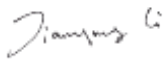
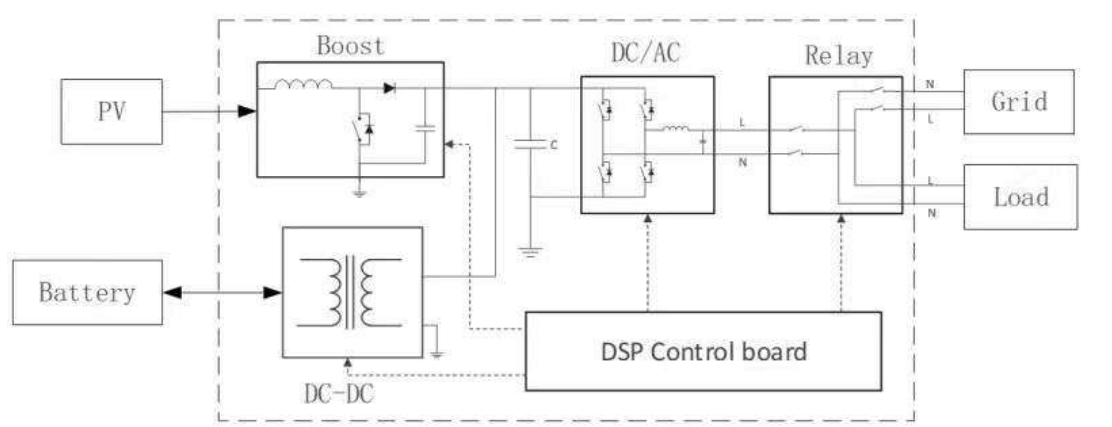


TEST REPORT CEI 0-21:2022+CEI 0-21/V1:2022+CEI 0-21/V2:2024 TUV SUD Test Report for Reference technical rules for the connection of active and passive users to the LV electrical Utilities			
Report No.:	704092450102-00		
Date of issue:	2024-09-09		
Project handler:	Jianyong Li		
Testing laboratory:	TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.		
Address:	Building A, No.15 Factory, Jintong International Industrial Park, No.8 Xihu Road, Wujin National Hi-tech Industrial Development Zone, Changzhou City, Jiangsu Province, P.R. China		
Testing location:	EMTEK(Shenzhen) Co., Ltd. Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China(CNAS L2291)		
Client:	SRNE Solar Co., Ltd		
Client number:	120189		
Address:	4-5F,Building13A, Taihua Wutong Industrial Park, Gushu Development Zone ,Hangcheng Street,Baoan, 518102 Shenzhen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA		
Contact person:	Mr. Yang guixian		
Standard:	This TUV SUD test report form is based on the following requirements: CEI 0-21:2022+CEI 0-21/V1:2022+CEI 0-21/V2:2024		
TRF number and revision:	TRF CEI 0-21:2022/V2:2024 Rev.02: 2024-04		
eDoc_ID:	TRF CEI 0-21:2022/V2:2024 rev.02/2024		
TRF originated by:	TUV SUD Product Service, Mr. Kai Zhao		
Copyright blank test report:	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service. TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.		
General disclaimer:	This test report may only be quoted in full. Any use for advertising purposes must be granted in writing. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production.		
Scheme:	<input type="checkbox"/> TUV Mark <input type="checkbox"/> without certification <input type="checkbox"/> AoC/CoC for EU-Directive / EU-Regulation: <input type="checkbox"/> GS Mark <input type="checkbox"/> NRTL Mark <input checked="" type="checkbox"/> other: Compliance Document		
Non-standard test method:	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, see details under <i>Summary of testing</i>		
National deviations:	N/A		
Number of pages (Report):	50		
Number of pages (Attachments):	Details see Attachment tabel.		
Compiled by:	Jianyong Li	Approved by:	Jialin Qian
(+ signature)		(+ signature)	

Test sample: Type of test object: Trademark: Model and/ or type reference:	Engineering sample Solar Hybrid inverter with storage battery system  Solar Hybrid inverter: HES4840S100-H, HESP4840S100-H, HES4846S100-H, HESP4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HESP4855S100-H, HES4860S100-H, HESP4860S100-H Storage battery system 1: EasyMatch B48, 1-15 pieces Storage battery system 2: LFPWall-5000, 1-8 pieces Storage battery system 3: M16S100BL-V, 1-15 pieces Storage battery system 4: SR-EOS10B, 1-16 pieces Storage battery system 5: SOLE 5000 Storage battery system 6: LFPWall-10K-V2, 1-8 pieces Storage battery system 7: SR-EOS05B, 1-16 pieces Storage battery system 8: TH-48200-W, 1-15 pieces
Rating(s):	See rating labels on page 15 to 16.
Manufacturer: Manufacturer number: Address:	SRNE Solar Co., Ltd 120189 4-5F,Building13A, Taihua Wutong Industrial Park, Gushu Development Zone ,Hangcheng Street,Baoan, 518102 Shenzhen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA
Name and address of factory(ies)	
Name: SRNE Solar Co.,Ltd	
Address: 4-5F,Building13A, Taihua Wutong Industrial Park, Gushu Development Zone ,Hangcheng Street,Baoan, 518102 Shenzhen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA	
Sub-contractors / tests (clause):	N/A
Name:	N/A
Order description:	<input type="checkbox"/> Complete test according to TRF
	<input type="checkbox"/> Partial test according to manufacturer's specifications
	<input type="checkbox"/> Preliminary test
	<input type="checkbox"/> Spot check
	<input checked="" type="checkbox"/> Others: based on the application
Date of order:	2024-08-13
Date of receipt of test item:	2024-08-14
Date(s) of performance of test:	2024-08-14 to 2024-09-09
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 :	<input checked="" type="checkbox"/> outdoor	<input type="checkbox"/> indoor unconditional	<input type="checkbox"/> indoor conditional	
Over voltage category Mains	<input type="checkbox"/> OVC I	<input type="checkbox"/> OVC II	<input checked="" type="checkbox"/> OVC III	<input type="checkbox"/> OVC IV
Over voltage category PV	<input type="checkbox"/> OVC I	<input checked="" type="checkbox"/> OVC II	<input type="checkbox"/> OVC III	<input type="checkbox"/> OVC IV
Mains supply tolerance (%)	±10 %			
Tested for power systems	TN-C-S			
IT testing, phase-phase voltage (V) :	---			
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)	Max total 19.2kg			
Pollution degree :	3 (external), 2 (internal)			
IP protection class :	IP65			
Purpose of the product (description of intended use):				
<p>The Solar Hybrid inverter with storage battery system is designed for both indoor and outdoor use. It is responsible for converting the direct current generated by photovoltaic panels and batteries into single phase L/N/PE~, 230V, 50Hz alternative current for feeding into the electrical power distribution grid or the backup load. The device can operate when it is connected to the electrical power distribution line and as a stand-alone unit in case of AC grid disruption (standalone mode only for equipment with Back-up output port). Energy produced from inverter will be used to optimize self-consumption, then charge battery, the remaining power could export to grid. Loads will be supported in priority by photovoltaic panels, then by the battery, and then by the grid.</p> <p>Model differences: HESP4860S100-H: basic model. HES4840S100-H, HESP4840S100-H,HES4846S100-H,HESP4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H,HESP4855S100-H and HES4860S100-H: same family product, same hardware as basic model, except for type name, rated/maximum output current and power limited/derated by software.</p> <p>Typical application diagram</p> 				
Firmware/software version for inverter: 2.85				
Firmware/software version for BMS of storage battery system: V16.4				

Characteristic data (not shown on the marking plate):					
The following generators meet the requirements of CEI 0-21:2022/V2:2024					
Section A	Manufacturer	SRNE Solar Co., Ltd 4-5F, Building 13A, Taihua Wutong Industrial Park, Gushu Development Zone, Hangcheng Street, Baoan, Shenzhen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA			
	Equipment type	Solar Hybrid inverter with storage battery system			
	Brand	SRNE			
	Number of phase	<input checked="" type="checkbox"/> Single phase <input type="checkbox"/> Three phase Frequency: 50Hz Voltage: a.c. 230V			
	Primary energy used	<input checked="" type="checkbox"/> Solar <input checked="" type="checkbox"/> Storage <input type="checkbox"/> Wind <input type="checkbox"/> Hydroelectric <input type="checkbox"/> CHP <input type="checkbox"/> Other:			
	Generator model	HES4840S100-H/ HESP4840S100-H	HES4846S100-H/ HESP4846S100-H	HES4850S100-H/ HES4855S100-H/ HESP4850S100-H/ HESP4855S100-H	HES4860S100-H/ HESP4860S100-H
	Rated power	4000 W / 4000 VA	4600 W / 4600 VA	5500 W / 5500 VA	6000 W / 6000 VA
	The generator:	<input type="checkbox"/> is suitable for installation in systems with an output power of more than 11.08 kW <input checked="" type="checkbox"/> is capable of limiting I _{dc} to 0.5% of rated current <input checked="" type="checkbox"/> uses a DC-sensitive protection function <input type="checkbox"/> uses a transformer operating at mains frequency			
Section B	Characteristics of the interface protection system				
	Manufacturer	SRNE Solar Co., Ltd			
	Model	HES4840S100-H/ HESP4840S100-H	HES4846S100-H/ HESP4846S100-H	HES4850S100-H/ HES4855S100-H/ HESP4850S100-H/ HESP4855S100-H	HES4860S100-H/ HESP4860S100-H
	Type	<input checked="" type="checkbox"/> Integrated <input type="checkbox"/> Not integrated			
Section C	Characteristics of inverter(s)				
	Model of inverter	HES4840S100-H/ HESP4840S100-H	HES4846S100-H/ HESP4846S100-H	HES4850S100-H/ HES4855S100-H/ HESP4850S100-H/ HESP4855S100-H	HES4860S100-H/ HESP4860S100-H
	Manufacturer of inverter	SRNE Solar Co., Ltd			
	Firmware version	2.85			

