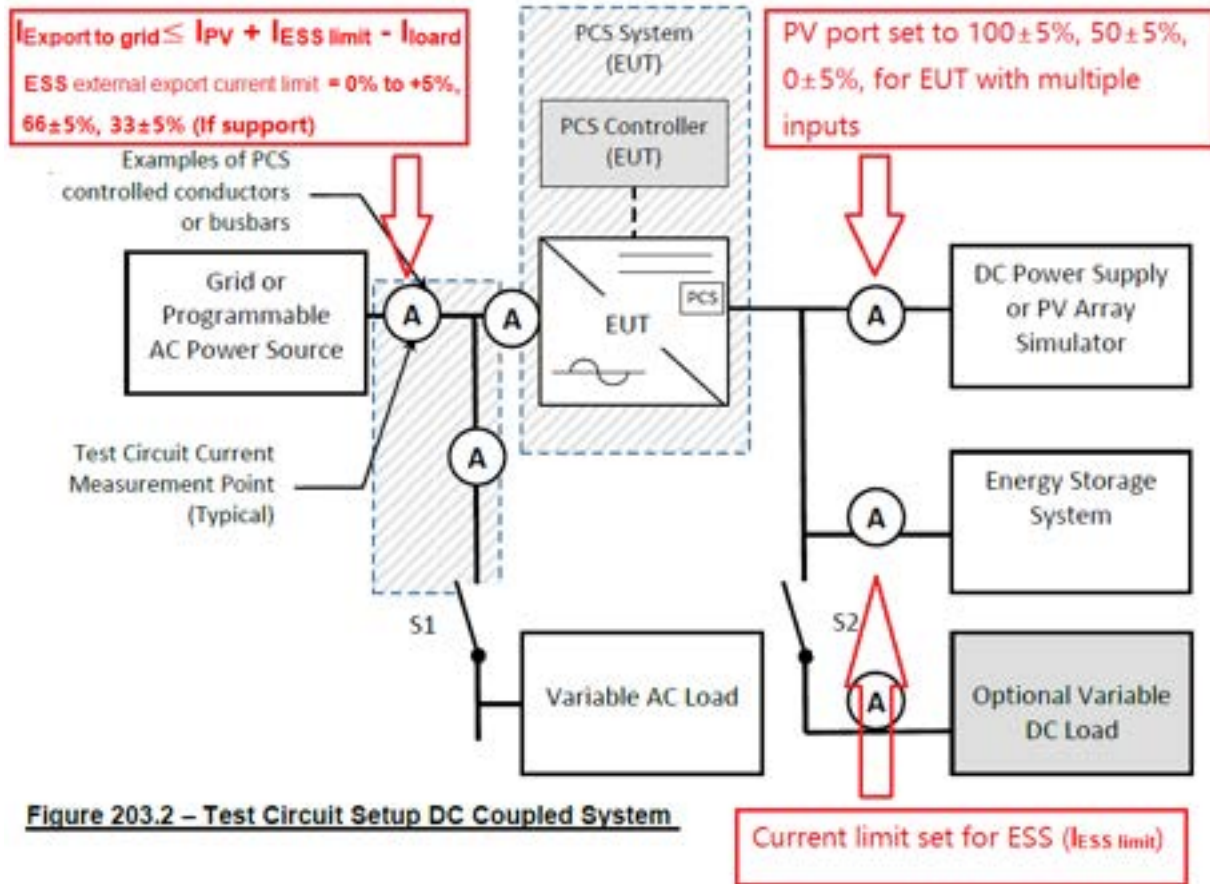


Figure 203.2 – Test Circuit Setup DC Coupled System

Criteria:

204.4.2 The EUT shall be considered in compliance if the steady state export current at the external reference point does not exceed the current from generation sources other than the ESS plus the current limit set for the ESS minus any local load.

204.4.3 For DC coupled systems the AC output current of the EUT shall be considered to be proportional to the relative DC current flows from each source divided by the sum of the DC current from all sources.

ie. $I_{\text{Export to grid}} \leq I_{PV} + I_{\text{ESS limit}} - I_{\text{load}}$ (Clause 204.4.2)

