

Prüfbericht - Nr.: <i>Test Report No.:</i>	50334060 003	Auftrags-Nr.: <i>Order No.:</i>	244331647	Seite 1 von 15 <i>Page 1 of 15</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	2055198	Auftragsdatum: <i>Order date:</i>	2021.05.13		
Auftraggeber: <i>Client:</i>	Zhejiang Benyi Electrical Co., Ltd. Wenzhou Bridge Industrial Zone, Beibaixiang Town, Yueqing, Wenzhou, Zhejiang, P. R. China				
Prüfgegenstand: <i>Test item:</i>	PV String Combiner Box				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	BHTx-yw/z, BHSx-y/z (x= Z or blank, stands for with the monitoring unit or not y= 1 to 20, stands for the number of input strings w= R or blank, stands for with the block diodes or not z= 1-8, stands for the number of output strings)				
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland type approval				
Prüfgrundlage: <i>Test specification:</i>	IEC 62109-1: 2010, IEC 61439-1: 2011, IEC 61439-2: 2011 EN 62109-1: 2010, EN 61439-1: 2011, EN 61439-2: 2011				
Wareneingangsdatum: <i>Date of receipt:</i>	N/A				
Prüfmuster-Nr.: <i>Test sample No.:</i>	N/A				
Prüfzeitraum: <i>Testing period:</i>	N/A				
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shanghai) Co., Ltd.				
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.				
Prüfergebnis*: <i>Test Result*:</i>	Pass				
geprüft/ tested by:	<i>Jane Zhang</i>		kontrolliert/ reviewed by:	<i>Yue Yin</i>	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
2021.05.19	Jane Zhang / Engineer		2021.05.20	Yue Yin / Reviewer	
Sonstiges/ Other Aspects:					
– No relevant tests were performed, only name of the license holder changed.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.					
V04					



TEST REPORT IEC 62109-1 Safety of Power Converter for use in Photovoltaic Power Systems Part 1: General requirements	
Report	
Report Reference No.:	50334060 003
Date of issue	See cover page
Total number of pages	See cover page
CB Testing Laboratory	TÜV Rheinland (Shanghai) Co., Ltd.
Address	No. 177, Lane 777, West Guangzhong Road, Jing'an District, Shanghai 200072, P. R. China
Applicant's name	Zhejiang Benyi Electrical Co., Ltd.
Address	Wenzhou Bridge Industrial Zone, Beibaixiang Town, Yueqing, Wenzhou, Zhejiang, P. R. China
Test specification:	
Standard	IEC 62109-1: 2010 (First Edition)
Test procedure	TUV Bauart mark approval
Non-standard test method.....	N/A
Test Report Form No.	IEC62109_1B
TRF Originator.....	VDE Testing and Certification Institute
Master TRF	Dated 2016-04
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Test item description	PV String Combiner Box
Trade Mark	
Model/Type reference	BHTx-yw/z, BHSx-y/z
(x= Z or blank, stands for with the monitoring unit or not y= 1 to 20, stands for the number of input strings w= R or blank, stands for with the block diodes or not z= 1-8, stands for the number of output strings)	
Ratings	See marking label and model list.

Testing procedure and testing location:
<input checked="" type="checkbox"/> Testing Laboratory: Testing location/ address : See cover page <input type="checkbox"/> Associated Laboratory: Testing location/ address : Tested by (name + signature) : See cover page Approved by (+ signature) : See cover page
<input type="checkbox"/> Testing procedure: TMP Testing location/ address : Tested by (name + signature) : Approved by (+ signature) :
<input type="checkbox"/> Testing procedure: WMT Testing location/ address : Tested by (name + signature) : Witnessed by (+ signature) : Approved by (+ signature) :
<input type="checkbox"/> Testing procedure: SMT Testing location/ address : Tested by (name + signature) : Approved by (+ signature) : Supervised by (+ signature) :
<input type="checkbox"/> Testing procedure: RMT Testing location/ address : Tested by (name + signature) : Approved by (+ signature) : Supervised by (+ signature) :

List of Attachments (including a total number of pages in each attachment):

ATTACHMENT 1 – PHOTO DOCUMENTATION (9 pages)

ATTACHMENT 2 – CRITICAL COMPONENTS DOCUMENTATION (CDF, 11 pages)

Summary of testing:**Tests performed (name of test and test clause):**

N/A

- The product fulfils the requirements of
IEC/EN 62109-1: 2010, IEC/EN 61439-1: 2011 and IEC/EN 61439-2: 2011.