	Rated power of inverter (P _{NINV})	4000 W	4600 W	5500 W	6000 W	
Section E	Characteristics of the Storage System (SdA)					
	Storage battery system 1: EasyMatch B48, 1-15 pieces					
	Model	HES4840S100-H/ HESP4840S100-H with EasyMatch B48(1piece)	HES4846S100-H / HESP4846S100-H with EasyMatch B48(1piece)	HES4850S100-H / HES4855S100-H / HESP4850S100-H / HESP4855S100-H with EasyMatch B48(1piece)	HES4860S100-H/ HESP4860S100-H with EasyMatch B48(1piece)	
	P _{sn} (nominal discharge power)	4000 W	4600 W	5500 W	6000 W	
	P _{cn} (nominal charging power)	3200 W	3200 W	3200 W	3200 W	
	P _{smax} (max. discharge power)	4000 W	4600 W	5500 W	6000 W	
	P _{cmax} (max. charging power)	3200 W	3200 W	3200 W	3200 W	
	Model	HES4840S100-H/ HESP4840S100-H with EasyMatch B48(2-15pieces)	HES4846S100-H / HESP4846S100-H with EasyMatch B48(2-15pieces)	HES4850S100-H / HES4855S100-H / HESP4850S100-H / HESP4855S100-H with EasyMatch B48(2-15pieces)	HES4860S100-H/ HESP4860S100-H with EasyMatch B48(2-15pieces)	
	P _{sn} (nominal discharge power)	4000 W	4600 W	5500 W	6000 W	
	P _{cn} (nominal charging power)	3200 W	3200 W	3200 W	3200 W	
	P _{smax} (max. discharge power)	4000 W	4600 W	5500 W	6000 W	
	P _{cmax} (max. charging power)	3200 W	3200 W	3200 W	3200 W	
	Storage battery system 2: LFPWall-5000, 1-8 pieces					
	Model	HES4840S100-H/ HESP4840S100-H with	HES4846S100-H/ HESP4846S100-H with	HES4850S100-H/ HES4855S100-H/ HESP4850S100-H/	HES4860S100-H/	



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		LFPWall-5000 (1 piece)	LFPWall-5000 (1 piece)	HESP4855S100-H with LFPWall-5000 (1 piece)	HESP4860S100-H with LFPWall-5000 (1 piece)
Psn (nominal discharge power)		4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)		2300 W	2300 W	2300 W	2300 W
Psmax (max. discharge power)		4000 W	4600 W	5500 W	6000 W
Pcmax (max. charging power)		2300 W	2300 W	2300 W	2300 W
Model		HES4840S100-H/ HESP4840S100-H with LFPWall-5000 (2-8 pieces)	HES4846S100-H/ HESP4846S100-H with LFPWall-5000 (2-8 pieces)	HES4850S100-H/ HES4855S100-H/ HESP4850S100-H/ HESP4855S100-H with LFPWall-5000 (2-8 pieces)	HES4860S100-H/ HESP4860S100-H with LFPWall-5000 (2-8 pieces)
Psn (nominal discharge power)		4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)		3200 W	3200 W	3200 W	3200 W
Psmax (max. discharge power)		4000 W	4600 W	5500 W	6000 W
Pcmax (max. charging power)		3200 W	3200 W	3200 W	3200 W
Storage battery system 3: M16S100BL-V, 1-15 pieces					
Model		HES4840S100-H/ HESP4840S100-H with M16S100BL-V (1-15pieces)	HES4846S100-H/ HESP4846S100-H with M16S100BL-V (1-15pieces)	HES4850S100-H/ HES4855S100-H/ HESP4850S100-H/ HESP4855S100-H with M16S100BL-V (1-15pieces)	HES4860S100-H/ HESP4860S100-H with M16S100BL-V (1-15pieces)
Psn (nominal discharge power)		4000 W	4600 W	5500 W	6000 W



Product Service

Pcn (nominal charging power)	3200 W	3200 W	3200 W	3200 W
Psmx (max. discharge power)	4000 W	4600 W	5500 W	6000 W
Pcmax (max. charging power)	3200 W	3200 W	3200 W	3200 W
Storage battery system 4: SR-EOS10B, 1-16 pieces				
Model	HES4840S100-H/ HESP4840S100-H with SR-EOS10B (1-16 pieces)	HES4846S100-H / HESP4846S100-H with SR-EOS10B (1-16 pieces)	HES4850S100-H / HES4855S100-H / HESP4850S100-H / HESP4855S100-H with SR-EOS10B (1-16 pieces)	HES4860S100-H/ HESP4860S100-H with SR-EOS10B (1-16 pieces)
Psn (nominal discharge power)	4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)	3200 W	3200 W	3200 W	3200 W
Psmx (max. discharge power)	4000 W	4600 W	5500 W	6000 W
Pcmax (max. charging power)	3200 W	3200 W	3200 W	3200 W
Storage battery system 5: SOLE 5000				
Model	HES4840S100-H/ HESP4840S100-H with SOLE 5000	HES4846S100-H / HESP4846S100-H with SOLE 5000	HES4850S100-H / HES4855S100-H / HESP4850S100-H / HESP4855S100-H with SOLE 5000	HES4860S100-H/ HESP4860S100-H with SOLE 5000
Psn (nominal discharge power)	4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)	3200 W	3200 W	3200 W	3200 W
Psmx (max. discharge power)	4000 W	4600 W	5500 W	6000 W



Product Service

Pcmax (max. charging power)	3200 W	3200 W	3200 W	3200 W
Storage battery system 6: LFPWall-10K-V2				
Model	HES4840S100-H/ HESP4840S100-H with LFPWall-10K-V2(1- 8 pieces)	HES4846S100-H / HESP4846S100-H with LFPWall-10K-V2(1- 8 pieces)	HES4850S100-H /HES4855S100-H / HESP4850S100-H / HESP4855S100-H with LFPWall-10K-V2(1- 8 pieces)	HES4860S100-H/HESP4860S100-H with LFPWall-10K-V2(1- 8 pieces)
Psn (nominal discharge power)	4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)	3200 W	3200 W	3200 W	3200 W
Psmax (max. discharge power)	4000 W	4600 W	5500 W	6000 W
Pcmax (max. charging power)	3200 W	3200 W	3200 W	3200 W
Storage battery system 7: SR-EOS05B, 1-16 pieces				
Model	HES4840S100-H/ HESP4840S100-H with SR-EOS05B (1- 16 pieces)	HES4846S100-H / HESP4846S100-H with SR-EOS05B (1- 16 pieces)	HES4850S100-H /HES4855S100-H / HESP4850S100-H / HESP4855S100-H with SR-EOS05B (1- 16 pieces)	HES4860S100-H/HESP4860S100-H with SR-EOS05B (1- 16 pieces)
Psn (nominal discharge power)	4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)	3200 W	3200 W	3200 W	3200 W
Psmax (max. discharge power)	4000 W	4600 W	5500 W	6000 W
Pcmax (max. charging power)	3200 W	3200 W	3200 W	3200 W
Storage battery system 8: TH-48200-W, 1-15 pieces				
Model	HES4840S100-H/ HESP4840S	HES4846S100-H/ HESP4846S	HES4850S100-H/	HES4860S100-H/



	100-H with TH-48200-W (1- 15 pieces)	100-H with TH-48200-W (1-15 pieces)	HES4855S100-H/ HESP4850S100-H/ HESP4855S100-H with TH-48200-W (1- 15 pieces)	HESP4860S100-H with TH-48200-W (1- 15 pieces)
Psn (nominal discharge power)	4000 W	4600 W	5500 W	6000 W
Pcn (nominal charging power)	3200 W	3200 W	3200 W	3200 W
Psmax (max. discharge power)	4000 W	4600 W	5500 W	6000 W
Pcmx (max. charging power)	3200 W	3200 W	3200 W	3200 W
Type	<input checked="" type="checkbox"/> Bidirectional <input type="checkbox"/> Monodirectional			
Batteries that can be used with the above inverters				
Battery 1:	Storage battery system 1: EasyMatch B48, 1-15 pieces			
Brand	SHENZHEN GNZ ENERGY CO., LTD.			
Technology	Li-Ion			
Models	EasyMatch B48			
CUS module (kWh)	5.12			
BMS firmware version	V1.5			
Number of modules	1-15 pieces			
Battery 2:	Storage battery system 2: LFPWall-5000, 1-8 pieces			
Brand	Enerlution Power Technology Co., Ltd			
Technology	Li-Ion			
Models	LFPWall-5000			
CUS module (kWh)	5.12			
BMS firmware version	V16.4			
Number of modules	1-8 pieces			
Battery 3:	Storage battery system 3: M16S100BL-V, 1-15 pieces			
Brand	SHENZHEN PCHNE TECHNOLOGY CO., LTD.			



Product Service

Technology	Li-Ion
Models	M16S100BL-V
CUS module (kWh)	5.12
BMS firmware version	V2.0
Number of modules	1-15 pieces
Battery 4:	Storage battery system 4: SR-EOS10B, 1-16 pieces
Brand	SRNE Solar Co., Ltd
Technology	Li-Ion
Models	SR-EOS10B
CUS module (kWh)	10.24
BMS firmware version	V1.1.7
Number of modules	1- 16 pieces
Battery 5:	Storage battery system 5: SOLE 5000
Brand	SHENZHEN FFD POWER TEC CO., LTD
Technology	Li-Ion
Models	SOLE 5000
CUS module (kWh)	5.12
BMS firmware version	V1.5
Number of modules	1
Battery 6:	Storage battery system 6: LFPWall-10K-V2
Brand	Enerlution Power Technology Co., Ltd
Technology	Li-Ion
Models	LFPWall-10K-V2
CUS module (kWh)	10.44KWh
BMS firmware version	V16.4
Number of modules	1-8 pieces
Battery 7:	Storage battery system 7: SR-EOS05B, 1-16 pieces