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

(1) ESS external export current limit = 0% to +5%, PV inputs = 100% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
1	100%	100%	d	276.3	71.9	59585.0	276.3	72.6	60161.1	277.0	3.3	-567.5	600.1	105.5	63311.5	600.3	0.0	10.3	--	Non-exchange	
			e	277.2	71.7	59585.5	277.2	1.2	3.9	277.9	71.7	59725.9	600.1	105.5	63306.7	600.3	0.0	10.3	0.1		
			f	276.4	71.9	59565.0	276.3	71.8	59497.0	277.0	3.2	77.8	600.1	105.5	63296.2	600.2	0.0	10.3	0.2		
			e	277.2	71.7	59591.4	277.2	1.2	3.7	277.9	71.7	59731.4	600.2	105.5	63292.1	600.3	0.0	10.3	0.3		
			f	276.4	71.9	59543.3	276.3	71.8	59485.3	277.0	3.2	69.3	600.2	105.4	63240.5	600.3	0.0	10.3	0.2		
			e	277.2	71.7	59590.7	277.2	1.2	3.6	277.9	71.7	59732.2	600.2	105.4	63286.0	600.3	0.0	10.3	0.2		
			f	276.4	71.9	59574.3	276.3	71.8	59491.0	277.0	3.2	91.8	600.2	105.4	63266.7	600.3	0.0	10.3	0.1		
2		100%	66%	d	276.7	71.8	59560.2	276.7	47.6	39509.8	277.4	24.4	20106.8	600.1	105.1	63081.2	600.2	0.0	10.3		--
				e	277.3	71.7	59573.7	277.2	1.2	3.7	277.9	71.7	59713.3	600.1	105.2	63107.3	600.3	0.0	10.3		0.2
				f	276.7	71.8	59557.8	276.7	47.3	39227.8	277.4	24.8	20388.0	600.1	105.1	63074.1	600.2	0.0	10.3		0.1
				e	277.3	71.7	59583.7	277.2	1.2	3.6	277.9	71.7	59724.0	600.1	105.1	63096.6	600.2	0.0	10.3		0.1
				f	276.7	71.8	59557.3	276.7	47.3	39217.6	277.4	24.7	20395.6	600.1	105.2	63100.4	600.3	0.0	10.3		0.1
				e	277.3	71.7	59580.1	277.2	1.2	3.5	277.9	71.7	59719.0	600.1	105.2	63145.3	600.2	0.0	10.3		0.2
3			100%	33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
4	50%	100%	d	275.9	36.0	29780.0	275.9	72.6	60063.4	276.5	36.6	-30356.0	600.2	51.9	31159.1	600.2	0.0	5.2				
			e	276.8	35.9	29788.8	276.8	1.1	3.7	277.4	35.9	29855.1	600.2	51.9	31163.8	600.2	0.0	5.2	0.2			
			f	275.9	36.0	29790.5	275.9	71.8	59401.4	276.5	35.8	-29681.5	600.5	51.9	31145.3	600.2	0.0	5.2	0.3			
			e	276.8	35.9	29792.1	276.8	1.1	3.5	277.4	35.9	29859.4	600.3	51.9	31123.9	600.3	0.0	5.2	0.2			
			f	275.9	36.0	29752.5	275.9	71.8	59430.4	276.5	35.9	-29748.9	600.2	51.8	31104.9	600.3	0.0	5.2	0.3			
			e	276.8	35.9	29781.7	276.8	1.1	3.6	276.4	35.9	29849.2	600.2	51.9	31125.0	600.2	0.0	5.2	0.2			
				f	275.9	36.0	29776.4	275.9	71.9	59470.5	276.6	35.9	-29764.8	600.2	51.8	3115.5	600.2	0.0	5.2	0.2		
5		50%	66%	d	276.2	36.0	29768.2	276.2	47.7	39477.7	276.9	11.8	-9734.6	600.2	51.8	31070.9	600.3	0.0	5.2			
				e	276.8	35.9	29777.4	276.8	1.1	3.9	277.5	35.9	29844.6	600.2	51.8	31057.2	600.2	0.0	5.2	0.2		
				f	276.2	36.0	29760.9	276.2	47.3	39194.9	276.9	11.5	-9458.1	600.2	51.7	31032.0	600.3	0.0	5.2	0.3		
				e	276.8	35.9	29783.4	276.8	1.1	3.6	277.5	35.9	29850.6	600.2	51.7	31052.9	600.3	0.0	5.2	0.2		
				f	276.2	36.0	29771.3	276.2	47.4	39236.6	276.9	11.5	-9490.0	600.2	51.7	31045.8	600.3	0.0	5.2	0.1		
	e			276.8	35.9	29790.4	276.8	1.1	3.3	277.5	35.9	29857.5	600.2	51.7	31037.2	600.3	0.0	5.2	0.2			
				f	276.2	36.0	29770.0	276.2	47.4	39231.8	276.9	11.6	-9486.1	600.2	51.7	31030.4	600.2	0.0	5.2	0.1		
6	50%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
7		0%	100%	d	275.4	0.7	474.7	275.4	72.8	60160.1	276.1	72.2	-59822.3	600.1	0.0	67.3	600.2	0.0	0.2	--		
				e	276.3	0.7	454.6	276.3	1.1	3.5	277.0	0.8	449.8	600.0	0.0	35.9	600.3	0.0	0.2	0.2		
				f	275.4	0.7	429.2	275.4	71.9	59421.3	276.1	71.4	-59127.3	600.1	0.0	12.4	600.3	0.0	0.2	0.3		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
8			e	276.3	0.6	394.9	276.3	1.0	3.1	277.0	0.7	389.8	600.1	0.0	12.6	600.3	0.0	0.1	0.2			
			f	275.4	0.6	366.7	275.4	71.9	59425.7	276.1	71.5	-59194.2	600.1	0.0	-6.6	600.3	0.0	0.6	0.3			
			e	276.3	0.6	317.0	276.3	1.0	3.4	277.0	0.6	311.8	600.1	0.0	-49.0	600.2	0.0	0.1	0.1			
			f	275.4	0.5	223.9	275.4	71.9	59422.7	276.1	71.6	-59334.7	600.1	0.0	-86.8	600.2	0.0	0.1				
		66%	d	275.8	0.7	459.1	275.7	47.8	39518.2	276.4	47.2	-39150.1	600.1	0.0	-6.6	600.2	0.0	0.2	--			
			e	276.4	0.7	433.7	276.3	0.7	3.1	277.0	0.7	428.7	600.1	0.0	-16.8	600.2	0.0	0.2	0.2			
			f	275.8	0.7	411.0	275.7	47.4	39202.7	276.4	46.9	-38881.8	600.1	0.0	-31.9	600.2	0.0	0.2	0.3			
			e	276.4	0.6	381.3	276.3	0.7	3.0	277.0	0.7	376.1	600.1	0.0	-48.4	600.3	0.0	0.1	0.2			
			f	275.8	0.6	333.6	275.7	47.4	39206.1	276.4	47.0	-38962.6	600.1	0.0	-73.6	600.2	0.0	0.1	0.1			
			e	276.4	0.5	243.6	276.3	0.7	3.4	277.0	0.6	238.2	600.1	0.0	-139.8	600.2	0.0	0.1	0.2			
		9		33% ⁽¹⁾	f	275.8	0.5	147.6	275.7	47.4	39205.5	276.4	47.2	-39147.9	600.1	0.0	-149.6	600.3	0.0		0.1	0.3
					d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
e	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
f	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
e	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
f	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
e	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Remark:
 (1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	276.2	71.9	59518.9	276.2	72.5	60077.1	276.9	3.3	-552.9	600.1	105.2	63139.4	600.2	0.0	10.3		Non-exchange			
			e	276.5	71.9	59526.6	276.5	49.0	40047.1	277.2	25.9	19615.9	600.1	105.3	63203.5	600.3	0.0	10.3	0.2				
			f	276.2	71.9	59539.1	276.2	72.8	60325.5	276.9	3.4	-781.9	600.1	105.4	63231.1	600.2	0.0	10.3	0.3				
			e	276.5	71.9	59533.3	276.5	49.0	40033.1	277.2	25.9	19635.9	600.1	105.3	63212.2	600.2	0.0	10.3	0.2				
			f	276.2	71.9	59542.1	276.2	72.8	60316.8	276.9	3.4	-769.9	600.1	105.4	63230.7	600.3	0.0	10.3	0.3				
			e	276.5	71.9	59525.3	276.5	49.0	40020.3	277.2	25.9	19640.9	600.1	105.4	63218.8	600.3	0.0	10.3	0.1				
			f	276.2	71.9	59547.1	276.2	72.8	60311.1	26.9	3.4	-759.8	600.1	105.4	63230.4	600.3	0.0	10.3	0.2				
2		100%	66%	d	276.6	71.8	59549.0	276.6	47.6	39473.9	277.3	24.4	20130.5	600.3	105.2	63147.0	600.3	0.0	10.3		--	Non-exchange	
				e	276.8	71.8	59551.9	276.8	32.5	26428.6	277.5	40.0	33260.1	600.3	105.3	63185.4	600.2	0.0	10.3		0.2		
				f	276.6	71.8	59528.3	276.6	47.8	39623.1	277.3	24.2	19956.7	600.2	105.2	63147.3	600.2	0.0	10.3		0.1		
				e	276.8	71.9	59610.2	276.8	32.5	26423.7	277.5	40.1	33327.6	600.3	105.3	63203.8	600.3	0.0	10.3		0.3		
				f	276.6	71.8	59563.7	276.6	47.8	39630.0	277.3	24.3	19959.3	600.3	105.2	63165.5	600.2	0.0	10.3		0.1		
				e	276.8	71.8	59587.5	276.8	32.5	26420.9	277.5	40.0	33302.4	600.3	105.3	63200.9	600.3	0.0	10.3		0.2		
				f	276.6	71.8	59544.4	276.6	47.8	39631.8	277.3	24.2	19963.8	600.3	105.2	63143.5	600.3	0.0	10.3		0.2		
3	100%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Non-exchange		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
4	50%	100%	d	275.8	36.0	29762.4	275.7	72.6	60074.1	276.4	36.7	-3038 5.5	600.2	51.9	31123.5	600.3	0.0	5.2	--	Non-exchange	
			e	276.0	36.0	29740.5	276.0	49.1	40029.4	276.7	36.5	-1022 4.1	600.2	51.8	31078.3	600.2	0.0	5.2	0.2		
			f	275.8	36.0	29758.6	275.7	72.9	60329.4	276.4	37.0	-3064 4.3	600.3	51.8	31086.7	600.3	0.0	5.2	0.2		
			e	276.0	36.0	29754.1	276.0	49.1	40026.1	276.7	36.5	-1020 6.7	600.3	51.8	31088.8	600.2	0.0	5.2	0.1		
			f	275.8	36.0	29760.1	275.7	72.9	60320.7	276.4	37.0	-3063 3.4	600.3	51.8	31101.8	600.3	0.0	5.2	0.1		
			e	276.0	36.0	29764.8	276.0	49.1	40015.7	276.8	36.5	-1018 6.2	600.3	51.8	31087.7	600.2	0.0	5.2	0.3		
			f	275.8	36.0	29761.9	275.7	72.9	60312.7	276.4	37.0	-3062 1.3	600.3	51.8	31076.7	600.2	0.0	5.2	0.2		
5		66%	d	276.2	36.0	29776.7	276.2	47.4	39261.1	276.9	11.6	-9509. 4	600.4	51.8	31078.6	600.2	0.0	5.2	--		
			e	276.4	36.0	29765.0	276.3	32.6	26486.0	277.0	20.1	3344.5	600.4	51.8	31068.7	600.2	0.0	5.2	0.2		
			f	276.2	36.0	29773.4	276.2	47.9	39693.4	276.8	12.0	-9944. 9	600.3	51.8	31073.1	600.3	0.0	5.2	0.1		
			e	276.4	35.9	29749.1	276.3	32.5	2644.38	277.0	20.1	3370.4	600.3	51.7	31010.3	600.3	0.0	5.2	0.3		
			f	276.2	36.0	29778.1	276.2	47.9	39659.0	276.9	12.0	-9909. 3	600.3	51.7	31043.5	600.2	0.0	5.2	0.2		
			e	276.4	36.0	29767.9	276.3	32.5	26422.7	277.0	20.0	3411.5	600.3	51.7	31045.7	600.2	0.0	5.2	0.2		
			f	276.2	36.0	29767.8	276.2	47.9	39639.0	276.9	12.0	-9898. 2	600.3	51.7	31025.4	600.3	0.0	5.2	0.1		
6	33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
7	0%	100%	d	275.3	0.7	459.0	275.3	72.8	60076.9	276.0	72.2	-5975 4.6	600.1	0.0	48.6	600.2	0.0	0.2	--	Non-exchange	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
8	8	66%	e	275.6	0.8	440.2	275.6	49.1	40042.1	276.2	48.6	-3960 8.8	600.1	0.0	41.8	600.3	0.0	0.2	0.2		
			f	275.3	0.7	409.9	275.3	73.1	60316.2	276.0	72.5	-6004 4.5	600.1	0.0	27.9	600.2	0.0	0.7	0.3		
			e	275.6	0.8	376.8	275.6	49.1	40032.6	276.3	48.6	-3966 2.9	600.1	0.0	3.8	600.3	0.0	0.2	0.3		
			f	275.3	0.6	360.2	275.3	73.0	60300.4	276.0	72.6	-6007 7.9	600.1	0.0	-19.5	600.3	0.0	0.1	0.2		
			e	275.6	0.7	298.8	275.6	49.1	40001.1	276.3	48.6	-3970 9.1	600.1	0.0	-43.2	600.2	0.0	0.1	0.2		
			f	275.3	0.5	201.8	275.3	73.0	60289.8	276.0	72.7	-6022 5.6	600.1	0.0	-85.1	600.2	0.0	0.1	0.1		
		66%	d	275.7	0.7	468.7	275.7	47.5	39241.5	276.4	46.9	-3886 3.9	600.2	0.0	-24.8	600.3	0.0	0.2	--		
			e	275.9	0.8	452.3	275.9	32.6	26444.7	276.6	32.0	-2599 7.9	600.2	0.0	-27.7	600.3	0.0	0.2	0.2		
			f	275.7	0.7	428.7	275.7	48.0	39675.5	276.4	47.5	-3933 8.4	600.1	0.0	-42.2	600.3	0.0	0.2	0.1		
			e	275.8	0.7	397.4	275.9	32.5	26430.2	276.6	32.0	-2603 7.9	600.1	0.0	-64.8	600.2	0.0	0.1	0.1		
			f	275.7	0.6	378.3	275.7	48.0	39656.9	276.4	47.5	-3937 0.9	600.1	0.0	-93.9	600.3	0.0	0.1	0.2		
			e	275.9	0.6	318.1	275.9	32.6	26415.6	276.6	32.0	-2610 3.2	600.1	0.0	-123.2	600.2	0.0	0.1	0.1		
9	9	33% ⁽¹⁾	f	275.7	0.5	229.0	275.7	48.0	39645.6	276.4	47.7	-3950 8.3	600.1	0.0	-160.7	600.3	0.0	0.1	0.2		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Remark:
 (1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
1	100%	100%	d	276.4	71.9	59549.0	276.4	72.5	60085.9	277.1	3.3	-534.7	600.3	105.1	63098.5	600.2	0.0	10.3	--	Non-exchange	
			e	277.1	71.8	59585.2	277.0	24.9	19663.3	277.7	48.5	40051.6	600.3	105.2	63129.8	600.2	0.0	10.3	0.2		
			f	276.4	71.9	59567.5	276.4	73.4	60837.6	277.1	3.6	-1269.1	600.3	105.2	63135.3	600.2	0.0	10.3	0.3		
			e	277.1	71.8	59567.9	277.0	24.9	19646.5	277.7	48.5	40054.1	600.3	105.1	63096.7	600.3	0.0	10.3	0.2		
			f	276.4	71.9	59566.3	276.4	73.4	60816.5	277.1	3.6	-1247.5	600.3	105.1	63097.9	600.3	0.0	10.3	0.2		
			e	277.1	71.8	59592.2	277.0	24.9	19638.5	277.7	48.5	40082.1	600.3	105.2	63118.1	600.2	0.0	10.3	0.1		
2		100%	66%	d	276.8	71.8	59578.2	276.7	47.4	39355.6	277.4	24.6	20276.4	600.3	105.2	63147.3	600.3	0.0	10.3		--
				e	277.2	71.7	59590.0	277.1	16.9	13087.6	277.9	56.0	46634.5	600.3	105.2	63133.0	600.2	0.0	10.3		0.3
				f	276.8	71.8	59591.8	276.7	47.9	39723.6	277.4	24.2	19921.7	600.3	105.2	63141.0	600.3	0.0	10.3		0.3
				e	277.2	71.7	59532.9	277.1	17.0	13086.3	277.8	55.9	46579.2	600.3	105.1	63062.4	600.2	0.0	10.3		0.2
				f	276.8	71.8	59568.3	276.7	47.9	39744.1	277.4	24.1	19877.3	600.3	105.1	63101.0	600.3	0.0	10.3		0.2
				e	277.2	71.7	59570.2	277.1	17.0	13086.0	277.8	55.9	46614.2	600.3	105.2	63108.6	600.3	0.0	10.3		0.3
3	100%		33% ⁽¹⁾	f	276.8	71.9	59595.9	276.7	47.9	39751.7	277.4	24.1	19900.1	600.3	105.2	63138.8	600.3	0.0	10.3		0.2
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
4		50%	100%	d	275.9	36.0	29775.2	275.9	72.6	60073.3	276.6	36.6	-30371.4	600.4	51.6	31004.7	600.2	0.0	5.2	--	
				e	276.6	35.9	29762.0	276.6	24.9	19647.8	277.2	35.7	10176.8	600.4	51.7	61006.3	600.3	0.0	5.1	0.2	
				f	275.9	36.0	29789.6	275.9	73.5	60805.8	276.6	37.5	-31090.3	600.4	51.7	31039.1	600.3	0.0	5.2	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
5		66%	e	276.6	36.0	29776.9	276.6	24.9	19644.1	277.3	35.7	10191.9	600.4	51.7	31031.4	600.3	0.0	5.1	0.1	Non-exchange
			f	275.9	36.0	29774.7	275.9	73.5	60808.5	276.6	37.5	-31108.6	600.4	51.7	31019.6	600.2	0.0	5.2	0.1	
			e	276.6	35.9	29761.1	276.6	24.9	19639.1	277.3	35.7	10184.2	600.4	51.6	30986.9	600.2	0.0	5.2	0.3	
			f	275.9	36.0	29770.3	275.9	73.5	60806.8	276.6	37.5	-31111.5	600.3	51.6	30982.5	600.3	0.0	5.2	0.2	
			d	276.3	36.0	29800.8	276.3	47.3	39220.5	277.0	11.5	-9446.7	600.4	51.7	31029.1	600.2	0.0	5.2	--	
			e	276.7	35.9	29786.2	276.7	17.0	13125.0	277.4	27.8	16722.5	600.3	51.7	31015.0	600.3	0.0	5.2	0.2	
		33% ⁽¹⁾	f	276.3	36.0	29803.9	276.3	48.1	39834.4	277.0	12.2	-10058.0	600.3	51.7	31029.6	600.2	0.0	5.2	0.2	
			e	276.7	35.9	29789.6	276.7	16.9	13103.3	277.4	27.8	16747.3	600.3	51.7	31027.2	600.2	0.0	5.2	0.1	
			f	276.3	36.0	29791.7	276.3	48.1	39832.1	277.0	12.2	-10068.2	600.3	51.7	31013.3	600.2	0.0	5.2	0.1	
			e	276.7	35.9	29776.9	276.7	16.9	136098.5	277.4	27.8	16739.0	600.3	51.6	30975.9	600.3	0.0	5.2	0.3	
			f	276.3	36.0	29789.1	276.3	48.1	39825.0	277.0	12.2	-10063.9	600.3	51.7	31013.7	600.2	0.0	5.2	0.2	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	275.5	0.7	470.1	275.4	71.8	59285.5	276.1	71.2	-58950.2	600.2	0.0	-73.4	600.2	0.0	0.2	--	
			e	276.1	0.8	450.4	276.1	24.9	19676.3	276.8	24.3	-19233.2	600.2	0.0	-94.1	600.2	0.0	0.2	0.1	
			f	275.4	0.7	425.8	275.4	73.6	60778.6	276.1	73.0	-60491.5	600.2	0.0	-98.1	600.2	0.0	0.2	0.1	
			e	276.1	0.8	406.4	276.1	24.9	19664.6	276.8	24.3	-19266.1	600.3	0.0	-113.5	600.3	0.0	0.1	0.1	
			f	275.4	0.6	379.4	275.4	73.6	60780.3	276.1	73.1	-60539.3	600.2	0.0	-131.3	600.3	0.0	0.1	0.2	
			e	276.1	0.7	307.4	276.1	24.9	19659.5	276.8	24.3	-19360.1	600.2	0.0	-173.1	600.2	0.0	0.1	0.1	
8	0%	66%	f	275.4	0.5	218.5	275.4	73.5	60750.0	276.1	73.2	-60669.8	600.2	0.0	-197.7	600.2	0.0	0.1	0.1	
			d	275.8	0.7	468.9	275.8	47.4	39164.5	276.5	46.8	-38785.9	600.1	0.0	-64.1	600.3	0.0	0.2	--	
			e	276.3	0.7	450.1	276.2	16.9	13115.0	276.9	16.3	-12671.8	600.1	0.0	-67.5	600.3	0.0	0.2	0.2	
			f	275.8	0.7	431.4	275.8	48.1	39811.6	276.5	47.6	-39471.9	600.1	0.0	-107.9	600.3	0.0	0.2	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
9			e	276.3	0.7	411.6	276.2	16.9	13105.4	276.9	16.3	-12700.9	600.1	0.0	-129.8	600.2	0.0	0.1	0.3		
			f	275.8	0.6	388.8	275.8	48.1	39796.3	276.5	47.6	-39499.1	600.1	0.0	-142.6	600.2	0.0	0.1	0.3		
			e	276.3	0.6	314.8	276.2	16.9	13107.2	276.9	16.2	-12799.9	600.1	0.0	-188.4	600.3	0.0	0.1	0.1		
			f	275.8	0.5	224.7	275.8	48.1	39797.3	276.5	47.8	-39664.0	600.2	0.0	-211.2	600.3	0.0	0.1	0.2		
		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Remark:
 (1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																						
Load level: 33%																						
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
1	100%	5%-10%	d	277.1	23.9	19838.0	277.0	23.9	19814.7	277.7	0.6	454.0	600.4	103.0	61813.2	600.7	63.6	-38204.8	--	Non-exchange		
			e	277.1	23.9	19837.5	277.0	23.9	19813.8	277.7	0.5	454.0	600.4	8.2	4946.8	600.7	26.2	15765.0	0.2			
			f	277.1	23.9	19843.6	277.0	23.9	19814.6	277.7	0.5	454.2	600.3	103.0	61847.3	600.6	63.6	-38224.4	0.3			
			e	277.1	23.9	19832.9	277.0	23.9	19813.5	277.7	0.5	453.9	600.4	8.2	4945.9	600.7	26.2	15762.1	0.1			
			f	277.1	23.9	19847.0	277.0	23.9	19814.7	277.7	0.5	454.3	600.3	103.0	61860.2	600.6	63.7	-38236.9	0.2			
			e	277.1	23.9	19821.6	277.0	23.9	19813.4	277.7	0.5	453.5	600.4	8.2	4944.3	600.7	26.2	15755.6	0.3			
2	100%	33%-66%	f	277.1	23.9	19828.9	277.0	23.9	19814.5	277.7	0.5	453.7	600.3	102.9	61784.0	600.6	63.6	-38187.4	0.2		Non-exchange	
			d	277.1	23.9	19851.0	277.0	23.9	19813.5	277.7	0.5	454.5	600.3	103.1	61866.2	600.7	63.5	-38168.6	--			
			e	277.1	23.9	19841.6	277.1	23.9	19813.6	277.8	0.5	454.2	600.4	51.8	31077.5	600.7	16.1	-9685.9	0.2			
			f	277.1	23.9	19836.8	277.0	23.9	19813.6	277.7	0.5	454.0	600.4	102.9	61806.4	600.7	63.5	-38137.1	0.1			
			e	277.1	23.9	19835.2	277.1	23.9	19813.7	277.8	0.5	453.9	600.4	51.7	31059.24	600.7	16.1	-9680.06	0.2			
			f	277.1	23.9	19842.2	277.0	23.9	19812.9	277.7	0.5	454.2	600.4	102.9	61807.2	600.7	63.5	-38140.5	0.3			
3	66% ⁽¹⁾	5%-10%	e	277.1	23.9	19827.0	277.1	23.9	19812.6	277.8	0.5	453.7	600.4	51.7	31049.3	600.7	16.1	-9676.2	0.2	Non-exchange		
			f	277.1	23.9	19837.1	277.0	23.9	19813.4	277.7	0.5	454.0	600.4	102.9	61805.0	600.7	63.5	-38134.2	0.2			
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
4	33%-66%	5%-10%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test

Load level: 33%

Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5	33% ⁽¹⁾	5%-10%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
6	33% ⁽¹⁾	33%-66%	f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

 (2) ESS external export current limit = $66 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