Copy of marking plate:

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHTZ-20/1		
Max.number of DC input (最大输入路数)	20		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	400A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	RS485		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHTZ-12/1		
Max.number of DC input (最大输入路数)	12		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	250A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	RS485		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			


ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHTZ-10/1		
Max.number of DC input (最大输入路数)	10		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	200A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	RS485		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHTZ-3/1		
Max.number of DC input (最大输入路数)	3		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	63A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	RS485		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHT-8/8		
Max.number of DC input (最大输入路数)	8		
Max.number of DC output (最大输出路数)	8		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	32A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	/		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHT-3/1		
Max.number of DC input (最大输入路数)	3		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	63A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	/		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHS-8/8		
Max.number of DC input (最大输入路数)	8		
Max.number of DC output (最大输出路数)	8		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	32A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	/		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHS-5/1		
Max.number of DC input (最大输入路数)	5		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	125A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	/		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

ZIBENY		PV Combiner Box 光伏汇流箱	
Model No(产品型号)	BHS-3/1		
Max.number of DC input (最大输入路数)	3		
Max.number of DC output (最大输出路数)	1		
Max.input voltage (最大输入电压)	1000VDC		
Max.input current each string (每路最大输入电流)	15A		
Max.output current (最大输出电流)	63A		
Max.discharge current of SPD (防雷器最大放电电流)	40kA		
Protective class of SPD (浪涌防护等级)	Class II		
Protection degree (保护类别)	IP65		
Communication (通讯方式)	/		
Operating Temperature Range (工作温度范围)	-20~60°C		
Made in China (中国制造)			

Remark(s): Rating labels of some models outlined above to represent the others.

Test item particulars		:	
Equipment mobility	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> stationary <input checked="" type="checkbox"/> fixed <input type="checkbox"/> transportable <input type="checkbox"/> for building-in	:	
Connection to the mains	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> direct plug-in <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> for building-in	:	
Environmental category	See model list for details.		
Over voltage category Mains	N/A		
Over voltage category PV	<input type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input checked="" type="checkbox"/> OVC III <input type="checkbox"/> OVC IV	:	
Mains supply tolerance (%)	N/A		
Tested for power systems	N/A		
IT testing, phase-phase voltage (V)	N/A		
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified	:	
Mass of equipment (kg)	See model list for details.		
Pollution degree	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 (inside) <input checked="" type="checkbox"/> PD 3 (outside)	:	
IP protection class	See model list for details.		
Testing			
Date of receipt of test item(s)	See cover page		
Dates tests performed	See cover page		
Possible test case verdicts:			
- test case does not apply to the test object	N/A		
- test object does meet the requirement	Pass (P)		
- test object was not evaluated for the requirement	N/E		
- test object does not meet the requirement	Fail (F)		

General remarks:

"(see Attachment #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

The tests results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

Throughout this report a comma / point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 6.2.5 of IEC60068-2-21:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided : Yes

Not applicable

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) : Zhejiang Benyi Electrical Co., Ltd.

Wenzhou Bridge Industrial Zone, Beibaixiang,
Yueqing, P. R. China

General product information:

The EUT is PV array string combiner box. It is a device that combines the output of multiple strings of PV modules for connection to the PV inverter. There are two model series of BHSx-y/z and BHTx-yw/z. The model series of BHSx-yw/z employ plastic enclosures and the BHTx-yw/z employs the metal enclosure. The model series is identical on topological schematic circuit diagram, critical components and control solution respectively. See model list below for details.