Product Service

	Brand	SRNE Solar Co., Ltd	
	Technology	Li-Ion	
	Models	SR-EOS05B	
	CUS module (kWh)	5.12kWh	
	BMS firmware version	V1.2.9	
	Number of modules	1-16 pieces	
Battery 8:	Battery 8:	Storage battery system 8: TH-48200-W, 1-15 pieces	
	Brand	TGPRO New Energy Technology Co., Ltd	
	Technology	Li-Ion	
	Models	TH-48200-W	
	CUS module (kWh)	9.6kWh	
	BMS firmware version	V3.3	
	Number of modules	1-15 pieces	
Section I	References of the laboratories that performed the tests and their test reports (RdP)		
	Selected method	<input checked="" type="checkbox"/> Tests performed under the supervision of a certification body	<input checked="" type="checkbox"/> Tests performed by an accredited laboratory
	Test Reports (RdP)	Test report according to Annex A & Bbis: 704092271801-00; 704092370503-00; 704092450102-00	1) EMC test report: ENS2404020050E00101R
	Issued by	Testing lab: 1) EMTEK(Shenzhen) Co., Ltd. Tests performed under supervision of certifier from TÜV SÜD Product Service GmbH	Testing lab: EMTEK(Shenzhen) Co., Ltd.
	Accreditation No.	D-ZE-11321-01-00	CNAS L2291
	Accreditation body reference.	DAKKS	CNAS
	Section M	Reference of the certification body	
Certification Body		TÜV SÜD Product Service GmbH	



Product Service

DAKKS accreditation certificate D-ZE-11321-01-00
according to DIN EN ISO/IEC 17065:2013

Attachments:

Item	Description	Certificate No. or Test report No.	Issued by	Model	Number of pages
1	CE-LVD& CE-EMC declaration	-	SRNE Solar Co.,Ltd	HES4840S100-H, HESP4840S100-H, HES4846S100-H, HESP4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HESP4855S100-H, HES4860S100-H, HESP4860S100-H	2
2	Safety test report	Report no: ENS2309250047P001	EMTEK(Shenzhen) Co., Ltd.	HES4840S100-H, HESP4840S100-H, HES4846S100-H, HESP4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HESP4855S100-H, HES4860S100-H, HESP4860S100-H	88
3	EMC test report	Report no: ENS2404020050E001 01R	EMTEK(Shenzhen) Co., Ltd.	HES4840S100-H, HESP4840S100-H, HES4846S100-H, HESP4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HESP4855S100-H, HES4860S100-H, HESP4860S100-H	64
4	EMC test report according to CEI 0-21 deviation	Report no: ENS2302090056E101 R	EMTEK(Shenzhen) Co., Ltd.	HES4840S100-H, HES4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HESP4855S100-H, HES4860S100-H, HESP4860S100-H	51
5	CEI 0-21:2022 test report	704092271801-00	TÜV SÜD	HES4840S100-H, HES4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HES4860S100-H, HESP4860S100-H	146



Product Service

6	CEI 0-21:2022 test report	704092370503-00	TÜV SÜD	HES4840S100-H, HES4846S100-H, HES4850S100-H, HESP4850S100-H, HES4855S100-H, HES4860S100-H, HESP4860S100-H	75
7	CB certificate	NL-103409	DEKRA	LFPWall-5000	1
8	IEC 62619 test report	TCT231010B018	TCT	EasyMatch B48	22
9	Certificate	NL-84880	DEKRA	SOLE5000	1
10	CB certificate	DE 7-0728	TÜV NORD CERT GmbH	M16S100BL-V	1
11	CB certificate	JPTUV-146166	TÜV Rheinland Japan Ltd.	SR-EOS10B	1
12	CB certificate	NL-91082	DEKRA	LFPWall-10K-V2	1
13	CB certificate	JPTUV-148913	TÜV Rheinland Japan Ltd.	SR-EOS05B	1
14	CB certificate	JPTUV-145596	TÜV Rheinland Japan Ltd.	TH-48200-W	1

If additional information is necessary, please provide

N/A

Copy of marking plate:

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCB' s that own these marks.



Product Service

Solar Hybrid Inverter

Model Name	HE3P4488100-H
Ingress protection	IP65
Operating Temperature Range	-25~60°C(-45~145°F)
Inverter topology	Non-isolated
Over voltage category	III(AC), III(DC)
Protective class	1
Max. Parallel	8
PV INPUT:	
Max. DC input power	4000W
Absolute max. voltage	550Vdc
MPPPT voltage range	120~450Vdc
Max. input current	32Adc
Isoc. PV	27Adc, 27Adc
AC INPUT:	
Nominal voltage	230VAc
RatedMax. current	40Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	8200VA
Nominal power	8200W
Power factor	1
AC OUTPUT:	
Nominal voltage	230VAc ±2%
RatedMax. current	11.4Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
AC output power factor	1
Battery:	
Battery type	Li-ion, Lead-acid
Battery voltage range	40Vdc ~ 48Vdc
Max. charge/discharge current	100Adc ±100Adc

SN:



Manufacturer: SRNE Solar Co., Ltd.
 Address: 4-E, Building 13A Taihu Wujin Industrial Park Guohu Development Zone, Hangzhou Street, Baosun 311150 Shenmen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA.
WARNING FIRE HAZARD:
 SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY
 CAUTION THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING

MADE IN CHINA

Solar Hybrid Inverter

Model Name	HE3P4488100-H
Ingress protection	IP65
Operating Temperature Range	-25~60°C(-45~145°F)
Inverter topology	Non-isolated
Over voltage category	III(AC), III(DC)
Protective class	1
Max. Parallel	8
PV INPUT:	
Max. DC input power	3000W/3600W
Absolute max. voltage	550Vdc
MPPPT voltage range	120Vdc ~ 450Vdc
Max. input current	18Adc ±18Adc
Isoc. PV	27Adc, 27Adc
AC INPUT:	
Nominal voltage	LN/PE 200VAc
RatedMax. current	45Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
Power factor	0.8 leading to 0.8 lagging
AC OUTPUT:	
Nominal voltage	LN/PE 200VAc
RatedMax. current	11.4Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
AC output power factor	0.8 leading to 0.8 lagging
Battery:	
Battery type	Li-ion, Lead-acid
Battery voltage range	40Vdc ~ 48Vdc
Max. charge/discharge current	100Adc ±100Adc

SN:



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MADE IN CHINA

Solar Hybrid Inverter

Model Name	HE3P4488100-H
Ingress protection	IP65
Operating Temperature Range	-25~60°C(-45~145°F)
Inverter topology	Non-isolated
Over voltage category	III(AC), III(DC)
Protective class	1
Max. Parallel	8
PV INPUT:	
Max. DC input power	4100W
Absolute max. voltage	550Vdc
MPPPT voltage range	120~450Vdc
Max. input current	32Adc
Isoc. PV	27Adc
AC INPUT:	
Nominal voltage	230VAc
RatedMax. current	40Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	8200VA
Nominal power	8200W
Power factor	1
AC OUTPUT:	
Nominal voltage	230VAc ±2%
RatedMax. current	25Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
AC output power factor	1
Battery:	
Battery type	Li-ion, Lead-acid
Battery voltage range	40Vdc ~ 48Vdc
Max. charge/discharge current	100Adc ±100Adc

SN:



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Solar Hybrid Inverter

Model Name	HE3P4488100-H
Ingress protection	IP65
Operating Temperature Range	-25~60°C(-45~145°F)
Inverter topology	Non-isolated
Over voltage category	III(AC), III(DC)
Protective class	1
Max. Parallel	8
PV INPUT:	
Max. DC input power	3000W/3600W
Absolute max. voltage	550Vdc
MPPPT voltage range	120Vdc ~ 450Vdc
Max. input current	18Adc ±18Adc
Isoc. PV	27Adc, 27Adc
AC INPUT:	
Nominal voltage	LN/PE 200VAc
RatedMax. current	45Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
Power factor	0.8 leading to 0.8 lagging
AC OUTPUT:	
Nominal voltage	LN/PE 200VAc
RatedMax. current	24Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
AC output power factor	0.8 leading to 0.8 lagging
Battery:	
Battery type	Li-ion, Lead-acid
Battery voltage range	40Vdc ~ 48Vdc
Max. charge/discharge current	100Adc ±100Adc

SN:



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MADE IN CHINA

Solar Hybrid Inverter

Model Name	HE3P4488100-H
Ingress protection	IP65
Operating Temperature Range	-25~60°C(-45~145°F)
Inverter topology	Non-isolated
Over voltage category	III(AC), III(DC)
Protective class	1
Max. Parallel	8
PV INPUT:	
Max. DC input power	4000W
Absolute max. voltage	550Vdc
MPPPT voltage range	120~450Vdc
Max. input current	32Adc
Isoc. PV	27Adc
AC INPUT:	
Nominal voltage	230VAc
RatedMax. current	40Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	8200VA
Nominal power	8200W
Power factor	1
AC OUTPUT:	
Nominal voltage	230VAc ±2%
RatedMax. current	24Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
AC output power factor	1
Battery:	
Battery type	Li-ion, Lead-acid
Battery voltage range	40Vdc ~ 48Vdc
Max. charge/discharge current	100Adc ±100Adc

SN:



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MADE IN CHINA

Solar Hybrid Inverter

Model Name	HE3P4488100-H
Ingress protection	IP65
Operating Temperature Range	-25~60°C(-45~145°F)
Inverter topology	Non-isolated
Over voltage category	III(AC), III(DC)
Protective class	1
Max. Parallel	8
PV INPUT:	
Max. DC input power	4000W/4000W
Absolute max. voltage	550Vdc
MPPPT voltage range	120Vdc ~ 450Vdc
Max. input current	18Adc ±18Adc
Isoc. PV	27Adc, 27Adc
AC INPUT:	
Nominal voltage	230VAc
RatedMax. current	23Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
Power factor	1
AC OUTPUT:	
Nominal voltage	230VAc ±2%
RatedMax. current	24Adc
Nominal frequency	50/60Hz
RatedMax. apparent power	4000VA
Nominal power	4000W
AC output power factor	1
Battery:	
Battery type	Li-ion, Lead-acid
Battery voltage range	40Vdc ~ 48Vdc
Max. charge/discharge current	100Adc ±100Adc

SN:



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MADE IN CHINA

Solar Hybrid Inverter		Solar Hybrid Inverter		Solar Hybrid Inverter	
Model Name	HE5P4800100-H	Model Name	HE5P4800100-H	Model Name	HE5P4800100-H
Ingress protection	IP65	Ingress protection	IP65	Ingress protection	IP65
Operating Temperature Range	-25~60°C (-45~145°F derating)	Operating Temperature Range	-25~60°C (-45~145°F derating)	Operating Temperature Range	-25~60°C (-45~145°F derating)
Overload capability	Non-extended	Overload capability	Non-extended	Overload capability	Non-extended
Over-voltage category	II(AC), III(DC)	Over-voltage category	II(AC), III(DC)	Over-voltage category	II(AC), III(DC)
Protection class	1	Protection class	1	Protection class	1
Max.Faulted	0	Max.Faulted	0	Max.Faulted	0
PV INPUT		PV INPUT		PV INPUT	
Max. DC input power	4800W	Max. DC input power	4800W/4800W	Max. DC input power	4800W
Absolute max. voltage	500V _{a.c.}	Absolute max. voltage	400V _{a.c./400V_{a.c.}}	Absolute max. voltage	500V _{a.c.}
MPPPT voltage range	120V _{a.c./40V_{a.c.}}	MPPPT voltage range	38V _{a.c.} ~400V _{a.c.}	MPPPT voltage range	120V _{a.c./40V_{a.c.}}
Max. input current	32A _{a.c.}	Max. input current	120V _{a.c.} ~480V _{a.c.}	Max. input current	32A _{a.c.}
Isoc.PV	37A _{a.c.}	Isoc.PV	16A _{a.c./16A_{a.c.}}	Isoc.PV	37A _{a.c.}
AC INPUT		AC INPUT		AC INPUT	
Nominal voltage	230V _{a.c.}	Nominal voltage	LN/PE 230V _{a.c.}	Nominal voltage	230V _{a.c.}
Rated/Max. current	45A _{a.c.}	Rated/Max. current	45A _{a.c.}	Rated/Max. current	45A _{a.c.}
Rated/Max. apparent power	10200VA	Rated/Max. apparent power	10200VA	Rated/Max. apparent power	10200VA
Nominal power	6000W	Nominal power	6000W	Nominal power	6000W
Power factor	1	Power factor	0.9 leading to 0.9 lagging	Power factor	1
AC OUTPUT		AC OUTPUT		AC OUTPUT	
Nominal voltage	230V _{a.c./230V_{a.c.}}	Nominal voltage	LN/PE 230V _{a.c.}	Nominal voltage	230V _{a.c./230V_{a.c.}}
Rated/Max. current	28A _{a.c.}	Rated/Max. current	28A _{a.c.}	Rated/Max. current	28A _{a.c.}
Nominal frequency	50Hz/60Hz	Nominal frequency	50Hz/60Hz	Nominal frequency	50Hz/60Hz
Rated/Max. apparent power	6000VA	Rated/Max. apparent power	6000VA	Rated/Max. apparent power	6000VA
Nominal power	6000W	Nominal power	6000W	Nominal power	6000W
AC output power factor	1	AC output power factor	0.9 leading to 0.9 lagging	AC output power factor	1
Battery		Battery		Battery	
Battery type	Li-ion/Lead-acid	Battery type	Li-ion/Lead-acid	Battery type	Li-ion/Lead-acid
Battery voltage range	40V _{a.c.} ~400V _{a.c.}	Battery voltage range	40V _{a.c.} ~400V _{a.c.}	Battery voltage range	40V _{a.c.} ~400V _{a.c.}
Max. charge/discharge current	150A _{a.c./170A_{a.c.}}	Max. charge/discharge current	150A _{a.c.} ~170A _{a.c.}	Max. charge/discharge current	150A _{a.c./170A_{a.c.}}

SN: <input type="text"/>
Manufacturer: SINE Solar Co., Ltd. Address: 4-E, Building 13A Taihua Wujing Industrial Park Guzhou Development Zone, Hangzhou Street, Baima 311102 Shaozhou, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA. WARNING FIRE HAZARD: SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY. CAUTION THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING. MADE IN CHINA

SN: <input type="text"/>
Manufacturer: SINE Solar Co., Ltd. Address: 4-E, Building 13A Taihua Wujing Industrial Park Guzhou Development Zone, Hangzhou Street, Baima 311102 Shaozhou, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA. WARNING FIRE HAZARD: SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY. CAUTION THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING. MADE IN CHINA

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Interface protection has been tested and evaluated on basis of rated grid voltage 230 V, 50Hz according to the grid code on page 1.

Interface protection settings is limited to authorized installer, password and seal provided to protect these from unpermitted interference.



Product Service

Inverters with multi-voltage and/or frequency ratings are available in difference versions based on output voltages and frequencies, the ratings on which the testing has been based was identified on paper tag and control panel.

Marking plate material: pressure-sensitive unprinted label stocks stamped into aluminium surface; Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and thermal transfer printed label stock applications, -20°C to 55°C. An additional PET film provided to cover label.

1.Datasheet of EasyMatch B48:

Basic Parameters	EasyMatch-B48
Capacity	100Ah/520Wh
Battery Type	LiFePO4
Max working power	5kw
Voltage	51.2V
Current	100A
DoD	90%
Dimension	629.4*500*184.5mm
Weight	50KG
Operation Voltage	45.2V - 58.4V
Charge Voltage	57.6V - 58.4V
Charge/Discharge Current	100A
Network Interface	RS485/CAN
Max Parallel Connection	15

2.Datasheet of LFPWall-5000:

Nominal Capacity	5.12kWh
Voltage	51.2V
Charge Voltage	57V
Discharge Voltage Range	45-57V
Max. Charging Current	45A
Max. Discharging Current	75A
Max. Output Power	3840W
DOD	90%
Modules Connection	1-8 in parallel
Communication	CAN OR RS485
Cycle Life	≥6000 25°C 0.5C
Working Temp. Range	Charge: 0°C~+55°C,
	Discharge: -10°C~+55°C
Storage Temperature(°C)	-20°C~+35°C
Net Weight (kg)	49kg
Gross Weight (kg)	52.5kg
Product Dimension (mm)	542*468*197mm
Package Dimension (mm)	592*522*252mm



Product Service

3.Datasheet of M16S100BL-V:

	Model	M16S100BL-V	M16S200BL-V
Basic Characteristics	Nominal Voltage	51.2V	51.2V
	Nominal Capacity	100Ah	200Ah
	Efficiency	>96%	>96%
	Inner Resistance	10mΩ	7mΩ
	Cell Type	LiFePO ₄	LiFePO ₄
Charging Characteristics	Charge Voltage	58.4V	58.4V
	Standard Charging Current	20A	40A
	Max.Continuous Charging Current	100A	100A
Discharge Characteristics	Standard Discharge Current	20A	40A
	Continuous Discharge Current	100A	100A
	Peak Discharge Current	200A(3S)	200A(3S)
	Discharge Cut-off Voltage	42V	42V
Environmental Requirements	Charge Temperature Range	0~60°C	0~60°C
	Discharge Temperature Range	-10°C~65°C	-10°C~65°C
	Storage Temperature Range	-5~40°C	-5~40°C
	Storage Humidity	65±20%HR	65±20%HR
Mechanical Characteristics	Size(LxWxH)	445×170×560mm	445×206×675mm
	Package Size (L×W×H)	632×512×255mm	755×525×395mm
	Shell Material	SPCC	SPCC
	Net Weight	41kg	76kg
	Gross Weight	43kg	89kg
	Package Method	1pcs per carton	1pcs per carton
Others Characteristics	Cycle Life	>6000 times	>6000 times
	Self Discharge	2% per month	2% per month
	SOC Indication	LED Light& LCD Screen	LED Light& LCD Screen
	Communication Protocol	RS485/CAN	RS485/CAN
	Matching Inverter	Growatt, Goodwe, Deye, Luxpower, SRNE etc	

4.Datasheet of SR-EOS10B:

Cell and battery	Cell	Battery System
Model Name	LF100L	SR-EOS10B
Rated capacity (Ah)	102	200
Nominal voltage (V)	3.2	51.2
Standard Charge Current (A)	50	100
Standard Discharge Current (A)	50	100
Maximum continuous charge current (A)	100	150
Maximum continuous discharge current (A)	250	200
Charge temperature Range (°C)	0 to 65	0 to 55
Discharge temperature Range (°C)	-30 to 65	-10 to 55
Standard Charge Voltage (V)	3.65	57.6
Upper limit Charging Voltage (V)	3.9	57.6
End-of-discharge Voltage (V)	2	44.8
Weight(Kg)	1.98±0.1	89.92
Structure	<input type="checkbox"/> Cylindrical <input checked="" type="checkbox"/> Prismatic	2 parallel & 16 series
Recommend charging method declared by the manufacturer	Charge the cell at constant current 50A until voltage reaches 3.65V, then charge at constant voltage 3.65V till charge current is 5.1A	Charge the battery at constant current 100A until voltage reaches 57.6V, then charge at constant voltage 57.6V till charge current is 10A
Further Configuration of Battery Management System		
Overcharge Voltage Protection:	3.65V/Cell, 58.4V/Pack	
Overcharge Current Protection:	160A	
Charge Thermal Protection:	57 °C	

5.Datasheet of SOLE 5000:

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 Date: 2024-09-09
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TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.,
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 Building A, No.15 Factory, Jintong International Industrial
 Park, No.8 Xihu Road, Wujin National Hi-tech Industrial
 Development Zone, Changzhou City, Jiangsu Province,
 P.R. China



Product Service

FFD
POWER深圳市晓鸟动力技术有限公司
SHENZHEN FFD POWER TEC CO.,LTDFile No.: UQW48100H221125
Rev: A1
Page: 20
Date: 2022.11.25

磷酸铁锂电池组规格书

Approval Sheet

Product Code 产品编码	SOLE 5000
Cell Type 电芯类别	Lithium Iron Phosphate
Pack Mode 组合方式	16S1P
Nominal Voltage 电压	51.2V
Nominal Capacity 容量	100Ah

项目 Item	参数 Rating	备注 Note
电池类型 Type	LiFePO ₄ Battery	
组合方式 Pack Method	16S1P	
标称容量 Nominal capacity	100Ah	Charge/Discharge: 0.5C Cut-off Voltage: 40V
标称电压 Nominal voltage	51.2V	
能量 Energy	5,120Wh	
充电方式 Charge method	CC/CV	
充电截止电压 Charge cut-off voltage	58.4V	
放电截止电压 Discharge cut-off voltage	43.2V	
标准充电电流 Standard charge current	50A	
最大充电电流 Max. charge current	100A	保修条件: 充电电流≤50A (0.5C) @77°F (25°C) 80% DoD
标准放电电流 Standard discharge current	50A	
最大持续放电电流 Max. continues discharge current	100A	保修条件: 放电电流≤50A (0.5C) @77°F (25°C) 80% DoD
放电深度	100%	
运行效率	98%	
循环寿命 Cycle life	≥5,000 times (周)	亿纬 100LA 电芯
内阻 Internal impedance	≤50mΩ	
尺寸 Dimension	L520 x W446.4 x H176.8 mm	
通讯方式 Communication Mode	CAN, RS485, RS232	
重量 Weight	Approx. 48.82Kg	(误差 1KG 左右)
工作温度范围 Working temperature range	Charge: 0°C--55°C Discharge: -7°C--55°C	
储存温度 Storage Temperature	-10°C--45°C	