 (3) ESS external export current limit = $33 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(4) ESS external export current limit = 0% to +5%, PV inputs = 50% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
1	100%	100%	d	276.3	72.8	60250.7	276.3	72.3	59908.7	277.0	0.1	-9.15	600.3	51.6	30970.5	600.6	51.5	30912.1	--	Import only	
			e	277.2	36.2	-30097.7	277.2	1.1	1.8	277.9	36.2	-30167.6	600.3	51.5	30906.9	600.6	94.9	-56983.2	0.3		
			f	276.3	72.8	60260.0	276.3	72.3	59908.4	277.0	0.1	-8.9	600.3	51.6	30978.0	600.6	51.5	30919.5	0.2		
			e	277.2	36.2	-30109.5	277.2	1.1	1.2	277.9	36.2	-30179.7	600.4	51.5	30929.1	600.7	94.9	-57021.9	0.2		
			f	276.3	72.7	60230.0	276.3	72.3	59906.7	277.0	0.0	-9.5	600.3	51.6	30967.1	600.6	51.5	30906.2	0.2		
			e	277.2	36.2	-30100.9	277.2	1.1	1.8	277.9	36.2	-30171.3	600.3	51.5	30920.3	600.6	94.9	-57005.3	0.1		
f		276.3	72.8	60245.8	276.3	72.3	59906.3	277.0	0.1	-9.2	600.3	51.6	30963.7	600.6	51.5	30902.9	0.1				
2		100%	66%	d	276.7	47.7	39578.8	276.7	47.7	39536.5	277.4	0.3	277.7	600.3	51.4	30872.9	600.6	16.8	10102.3		--
				e	277.3	36.2	-30077.9	277.3	1.2	1.3	278.0	36.2	-30148.7	600.3	51.4	30859.1	600.6	94.8	-56915.5		0.2
				f	276.7	47.7	39569.0	276.7	47.6	39527.3	277.4	0.3	227.6	600.3	51.4	30858.3	600.6	16.8	10097.1		0.3
				e	277.3	36.2	-30079.0	277.3	1.2	1.6	278.0	36.2	-30149.4	600.3	51.4	30870.1	600.7	94.8	-56933.4		0.1
				f	276.7	47.7	39594.7	276.7	47.6	39521.5	277.4	0.3	228.1	600.3	51.4	30881.3	600.6	16.8	10105.7		0.2
	e			277.3	36.2	-30094.4	277.3	1.2	1.0	278.0	36.2	-30164.2	600.3	51.4	30874.7	600.7	94.8	-56947.4	0.3		
f	276.7		47.7	39586.8	276.7	47.6	39516.9	277.4	0.3	228.0	600.3	51.4	30872.6	600.6	16.8	10103.7	0.2				
3	100%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																									
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode					
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)							
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--						
4	50%	100%	d	275.9	36.3	30058.2	275.9	72.4	59932.0	276.6	36.4	-30146.8	600.4	51.3	30788.9	600.7	0.1	51.3	--	Import only					
			e	276.9	36.3	-30106.7	276.8	1.2	1.0	277.5	36.3	-30174.0	600.4	51.4	30855.5	600.7	94.8	-56948.9	0.2						
			f	275.9	36.4	30115.3	275.9	72.4	59921.1	276.6	36.3	-30079.4	600.3	51.4	30840.9	600.7	0.1	61.4	0.3						
			e	276.9	36.3	-30127.8	276.8	1.2	1.2	277.5	36.3	-30194.6	600.4	51.4	30855.9	600.7	94.8	-56960.1	0.2						
			f	276.0	36.4	30081.4	275.9	72.3	59911.1	276.6	36.3	-30097.7	600.3	51.3	30820.1	600.7	0.1	51.3	0.1						
			e	276.9	36.3	-30122.0	276.8	1.2	0.9	277.5	36.3	-30188.2	600.4	51.4	30879.8	600.7	94.9	-56982.2	0.3						
f		276.0	36.4	30077.1	276.0	72.4	59905.4	276.6	36.3	-30098.2	600.3	51.4	30826.7	600.7	0.1	51.3	0.2								
5		50%	66%	d	276.3	36.4	30127.1	276.3	47.7	39496.7	277.0	11.7	-9602.68	600.4	51.4	30880.7	600.7	0.1	51.4		--	Import only			
				e	276.9	36.3	-30110.8	276.8	1.1	1.4	277.5	36.3	-30177.4	600.3	51.4	30881.4	600.7	94.9	-56992.5		0.3				
				f	276.3	36.4	30096.5	276.3	47.7	39492.1	277.0	11.7	-9624.7	600.4	51.4	30854.7	600.7	0.1	51.4		0.2				
				e	276.9	36.3	-30135.4	276.8	1.1	1.0	277.5	36.3	-30202.7	600.3	51.5	30899.2	600.7	95.0	-57040.5		0.3				
				f	276.3	36.4	30119.8	276.3	47.7	39489.5	277.0	11.7	-9601.8	600.4	51.5	30893.8	600.7	0.0	51.4		0.3				
				e	276.9	36.3	-30112.4	276.8	1.1	0.8	277.5	36.3	-30178.6	600.4	51.4	30871.5	600.7	94.9	-56983.0		0.2				
f			276.3	36.4	30106.1	276.3	47.7	39486.1	276.9	11.7	-9611.1	600.4	51.4	30854.0	600.7	0.1	51.4	0.1							
6			50%	33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	Import only	
					e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
					f	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
					e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
7	0%			100%	d	276.1	0.2	149.5	276.0	72.3	59848.9	276.7	73.2	-60702.3	600.4	51.3	30807.8	600.8	47.5	-28543.1	--		Import only		
					e	277.0	0.2	149.7	276.9	1.2	1.0	277.6	0.0	6.8	600.4	51.3	30805.2	600.8	47.5	-28553.2	0.2				
					f	276.1	0.2	149.5	276.0	72.3	59846.7	276.7	73.2	-60725.5	600.4	51.3	30774.0	600.8	47.5	-28520.6	0.3				
					e	277.0	0.2	149.7	276.9	1.2	0.6	277.6	0.0	6.8	600.4	51.3	30777.5	600.8	47.5	-28526.2	0.1				
					f	276.1	0.2	149.4	276.0	72.3	59847.4	276.7	73.3	-60777.7	600.4	51.2	30742.4	600.8	47.4	-28489.7	0.3				
		e			276.0	0.2	149.7	276.9	1.2	0.7	277.6	0.0	6.8	600.4	51.3	30772.9	600.8	47.5	-28526.9	0.2					

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
8		66%	f	276.1	0.2	149.5	276.0	72.3	59848.3	276.7	73.2	-60707.5	600.5	51.3	30785.4	600.8	47.5	-28523.4	0.3			
			d	276.4	0.2	149.6	276.4	47.7	39505.5	277.1	47.6	-39103.1	600.4	81.3	30793.0	600.8	47.5	-28526.0	--			
			e	277.0	0.2	149.6	276.9	1.2	1.0	277.6	0.0	6.8	600.4	51.3	30779.3	600.7	47.5	-28518.2	0.2			
			f	276.4	0.2	149.6	276.4	47.7	39497.2	277.1	47.6	-39093.4	600.3	51.3	30771.4	600.7	47.5	-28513.2	0.2			
			e	276.9	0.2	149.6	276.9	1.2	0.8	277.6	0.0	6.8	600.4	51.3	30772.1	600.8	47.5	-28502.4	0.1			
			f	276.4	0.2	149.7	276.4	47.6	39491.1	277.1	49.4	-38943.6	600.4	51.4	30818.2	600.8	47.5	-28557.0	0.2			
			e	276.9	0.2	149.8	276.9	1.2	1.0	277.6	0.0	6.8	600.4	51.3	30768.3	600.7	47.5	-28509.5	0.3			
			f	276.4	0.2	149.7	276.4	47.6	39486.5	277.1	47.5	-39022.3	600.4	51.3	30775.2	600.8	47.5	-28516.3	0.3			
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	276.4	72.7	60251.8	276.4	72.3	59953.5	277.0	0.0	-0.1	600.3	51.8	31104.9	600.3	51.5	31104.9	--	Import only			
			e	227.2	36.2	-30091.0	277.2	48.5	40204.6	277.9	84.5	-70303.2	600.3	51.7	31057.5	600.3	95.1	-57058.9	0.1				
			f	276.4	72.7	60247.2	276.4	72.3	59944.9	277.0	0.0	-0.1	600.3	51.8	31097.7	600.3	51.5	30931.6	0.2				
			e	277.2	36.2	-30097	277.2	48.5	40204.5	277.9	84.5	-70315.3	600.3	51.8	31068.6	600.3	95.1	-57081.2	0.2				
			f	276.4	72.77	60221.6	276.4	72.3	59937.3	277.0	0.0	-0.1	600.3	51.8	31081.7	600.4	51.5	30914.9	0.2				
			e	277.2	36.2	-30090.3	277.2	48.5	40205.3	277.9	84.5	-70299.2	600.2	51.7	31059.7	600.3	95.1	-57065.9	0.1				
2		100%	66%	f	276.4	72.7	60221.9	276.4	72.3	59932.6	277.0	0.0	-0.1	600.3	51.8	31092.3	600.3	51.5	30925.0		0.1	Import only	
				d	277.0	47.7	39625.9	277.0	47.8	39638.8	277.0	0.0	11.6	600.4	51.7	31047.5	600.9	16.9	10141.9		--		
				e	277.2	36.2	-30092.8	277.2	31.9	26368.6	277.9	67.4	-56079.8	600.2	103.9	62341.5	600.3	95.1	-57079.2		0.2		
				f	277.0	47.7	39600.1	277.0	47.8	39637.9	277.0	0.0	11.6	600.3	51.7	31023.8	600.8	16.9	10135.7		0.1		
				e	277.2	36.2	-30092.7	277.2	31.9	26368.6	277.9	67.4	-56080.7	600.3	103.9	62337.4	600.3	95.1	-57065.9		0.1		
				f	277.0	47.7	39615.7	277.0	47.8	39638.9	277.0	0.0	11.6	600.3	51.7	31036.8	600.8	16.9	10138.5		0.2		
3	100%		33% ⁽¹⁾	e	277.2	36.2	-30086.9	277.2	31.8	26368.9	277.9	67.4	-56068.3	600.3	103.8	62322.8	600.3	95.0	-57051.3	0.2	Import only		
				f	277.0	47.7	39600.1	277.0	47.8	39638.9	277.0	0.0	11.6	600.3	51.7	31023.8	600.8	16.9	10137.5	0.3			
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
4		50%	100%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		Import only	
				d	277.0	36.3	30110.5	277.0	36.2	60010.8	277.7	36.2	-30097.5	600.2	52.1	31248.0	600.1	0.0	10.3	--			
				e	277.1	36.3	-30139.8	277.0	48.7	40241.6	277.7	84.3	-70111.1	600.2	52.0	31249.6	600.2	95.3	-57187.4	0.2			
				f	277.0	36.3	30133.2	277.0	72.9	60011.9	277.7	36.2	-30123.2	600.2	52.1	31266.2	600.2	0.0	10.3	0.2			
				e	277.1	36.3	-30145.0	277.1	48.7	40241.9	277.7	84.3	-70124.8	600.3	52.1	31260.9	600.2	95.3	-57212.4	0.2			
f			277.0	36.3	30112.1	277.0	72.9	60009.6	277.7	36.2	-30099.0	600.2	52.0	31232.3	600.2	0.0	10.3	0.1					