Definition of variables:

Model: BHTx-yw/z, BHSx-y/z		
Variable	Range or value of variable	Content
x	Z or blank	with the monitoring unit or not
y	1 to 20	the number of input strings
w	R or blank	With the block diodes or not
z	1 to 8	the number of output strings

History of amendments and modifications:

Report No.	Date	Content
50334060 001	2020.01.16	Original Report
50334060 002	2020.05.15	Co-license for OANISO ELECTRICAL LIMITED
50334060 003	2021.05.20	Name of the license holder changed

Model	BHTZ-1R/1 to BHTZ-3R/1	BHTZ-4R/1 to BHTZ-6R/1	BHTZ-7R/1 to BHTZ-12R/1	BHTZ-13R/1 to BHTZ-16R/1	BHTZ-17R/1 to BHTZ- 20R/1
Max. input voltage [Vd.c.]	1000	1000	1000	1000	1000
Max. input current per string [A]	15	15	15	15	15
Number of input strings	1, 2, 3	4, 5, 6	7, 8, 9, 10, 11, 12	13, 14, 15, 16	17, 18, 19, 20
Max. output current [A]	15, 30, 45	60, 75, 90	105, 120, 135, 150, 165, 180	195, 210, 225, 240	255, 270, 285, 300
Construction					
Protective class	I	I	I	I	I
Degree protection of enclosure (IP)	IP65	IP65	IP65	IP65	IP65
Overvoltage category (OVC)	OVC III	OVC III	OVC III	OVC III	OVC III
Pollution degree (PD)	PD 3	PD 3	PD 3	PD 3	PD 3
Temperature range [°C]	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60
Weight [kg]	30	35	40	50	65
Size [mm]	450x400x180	550x500x210	700x600x210	700x600x210	850x650x210

Model	BHTZ-1/1 to BHTZ-3/1	BHTZ-4/1 to BHTZ-6/1	BHTZ-7/1 to BHTZ-12/1	BHTZ-13/1 to BHTZ-16/1	BHTZ-17/1 to BHTZ-20/1
Max. input voltage [Vd.c.]	1000	1000	1000	1000	1000
Max. input current per string [A]	15	15	15	15	15
Number of input strings	1,2,3	4, 5, 6	7, 8, 9,10,11,12	13,14,15,16	17,18,19,20
Max. output current [A]	15, 30, 45	60, 75, 90	105, 120, 135, 150, 165, 180	195, 210, 225, 240	255, 270, 285, 300
Construction					
Protective class	I	I	I	I	I
Degree protection of enclosure (IP)	IP65	IP65	IP65	IP65	IP65
Overvoltage category (OVC)	OVC III	OVC III	OVC III	OVC III	OVC III
Pollution degree (PD)	PD 3	PD 3	PD 3	PD 3	PD 3
Temperature range [°C]	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60
Weight [kg]	23	25	32	32	40
Size [mm]	450x400x180	550x450x180	600x550x180	650x550x180	800x650x210

Model	BHT-1R/1 to BHT-3R/1	BHT-4R/1 to BHT-6R/1	BHT-7R/1 to BHT-12R/1	BHT-13R/1 to BHT-16R/1	BHT-17R/1 to BHT-20R/1
Max. input voltage [Vd.c.]	1000	1000	1000	1000	1000
Max. input current per string [A]	15	15	15	15	15
Number of input strings	1, 2, 3	4, 5, 6	7, 8, 9, 10, 11, 12	13, 14, 15, 16	17, 18, 19, 20
Max. output current [A]	15, 30, 45	60, 75, 90	105, 120, 135, 150, 165, 180	195, 210, 225, 240	255, 270, 285, 300
Construction					
Protective class	I	I	I	I	I
Degree protection of enclosure (IP)	IP65	IP65	IP65	IP65	IP65
Overvoltage category (OVC)	OVC III	OVC III	OVC III	OVC III	OVC III
Pollution degree (PD)	PD 3	PD 3	PD 3	PD 3	PD 3
Temperature range [°C]	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60
Weight [kg]	18	20	38	46	50
Size [mm]	400x400x180	500x400x180	550x550x180	650x550x210	650x600x210