6.Datasheet of LFPWall-10K-V2

Project No: 704092450102-00
Rev.: 00
Date: 2024-09-09
Page: 18 of 50Telephone : +86 519 8109 8308
Telefax : +86 519 81239872-123<http://www.tuv-sud.cn>TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.,
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Building A, No.15 Factory, Jintong International Industrial
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Development Zone, Changzhou City, Jiangsu Province,
P.R. China



Product Service

4 Specifications

Nominal Capacity	10.44kWh
Voltage	51.2V
Charge Voltage	57.6V
Discharge Voltage Range	43.2-57.6V
Max. Charging Current	90A
Max. Discharging Current	140A
Max. Output Power	7168W
DOD	90%
Modules Connection	1-8 in parallel
Communication	CAN OR RS485
Cycle Life	≥6000 25℃ 0.5C
Working Temp. Range	Charge: 0℃~+55℃,
	Discharge: -10℃~+55℃
Storage Temperature(℃)	-20℃~+35℃
Recommend charge	Constant-current charge to 57.6V at 90A, stop until 57.6V
Net Weight (kg)	96kg
Gross Weight (kg)	125kg
Product Dimension (mm)	805mm*586mm*197mm
Package Dimension (mm)	950mm*720mm*390mm

7. Datasheet of SR-EOS05B:

Product model	SR-EOS05B	SR-EOS10B
Rated voltage	51.2V	51.2V
Rated capacity	100Ah	200Ah
Rated energy	5.12kWh	10.24kWh
Weight	47kg	88kg
Dimensions (L*W*H)	725*460*100mm	1014*620*205mm
Max. charging current	100A	150A
Max. discharging current	100A	200A
Peak charging current	110A (3S)	200A (3S)
Peak discharging current	110A (3S)	220A (3S)
Screen	LCD Screen	Touch Screen
Battery type	LFP	
Life time(25℃)	20 Years	
Life cycles (80% DOD,0.5C,25℃)	6000 Cycles	
Max.charging voltage	57.6V	
Over discharge voltage	44.8V	
Max.Number of parallel	16	
Communication interfaces	CAN/RS485/USB/WIFI/Bluetooth	
Lithium Battery Standard	UN38.3,MSDS,IEC 62619: 2017,EN IEC 61000-6,UL1973	
Storage time / temperature	6 months @25℃;3 months @35℃;1 months @45℃;	
Charging temperature range	0 ~ 45℃	
Discharging temperature range	-10 ~ 45℃	

8. Datasheet of TH-48200-W:

Specifications

Project No: 704092450102-00
Rev.: 00
Date: 2024-09-09
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Development Zone, Changzhou City, Jiangsu Province,
P.R. China

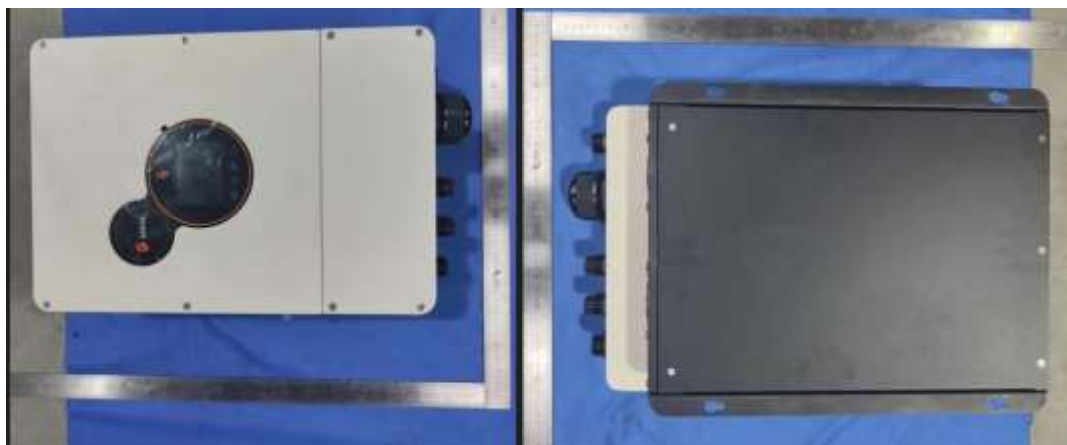
Basic Parameters	TH-48200-W
Nominal Capacity	9.6KWh
Voltage	48V
Charge Voltage	54V
Discharge Voltage Range	40.5V-54V
Max. Charging Current	100A
Max. Discharging Current	100A
Max. Output Power	4800W
DOD	80%
Modules Connection	1-15 in parallel
Communication	CAN OR RS485
Cycle Life	≥6000 25°C 0.5C
Working Temp. Range	0~55°C
	-20~55°C
Storage Temperature(c)	Recommend (25±3°C)
Net Weight (kg)	90Kg±1Kg
Gross Weight (kg)	96Kg±1Kg
Product Dimension (mm)	485*690*226
Package Dimension (mm)	570*850*285

Pictures of the product:

Representative model: HES4860S100-H

Front side

Rear side



Bottom side

Right side



Terminal



Summary of testing:

The product design inverter considered as Static Conversion Devices, Integrated Interface Device and Interface Protection Device for plant power upto 11.08 kW.

DISPOSITIVO DI INTERFACCIA Interface Device	PROTEZIONE DI INTERFACCIA Interface Protection Device	DISPOSITIVO DI CONVERSIONE STATICA Static Conversion Device	DISPOSITIVO DI GENERAZIONE TOTANTE Rotating Device
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Tests of Annex A and Annex Bbis were carried out on representative model HESP4860S100-H in test report 704092271801-00 and 704092370503-00 with positive results and used as an reference for compliance.

Test standard in this test report was updated from “CEI 0-21:2022” to “CEI 0-21:2022/V2:2024” and added two inverter models, for details see below table.

In addition, it is recommended to carry out tests according to annex Bbis with new storage battery system.

Test items below according to CEI 0-21:2022/V2:2024, are evaluated at rated voltage 230 V and at rated frequency 50Hz.

Tests in Annex Bbis were conducted based on the principle of following matrix:

Case B		Conversion power subsystem (W)		
		P ₁ (Pmin)	...	P _N (Pmax)
Storage subsystem capacity (Wh)	Basic module C (Emin)	Partial test according to Annex Bbis	No additional test required	Partial test according to Annex Bbis
	...	No additional test required	No additional test required	No additional test required
	M modules (Emax)	No additional test required	No additional test required	Complete test according to Annex Bbis

Clause	Requirement + Test	Sample for testing		
		HES4840S100-H with 1 piece of LFPWall-5000 battery module and PV together supply	HESP4860S100-H with 1 piece of LFPWall-5000 battery module and PV together supply	HESP4860S100-H with with SOLE 5000 battery module and PV together supply
Bbis.3	EMC requirements (current harmonic, voltage flicker)	N/A	N/A	Yes
Bbis.4	Checking of the operation range of the voltage and frequency	N/A	N/A	Yes
Bbis.5	Checking the connection and reconnection conditions	N/A	N/A	Yes
Bbis.6.1/Bbis.6.2	Checking of constructional requirements: reactive power capability	Yes	Yes	Yes
Bbis.6.3/Bbis.6.4	Exchange of reactive power according to an assigned level	N/A	N/A	N/A
Bbis.6.5	Response time to an assigned step level change	N/A	N/A	N/A



Bbis.6.6	Automatic supply of reactive power according to a characteristic curve $\cos \varphi = f(P)$	Yes	Yes	Yes
Bbis.6.7	Checking compliance with the rules for implementing the standard characteristic curve $\cos \varphi = f(P)$	Yes	Yes	Yes
Bbis.6.8/Bbis.6.9	Automatic exchange of reactive power according to characteristic curve $Q = f(V)$	N/A	N/A	N/A
Bbis.7.1	Automatic limitation the active power for voltage value close to 110% of the nominal voltage	N/A	N/A	Yes
Bbis.7.2	Checking of the automatic reduction of the active power in the presence of over-frequency transient network	Yes	Yes	Yes
Bbis.7.3	Checking of automatic increase of active power in case of underfrequency transients on the transmission network	Yes	Yes	Yes
Bbis.7.4	Checking of Active Power adjustment upon external command from Distributor	N/A	N/A	Yes
Bbis.8	Output of DC component in the output current	N/A	N/A	Yes
Bbis.9	Checking insensitivity to voltage dips (LVFRT capability)	N/A	N/A	N/A
Bbis.10	Checking the insensitivity to automatic reclosing during phase discordance	N/A	N/A	Yes
Note: Full tests of Annex B can be covered by test of Annex Bbis on storage system at test condition of Pn in discharge conditions.				

deviation(s) found

no deviations found

Additional information on non-standard test method(s)

Sub clause: N/A
 Page: N/A
 Rational: N/A

Possible test case verdicts:

test case does not apply to the test object: N/A (not applicable / not included in the order)
 test object does meet the requirement: P (Pass)
 test object does not meet the requirement: F (Fail)

General remarks:

*"(see remark #)" refers to a remark appended to the report.
 "(see appended table)" refers to a table appended to the report.
 Throughout this report a **point** is used as the decimal separator.
 The test 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.*

Reports revision history:

1. First revision report no. 704092271801-00, date on: 2023-02-28 and 704092370503-00, date on: 2023-10-15 which were updated by 704092450102-00, date on: 2024-09-09 due to following reason:

- The standard was changed from "CEI 0-21:2022" to "CEI 0-21/V2:2024".*
- For model HESP4850S100-H: Max. input current change from "3x36A+3x32 A" to "3*40A+3*32 A";*
- Updated firmware version from "2.60" to "2.85".*
- Added the models: HESP4840S100-H, HESP4846S100-H and HESP4855S100-H*
- Updated attachments safety test report and emc test report.*
- Added storage Storage battery system 1: EasyMatch B48, 1-15 pieces*
- Added storage Storage battery system 2: LFPWall-5000, 1-8 pieces*
- Added storage Storage battery system 3: M16S100BL-V, 1-15 pieces*
- Added storage Storage battery system 4: SR-EOS10B, 1-16 pieces*
- Added storage Storage battery system 5: SOLE 5000*
- Added storage Storage battery system 6: LFPWall-10K-V2, 1-8 pieces*
- Added storage Storage battery system 7: SR-EOS05B, 1-16 pieces*
- Added storage Storage battery system 8: TH-48200-W, 1-15 pieces*

For all updated models, after reviewed marking plate and technical specification of the inverters, only cls. Bbis.6.6 and 6.7 test should be performed, and this report should be used in conjunction with original test report No.: 704092271801-00 and 704092370503-00.