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
5		66%	e	277.1	36.3	-30128.5	277.1	48.7	40240.9	277.7	84.2	-70079.8	600.3	52.0	31239.6	600.3	95.3	-57173.4	0.2		
			f	277.0	36.3	30155.2	277.0	72.8	60011.5	277.7	36.2	-30146.2	600.2	52.1	31281.8	600.1	0.0	10.3	0.1		
			d	277.1	36.3	30111.4	277.1	48.1	39604.6	277.8	11.5	-9607.6	600.2	51.9	31189.9	600.2	0.0	10.3	--		
			e	277.1	36.3	-30111.6	277.1	31.9	26442.0	277.8	67.7	-56371.6	600.3	51.9	31198.1	600.3	95.1	-57110.4	0.2		
			f	277.1	36.2	30096.3	277.1	48.1	39605.3	277.8	11.5	-9601.7	600.2	51.9	31193.8	600.2	0.0	10.3	0.2		
			e	277.1	36.2	-30102	277.1	31.9	26442.3	277.8	67.7	-56348.7	600.2	51.9	31190.5	600.2	95.1	-57098.6	0.2		
			f	277.1	36.3	30111.3	277.1	48.1	39606.9	277.7	11.5	-9607.1	600.2	51.9	31207.2	600.2	0.0	10.3	0.3		
			e	277.1	36.2	-30099.2	277.1	31.9	26443.0	277.1	67.7	-56340.8	600.2	51.9	31182.1	600.2	95.1	-57077.1	0.2		
			f	277.1	36.2	30097.5	277.1	48.1	39605.9	277.8	11.5	-9602.2	600.2	51.9	31189.2	600.2	0.0	10.3	0.2		
			6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--		--
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	0%	100%	d	277.2	0.0	13.6	277.1	72.9	60058.3	277.8	72.3	-60180.5	600.2	52.0	31198.6	600.2	45.7	-27422.2	--	Import only	
			e	277.2	0.0	13.6	277.2	48.6	40274.5	277.9	48.4	-40278.6	600.2	51.9	31183.9	600.3	47.7	-28643.9	0.2		
			f	277.2	0.0	13.6	277.1	72.9	60059.9	277.8	72.3	-60184.2	600.2	51.9	31184.8	600.2	45.6	-27408.7	0.1		
			e	277.2	0.0	13.6	277.2	48.6	40274.7	277.9	48.4	-40273.2	600.3	51.9	31173.5	600.3	47.7	-28637.7	0.2		
			f	277.2	0.0	13.6	277.1	72.9	60061.4	277.8	72.3	-60194.7	600.2	52.0	31180.8	600.3	45.7	-27406.0	0.1		
			e	277.2	0.0	13.6	277.2	48.6	40274.8	277.9	48.4	-40270.8	600.3	52.0	31168.0	600.3	47.7	-28631.5	0.2		
8	0%	66%	f	277.2	0.0	13.6	277.1	72.9	60059.5	277.8	72.3	-60209.5	600.3	52.0	31199.4	600.3	45.7	-27421.3	0.2		
			d	277.2	0.0	13.6	277.2	47.9	39633.9	277.9	47.7	-39700.3	600.3	51.9	31168.5	600.3	47.7	-28634.6	--		
			e	277.2	0.0	13.6	277.27	31.9	26428.4	277.9	31.7	-26376.8	600.3	51.9	3157.6	600.3	48.0	-28833.5	0.1		
			f	277.2	0.0	13.6	277.2	47.9	39633.8	277.9	47.7	-39703.9	600.3	51.9	31170.9	600.3	47.7	-28635.7	0.1		
			e	277.2	0.0	13.6	277.2	31.9	26427.3	277.9	31.7	-26384.2	600.4	51.9	31159.2	600.4	48.0	-28835.5	0.2		
			f	277.2	0.0	13.6	277.2	47.9	39634.4	277.9	47.7	-39688.6	600.3	51.9	31167.9	600.3	47.7	-28632.2	0.2		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
9			e	277.2	0.0	13.6	277.2	31.9	26427.3	277.9	31.7	-26378.4	600.3	51.9	31148.7	600.3	48.0	-28824.6	0.1				
			f	277.2	0.0	13.6	277.2	47.9	39634.9	277.9	47.7	-39720.2	600.3	51.9	31189.4	600.3	47.7	-28652.1	0.1				
		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	277.0	72.5	60159.7	277.0	72.9	60067.0	277.7	0.0	11.6	600.2	52.0	31234.0	600.3	52.1	31289.9	--	Import only			
			e	277.1	36.2	-30070.6	277.1	23.8	19810.2	277.7	59.6	-49713.9	600.2	51.9	31183.7	600.4	95.2	-57138.3	0.2				
			f	277.0	72.4	60119.2	277.0	72.9	60068.9	277.7	0.0	11.6	600.1	52.0	31215.3	600.3	52.1	31274.8	0.1				
			e	277.1	36.2	-30065.1	277.1	23.8	19809.7	277.7	59.7	-49704.4	600.2	51.9	31170.7	600.4	95.2	-57114.9	0.1				
			f	277.0	72.5	60159.2	277.0	72.9	60069.2	277.7	0.0	11.6	600.2	52.0	31234.0	600.3	52.1	31294.6	0.1				
			e	277.1	36.2	-30060.2	277.1	23.8	19810.5	277.7	59.7	-49594.4	600.3	51.9	31146.8	600.4	95.0	-57072.7	0.2				
f		277.0	72.4	60143.7	277.0	72.9	60071.1	277.7	0.0	11.6	600.2	52.0	31220.9	600.3	52.1	31280.8	0.2						
2		100%	66%	d	277.1	27.7	39634.9	277.1	48.1	39604.4	277.8	0.0	11.6	600.2	51.9	31137.3	600.5	16.9	10121.1		--	Import only	
				e	277.1	36.2	-30041.3	277.1	15.9	13162.8	277.8	52.0	-43287.9	600.3	51.8	31123.9	600.5	95.0	-57038.6		0.2		
				f	277.1	47.7	39623.1	277.1	48.1	39605.4	277.8	0.0	11.8	600.2	51.9	31127.5	600.4	16.9	10120.3		0.1		
				e	277.1	36.1	-29987.6	277.1	15.8	13164.3	277.8	51.9	-43199.2	600.3	51.7	31052.2	600.5	94.8	-56904.3		0.2		
				f	277.1	47.7	39610.6	277.1	48.1	39605.3	277.8	0.0	11.6	600.3	51.8	31116.8	600.5	16.8	10116.1		0.1		
	e			277.1	36.2	-30038.7	277.1	15.8	13163.6	277.8	52.0	-43283.3	600.3	51.8	31119.2	600.5	95.0	-57025.9	0.1				
f	277.1		47.7	39635.2	277.1	48.1	39606.4	277.8	0.0	11.6	600.3	51.9	31138.8	600.5	16.9	10124.1	0.2						
3	100%		33%(1)	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Import only		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
		e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
4		50%	100%	d	277.1	36.2	30031.3	277.1	73.0	60103.7	277.80	36.2	-30084.1	600.2	51.8	31107.3	600.5	0.0	10.3	--		Import only	
				e	277.2	36.2	-30030.7	277.1	23.8	19807.8	277.8	59.8	-49747.7	600.3	51.8	31112.2	600.5	95.0	-57023.6	0.2			
				f	277.1	36.2	30031.6	277.1	73.0	60104.7	277.8	36.1	-30081.9	600.3	51.8	31106.7	600.5	0.0	10.3	0.2			
				e	277.2	36.2	-30038.9	277.1	23.8	19806.9	277.8	59.8	-49757.2	600.3	51.9	31123.1	600.5	95.0	-57047.4	0.1			
				f	277.1	36.2	30037.4	277.1	73.0	60105.2	277.8	36.2	-30089.8	600.2	51.8	31112.3	600.4	0.0	10.3	0.1			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
5		66%	e	277.2	36.2	-30032.5	277.1	23.8	19809.3	277.8	59.8	-49751.8	600.3	51.9	31116.6	600.5	95.0	-5731.0	0.3	
			f	277.1	36.2	30039.8	277.1	73.0	60104.7	277.8	36.2	-30091.1	600.2	51.8	31118.5	600.5	0.0	10.3	0.2	
			d	277.2	36.2	30043.7	277.2	48.1	39628.9	277.9	11.5	-9606.5	600.3	51.8	31105.8	600.6	0.0	10.3	--	
			e	277.2	36.2	-30057.0	277.2	15.8	13170.3	277.9	51.8	43170.3	600.3	51.8	31122.4	600.6	95.0	-57052.6	0.2	
			f	277.2	36.2	30053.7	277.2	48.1	39628.1	277.9	11.5	-9610.6	600.3	51.8	31114.0	600.6	0.0	10.3	0.1	
			e	277.2	36.1	-30029.5	277.2	15.8	13169.7	277.9	51.8	-43144.1	600.3	51.8	31083.7	600.6	94.9	-56981.6	0.2	
			f	277.2	36.2	30031.4	277.2	48.1	39627.9	277.9	11.5	-9602.6	600.3	51.8	31094.3	600.6	0.0	10.3	0.2	
			e	277.2	36.2	-30044.4	277.2	15.8	13170.6	277.9	51.9	-43172.3	600.3	51.8	31092.2	600.6	94.9	-57002.5	0.1	
			f	277.2	36.1	30022.1	277.2	48.1	39629.6	277.9	11.5	-9598.4	600.3	51.8	31079.6	600.6	0.0	10.3	0.1	
			6		33%(1)	d	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	277.2	0.0	13.6	277.2	73.0	60140.3	277.9	72.3	-60189.0	600.3	51.8	31096.2	600.6	47.6	-28608.2	--	Import only
			e	277.2	0.0	13.6	277.2	23.8	19818.4	277.9	23.8	-19790.1	600.3	51.8	31090.9	600.6	47.6	-28603.0	0.2	
			f	277.2	0.0	13.6	277.2	73.0	60142.0	277.9	72.3	-60188.3	600.3	51.8	31097.2	600.6	47.6	-28609.9	0.1	
			e	277.2	0.0	13.6	277.2	23.8	19818.5	277.9	23.9	-19793.7	600.3	51.8	31094.4	600.6	47.6	-28606.1	0.2	
			f	277.2	0.0	13.6	277.2	73.0	60142.4	277.9	72.3	-60196.1	600.3	51.8	31100.0	600.6	47.7	-28610.9	0.3	
			e	277.3	0.0	13.6	227.2	23.0	19817.4	277.9	23.8	-19796.2	600.3	51.8	31104.4	600.6	47.6	-28616.3	0.1	
			f	277.2	0.0	13.6	277.2	73.0	60141.17	277.9	72.3	-60179.2	600.3	51.8	31098.7	600.6	47.6	-28609.4	0.2	
8		66%	d	277.2	0.0	13.6	277.2	48.1	39635.9	277.9	23.8	-39702.2	600.3	51.8	31087.5	600.6	47.6	-28598.5	--	
			e	277.2	0.0	13.6	277.2	15.8	13170.3	277.9	15.9	-13195.1	600.3	51.8	31090.9	600.6	47.6	-28601.8	0.2	
			f	277.2	0.0	13.6	277.2	48.1	39635.9	277.9	47.7	-39693.7	600.3	51.9	31095.3	600.6	47.6	-28605.5	0.2	
			e	277.2	0.0	13.6	277.2	15.9	13171.4	277.9	15.9	-13194.7	600.3	51.8	31088.8	600.6	47.6	-28601.8	0.3	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			f	277.2	0.0	13.6	277.2	48.1	39635.3	277.9	47.7	-39691.3	600.3	51.8	31094.0	600.6	47.6	-28604.4	0.1			
			e	277.2	0.0	13.6	277.2	15.8	13170.8	277.9	15.9	-13195.9	600.3	51.8	31089.6	600.6	47.6	-28602.1	0.1			
			f	277.2	0.0	13.6	277.2	48.1	39635.4	277.9	47.7	-39686.8	600.3	51.8	31096.5	600.6	47.6	-28607.8	0.1			
9		33%(1)	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																									
Load level: 33%																									
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode					
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)							
1	100%	5%-10%	d	276.9	36.2	-30067.9	276.9	24.1	19791.5	277.7	59.9	-49827.4	600.1	52.1	31252.8	600.2	95.4	-57226.0	--	Import only					
			e	276.9	66.5	-55209.1	277.0	23.9	19799.8	277.0	90.4	-74984.8	600.1	8.2	4905.7	600.2	95.3	-57227.8	0.2						
			f	277.0	36.3	-30071.0	276.9	24.1	19792.1	277.7	59.9	-49837.2	600.1	52.0	31262.3	600.2	95.4	-57249.8	0.2						
			e	276.9	66.5	-55213.6	277.0	23.9	19799.2	277.0	90.4	-74992.6	600.1	8.2	4906.3	600.2	95.4	-57238.4	0.1						
			f	276.9	36.2	-30062.5	276.9	24.1	19791.9	277.7	59.9	-49819.1	600.1	52.1	31256.5	600.2	95.4	-57239.5	0.1						
			e	276.9	66.5	-55216.3	277.0	23.9	19799.6	277.0	90.4	-74996.6	600.1	8.2	4906.8	600.2	95.4	-57251.7	0.3						
			f	277.0	36.2	-30089.2	277.0	24.1	19791.9	277.7	59.9	-49870.1	600.1	52.1	31285.3	600.2	95.5	-57291.6	0.2						
2		100%	33%-66%	d	277.1	36.2	-30044.2	277.1	24.1	19796.8	277.7	59.8	-49780.1	600.2	51.9	31174.5	600.3	95.1	-57102.4		--	Import only			
				e	277.1	48.3	-40077.8	277.1	24.1	19800.2	277.8	72.3	-60148.5	600.2	34.5	20735.3	600.4	95.0	-57032.5		0.2				
				f	277.1	36.2	-30010.0	277.0	24.1	19797.0	277.7	59.8	-49769.7	600.2	51.9	31158.0	600.3	95.0	-57070.6		0.2				
				e	277.1	48.3	-40082.7	277.1	24.1	19800.3	277.8	72.3	-60158.0	600.2	34.6	20745.2	600.4	95.0	-57055.3		0.1				
				f	277.1	36.1	-30035.6	277.1	24.1	19797.8	277.7	59.8	-49761.5	600.2	51.9	31157.1	600.3	95.1	-27074.5		0.3				
				e	277.1	48.3	-40073.0	277.1	24.1	19800.2	277.8	72.3	-60142.0	600.2	34.6	20739.4	600.4	95.0	-57038.7		0.1				
				f	277.1	36.2	-30020.1	277.1	24.1	19797.7	277.7	59.8	-49730.3	600.2	51.9	31147.0	600.3	95.0	-57053.5		0.1				
3	66% ⁽¹⁾		5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--					
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--		
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--	--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																					
Load level: 33%																					
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
4		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(5) ESS external export current limit = $66 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

(6) ESS external export current limit = $33 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(7) ESS external export current limit = 0% to +5%, PV inputs = 0% + 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
0.1	100%	100%	d	277.1	72.5	60192.3	277.1	72.9	60036.9	277.8	0.0	11.6	600.2	0.0	5.1	600.4	95.0	57046.4	--	Import only		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.5	600.3	0.0	5.14	600.5	0.0	10.3	0.2			
			f	277.1	72.5	60194.6	277.0	72.9	60037.9	277.8	0.0	11.6	600.2	0.0	5.1	600.4	95.0	57051.3	0.2			
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.1			
			F	277.1	72.5	60218.2	277.1	72.9	60038.3	277.8	0.0	11.6	600.3	0.0	5.1	600.5	95.1	57090.7	0.3			
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.2			
f		277.1	72.5	60177.2	277.1	72.9	60039.0	277.8	0.0	11.6	600.3	0.0	5.1	600.5	95.0	57064.0	0.2					
2		100%	66%	d	277.1	47.7	39601.6	277.1	48.1	39614.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	39601.6		--	
				e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3		0.3	
				f	277.1	47.7	39614.6	277.1	48.1	39614.7	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38118.1		0.2	
				e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3		0.1	
				f	277.1	47.7	39612.3	277.1	48.1	39614.4	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38111.4		0.2	
	e			277.2	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.1			
f	277.1		47.7	39620.2	277.1	48.1	39615.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38109.3	0.1					
3	100%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
4	50%	100%	d	277.2	36.2	30029.6	277.1	72.9	60062.2	277.8	36.1	-30077.1	600.3	0.0	5.1	600.6	51.9	31224.9	--	Import only		
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.2			
			f	277.2	36.2	30028.6	277.2	72.9	60063.1	277.8	36.1	-30074.6	600.4	0.0	5.1	600.6	52.0	31221.0	0.3			
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.1			
			f	277.2	36.2	30040.1	277.2	72.9	60064.2	277.8	36.2	-30088.5	600.3	0.0	5.1	600.6	52.0	31230.2	0.3			
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.2			
5		50%	66%	d	277.2	36.2	30030.1	277.2	48.2	39629.7	277.9	11.5	-9601.2	600.3	0.0	5.2	600.6	52.0	31255.3		--	
				e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3		0.2	
				f	277.2	36.2	30045.5	277.2	48.1	39630.5	277.9	11.5	-9607.2	600.3	0.0	5.2	600.5	52.1	31276.3		0.3	
				e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3		0.1	
				f	277.2	36.2	30040.5	277.2	48.1	39630.9	277.9	11.5	-9605.2	600.3	0.0	5.2	600.6	52.1	31265.0		0.2	
				e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3		0.3	
6	50%		33% ⁽¹⁾	f	277.2	36.1	30023.9	277.2	48.1	39630.4	277.9	11.5	-9598.8	600.3	0.0	5.2	600.6	52.0	31253.4		0.2	
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
7		0%	100%	d	277.2	72.5	-60251.4	277.2	73.0	60132.8	277.9	144.7	-120434.3	600.4	0.0	5.2	600.6	95.2	-57153.6	--		
				e	277.2	72.5	-60204.8	277.2	0.0	1.8	277.9	72.3	-60160.0	600.3	0.0	5.2	600.6	95.1	-57134.4	0.2		
				f	277.2	72.5	-60233.2	277.2	73.0	60133.0	277.9	144.6	-120390.3	600.3	0.0	5.1	600.6	95.1	-57118.1	0.1		
				e	277.2	72.5	-60245.9	277.2	0.0	1.8	277.9	72.3	-60206.4	600.3	0.0	5.2	600.6	95.2	-57176.4	0.2		
				f	277.2	72.5	-60218.3	277.2	73.1	60133.9	277.9	144.6	-120350.3	600.3	0.0	5.1	600.6	95.1	-57095.0	0.3		
				e	277.2	72.5	-60238.0	277.2	0.0	1.8	277.9	72.3	-60201.8	600.3	0.0	5.2	600.6	95.2	-57178.5	0.2		
7	0%		100%	f	277.2	72.5	-60224.2	277.2	73.1	60134.3	277.9	144.6	-120360.0	600.3	0.0	5.1	600.6	95.1	-57114.3	0.1		