Model	BHT-1/1 to BHT-4/4	BHT-5/5 to BHT-8/8	BHT-4/2 to BHT-6/2	BHT-2/1 to BHT-3/1	BHT-4/1 to BHT-6/1	BHT-7/1 to BHT-12/1	BHT-13/1 to BHT-20/1	BHT-21/1 to BHT-24/1
Max. input voltage [Vd.c.]	1000	1000	1000	1000	1000	1000	1000	1000
Max. input current per string [A]	15	15	15	15	15	15	15	15
Number of input strings	1,2,3,4	5, 6, 7, 8	4, 5, 6	2, 3	4, 5, 6	7,8,9,10,11,12	13,14,15,16,17,18 ,19,20	21, 22, 23, 24
Max. output current [A]	15, 30, 45, 60	75,90,105,120	60, 75, 90	30,45	60, 75, 90	105,120,135,150, 165,180	195,210,215,230, 245,260,275,300	315, 330, 345, 360
Construction								
Protective class	I	I	I	I	I	I	I	I
Degree protection of enclosure (IP)	IP65	IP65	IP65	IP65	IP65	IP65	IP65	IP65
Overvoltage cate- gory (OVC)	OVC III	OVC III	OVC III	OVC III	OVC III	OVC III	OVC III	OVC III
Pollution degree (PD)	PD 3	PD 3	PD 3	PD 3	PD 3	PD 3	PD 3	PD 3
Temperature range [°C]	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60
Weight [kg]	25	35	20	18	28	35	50	50
Size [mm]	450x450x180	800x600x180	400x350x150	420x250x150	450x400x180	600x400x180	750x550x210	750x500x250

Model	BHSZ-1/1 to BHSZ-3/1	BHSZ-4/1 to BHSZ-6/1	BHSZ-7/1 to BHSZ-12/1	BHSZ-13/1 to BHSZ-16/1	BHSZ-17/1 to BHSZ-20/1
Max. input voltage [Vd.c.]	1000	1000	1000	1000	1000
Max. input current per string [A]	15	15	15	15	15
Number of input strings	1,2,3	4,5,6,	7,8,9,10,11,12,	13, 14, 15, 16	17, 18, 19, 20
Max. output current [A]	15,30,45	60, 75, 90	105,120,135, 150,165,180	195, 210, 225, 240	255, 270, 285, 300
Construction					
Protective class	I	I	I	I	I
Degree protection of enclosure (IP)	IP65	IP65	IP65	IP65	IP65
Overtoltage category (OVC)	OVC III	OVC III	OVC III	OVC III	OVC III
Pollution degree (PD)	PD 3	PD 3	PD 3	PD 3	PD 3
Temperature range [°C]	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60
Weight [kg]	23	25	30	35	40
Size [mm]	400x300x180	600x400x180	630x530x180	800x600x300	800x600x300

Model	BHS-1/1 to BHS-3/3	BHS-4/4 to BHS-8/8	BHS-4/2 to BHS-6/2	BHS-2/1 to BHS-3/1	BHS-4/1 to BHS-6/1	BHS-7/1 to BHS-12/1	BHS-13/1 to BHS-20/1
Max. input voltage [Vd.c.]	1000	1000	1000	1000	1000	1000	1000
Max. input current per string [A]	15	15	15	15	15	15	15
Number of input strings	1,2,3	4,5,6,7,8	4,5,6	2,3	4,5,6	7,8,9,10,11,12	13,14,15,16,17, 18,19,20
Max. output current [A]	15,30,45	60, 75 ,90, 105, 120	40,75,90	30,45	60,75,90	105, 120, 135, 150, 165, 180	195, 210, 225, 240, 255, 270, 285, 300
Construction							
Protective class	I	I	I	I	I	I	I
Degree protection of enclosure (IP)	IP65	IP65	IP65	IP65	IP65	IP65	IP65
Overvoltage category (OVC)	OVC III	OVC III	OVC III	OVC III	OVC III	OVC III	OVC III
Pollution degree (PD)	PD 3	PD 3	PD 3	PD 3	PD 3	PD 3	PD 3
Temperature range [°C]	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60	-20 to 60
Weight [kg]	12	30	8	5	15	20	35
Size [mm]	555x315x150	800x600x300	375x305x132	335x210x120	540x360x180	600x400x220	800x600x300

-End of the report-