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Clause	Requirement + Test	result – Remark	Verdict
Annex A	Characteristics and tests for the Protection System Interface (SPI) (normative)		P
A.1	Types of evidence		P
	The types of tests to be performed on the interface protection system (SPI) and the inverter are as follows:		P
	- Type tests		P
	- Field tests: here have to be classified both the tests of first installation and the tests that follows first installation; such tests (with relative frequency) must be explicitly required in the eventual operating rules of the distributor. Are not required for systems with power less than 800 W		
A.2	Characteristics of SPI		P
	The SPI must include:		P
	- a minimum voltage protection function with two thresholds		P
	- an overvoltage protection function with two thresholds		P
	- a minimum frequency protection function with two thresholds		P
	- a maximum frequency protection function with two thresholds		P
	- a processing function of the remote tripping signal in the event of installation of a dedicated device (protection relay)		P
	- a function of process the signal indicating the presence of a communication signal		P
	- a self-diagnostic function,		P
	- a self-test function (mandatory, if integrated in the inverter control system of of a plant with overall capacity up to 11,08 kW); any transducers designed to capture voltage signals		P
	- an opening circuit for the interface device		P
	- only for external SPI, an auxiliary power system which enable it's operation for at least 5 s in the absence of mains power. The auxiliary power system must be sized appropriately so that, in the absence of mains power, it allows operation of the IPS, the closure of the interface device (DDI) and a possible control device for backup for at least for the time defined above . The integrated SPI	Integrated SPI	N/A



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Clause	Requirement + Test	result – Remark	Verdict
	must meet the requirement of "single fault tolerance." This requirement implies that in case of failure of a component of the SPI, the latter must continue to ensure its proper operation or cause the opening of the DDI and report the fault condition.		
	The nominal voltage and nominal frequency for all protection functions are: Rated Voltage: (230/400) V Rated frequency: 50 Hz		P
A.3	Adjustment ranges for the SPI		P
A.3.1	Minimum phase voltage protection [27]		P
A.3.2	Maximum phase voltage protection [59]		P
A.3.3	Minimum frequency protection[81<]		P
A.3.4	Maximum frequency protection[81>]		P
A.4	Checks and tests on SPI		P
	The interface protection system shall be subjected to the following tests:		P
	- functional (see A.4.3, and in particular A.4.4 in the case of self-testing);		P
	- single fault tolerance (see A.4.5);		P
	- climate compatibility (see A.4.7);		P
	- insulation (see A.4.8);		P
	- overloadability of measuring circuits (see A.4.9).		P
	Accreditation	<input checked="" type="checkbox"/> laboratory accredited to CEI UNI EN ISO/IEC 17025 <input type="checkbox"/> non-accredited facilities <input type="checkbox"/> at manufacturers' premises <input type="checkbox"/> directly in the field	P
	For any SPI, whether it is integrated in the inverter or not, it must always be possible to verify that it operates correctly according to the set thresholds and times.		P
	For the SPI integrated in the inverter, the relapse ratios and relapse times do not have to be verified.		P
A.4.1	Characteristics of the relay test box	Grid simulator used	P
A.4.2	Characteristics of the LV network simulator		P
A.4.3	Functional tests on SPI		P

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Clause	Requirement + Test	result – Remark	Verdict
A.4.3.1	Test procedure for maximum voltage and frequency		P
A.4.3.2	Test procedure for minimum voltage and frequency functions		P
A.4.3.3	Additional prescriptions for functional tests		P
A.4.3.3.1	Frequency relay insensitivity to harmonics		P
A.4.3.3.2	Remote trip time		P
A.4.3.3.3	Communication signal		P
A.4.3.4	Verification of insensitivity to the frequency derivative		P
A.4.4	Self test		P
A.4.5	Single fault tolerance		P
A.4.6	EMC compatibility tests		P
A.4.6.1	General		P
A.4.6.2	Evaluation criteria		P
A.4.7	Climate compatibility test		P
	Dry heat +55°C ± 2°C(16 hours)		P
	Damp heat +40°C ± 2°C RH=93%±3% (4 days)		P
	Cold test -25°C ± 2°C (16 hours)		P
	Temperature change -25/+60°C±2°C (3hour+3hour)		P
	Dry heat +55°C ± 2°C(16 hours)		P
	Damp heat +40°C ± 2°C RH=93%±3% (4 days)		P
	Cold test -25°C ± 2°C (16 hours)		P
	Temperature change -25/+55°C±2°C(3 hours + 3 hours)		P
A.4.8	Insulation test		P
	Impulse test		P
	Dielectric strength test		P
	Isolation resistance		P
A.4.9	Tests for the overload capacity of measuring circuits		P
	Permanent V ≥ 1.3Vn		P
	Transient(1s) V ≥ 1.5Vn		P
A.4.10	Compliance of equipment		P



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Clause	Requirement + Test	result – Remark	Verdict
	Accreditation	<input checked="" type="checkbox"/> laboratory accredited to CEI UNI EN ISO/IEC 17025 <input type="checkbox"/> non-accredited facilities <input type="checkbox"/> at manufacturers' premises <input type="checkbox"/> directly in the field	P
	It must also include certification that the production of the device is carried out in accordance with quality (according to ISO 9001, ed. 2000 [as amended]).		P
A.4.11	Automatic mechanism to prevent current imbalances during production		N/A
	The following tests should be performed only if the entire production system can be operated with power imbalance below 10 kW (test 1) or above 10 kW (tests 1 and 2).		N/A
	Test no.1 -.System operating at its normal conditions -.Creation of a permanent artificial imbalance between 6kW to 10kW -.Checking the disconnection of entire production system using the DDI within a maximum time of 30 minutes.		N/A
	Test no.2 -.System operating at its normal conditions -.Creation of a permanent artificial imbalance greater than 10kW -.Checking the disconnection of entire production system using the DDI within a maximum time of 1 minute.		N/A
Annex B	Tests on generators connected to the grid via static converters (normative)		N/A
B.1	Tests on the inverter	Test on storage system instead with rated power	N/A
	Tests on the inverter must be carried out at a third-party laboratory accredited according to CEI UNI EN ISO/IEC 17025 or under the supervision and responsibility of a certification body accredited according to CEI UNI EN ISO/IEC 17065.	<input type="checkbox"/> laboratory accredited to CEI UNI EN ISO/IEC 17025 <input type="checkbox"/> non-accredited facilities <input type="checkbox"/> at manufacturers' premises <input type="checkbox"/> directly in the field	N/A
	The device must be marked with CE mark.		N/A
	The device must be successfully passed the following test:		N/A



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Clause	Requirement + Test	result – Remark	Verdict
	a. Harmonic emission limits for Class A (IEC EN 61000-3-2 and IEC EN 61000-3-12), the test is repeated in 3 sessions (33%, 66% and 100% of rated output);		N/A
	b. For devices with phase currents above 75A, harmonic emission test, with the same criteria of IEC EN 61000-3-12;		N/A
	c. The limits of voltage fluctuation and flicker (IEC EN 61000-3-3 or IEC EN 61000-3-11), the test is repeated in 3 sessions (33%, 66% and 100% of rated output);		N/A
	d. Conditions for connection, reconnection and gradual increase of power(see 8.4.4.1), as described in B1.1		N/A
	e. provision of reactive power(see 8.4.4.2 and 8.5.2), as described in B1.2		N/A
	f. limitation of active power(see 8.5.3), as described in B.1.3		N/A
	g. Checking of the d.c. component of the output current (see 8.4.4.2), as described in B.1.4;		N/A
	h. Checking the insensitivity of sags in 8.5.1 (UVRT), as described in B.1.5		N/A
	i. Checking of the absence of any damage in case of automatic reclosing by the Distributor(see 8.4.4.3 and 8.6.2.1), as described below in B.1.6		N/A
	The tests referred to in points a), b), c), g) must be carried out on the device in the reference conditions of Tab. 21 and Tab. 22. The remaining tests may be performed only under the conditions described in Tab. 21 .		N/A
	The inverters must comply with CEI EN 61000-6-3 (residential environment) as they are directly connected to the Distributor's low voltage network.		N/A
B.1.1	Conditions of connection, reconnection and gradual power supply		N/A
B.1.1.1	Checking the connection and reconnection conditions		N/A
B.1.1.2	Checking gradual supply of active power		N/A
B.1.2	Reactive power exchange		N/A



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Clause	Requirement + Test	result – Remark	Verdict
B.1.2.1	Checking of construction requirements: reactive power capability		N/A
B.1.2.2	Test performance and recording mode		N/A
B.1.2.2.1	Inverter in systems with total capacity up to 11.08 kW		N/A
B.1.2.2.2	Inverter in system with total capacity greater than 11.08 kW		N/A
B.1.2.3	Reactive power Exchange at an assigned level		N/A
B.1.2.3.1	Mode of execution and registration of the test results (assuming Q regulation)		N/A
B.1.2.4	Response time to an assigned step level change		N/A
B.1.2.5	Automatic supply of reactive power according to a characteristic curve $\cos \varphi = f(P)$	A: $P = 0,2 P_n$; $\cos \varphi = 1$ B: $P = 0,5 P_n$; $\cos \varphi = 1$ C: <input type="checkbox"/> (Inverter): $P = 0,5 P_n$; $\cos \varphi = 0,9$ (absorption of reactive power) <input type="checkbox"/> (wind generators): $P = 0,5 P_n$; $\cos \varphi = 0,95$ (absorption of reactive power)	N/A
B.1.2.5.1	Checking compliance with the rules for implementing the standard supply curve		N/A
B.1.2.6	Automatic exchange of reactive power according to a characteristic curve $Q = f(V)$		N/A
B.1.2.6.1	checking compliance with rules for implementing the characteristic curve $Q = f(V)$		N/A
B.1.3	Limitation of active power		N/A
B.1.3.1	Automatic limitation of active power for voltage values close to 110% of the rated voltage		N/A
B.1.3.2	Regulation of active power in the presence of over-frequency transients on the transmission network		N/A
B.1.3.2.1	Testing procedure		N/A
B.1.3.2.2	Test results		N/A
B.1.3.3	Verification of the operating range in voltage and frequency		N/A
B.1.3.3.1	Reduction of active power in case of transients underfrequency on the transmission grid		N/A