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
8		66%	d	277.2	72.5	-60241.4	277.2	48.2	39638.1	277.9	119.6	-99564.3	600.3	0.0	5.2	600.6	95.1	-57129.6	--		
			e	277.2	72.5	-60219.5	277.2	0.0	1.8	277.9	72.3	-60185.2	600.4	0.0	5.1	600.6	95.1	-57117.7	0.2		
			f	277.2	72.5	-60237.6	277.2	48.2	39638.1	277.9	119.6	-99560.0	600.4	0.0	5.2	600.7	95.1	-57127.2	0.1		
			e	277.2	72.5	-60230.2	277.2	0.0	1.8	277.9	72.3	-60185.9	600.4	0.0	5.1	600.6	95.1	-57108.1	0.2		
			f	277.2	72.5	-60226.1	277.2	48.1	39639.2	277.9	119.6	-99535.4	600.4	0.0	5.1	600.6	95.1	-57098.5	0.3		
			e	277.2	72.5	-60249.1	277.2	0.0	1.8	277.9	72.3	-60209.1	600.4	0.0	5.2	600.7	95.2	-57155.0	0.2		
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	277.2	72.4	60195.7	277.2	73.1	60148.7	277.9	0.0	11.6	600.4	0.0	5.2	600.6	103.9	62392.6	--	Import only			
			e	277.3	48.4	40241.8	277.2	48.8	40297.4	277.9	0.0	11.6	600.4	0.0	5.2	600.7	69.6	41814.4	0.2				
			f	277.2	72.5	60235.7	277.2	73.1	60149.0	277.9	0.0	11.6	600.4	0.0	5.2	600.6	104.0	62450.8	0.3				
			e	277.3	48.4	40257.6	277.2	48.8	40296.3	277.9	0.0	11.6	600.4	0.0	5.2	600.6	69.6	41828.3	0.1				
			f	277.2	72.5	60215.9	277.2	73.1	60147.2	277.9	0.0	11.6	600.4	0.0	5.2	600.7	104.0	62436.5	0.3				
			e	277.3	48.4	40254.4	277.2	48.8	40295.6	277.9	0.0	11.6	600.4	0.0	5.2	600.7	69.6	41819.2	0.1				
2		100%	66%	d	277.3	47.6	39564.4	277.3	48.2	39656.6	278.0	0.0	11.6	600.3	0.0	5.2	600.6	63.6	38213.3		--	Import only	
				e	277.3	31.9	26518.1	277.3	31.8	26295.5	278.0	0.0	11.6	600.4	0.0	5.2	600.7	45.9	27592.6		0.2		
				f	277.3	47.6	39572.5	277.3	48.2	39656.7	278.0	0.0	11.6	600.3	0.0	5.2	600.6	63.6	38223.0		0.1		
				e	277.3	31.9	26487.1	277.3	31.8	26296.0	278.0	0.0	11.6	600.4	0.0	5.2	600.6	45.9	27549.7		0.1		
				f	277.3	47.6	39557.7	277.3	48.2	39656.3	278.0	0.0	11.6	600.4	0.0	5.2	600.6	63.6	38205.6		0.2		
				e	277.3	31.9	26506.9	277.3	31.8	26297.0	278.0	0.0	11.6	600.4	0.0	5.2	600.6	45.9	27575.0		0.3		
3	100%		33% ⁽¹⁾	f	277.3	47.6	39564.5	277.3	48.2	39657.1	278.0	0.0	11.6	600.4	0.0	5.2	600.6	63.6	38217.1	0.2	Import only		
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
4		50%	100%	d	277.3	36.1	30034.2	277.3	72.9	60029.0	278.0	36.1	-30074.4	600.4	0.0	5.2	600.7	52.1	31277.3	--		Import only	
				e	277.3	36.2	30054.9	277.3	48.8	40310.4	278.0	12.2	-10187.9	600.4	0.0	5.2	600.6	52.1	31298.9	0.2			
				f	277.3	36.2	30049.8	277.3	72.9	60030.9	278.0	36.1	-30093.2	600.4	0.0	5.2	600.7	52.1	31289.2	0.3			
				e	277.3	36.2	30046.5	277.3	48.8	40312.8	278.0	12.2	-10184.5	600.4	0.0	5.2	600.7	52.1	31286.8	0.1			
				f	277.3	36.2	30053.5	277.3	72.9	60028.8	278.0	36.1	-30098.6	600.4	0.0	5.2	600.7	52.1	31292.7	0.1			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
5		66%	e	277.3	36.1	30039.9	277.3	48.8	40312.3	278.0	12.2	-10182.1	600.3	0.0	5.2	600.6	52.1	31287.1	0.2		
			f	277.3	36.1	30042.2	277.3	72.9	60031.4	278.0	36.1	-30086.6	600.4	0.0	5.2	600.7	52.1	31283.7	0.3		
			d	277.3	36.2	30073.8	277.3	48.2	39664.6	278.0	11.5	-9616.0	600.4	0.0	5.2	600.7	52.2	31338.0	--		
			e	277.3	31.7	26376.3	277.3	31.9	26362.1	278.0	0.0	11.6	600.3	0.0	5.2	600.6	45.6	27391.9	0.2		
			f	277.3	36.1	30040.5	277.3	48.2	39667.5	278.0	11.5	-9603.3	600.4	0.0	5.2	600.7	52.1	31296.9	0.1		
			e	277.3	31.7	26383.1	277.3	31.9	26361.8	278.0	0.0	11.6	600.3	0.0	5.2	600.6	45.6	27401.6	0.2		
			f	277.3	36.2	30064.1	277.3	48.2	39666.7	278.0	11.5	-9611.6	600.4	0.0	5.2	600.7	52.1	31323.7	0.3		
			e	277.3	31.7	26379.4	277.3	31.9	26360.6	278.0	0.0	11.6	600.3	0.0	5.2	600.6	45.6	27397.2	0.2		
			f	277.3	36.2	30067.5	277.3	48.2	39667.1	278.0	11.5	-9613.4	600.4	0.0	5.2	600.7	52.1	31320.4	0.2		
			6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--		--
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	0%	100%	d	277.3	72.5	-60240.7	277.3	72.9	60042.0	278.0	143.9	-119803.8	600.4	0.0	5.2	600.7	95.2	-57159.9	--	Import only	
			e	277.3	72.5	-60282.7	277.3	48.7	40259.2	278.0	120.6	-100449.5	600.4	0.0	5.2	600.7	95.2	-57206.6	0.2		
			f	277.3	72.5	-60255.3	277.3	72.9	60042.4	278.0	143.9	-119847.2	600.4	0.0	5.2	600.7	95.2	-57170.2	0.2		
			e	277.3	72.5	-60231.2	277.3	48.7	40260.0	278.0	120.5	-100348.3	600.4	0.0	5.2	600.7	95.1	-57151.6	0.3		
			f	277.3	72.5	-60243.9	277.3	72.9	60042.5	278.0	143.9	-119809.7	600.4	0.0	5.2	600.7	95.2	-57155.3	0.1		
			e	277.3	72.5	-60256.8	277.3	48.7	40258.8	278.0	120.6	-100391.5	600.4	0.0	5.2	600.7	95.2	-57175.6	0.1		
			f	277.3	72.5	-60262.0	277.3	72.9	60044.0	278.0	143.9	-119857.8	600.4	0.0	5.2	600.7	95.2	-57184.0	0.1		
8		66%	d	277.3	72.5	-60279.5	277.3	48.2	39671.9	278.0	119.4	-99399.2	600.4	0.0	5.2	600.7	95.2	-57201.9	--		
			e	277.3	72.4	-60218.2	277.3	31.9	26363.7	278.0	103.5	-86201.9	600.4	0.0	5.1	600.7	95.1	-57113.9	0.2		
			f	277.3	72.5	-60295.3	277.3	48.1	39669.9	278.0	119.4	-99423.7	600.4	0.0	5.2	600.7	95.3	-57221.5	0.3		
			e	277.3	72.5	-60219.4	277.3	31.9	26364.6	278.0	103.5	-86202.0	600.4	0.0	5.1	600.7	95.1	-57115.7	0.2		
			f	277.3	72.5	-60255.2	277.3	48.1	39670.4	278.0	119.3	-99346.0	600.4	0.0	5.2	600.7	95.2	-57185.9	0.2		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
9		33% ⁽¹⁾	e	277.3	72.5	-60275.5	277.3	31.9	26364.2	278.0	103.6	-86296.4	600.4	0.0	5.2	600.6	95.2	-57184.0	0.2			
			f	277.3	72.5	-60228.8	277.3	48.2	39669.8	278.0	119.2	-99294.7	600.4	0.0	5.2	600.7	95.1	-57140.2	0.1			
		d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	
		e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	
		e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	---
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	---
		e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	---
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---	---

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.0	72.6	60249.6	277.0	73.0	60014.9	277.7	0.0	11.6	600.2	0.0	5.2	600.3	105.2	63126.0	--	Import only
			e	277.1	23.9	19809.6	277.1	23.8	19797.1	277.8	0.0	11.6	600.2	0.0	5.2	600.3	34.4	20623.2	0.2	
			f	277.0	72.6	60253.2	277.0	72.9	60016.6	277.7	0.0	11.6	600.2	0.0	5.2	600.2	105.1	63112.8	0.3	
			e	277.1	23.9	19813.3	277.1	23.8	19797.7	277.7	0.0	11.6	600.2	0.0	5.2	600.3	34.4	20621.4	0.2	
			f	277.0	72.6	60250.6	277.0	72.9	60017.0	277.7	0.0	11.6	600.1	0.0	5.2	600.2	105.2	63120.0	0.3	
			e	277.1	23.9	19810.6	277.1	23.8	19797.2	277.7	0.0	11.6	600.2	0.0	5.2	600.3	34.4	2620.2	0.2	
			f	277.0	72.6	60274.7	277.0	72.9	60017.9	277.7	0.0	11.6	600.2	0.0	5.2	600.2	105.2	63142.9	0.3	
2	66%	66%	d	277.1	47.7	39601.6	277.1	48.1	39614.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38105.0	--	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.2	
			f	277.1	47.7	39614.6	277.1	48.1	39614.7	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38118.1	0.3	
			e	277.1	0.0	13.6	277.1	0.0	11.6	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.2	
			f	277.1	47.7	39612.3	277.1	48.1	39614.4	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38111.4	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
3		33% ⁽¹⁾	e	277.2	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.1		
			f	277.1	47.7	39620.2	27.1	48.1	39615.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38109.3	0.1		
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
4		100%	d	277.1	36.2	30042.3	277.1	73.0	60109.5	277.8	36.2	-30095.5	600.3	0.0	5.2	600.4	52.0	31207.5	--		
			e	277.2	23.8	19785.5	277.2	23.8	19807.7	277.8	0.0	11.6	600.2	0.0	5.2	600.4	34.7	20821.7	0.2		
			f	277.1	36.2	30054.5	277.1	73.0	60109.45	277.8	36.2	-30108.4	600.2	0.0	5.2	600.4	52.0	31216.3	0.3		
			e	277.2	23.8	19796.6	277.2	23.8	19808.5	277.9	0.0	11.6	600.2	0.0	5.2	600.4	34.7	20840.0	0.2		
			f	277.1	36.2	30063.5	277.1	73.0	60109.8	277.8	36.2	-30120.1	600.2	0.0	5.2	600.3	52.0	31222.6	0.1		
			e	277.2	23.8	19793.4	277.2	23.8	19808.6	277.8	0.0	11.6	600.2	0.0	5.2	600.4	34.7	20834.4	0.2		
5	50%	66%	f	277.1	36.2	30053.3	277.1	73.0	60109.9	277.8	36.2	-30107.8	600.2	0.0	5.2	600.4	52.0	31212.3	0.1	Import only	
			d	277.2	36.2	30054.0	277.2	48.1	39626.1	277.9	11.5	-9611.3	600.2	0.0	5.2	600.4	52.0	31221.7	--		
			e	227.2	15.9	13191.6	277.2	15.9	13168.6	277.9	0.0	11.6	600.3	0.0	5.1	600.4	22.9	13750.2	0.2		
			f	277.2	36.2	30047.3	277.2	48.1	39626.0	277.9	11.5	-9609.0	600.2	0.0	5.2	600.4	52.0	31211.1	0.2		
			e	277.2	15.9	13189.9	277.2	15.9	13168.4	277.9	0.0	11.6	600.3	0.0	5.2	600.4	22.9	13755.1	0.1		
			f	277.2	36.2	30057.0	277.2	48.1	39626.5	277.9	11.5	-9611.1	600.3	0.0	5.1	600.4	52.0	31208.2	0.2		
6		33% ⁽¹⁾	e	277.2	15.9	13195.1	277.2	15.9	13169.1	277.9	0.0	11.6	600.3	0.0	5.2	600.4	22.9	13763.1	0.1		
			f	277.2	36.2	30059.6	277.2	48.1	39627.2	277.9	11.5	-9613.0	600.3	0.0	5.1	600.4	51.9	31203.1	0.3		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
7	0%	100%	d	277.2	72.5	-60264.4	277.2	73.0	60130.7	277.9	144.6	-120353.0	600.3	0.0	5.2	600.4	95.1	-57079.6	--	Import only		
			e	277.2	72.4	-60108.5	277.2	23.8	19815.3	277.9	96.0	-79895.1	600.3	0.0	5.1	600.5	95.0	-57065.4	0.2			
			f	277.2	72.5	-60210.4	277.2	73.0	60130.7	277.9	144.4	-120224.4	600.3	0.0	5.1	600.4	95.0	-57017.6	0.3			
			e	277.2	72.3	-60097.1	277.2	23.8	19815.3	277.9	96.0	-79876.4	600.3	0.0	5.1	600.5	95.0	-57058.1	0.1			
			f	277.2	72.5	-60247.9	277.2	73.0	60131.6	277.9	144.5	-120313.5	600.2	0.0	5.1	600.4	95.0	-57059.5	0.2			
			e	277.2	72.4	-60124.1	277.2	23.8	19814.3	277.9	96.0	-79917.9	600.3	0.0	5.2	600.5	95.1	-57097.0	0.1			
				f	277.2	72.5	-60229.1	277.2	73.0	60133.6	277.9	144.5	-120269.4	600.3	0.0	5.1	600.4	95.0	-57061.2		0.1	
8		0%	66%	d	277.2	72.3	-60104.3	277.2	48.1	39638.0	277.9	118.9	-98989.5	600.3	0.0	5.1	600.5	95.0	-57031.3		--	
				e	277.2	72.3	-60096.5	277.2	15.8	13170.6	277.9	88.3	-73511.8	600.3	0.0	5.1	600.5	95.0	-57046.8		0.2	
				f	277.2	72.3	-60104.3	277.2	48.1	39638.5	277.9	118.9	-98989.5	600.3	0.0	5.1	600.5	95.0	-57033.4		0.3	
				e	277.2	72.3	-60101.3	277.2	15.8	13171.8	277.9	88.3	-73509.5	600.3	0.0	5.1	600.5	95.0	-57046.4		0.2	
				f	277.2	72.3	-60088.4	277.2	48.1	39637.9	277.9	118.9	-98956.4	600.3	0.0	5.1	600.5	95.0	-57027.6		0.2	
	e			277.2	72.3	-60092.5	277.2	15.8	13172.2	277.9	88.3	-73497.8	600.3	0.0	5.1	600.5	95.0	-57039.9	0.2			
				f	277.2	72.4	-60111.4	277.2	48.1	39639.7	277.9	118.9	-99007.7	600.3	0.0	5.1	600.5	95.0	-57045.1		0.1	
9	0%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																									
Load level: 33%																									
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode					
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)							
1	100%	5%-10%	d	277.2	23.9	19849.6	277.2	24.1	19820.9	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20804.0	--	Import only					
			e	277.2	23.9	19841.9	277.2	24.1	19822.9	277.9	0.0	11.6	600.3	8.2	4934.8	600.5	26.2	15738.9	0.2						
			f	277.2	23.9	19851.2	277.2	24.1	19821.6	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20801.7	0.1						
			e	277.2	23.9	19839.7	277.2	24.1	19823.3	277.9	0.0	11.6	600.3	8.2	4934.7	600.5	26.2	15739.4	0.2						
			f	277.2	23.9	19839.5	277.2	24.1	19821.6	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20785.7	0.3						
			e	277.2	23.9	19845.0	277.2	24.1	19823.0	277.9	0.0	11.6	600.3	8.2	4935.8	600.6	26.2	15743.7	0.1						
			f	277.2	23.9	19862.4	277.2	24.1	19822.1	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.7	20815.2	0.3						
2		100%	33%-66%	d	277.2	23.9	19858.5	277.2	24.1	19823.2	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20805.2	--	--				
				e	277.2	23.9	19848.2	277.2	24.1	19823.5	277.9	0.0	11.6	600.3	34.0	20426.3	600.5	0.0	10.3	0.2					
				f	277.2	23.9	19851.1	277.2	24.1	19823.7	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20788.2	0.3					
				e	277.3	23.9	19841.3	277.2	24.1	19824.1	277.9	0.0	11.6	600.3	34.0	20411.6	600.5	0.0	10.3	0.2					
				f	277.2	23.9	19846.6	277.2	24.1	19823.4	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20790.9	0.1					
				e	277.3	23.9	19842.0	277.2	24.1	19824.3	277.9	0.0	11.6	600.3	34.0	20414.8	600.6	0.0	10.3	0.3					
3			66% ⁽¹⁾	5%-10%	f	277.2	23.9	19850.3	277.2	24.1	19823.7	277.9	0.0	11.6	600.4	0.0	5.1	600.5	34.6	20797.5		0.2	--		
	d				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--			
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	--
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	--
4	66% ⁽¹⁾			33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--		
		e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
		f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
		e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																							
Load level: 33%																							
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
6		33% ⁽¹⁾	33%-66%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--

Note (1): Because the 33% and 66% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(8) ESS external export current limit = $66 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

(9) ESS external export current limit = $33 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204.5 Import limiting to Energy Storage Systems

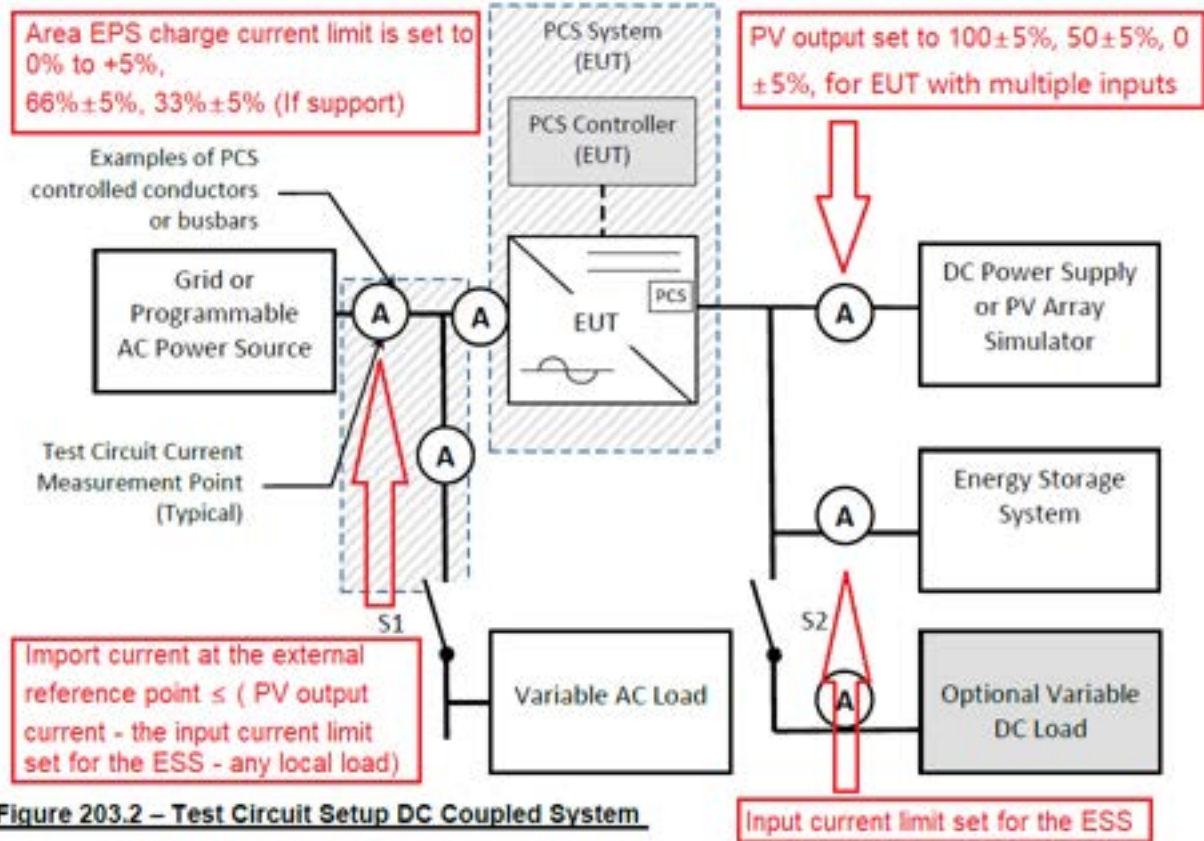
Testing date: See page 2.

Test Method:

204.5.1 Where the PCS includes ability to limit current flow from the Area EPS to an Energy Storage System (ESS), i.e. ESS grid charge limiting, repeat the test sequence in 203.5 and 203.6 at the following conditions:

- a) Install any external current sensors, if applicable, in accordance with the instructions supplied by the manufacturer.
- b) Set or verify that the ESS is at **the lowest state of charge** the ESS can support for the duration of the tests without causing damage or mis-operation. The lowest state of charge operating condition shall be specified by the manufacturer.
- c) Set or verify that the Area EPS charge current limit is set to 0% to +5% of EUT nameplate rating.
- d) For EUT's with multiple inputs, such as PV and ESS, set or verify the other, non ESS, inputs are set to 100% +/-5% of their nameplate ratings.
- e) Where the PCS only supports zero charging from the Area EPS steps f) and g) may be omitted.
- f) Run test 203.5 and 203.6 and record current flows including current flow from the Area EPS or programmable ac power source and the input of the ESS. The timing of the step transitions, Th1 and Th2, in Figure 203.3 shall be selected to achieve steady state conditions in all current sensors including the external current sensor at the external reference point and at the output of the ESS.
- g) Repeat steps b) through d) above with external charge current limit set to 66% (+/- 5%) and 33%(+/- 5%) of EUT nameplate rating.
- h) For EUT's with multiple inputs, such as PV and ESS, repeat steps c) through g) with the other, non ESS, inputs set to 50% +/- 5% and 0% +5% of their nameplate ratings

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		



Criteria:

204.5.2 For EUT's with multiple inputs, such as PV and ESS, the EUT shall be considered in compliance if the steady state import current at the external reference point does not exceed the sum of the PV output current minus the input current limit set for the ESS minus any local load. For DC coupled systems the EUT input current, shall be considered to be proportional to the sum of the relative current flows of each source.

ie. $I_{from\ grid} \leq I_{PV} - I_{ESS\ limit} - I_{load}$ (Clause 204.5.2)

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

(1) ESS external charge current limit = 0% to +5%, PV inputs = 100% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.1

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	277.0	72.2	59947.6	277.0	72.7	60113.0	277.0	0.0	11.5	600.1	103.6	62160.6	600.6	0.0	10.3	--	Non-exchange			
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	103.7	62255.7	600.7	95.1	-57104.0	0.1				
			f	277.0	72.3	59992.6	277.0	72.7	60127.0	277.0	0.0	11.6	600.1	103.7	62213.4	600.7	0.0	10.3	0.2				
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	103.8	62276.5	600.7	95.1	-57134.6	0.1				
			f	277.0	72.3	59977.2	277.0	72.7	60133.6	277.0	0.0	11.6	600.2	103.6	62201.9	600.7	0.0	10.3	0.3				
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	103.8	62293.3	600.7	95.2	-57161.4	0.1				
			f	277.0	72.3	59995.0	277.0	72.7	60136.7	277.0	0.0	11.6	600.1	103.7	62221.8	600.6	0.0	10.3	0.2				
2		100%	66%	d	277.0	47.7	39604.9	277.0	47.9	39639.4	277.1	0.0	11.6	600.2	103.7	62249.4	600.7	32.3	-19379.4		--	Non-exchange	
				e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62317.2	600.8	95.2	-57169.2		0.1		
				f	277.0	47.7	39593.4	277.0	47.9	39639.7	277.1	0.0	11.6	600.2	103.7	62234.0	600.7	32.2	-19370.5		0.2		
				e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62325.0	600.8	95.1	-57158.2		0.2		
				f	277.0	47.7	39628.3	277.0	47.9	39640.2	277.1	0.0	11.6	600.2	103.8	62296.2	600.7	32.3	-19395.0		0.3		
				e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62306.2	600.8	95.1	-57143.2		0.2		
3			100%	33% ⁽¹⁾	f	277.0	47.7	39631.4	277.0	47.9	39642.1	277.1	0.0	11.6	600.2	103.8	62304.5	600.8	32.3		-19401.4		0.1
	d				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
3	100%			33% ⁽¹⁾	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		Non-exchange
					d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
					e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
					f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4		100%	d	277.1	36.3	30100.6	277.1	72.5	60008.5	277.1	36.1	-29974.4	600.3	103.9	62342.8	600.8	47.4	-28506.7	--	Non-exchange	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62322.7	600.8	95.2	-57204.4	0.1		
			f	277.1	36.2	30077.3	277.1	72.5	60009.1	277.1	36.1	-29946.7	600.3	103.8	62290.4	600.8	47.4	-28488.4	0.2		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.9	62364.0	600.9	95.3	-57250.0	0.3		
			f	277.1	36.3	30104.2	277.1	72.5	60010.2	277.1	36.1	-29977.5	600.3	103.9	62342.3	600.8	47.4	-28499.1	0.2		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62323.8	600.9	95.2	-57199.6	0.1		
5	50%	66%	f	277.1	36.2	30090.6	277.1	72.5	60010.0	277.1	36.1	-29961.2	600.3	103.8	62309.7	600.8	47.4	-28491.1	0.3	Non-exchange	
			d	277.1	36.2	30098.5	277.1	47.9	39651.3	277.1	11.6	-9604.5	600.4	103.8	62335.1	600.8	47.4	-28493.7	--		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62316.8	600.9	95.1	-57164.6	0.2		
			f	277.1	36.2	30085.4	277.1	47.9	39651.0	277.1	11.6	-9599.1	600.4	103.8	62306.5	600.8	47.4	-28471.7	0.2		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62304.9	600.8	95.1	-57157.9	0.1		
			f	277.1	36.2	30085.6	277.1	47.9	39652.1	277.1	11.6	-9599.1	600.4	103.8	62306.5	600.9	47.4	-28482.4	0.1		
6		33% ⁽¹⁾	e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62331.5	600.8	95.2	-57178.6	0.1	Non-exchange	
			f	277.1	36.2	30091.2	277.1	47.9	39653.1	277.1	11.6	-9601.6	600.4	103.8	62319.1	600.9	47.4	-28479.4	0.3		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
7	0%	100%	d	276.9	0.0	13.6	277.0	72.6	60017.6	277.0	72.4	-60032.5	600.2	103.6	62154.0	600.5	95.3	-57213.6	--	Non-exchange	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	103.5	62153.9	600.6	95.2	-57205.8	0.1		
			f	276.9	0.0	13.6	277.0	72.6	60017.0	277.0	72.4	-60050.0	600.2	103.6	62168.7	600.5	95.3	-57235.7	0.2		
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.4	103.5	62138.8	600.6	95.2	-57170.3	0.1		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	f	276.9	0.0	13.6	277.0	72.6	60017.8	277.0	72.4	-60031.5	600.3	103.6	62155.3	600.5	95.3	-57232.1	0.2	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	103.5	62141.6	600.6	95.1	-57129.5	0.3	
			f	276.9	0.0	13.6	277.0	72.6	60019.0	277.0	72.4	-60046.3	600.2	103.6	62173.1	600.5	95.3	-57242.3	0.2	
		d	277.0	0.0	13.6	277.0	47.9	39640.0	277.1	47.7	-39598.1	600.4	103.5	62136.1	600.7	95.1	-57108.6	--		
		e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.4	103.4	62107.8	600.8	95.0	-57087.8	0.2		
		f	277.0	0.0	13.6	277.0	47.9	39640.3	277.1	47.7	-39585.9	600.4	103.5	62122.5	600.7	95.1	-57109.9	0.1		
		e	277.0	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.4	103.5	62134.2	600.8	95.1	-57102.3	0.2		
		f	277.0	0.0	13.6	277.0	47.9	39640.4	277.1	47.7	-39574.1	600.4	103.4	62103.6	600.7	95.0	-57088.0	0.2		
		e	277.0	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.4	103.5	62123.6	600.8	95.0	-57089.4	0.1		
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																								
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode				
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)						
1	100%	100%	d	277.1	72.3	60048.4	277.1	72.6	60057.9	277.1	0.0	11.6	600.2	103.7	62232.3	600.3	0.0	10.3	--	Non-exchange				
			e	277.1	48.5	40247.6	277.1	48.5	40211.5	277.2	0.0	11.6	600.3	103.7	62257.4	600.3	31.3	-18808.1	0.2					
			f	277.1	72.3	60012.0	277.1	72.6	60059.9	277.1	0.0	11.6	600.3	103.6	62195.3	600.3	0.0	10.3	0.1					
			e	277.1	48.5	40248.1	277.1	48.5	40209.5	277.2	0.0	11.6	600.3	103.7	62257.8	600.4	31.3	-18811.2	0.2					
			f	277.1	72.3	60007.2	277.1	72.6	60059.4	277.1	0.0	11.6	600.3	103.6	62187.4	600.3	0.0	10.3	0.1					
			e	277.1	48.5	40246.0	277.1	48.5	40210.1	277.2	0.0	11.6	600.3	103.7	62254.5	600.4	31.3	-18808.9	0.2					
2		100%	66%	f	277.1	72.3	60026.5	277.1	72.6	60060.5	277.1	0.0	11.6	600.3	103.6	62218.3	600.3	0.0	10.3		0.1	Non-exchange		
				d	277.1	47.7	39636.2	277.2	47.8	39599.8	277.2	0.0	11.6	600.2	103.7	62250.9	600.3	32.3	-19397.0		--			
				e	277.1	31.8	26445.7	277.2	31.9	26405.5	277.2	0.0	11.6	600.2	103.8	62301.6	600.1	53.3	-31965.6		0.2			
				f	277.1	47.7	39634.3	277.2	47.8	39600.0	277.2	0.0	11.6	600.2	103.7	62249.4	600.3	32.3	-19396.8		0.2			
				e	277.1	31.8	26430.7	277.2	31.9	26404.1	277.2	0.0	11.6	600.2	103.7	62265.8	600.1	53.2	-31941.0		0.1			
				f	277.1	47.7	39651.4	277.2	47.8	39599.6	277.2	0.0	11.6	600.2	103.8	62276.8	600.3	32.3	-19396.2		0.2			
3	100%		33% ⁽¹⁾	e	277.1	31.8	26430.3	277.2	31.9	26403.9	277.2	0.0	11.6	600.2	103.7	62266.2	600.1	53.2	-31944.2		0.1		Non-exchange	
				f	277.1	47.7	39643.9	277.2	47.8	39599.8	277.2	0.0	11.6	600.2	103.7	62262.5	600.3	32.3	-19398.0		0.2			
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--			--
4		50%	100%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Non-exchange			
				d	277.0	36.1	29990.3	277.0	72.5	60027.4	277.1	36.2	-30013.4	600.2	103.7	62245.2	600.4	47.6	-28551.1	--				
				e	277.0	36.1	29995.5	277.0	48.6	40240.0	277.1	11.7	-9700.4	600.3	103.7	62254.5	600.5	47.6	-28559.1	0.2				
				f	277.0	36.1	29989.7	277.0	72.5	60028.8	277.1	36.2	-30010.7	600.3	103.7	62243.2	600.5	47.5	-28538.6	0.1				
				e	277.0	36.1	29975.9	277.0	48.6	40240.6	277.1	11.7	-9692.9	600.3	103.6	62214.8	600.5	47.5	-28542.9	0.2				
f			277.0	36.1	29981.1	277.0	72.5	60028.0	277.1	36.1	-30000.9	600.3	103.7	62226.3	600.4	47.5	-28531.3	0.1						