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Clause	Requirement + Test	result – Remark	Verdict
B.1.3.3.1.1	Testing procedure		N/A
B.1.3.3.1.2	Test results		N/A
B.1.3.4	Limitation of active power by external control from the Distributor		N/A
B.1.4	Output of the DC component in the output current		N/A
B.1.4.1	Checking of the DC component output		N/A
B.1.4.2	Checking the protection against DC component		N/A
B.1.5	Checking insensitivity to voltage dips (UVRT capability)		N/A
B.1.6	Checking the insensitivity to automatic reclosing during phase discordance		N/A
B.1.6.1	Tests on simulated network		N/A
B.1.6.2	Testing on the distribution network using a coupling transformer		N/A
B.1.6.3	Testing on the distribution network, simulation of frequency drift		N/A
B.1.6.4	Extension of results		N/A
	Some simplifications to the prove process are applicable in the case of static converters of the following types:		N/A
	Case A: generators that share the same control electronics, with the same firmware, with the same construction solutions including the power part, with the same number of phases, with power electronics, filters and transducers sized on different voltage and/or current sizes.		N/A
	With regard to Case A:		N/A
	The demonstration of conformity of the two extremes of the systems concerned implies the conformity of each element of the whole.		N/A
	Alternatively, the tests can be performed on a representative generator and in this case the results of the tests will be representative of similar generators with power included between $P_{gen}/\sqrt{10} < P_{gentestato} < P_{gen} * \sqrt{10}$.		N/A
	Case B : modular generators, consisting of a basic element that is repeated N times in larger sizes		N/A
	With reference to case B:		N/A
	at least one complete test session on the smaller generator and confirmation of the correct		N/A

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Clause	Requirement + Test	result – Remark	Verdict
	adjustments on the other models of the assembly are expected, carrying out a partial test session on the higher power model (B.1.2.1, B.1.2.2, B.1.2.5, B.1.3.2).		
	The requirements relating to the quality of the voltage (B.1 paragraph a), paragraph b) and paragraph c)) are met if the total contribution of the generator (evaluated as the arithmetic sum of the individual size generators lower) is within the limits laid down.		N/A
	Otherwise, a test shall be carried out secondo B.1 paragraph a), paragraph b) and paragraph c) on the generator of maximum size.		N/A
Annex Bbis	Tests on storage systems		P
Bbis.1	Introduction		P
Bbis.2	Execution of tests		P
Bbis.2.1	Accreditation		P
	Tests on storage systems are typically performed at a third-party laboratory accredited according to the CEI UNI EN ISO / IEC 17025 standard.		N/A
	Alternatively, the tests can be carried out at other non-accredited facilities or at the Manufacturers, or directly in the field, provided that:	<input type="checkbox"/> laboratory accredited to CEI UNI EN ISO/IEC 17025 <input type="checkbox"/> non-accredited facilities <input checked="" type="checkbox"/> at manufacturers' premises <input type="checkbox"/> directly in the field	P
	- the equipment used complies with the requirements set out in this Annex;		P
	- in the case of non-accredited structures or Manufacturers' Laboratories, the tests are carried out under the supervision of an accredited certification body according to the CEI UNI EN ISO / IEC 17065 standard.		P
	- in the case of field tests, the tests are and followed by the staff of the accredited laboratory for field tests (accreditation in category III), according to the CEI UNI EN ISO / IEC 17025 standard, which is responsible for verifying the correctness of the procedures and the drafting of the prove report.		N/A
	- in particular, the instruments and equipment belonging to non-accredited structures, used for the purpose of verifying compliance with this standard, are found in the period of validity of calibration. Calibrations shall cover all the parameters required by this Standard. Copies of the calibration reports of the aforementioned		P



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Clause	Requirement + Test	result – Remark	Verdict
	instrumentation and equipment, complete with all the data collected, are given in the test reports,		
	Measurements shall be made at the AC terminals of the storage system (electrochemical accumulators + mains coupling converter).		P
Bbis.2.2	Scaling and modularity		P
	Case A - Scalar in power and energy capacity sizes		N/A
	Case B - Scalar in power sizes and modularity in energy capacity		P
	Case C - Modularity in power sizes and scalar in energy capacity		N/A
	Case D - Modularity		N/A
Bbis.3	List of reference tests and conditions		P
	The device must be marked with CE mark.	See separated CE-EMC certificate and CE-LVD certificate provided by third party as in attachments	P
	In particular, it shall have to be manufactured as technical files required for assessing compliance with the aspects of Electromagnetic Compatibility and Electrical Safety.		P
	The device must be successfully passed the following test:		P
	a. Harmonic emission limits for Class A (IEC EN 61000-3-2 and IEC EN 61000-3-12), the test is repeated in 6 sessions (33%, 66% and 100 % of the P_{SMAX} , or P_{NINV} for integrated EESS, and to 33%, 66% and 100% of the P_{CMAX}), for storage system connected to the bidirectional converters, and for the storage system connected to unidirectional converters, 3 sessions (33%, 66% and 100 % of the maximum power available discharged.)		P
	b. For devices with phase currents above 75 A, it is possible to carry out the tests of harmonic emission, with the same criteria of the IEC 61000-3-12; they should be repeated in 6 sessions (33%, 66% and 100 % of the P_{SMAX} , or P_{NINV} for integrated EESS, and to 33%, 66% and 100% of the P_{CMAX}), for storage system connected to the bidirectional converters, and for the storage system connected to		N/A



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Clause	Requirement + Test	result – Remark	Verdict
	unidirectional converters, 3 sessions (33%, 66% and 100 % of the maximum power available discharged.)		
	c. Limits of voltage fluctuations and flicker (IEC 61000-3-3 or IEC 61000-3-11); they should be repeated in 6 sessions (33%, 66% and 100 % of the P _S MAX, or P _N INV for integrated EESS, and to 33%, 66% and 100% of the P _C MAX), for storage system connected to the bidirectional converters, and for the storage system connected to unidirectional converters, 3 sessions (33%, 66% and 100 % of the maximum power available discharged.)		P
	d. Verification of the operating range in voltage and frequency (see 8.4.4), as described below in Bbis.4;		P
	e. Conditions of connection, reconnection and gradual delivery of the power (see 8.4.1.3), as described below in Bbis.5;		P
	f. Supply of reactive power (see 8.4.4.2 and 8.5.2), as described in Bbis.6;		P
	g. limitation of active power(see 8.5.3), as described in Bbis.7		P
	h. Checking of the d.c. component of the output current (see 8.4.4.2), as described in Bbis.8		P
	i. Checking the insensitivity of sags in 8.5.1 (UVRT), as described in Bbis.9		P
	j. Checking of the absence of any damage in case of automatic reclosing by the Distributor(see 8.4.4.3 and 8.6.2.1), as described below in Bbis.10		P
	The tests referred to in points a) b) c), g) must be performed on an ambient temperature of -25±2°C, 25±2°C and 60±2°C; the remaining test is performed on an ambient temperature of 25±2°C		P
	The inverter must be in accordance with the IEC EN 61000-6-3 (residential environment) as directly connected to the Distributor low voltage network.		P
	If the requirements of points a), b), c), h) above are complied with in a temperature range declared by the Manufacturer other than that indicated in Tab. 33, the Manufacturer must prevent the device from functioning outside the		P



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Clause	Requirement + Test	result – Remark	Verdict
	declared operating range. This functionality must be verified by a specific test		
Bbis.4	Checking of the operation range of the voltage and frequency		P
Bbis.5	Conditions of connection, reconnection and gradual power supply		P
Bbis.5.1	Checking the connection and reconnection conditions		P
Bbis.5.2	Checking gradual consumption / supply of active power		P
Bbis.6	Reactive power exchange		P
Bbis.6.1	Verification of construction requirements: reactive power capability		P
Bbis.6.2	Test performance and recording mode		P
Bbis.6.3	Exchange of reactive power according to an assigned level		N/A
Bbis.6.4	Procedures of execution and registration of the test results (assuming by Q regulation)		N/A
Bbis.6.5	Response time to an assigned step level change		N/A
Bbis.6.6	Automatic supply of reactive power according to a characteristic curve $\cos \varphi = f(P)$	A: $P = 0,2 P_n$; $\cos \varphi = 1$ B: $P = 0,5 P_n$; $\cos \varphi = 1$ C: <input checked="" type="checkbox"/> (Inverter): $P = 0,5 P_n$; $\cos \varphi = 0,9$ (absorption of reactive power) <input type="checkbox"/> (wind generators): $P = 0,5 P_n$; $\cos \varphi = 0,95$ (absorption of reactive power)	P
Bbis.6.7	Checking compliance with the rules for implementing the standard supply curve $\cos \varphi = f(P)$		P
Bbis.6.8	Automatic exchange of reactive power according to a characteristic curve $Q = f(V)$		N/A
Bbis.6.9	Checking compliance with the implementing rules of the characteristic curve $Q = f(V)$		N/A
Bbis.7	Active power control		P
Bbis.7.1	Automatic limitation the active power for voltage value close to 110% of the nominal voltage		P