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
5	0%	66%	e	277.0	36.1	29975.9	277.0	48.6	40240.6	277.1	11.7	-9692.9	600.3	103.6	62214.8	600.5	47.5	-28542.9	0.2	Non-exchange
			f	277.0	36.1	29979.7	277.0	72.5	60028.1	277.1	36.1	-29999.0	600.3	103.7	62222.6	600.4	47.5	-28531.8	0.3	
			d	277.0	36.1	29985.3	277.1	47.9	39608.7	277.1	11.0	-9117.2	600.2	103.7	62224.2	600.5	47.5	-28550.6	--	
			e	277.0	31.8	26416.7	277.1	31.9	26432.9	277.1	0.0	11.6	600.3	103.7	62227.5	600.5	53.2	-31927.3	0.2	
			f	277.0	36.1	29989.7	277.1	47.9	39609.0	277.1	11.0	-9118.8	600.2	103.7	62236.7	600.5	47.6	-28552.4	0.3	
			e	277.0	31.8	26397.8	277.1	31.9	26435.0	277.1	0.0	11.6	600.3	103.6	62188.4	600.6	53.1	-31904.5	0.2	
			f	277.0	36.1	29985.2	277.1	47.9	39608.8	277.1	11.0	-9117.2	600.3	103.7	62228.9	600.5	47.6	-28553.7	0.1	
			e	277.0	31.8	26408.1	277.1	31.9	26434.2	277.1	0.0	11.6	600.3	103.6	62211.1	600.6	53.2	-31918.3	0.2	
			f	277.0	36.1	29977.3	277.1	47.9	39608.5	277.1	11.0	-9114.4	600.3	103.6	62213.8	600.5	47.5	-28544.1	0.1	
			6	0%	33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
f	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
e	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	277.0	0.0	13.6	277.1	72.5	60045.6	277.1	72.3	-60004.9	600.3	103.7	62232.3	600.5	95.5	-57343.7	--	Non-exchange
			e	277.1	0.0	13.6	277.1	48.5	40203.7	277.1	48.4	-40189.2	600.3	103.6	62219.0	600.6	95.4	-57294.9	0.2	
			f	277.0	0.0	13.6	277.1	72.5	60047.5	277.1	72.3	-60006.1	600.3	103.7	62233.6	600.6	95.4	-57317.4	0.1	
			e	277.1	0.0	13.6	277.1	48.5	40204.6	277.1	48.4	-40166.7	600.3	103.6	62185.5	600.6	95.4	-57265.2	0.3	
			f	277.1	0.0	13.6	277.1	72.5	60048.6	277.1	72.3	-59986.0	600.3	103.6	62212.9	600.5	95.4	-57283.2	0.2	
			e	277.1	0.0	13.6	277.1	48.5	40206.4	277.1	48.4	-40173.3	600.3	103.6	62192.8	600.6	95.4	-57293.3	0.1	
8	0%	66%	f	277.0	0.0	13.6	277.1	72.5	60047.2	277.1	72.3	-59977.0	600.3	103.6	62202.9	600.6	95.4	-57272.0	0.2	Non-exchange
			d	277.1	0.0	13.6	277.1	47.9	39617.6	277.1	47.7	-39605.9	600.4	103.6	62214.9	600.6	95.4	-57295.7	--	
			e	277.1	0.0	13.6	277.1	31.9	26418.5	277.1	31.8	-26421.9	600.4	103.6	62202.5	600.6	95.3	-57267.3	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39617.8	277.1	47.7	-39607.6	600.3	103.6	62218.4	600.6	95.4	-57281.3	0.1	
			e	277.1	0.0	13.6	277.1	31.9	26418.2	277.1	31.8	-26417.2	600.4	103.6	62191.7	600.7	95.4	-57274.7	0.2	
f	277.1	0.0	13.6	277.1	47.9	39618.6	277.1	47.7	-39613.7	600.3	103.7	62222.1	600.6	95.4	-57288.8	0.3				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
9		33% ⁽¹⁾	e	277.1	0.0	13.6	277.1	31.9	26419.2	277.1	31.8	-26404.9	600.3	103.6	62168.0	600.6	95.3	-57225.4	0.2	Non-exchange		
			f	277.1	0.0	13.6	277.1	47.9	39618.5	277.1	47.7	-39610.1	600.3	103.6	62215.2	600.6	95.4	-57295.0	0.1			
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		Non-exchange	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.1	72.1	59907.4	277.1	72.5	60062.5	277.1	0.0	11.6	600.4	103.5	62162.0	600.7	0.0	10.3	--	Non-exchange
			e	277.1	23.9	19813.5	277.1	23.8	19809.8	277.2	0.0	11.6	600.4	103.5	62165.1	600.7	63.6	-38185.7	0.1	
			f	277.1	72.1	59907.4	277.1	72.5	60062.3	277.1	0.0	11.6	600.4	103.5	62147.0	600.7	0.0	10.3	0.2	
			e	277.1	23.8	19805.3	277.1	23.8	19809.9	277.2	0.0	11.6	600.4	103.5	62137.0	600.7	63.5	-38169.2	0.2	
			f	277.1	72.1	59913.0	277.1	72.5	60063.1	277.1	0.0	11.6	600.4	103.5	62162.4	600.7	0.0	10.3	0.1	
			e	277.1	23.9	19808.1	277.1	23.8	19810.1	277.2	0.0	11.6	600.4	103.5	62145.8	600.7	63.6	-38191.3	0.3	
2	100%	66%	f	277.1	72.1	59908.5	277.1	72.5	60064.7	277.2	0.0	11.6	600.4	103.5	62159.4	600.7	0.0	10.3	0.2	Non-exchange
			d	277.1	47.7	39637.3	277.1	47.9	39629.4	277.2	0.0	11.6	600.4	103.6	62182.4	600.7	32.2	-19363.9	--	
			e	277.1	15.9	13217.4	277.1	15.9	13200.0	277.2	0.0	11.6	600.4	103.6	62212.8	600.7	74.1	-44485.4	0.1	
			f	277.1	47.7	39633.4	277.1	47.9	39628.8	277.2	0.0	11.6	600.4	103.6	62177.3	600.7	32.2	-19369.3	0.2	
			e	277.1	15.9	13213.3	277.1	15.9	13199.9	277.2	0.0	11.6	600.4	103.6	62198.5	600.7	74.1	-44485.5	0.3	
			f	277.1	47.7	39633.4	277.1	47.9	39630.4	277.2	0.0	11.6	600.4	103.6	62173.5	600.7	32.2	-19365.8	0.1	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
3		33% ⁽¹⁾	e	277.1	15.9	13210.6	277.1	15.9	13200.0	277.2	0.0	11.6	600.4	103.6	62181.3	600.7	74.1	-44483.7	0.2	Non-exchange
			f	277.1	47.7	39644.8	277.1	47.9	39629.3	277.2	0.0	11.6	600.4	103.6	62185.9	600.7	32.2	-19367.7	0.2	
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4		100%	d	277.1	36.3	30113.2	277.1	72.5	60029.6	277.1	36.2	-30044.5	600.3	103.6	62161.3	600.6	47.4	-28496.6	--	
			e	277.1	23.9	19820.6	277.1	23.8	19799.3	277.1	0.0	11.6	600.3	103.6	62165.3	600.6	63.6	-38189.6	0.2	
			f	277.1	36.3	30106.8	277.1	72.5	60032.0	277.1	36.2	-30037.9	600.3	103.6	62154.4	600.6	47.4	-28478.3	0.2	
			e	277.1	23.9	19814.3	277.1	23.8	19798.8	277.1	0.0	11.6	600.3	103.5	62141.8	600.7	63.6	-38172.3	0.1	
			f	277.1	36.3	30107.0	277.1	72.5	60033.8	277.1	36.2	-30037.6	600.3	103.5	62158.8	600.6	47.4	-28493.4	0.2	
			e	277.1	23.9	19811.3	277.1	23.8	19799.4	277.1	0.0	11.6	600.3	103.5	62131.9	600.6	63.6	-38170.2	0.1	
5	50%	66%	f	277.1	36.3	30106.5	277.1	72.5	60031.4	277.1	36.2	-30036.2	600.3	103.5	62155.8	600.7	47.4	-28498.9	0.2	
			d	277.1	36.2	30094.6	277.1	47.9	39610.2	277.1	11.6	-9601.9	600.3	103.5	62144.5	600.6	47.4	-28495.1	--	
			e	277.1	15.9	13214.9	277.1	15.9	13189.2	277.2	0.0	11.6	600.4	103.6	62181.0	600.7	74.0	-44468.5	0.3	
			f	277.1	36.2	30089.3	277.1	47.9	39609.5	277.1	11.6	-9600.0	600.4	103.5	62136.9	600.7	47.4	-28479.8	0.2	
			e	277.1	15.9	13207.5	277.1	15.9	13189.7	277.2	0.0	11.6	600.4	103.5	62143.7	600.7	74.0	-44440.1	0.2	
			f	277.1	36.2	30099.8	277.1	47.9	39610.7	277.1	11.6	-9604.1	600.4	103.5	62158.1	600.7	47.4	-28487.2	0.1	
6		33% ⁽¹⁾	e	277.1	15.9	13211.8	277.1	15.9	13189.5	277.2	0.0	11.6	600.4	103.6	62168.3	600.7	74.0	-44452.0	0.2	
			f	277.1	36.3	30102.8	277.1	47.9	39611.0	277.2	11.6	-9605.1	600.4	103.6	62170.1	600.7	47.5	-28507.1	0.3	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
7	0%	100%	d	277.1	0.0	13.6	277.1	72.6	60047.7	277.2	72.2	-59935.1	600.4	103.5	62168.0	600.7	95.2	-57209.4	--	Non-exchange			
			e	277.1	0.0	13.7	277.1	23.9	19828.2	277.1	23.9	-19818.0	600.2	103.8	62327.1	600.3	95.5	-57312.4	0.2				
			f	277.1	0.0	13.6	277.1	72.5	60048.4	277.2	72.2	-59941.7	600.4	103.6	62169.5	600.7	95.2	-57208.4	0.1				
			e	277.1	0.0	13.7	277.1	23.9	19824.5	277.1	23.9	-19825.9	600.2	103.9	62348.0	600.2	95.5	-57330.4	0.3				
			f	277.1	0.0	13.6	277.1	72.5	60047.0	277.2	72.2	-59921.7	600.4	103.5	62151.9	600.7	95.2	-57193.3	0.2				
			e	277.1	0.0	13.7	277.1	23.9	19824.4	277.1	23.9	-19824.8	600.2	103.9	62345.2	600.2	95.5	-57325.7	0.1				
				f	277.1	0.0	13.6	277.1	72.5	60048.4	277.2	72.1	-59901.0	600.4	103.5	62134.9	600.7	95.2	-57181.9		0.2		
8		0%	66%	d	277.1	0.0	13.6	277.2	47.8	39587.1	277.2	47.8	-39687.0	600.4	103.5	62157.3	600.7	95.3	-57218.1		--		
				e	277.1	0.0	13.6	277.2	15.9	13211.3	277.2	15.9	-13193.9	600.4	103.6	62180.5	600.7	95.3	-57228.8		0.2		
				f	277.1	0.0	13.6	277.2	47.8	39587.0	277.2	47.8	-39677.9	600.4	103.5	62148.4	600.7	95.2	-57200.8		0.2		
				e	277.1	0.0	13.6	277.2	15.9	13213.9	277.2	15.9	-13196.4	600.3	103.6	62190.7	600.6	95.3	-57229.8		0.2		
				f	277.1	0.0	13.6	277.2	47.8	39586.2	277.2	47.8	-39663.4	600.4	103.5	62128.5	600.7	95.2	-57161.3		0.1		
	e			277.1	0.0	13.6	277.2	15.9	13211.9	277.2	15.9	-13195.2	600.4	103.6	62181.9	600.6	95.3	-57220.9	0.1				
				f	277.1	0.0	13.6	277.2	47.8	39587.5	277.2	47.8	-39692.8	600.4	103.6	62172.6	600.7	95.2	-57210.3		0.3		
9	0%		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																							
Load level: 33%																							
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	5%-10%	d	277.0	23.9	19800.0	277.0	24.0	19900.0	277.0	0.0	11.6	600.2	103.6	62168.1	600.4	63.6	-38194.4	--	Non-exchange			
			e	277.0	0.0	13.6	277.0	23.9	19800.0	277.1	18.1	-15004.1	600.3	8.4	5015.5	600.5	0.0	10.3	0.2				
			f	277.0	23.9	19802.9	277.0	24.0	19900.0	277.0	0.0	11.6	600.3	103.6	62157.3	600.4	63.6	-38196.8	0.3				
			e	277.0	0.0	13.6	277.0	23.9	19800.0	277.1	18.1	-15009.4	600.3	8.4	5016.9	600.5	0.0	10.3	0.2				
			f	277.0	23.9	19800.0	277.0	24.0	19900.0	277.0	0.0	11.6	600.3	103.5	62141.1	600.4	63.6	-38181.0	0.2				
			e	277.0	0.0	13.6	277.0	23.9	19800.0	277.1	18.1	-15010.9	600.3	8.4	5017.6	600.5	0.0	10.3	0.1				
			f	277.0	23.9	19800.0	277.0	24.0	19900.0	277.0	0.0	11.6	600.2	103.6	62177.2	600.4	63.6	-38204.6	0.1				
2		100%	33%-66%	d	276.9	23.9	19827.1	277.0	24.0	19876.6	277.0	0.0	11.6	600.2	103.6	62174.0	600.4	63.6	-38192.8		--	Non-exchange	
				e	277.0	36.1	29986.3	277.1	23.9	19800.0	277.1	12.3	10194.8	600.3	52.2	31316.9	600.5	0.0	10.3		0.2		
				f	276.9	23.9	19822.2	277.0	24.0	19880.0	277.0	0.0	11.6	600.2	103.6	62158.3	600.4	63.6	-38194.1		0.2		
				e	277.0	36.1	29986.5	277.1	23.9	19800.0	277.1	12.3	10195.1	600.3	52.2	31318.4	600.5	0.0	10.3		0.1		
				f	276.9	23.9	19823.2	277.0	24.0	19880.0	277.0	0.0	11.6	600.2	103.6	62167.6	600.4	63.7	-38218.3		0.2		
				e	277.0	36.1	29990.4	277.1	23.9	19800.1	277.1	12.3	10196.6	600.3	52.2	31324.2	600.5	0.0	10.3		0.3		
3			66% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4	66% ⁽¹⁾			33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																						
Load level: 33%																						
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Non-exchange	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
6		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(2) ESS external charge current limit = $66 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

(3) ESS external charge current limit = $33 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(4) ESS external charge current limit = 0% to +5%, PV inputs = 50% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.1

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
1	100%	100%	d	276.9	0.0	13.6	276.9	72.5	60013.0	276.9	72.3	-59951.3	600.2	52.1	31292.5	600.4	47.5	-28500.4	--	Export only	
			e	276.9	0.0	13.6	276.9	0.0	1.8	277.0	0.0	11.6	600.2	52.2	31303.6	600.5	47.5	-28525.3	0.2		
			f	276.9	0.0	13.6	276.9	72.5	60013.5	276.9	72.3	-59974.4	600.2	52.2	31304.5	600.4	47.5	-28520.4	0.1		
			e	276.9	0.0	13.6	276.9	0.0	1.8	277.0	0.0	11.6	600.2	52.2	31311.9	600.5	47.5	-28533.5	0.1		
			f	276.9	0.0	13.6	276.9	72.5	60016.6	277.0	72.3	-60004.2	600.2	52.2	31319.6	600.4	47.5	-28531.8	0.1		
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	52.2	31308.1	600.5	47.5	-28530.3	0.2		
			f	276.9	0.0	13.6	276.9	72.5	60017.7	277.0	72.3	-59994.1	600.2	52.2	31312.0	600.4	47.5	-28529.5	0.3		
2	100%	66%	d	276.9	0.0	13.6	277.0	47.9	39622.9	277.0	47.7	-39559.7	600.2	52.1	31279.4	600.5	47.5	-28511.7	--		
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	52.1	31286.4	600.5	47.5	-28520.7	0.1		
			f	276.9	0.0	13.6	277.0	47.9	39625.1	277.0	47.7	-39561.4	600.3	52.1	31279.8	600.5	47.5	-28513.5	0.2		
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	52.2	31304.3	600.5	47.5	-28537.5	0.2		
			f	276.9	0.0	13.6	277.0	47.9	39625.8	277.0	47.7	-39559.8	600.3	52.1	31276.8	600.5	47.5	-28517.7	0.2		
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	52.1	31296.6	600.5	47.5	-28527.5	0.3		
3	33% ⁽¹⁾	33% ⁽¹⁾	f	276.9	0.0	13.6	277.0	47.9	39627.2	277.0	47.7	-39580.1	600.3	52.1	31293.0	600.5	47.5	-28530.3	0.1		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
4	50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
5		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1		100%	d	277.1	0.0	13.6	277.2	72.5	60015.9	277.2	72.4	-60085.4	600.4	52.0	31236.5	600.9	47.3	-28424.5	--	Export only
			e	277.1	0.0	13.6	277.2	48.5	40210.3	277.2	48.4	-40215.4	600.5	52.0	31242.6	600.9	47.3	-28434.8	0.2	
			f	277.1	0.0	13.6	277.2	72.5	60015.9	277.2	72.4	-60083.2	600.5	52.0	31232.3	600.9	47.3	-28422.9	0.3	
			e	277.1	0.0	13.6	277.2	48.5	40210.6	277.2	48.4	-40204.3	600.4	52.0	31231.9	600.9	47.3	-28435.7	0.1	
			f	277.1	0.0	13.6	277.2	72.5	60017.4	277.2	72.4	-60083.4	600.5	52.0	31236.3	600.9	47.3	-28428.8	0.3	
			e	277.1	0.0	13.6	277.2	48.5	40210.0	277.2	48.4	-40196.9	600.4	52.0	31226.0	600.9	47.3	-28421.0	0.2	
			f	277.1	0.0	13.6	277.2	72.5	60014.3	277.2	72.4	-60079.7	600.4	52.0	31234.3	600.8	47.3	-28430.5	0.2	
2	100%	66%	d	277.1	0.0	13.6	277.1	47.9	39645.7	277.1	47.7	-39607.2	600.3	52.1	31272.0	600.8	47.4	-28499.4	--	
			e	277.1	0.0	13.6	277.1	31.9	26408.5	277.1	31.8	-26416.4	600.4	52.1	31275.1	600.8	47.4	-28504.5	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39655.7	277.1	47.7	-39602.1	600.3	52.1	31272.4	600.8	47.4	-28490.8	0.3	
			e	277.1	0.0	13.6	277.1	31.9	26409.7	277.1	31.8	-26402.0	600.4	52.1	31262.0	600.8	47.4	-28476.1	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39661.0	277.1	47.7	-39594.8	600.4	52.1	31271.9	600.8	47.4	-28473.9	0.2	
			e	277.1	0.0	13.6	277.1	31.9	26410.0	277.1	31.8	-26403.7	600.4	52.1	31265.5	600.8	47.4	-28476.4	0.1	
			f	277.1	0.0	13.6	277.1	47.9	39664.4	277.1	47.7	-39585.4	600.4	52.1	31270.1	600.8	47.4	-28479.7	0.2	
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4	50% ⁽¹⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
5		66%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
7	0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
9		33%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.0	0.0	13.6	277.0	72.5	60018.9	277.0	72.2	-59943.8	600.2	52.0	31213.3	600.4	47.4	-28439.8	--	Export only
			e	277.0	0.0	13.6	277.0	23.8	19811.2	277.1	23.9	-19836.4	600.2	52.1	31280.3	600.5	47.4	-28483.6	0.2	
			f	277.0	0.0	13.6	277.0	72.5	60008.3	277.0	72.3	-60002.9	600.1	52.1	31242.5	600.4	47.4	-28469.3	0.2	
			e	277.0	0.0	13.6	277.0	23.8	19810.5	277.1	23.9	-19819.7	600.3	52.1	31261.2	600.6	47.4	-28464.9	0.1	
			f	277.0	0.0	13.6	277.0	72.5	60001.6	277.0	72.3	-59981.7	600.1	52.0	31233.1	600.4	47.4	-28452.9	0.2	
			e	277.0	0.0	13.6	277.0	23.8	19810.2	277.1	23.9	-19828.3	600.3	52.1	31273.9	600.6	47.4	-28481.6	0.3	
2	66%	66%	f	277.0	0.0	13.6	277.0	72.5	59995.8	277.0	72.3	-60016.7	600.1	52.1	31249.8	600.4	47.4	-28471.5	0.2	
			d	277.0	0.0	13.6	277.0	47.9	39612.9	277.1	47.8	-39676.7	600.3	52.1	31262.0	600.6	47.4	-28496.8	--	
			e	277.0	0.0	13.6	277.1	15.9	13203.2	277.1	15.9	-13181.8	600.3	52.1	31256.8	600.6	47.4	-28484.3	0.1	
			f	277.0	0.0	13.6	277.0	47.9	39631.9	277.1	47.8	-39687.2	600.3	52.1	31274.3	600.7	47.5	-28505.0	0.2	
			e	277.0	0.0	13.6	277.1	15.9	13206.2	277.1	15.9	-13185.0	600.3	52.1	31265.0	600.6	47.4	-28493.8	0.3	
			f	277.0	0.0	13.6	277.0	47.9	39641.5	277.1	47.8	-39707.4	600.3	52.1	31287.8	600.7	47.5	-28515.4	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
			e	277.0	0.0	13.6	277.1	15.9	13208.8	277.1	15.9	-13189.4	600.3	52.1	31272.8	600.7	47.5	-28503.6	0.3	Export only			
			f	277.0	0.0	13.6	277.0	47.9	39647.9	277.1	47.8	-39706.0	600.3	52.1	31285.6	600.7	47.5	-28523.4	0.1				
3	33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
4	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
5	50% ⁽²⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6	33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
7		100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
8	0% ⁽²⁾	66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																								
Load level: 33%																								
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode				
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)						
1	100%	5%-10%	d	277.1	0.0	13.6	277.1	23.9	19809.5	277.1	23.8	-19768.1	600.4	52.0	31241.6	600.8	47.3	-28414.5	--	Export only				
			e	277.1	0.0	13.6	277.1	23.9	19810.0	277.2	23.8	-19748.3	600.4	8.3	4998.5	600.8	7.6	-4545.3	0.2					
			f	277.1	0.0	13.6	277.1	23.9	19810.0	277.1	23.8	-19763.3	600.4	52.0	31236.7	600.8	47.3	-28415.8	0.3					
			e	277.1	0.0	13.6	277.1	23.9	19810.0	277.2	23.8	-19756.8	600.4	8.3	5000.5	600.8	7.6	-4547.8	0.2					
			f	277.1	0.0	13.6	277.1	23.9	19810.0	277.1	23.8	-19757.6	600.4	52.0	31228.1	600.8	47.3	-28406.9	0.3					
			e	277.1	0.0	13.6	277.1	23.9	19810.0	277.2	23.8	-19770.2	600.4	8.3	5003.6	600.8	7.6	-4549.1	0.2					
			f	277.1	0.0	13.6	277.1	23.9	19810.0	277.1	23.8	-19747.6	600.4	52.0	31212.9	600.7	47.3	-28403.0	0.1					
2		100%	33%-66%	d	277.1	0.0	13.6	277.1	23.9	19791.0	277.2	23.9	-19802.5	600.4	52.0	31244.8	600.7	47.3	-28411.6		--	Export only		
				e	277.1	0.0	13.6	277.2	23.9	19795.4	277.2	23.9	-19803.9	600.4	34.2	20525.3	600.8	31.2	-18740.2		0.3			
				f	277.1	0.0	13.6	277.1	23.9	19791.5	277.2	23.8	-19787.7	600.4	52.0	31224.0	600.7	47.3	-28391.1		0.3			
				e	277.1	0.0	13.6	277.2	23.9	19795.2	277.2	23.8	-19792.9	600.5	34.2	20512.9	600.8	31.2	-18731.6		0.2			
				f	277.1	0.0	13.6	277.1	23.9	19790.9	277.2	23.8	-19786.2	600.4	52.0	31225.4	600.7	47.3	-28406.5		0.1			
				e	277.1	0.0	13.6	277.2	23.9	19795.4	277.2	23.8	-19797.1	600.5	34.2	20521.4	600.8	31.2	-18723.8		0.2			
				f	277.1	0.0	13.6	277.1	23.9	19792.0	277.2	23.9	-19807.7	600.4	52.1	31252.9	600.8	47.3	-28425.6		0.2			
3	66% ⁽¹⁾		5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only			
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--	--
4		66% ⁽¹⁾	33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																						
Load level: 33%																						
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
6	33%-66%		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(5) ESS external charge current limit = $66 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

(6) ESS external charge current limit = $33 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(7) ESS external charge current limit = 0% to +5%, PV inputs = 0% + 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																									
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode					
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)							
1	100%	100%	d	276.6	0.0	13.6	276.7	72.5	60036.8	276.7	72.3	-59919.4	600.0	0.0	10.2	600.1	0.0	10.3	--	Export only					
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.5	600.0	0.0	10.2	600.2	0.0	10.3	0.2						
			f	276.7	0.0	13.6	276.7	72.6	60064.4	276.7	72.3	-59900.4	600.0	0.0	10.2	600.2	0.0	10.3	0.3						
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.1	0.0	10.2	600.3	0.0	10.3	0.2						
			f	276.7	0.0	13.6	276.7	72.8	60081.5	276.7	72.3	-59904.2	600.0	0.0	10.2	600.2	0.0	10.3	0.2						
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.5	600.1	0.0	10.2	600.3	0.0	10.3	0.3						
2		100%	66%	f	276.7	0.0	13.6	276.7	72.9	60092.1	276.8	72.2	-59850.7	600.0	0.0	10.2	600.2	0.0	10.3		0.1	Export only			
				d	276.8	0.0	13.6	276.8	47.9	39612.6	276.8	47.8	-39609.1	600.2	0.0	10.2	600.4	0.0	10.3		--				
				e	276.7	0.0	13.6	276.8	0.0	1.8	276.8	0.0	11.6	600.2	0.0	10.2	600.3	0.0	10.3		0.2				
				f	276.8	0.0	13.6	276.8	47.9	39613.8	276.9	47.7	-39593.3	600.2	0.0	10.2	600.4	0.0	10.3		0.3				
				e	276.8	0.0	13.6	276.8	0.0	1.8	276.8	0.0	11.6	600.2	0.0	10.2	600.3	0.0	10.3		0.3				
				f	276.8	0.0	13.6	276.8	47.9	39615.5	276.9	47.8	-39599.8	600.2	0.0	10.2	600.4	0.0	10.3		0.3				
3			100%	33% ⁽¹⁾	e	276.8	0.0	13.6	276.8	0.0	1.8	276.8	0.0	11.6	600.2	0.0	10.2	600.3	0.0		10.3		0.2	Export only	
					f	276.8	0.0	13.6	276.8	47.9	39617.2	276.9	47.8	-39608.8	600.2	0.0	10.2	600.4	0.0		10.3		0.2		
					d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
					e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
					f	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
					e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--		--
f	--			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--						

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
4	50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
5		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	276.8	0.0	13.6	276.9	72.5	59971.5	276.9	72.2	-59909.6	600.2	0.0	10.2	600.5	0.0	10.3	--	Export only			
			e	276.9	0.0	13.6	276.9	48.5	40206.0	276.9	48.5	-40212.3	600.3	0.0	10.2	600.5	0.0	10.3	0.2				
			f	276.9	0.0	13.6	276.9	72.5	59973.9	276.9	72.3	-59935.1	600.2	0.0	10.2	600.5	0.0	10.3	0.3				
			e	276.9	0.0	13.6	276.9	48.6	40207.6	276.9	48.5	-40216.3	600.3	0.0	10.2	600.6	0.0	10.3	0.2				
			f	276.9	0.0	13.6	276.9	72.5	59975.7	276.9	72.3	-59963.0	600.2	0.0	10.2	600.5	0.0	10.3	0.3				
			e	276.9	0.0	13.6	276.9	48.6	40207.8	276.9	48.5	-40228.9	600.3	0.0	10.2	600.6	0.0	10.3	0.2				
2		100%	66%	f	276.9	0.0	13.6	276.9	72.6	59975.6	276.9	72.3	-59936.9	600.3	0.0	10.2	600.5	0.0	10.3		0.1	Export only	
				d	276.9	0.0	13.6	276.9	47.9	39608.3	277.0	47.8	-39683.5	600.3	0.0	10.2	600.6	0.0	10.3		--		
				e	276.9	0.0	13.6	277.0	31.9	26400.0	277.0	31.8	-26400.3	600.3	0.0	10.2	600.5	0.0	10.3		0.2		
				f	276.9	0.0	13.6	276.9	47.9	39607.9	277.0	47.8	-39652.7	600.2	0.0	10.2	600.5	0.0	10.3		0.2		
				e	276.9	0.0	13.6	277.0	31.9	26400.1	277.0	31.8	-26402.7	600.2	0.0	10.2	600.5	0.0	10.3		0.3		
				f	276.9	0.0	13.6	276.9	47.9	39609.3	277.0	47.8	-39662.3	600.3	0.0	10.2	600.5	0.0	10.3		0.1		
3	100%		33% ⁽¹⁾	e	276.9	0.0	13.6	277.0	31.9	26400.2	277.0	31.8	-26401.1	600.3	0.0	10.2	600.6	0.0	10.3	0.1	Export only		
				f	276.9	0.0	13.6	276.9	47.9	39610.5	277.0	47.8	-39664.5	600.3	0.0	10.2	600.5	0.0	10.3	0.2			
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
4		50% ⁽²⁾	100%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		Export only	
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
5		66%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
7	0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																							
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode			
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)					
1	100%	100%	d	276.9	0.0	13.6	277.0	72.6	60011.7	277.0	72.3	-59986.6	600.3	0.0	10.2	600.6	0.0	10.3	--	Export only			
			e	277.0	0.0	13.6	277.0	23.8	19799.3	277.0	23.8	-19784.6	600.3	0.0	10.2	600.7	0.0	10.3	0.2				
			f	277.0	0.0	13.6	277.0	72.7	60014.6	277.0	72.3	-59978.6	600.3	0.0	10.2	600.6	0.0	10.3	0.2				
			e	277.0	0.0	13.6	277.0	23.8	19799.5	277.0	23.8	-19780.0	600.4	0.0	10.2	600.7	0.0	10.3	0.3				
			f	277.0	0.0	13.6	277.0	72.8	60016.3	277.0	72.4	-60066.5	600.4	0.0	10.2	600.6	0.0	10.3	0.1				
			e	277.0	0.0	13.6	277.0	23.8	19800.0	277.0	23.8	-19779.8	600.4	0.0	10.2	600.7	0.0	10.3	0.1				
2		100%	66%	d	277.0	0.0	13.6	277.0	47.9	39631.0	277.1	47.8	-39646.5	600.4	0.0	10.2	600.7	0.0	10.3		--	Export only	
				e	277.0	0.0	13.6	277.0	15.9	13200.0	277.1	15.9	-13199.3	600.4	0.0	10.2	600.7	0.0	10.4		0.2		
				f	277.0	0.0	13.6	277.0	47.9	39631.7	277.1	47.8	-39669.7	600.4	0.0	10.2	600.7	0.0	10.3		0.3		
				e	277.0	0.0	13.6	277.0	15.9	13200.0	277.1	15.9	-13193.8	600.4	0.0	10.2	600.7	0.0	10.3		0.3		
				f	277.0	0.0	13.6	277.0	47.9	39631.4	277.1	47.8	-39655.6	600.4	0.0	10.2	600.7	0.0	10.3		0.1		
				e	277.0	0.0	13.6	277.0	15.9	13200.0	277.1	15.9	-13190.9	600.4	0.0	10.2	600.7	0.0	10.3		0.1		
3	100%		33% ⁽¹⁾	f	277.0	0.0	13.6	277.0	47.9	39633.3	277.1	47.8	-39666.3	600.4	0.0	10.2	600.7	0.0	10.3	0.1	Export only		
				d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
4		50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		Export only	
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
5		66%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
7	0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
9		33%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note (1)(2): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																								
Load level: 33%																								
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode				
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)						
1	100%	5%-10%	d	276.9	0.0	13.6	277.0	24.0	19838.3	277.0	23.9	-19792.5	600.3	0.0	10.2	600.3	0.0	10.3	0.3	Export only				
			e	277.1	0.0	13.6	277.1	23.9	19818.5	277.2	23.8	-19797.4	600.3	8.4	5017.3	600.4	7.6	-4566.7	0.2					
			f	277.0	0.0	13.6	277.0	24.0	19838.7	277.0	23.9	-19801.3	600.2	0.0	10.2	600.2	0.0	10.3	0.2					
			e	277.1	0.0	13.6	277.1	24.0	19828.5	277.2	23.8	-19789.5	600.4	8.4	5015.6	600.4	7.6	-4566.1	0.3					
			f	277.0	0.0	13.6	277.0	24.0	19838.8	277.0	23.9	-19795.6	600.2	0.0	10.2	600.2	0.0	10.3	0.1					
			e	277.1	0.0	13.6	277.1	24.0	19830.2	277.2	23.8	-19788.7	600.3	8.4	5015.4	600.4	7.6	-4564.3	0.1					
			f	277.0	0.0	13.6	277.0	24.0	19839.3	277.0	23.9	-19809.2	600.2	0.0	10.2	600.2	0.0	10.3	0.1					
2		100%	33%-66%	d	277.0	0.0	13.6	277.0	24.0	19839.1	277.0	23.9	-19815.0	600.3	0.0	10.2	600.3	0.0	10.3		--	Export only		
				e	277.1	0.0	13.6	277.1	24.0	19830.0	277.2	23.8	-19769.6	600.3	52.0	31191.7	600.4	47.4	-28482.8		0.1			
				f	277.0	0.0	13.6	277.0	24.0	19839.0	277.0	23.9	-19812.7	600.2	0.0	10.2	600.2	0.0	10.3		0.1			
				e	277.1	0.0	13.6	277.1	24.0	19830.0	277.2	23.8	-19767.5	600.3	52.0	31188.2	600.4	47.4	-28472.6		0.1			
				f	277.0	0.0	13.6	277.0	24.0	19839.3	277.0	23.9	-19816.5	600.2	0.0	10.2	600.2	0.0	10.3		0.2			
				e	277.1	0.0	13.6	277.1	24.0	19830.0	277.2	23.8	-19765.5	600.3	52.0	31187.1	600.4	47.4	-28471.5		0.2			
3			66% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	Export only
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
	e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
	f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	
4	66% ⁽¹⁾			33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		Export only	
		e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test

Load level: 33%

Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
6		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Note (1): Because the 33% and 66% load condition is not affected by the change in EUT output variation, the related test is not repeated.

 (8) ESS external charge current limit = $66 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

 (9) ESS external charge current limit = $33 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>[Signature]</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	<i>UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)</i>		

205 Abnormal tests

Testing date:

Test Method:

205.1 All Power Control Systems shall be tested as described in UL1741 Section 47 and comply with section 47.1.1 and 47.1.2 of UL 1741.

Criteria:

Passing criteria are specified in the "Criteria" column of Table 44.

Results: PASS

See UL 1741 test report for details.

----- End of report -----