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Clause	Requirement + Test	result – Remark	Verdict
Bbis.7.2	Verification of the automatic reduction of active power in the presence of over-frequency transients on the network		P
Bbis.7.2.1	Execution of tests		P
Bbis.7.2.2	Results of tests		P
Bbis.7.3	Verification of the automatic increase of the active power in the presence of subfrequencies transient on the network		P
Bbis.7.3.1	Execution of tests		P
Bbis.7.3.2	Results of tests		P
Bbis.7.4	Verification of the regulation of active power on external command from the Distributor		P
Bbis.7.4.1	Verification of settling time to a command of increase / reduction in power		P
Bbis.8	Output of the DC component in the output current		P
Bbis.8.1	Checking of the DC component output		P
Bbis.8.2	Checking the protection against DC component		P
Bbis.9	Checking insensitivity to voltage dips (UVRT capability)		N/A
Bbis.9.1	Method of execution and registration of evidence		N/A
Bbis.9.2	Test circuit – requirements		N/A
Bbis.9.2.1	Test circuit – short circuit simulator		N/A
Bbis.9.2.2	Alternative test methods – network simulator		N/A
Bbis.10	Checking the insensitivity to automatic reclosing during phase discordance		P
Bbis.10.1	Testing on the simulated network		P
Bbis.10.2	Testing on the simulated network using a coupling transformer		N/A
Bbis.10.3	Testing on the distribution network, simulation of frequency drift		N/A
Annex Bter	Conformity of synchronous and asynchronous generation groups (normative)		P
Annex C	Declaration of compliance (normative)		P
C.1	Example of Bbis.10.2 for SPI test report tables		P
Annex D	Signals on protocol IEC EN 61850 (informative, at the study)		P
Annex E	Participation of DG units in controlling voltage (normative)		P
E.1	General		P



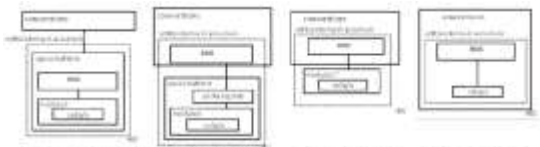
Product Service

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Clause	Requirement + Test	result – Remark	Verdict
E.2	Automatic supply of reactive power according to a characteristic curve $\cos \varphi = f(P)$		P
E.2.1	Automatic supply/consumption of reactive power according to a characteristic curve $Q = f(V)$		N/A
E.3	Centralized control		N/A
Annex F	Limitation of the active power of DG units (normative)		P
F.1	General		P
F.2	Limitation in local logic		P
F.3	Regulation of active power in the presence of transients on the distribution network		P
F.4	Limiting as an effect of centralized logic		N/A
Annex G	Regulations for operation in parallel with the “DISTRIBUTOR” LV network of generating systems (normative)		N/A
Annex Gbis	Operating regulation in parallel with BT “DISTRIBUTOR” network of production plants < 0.8 kW (normative)		N/A
Annex H	Characteristics of the relay test box (normative)		P
Annex I	Evaluation of the angle at reclosing (Informative)		N/A

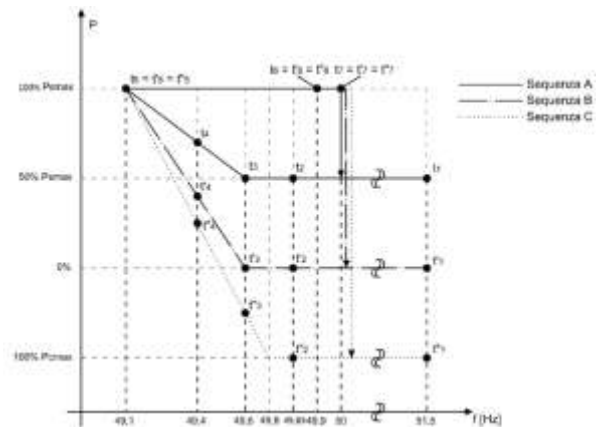
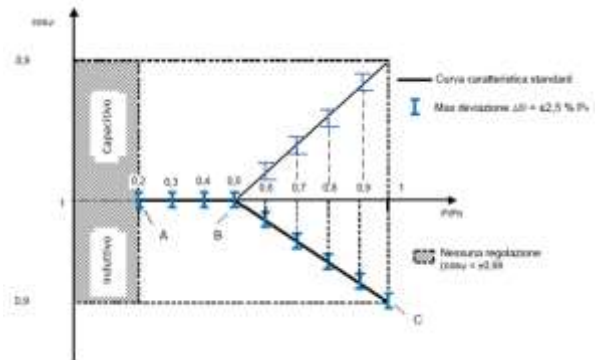
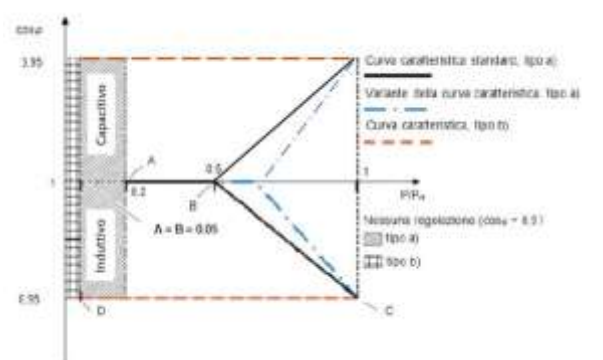
CEI 0-21/V1:2022			
Clause	Requirement + Test	result – Remark	Verdict
Annex A	Characteristics and tests for the Protection System Interface (SPI) (normative)		P
A.4.8	Table 20 Insulation tests Replace CEI EN 60255-5 with CEI EN 60255-27		P
Annex B	Tests on inverters for indirectly connected systems (normative)		N/A
	After B.1.5 add:		N/A
B.1.5bis	Checking insensitivity to voltage swell (OVRT capability)		N/A
Annex Gter	Operating rules for generators providing intentional island repower service		N/A
Annex X	Charging infrastructure controller for electric vehicles		N/A

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Clause	Requirement + Test	result – Remark	Verdict

Annex Bbis	Tests on storage systems		P
Bbis.2.1	Accreditation		P
Bbis.2.2	Scalar and modularity		P
	After the second line add the following sentence: In particular, the following states the conditions for extending the certification of a storage system to storage systems belonging to the same family.		P
	The following conditions also further simplify the test process by avoiding retesting in the event of a change or modification of the storage subsystem of a certified generator. In particular, the certification of a storage system consisting of a certain model of inverter (conversion subsystem) in combination with a certain model of battery (storage subsystem) can be extended without retesting to the case of a modified system in which the part of the storage subsystem is replaced with another model only if the following conditions are met:		P
	1. The storage system is of the electrochemical type, based on lithium technology (Li-ion and Li metal) whose storage elements are qualified according to the reference standard CEI EN 62619 which defines and characterises the safety and operational perimeters of the storage subsystem in terms of voltage, current and temperature operating ranges. Based on the same standards and other technical documentation, the manufacturer of the storage system must declare its operating perimeter to the grid in terms of PSMAX and PCMAX.		P
	2. The replacement storage subsystem is also based on lithium technology; the new storage system is characterised by safety and operational perimeters that are no more extensive than those of the original storage subsystem. If the perimeters are more extensive (e.g. larger PSMAX, PCMAX), certification may be extended to the modified system only within the limits of the original perimeter. In order to obtain certification for the extended perimeter, it is only necessary to verify		P

CEI 0-21/V2:2024			
Clause	Requirement + Test	result – Remark	Verdict
	the requirements that actually involve the new attainable power and only in the range of power exceeding the previous characterisation.		
	<p>3. The original and the modified storage subsystem have the following requirements:</p> <ul style="list-style-type: none"> - there is no BMS, or; - the BMS does not participate in the chain of command and execution functions other than the maintenance of SIL ("Safety Integrity Level" with ref. to CEI EN IEC 62619 sec. 8), and; - any other hardware or software present does not participate in the chain of command and execution of functions beyond maintaining SIL. 		P
	<p>4. With reference to the figure below, the original and the modified system have the same configuration and the content of the "converter" (inverter) in its physical components (hardware) is not changed in any way compared to the previous certification. Modifications to the converter parameters are accepted for the correct integration of the different coupled batteries while maintaining the safety perimeters.</p>  <p>a) Tutte le funzioni del BMS sono nel pacco batterie b) Le funzioni del BMS sono suddivise tra pacco batterie e convertitore c) Configurazione del convertitore con BMS e celle d) Il convertitore integra tutte le funzioni del BMS e le celle</p> <p>dalla Fig. 9 della CEI EN 62619: "esempi di posizione del BMS e configurazioni del sottosistema di accumulo"</p>		P
	<p>5. If DC/DC converters are present (in the original system and/or the modified system), they do not affect any of the above conditions (e.g. are not added or removed from the 'converter')</p>		N/A
Bbis.3	List of tests and reference conditions		P
	The device must be CE marked. In particular, the technical documents required to assess conformity with Electromagnetic Compatibility and Electrical Safety aspects shall be produced.		P
	The tests on the charging infrastructure storage system in V2G mode shall be performed using a		N/A

CEI 0-21/V2:2024			
Clause	Requirement + Test	result – Remark	Verdict
	DC source having operating characteristics and voltage, current and therefore power regulation ranges appropriate to the various tests and such as to allow the exchange (in supply and absorption) of power with the inverter for the time required to perform the individual tests. By way of example, an electric vehicle emulator, an electrochemical storage subsystem or generically a DC generator may be used as a DC source.		
	The device must have successfully passed the following tests (the IEC reference standard for the tests is indicated in brackets):		N/A
	In the case of a charging infrastructure storage system in V2G mode, it must be taken into account when performing the tests that: - PSN = PCN = PSMAX = PCMAX = PNINV - CUS: energy required to perform the individual test for the required power		N/A
Bbis.7.2	Verification of automatic active power reduction in the presence of over-frequency transients on the grid		P
	Add, at the end of the paragraph, the following text (insert cross-reference to the mentioned paragraph): In case the power exchanger section of a charging infrastructure in V2G mode is present, this must be tested by verifying that, under conditions of over-frequency ($f > 50.2$ Hz) and active power delivery to the grid by the infrastructure (electric vehicle discharge), the DDD device opens.		P
Bbis.7.3	Verification of automatic active power increase in the presence of under-frequency transients on the grid		P
	Add, at the end of the paragraph, the following text (insert cross-reference to the mentioned paragraph): In case the power exchanger section of a charging infrastructure in V2G mode is present, this must be tested by verifying that, under conditions of underfrequency ($f < 49.8$ Hz) and active power absorption from the grid by the infrastructure (electric vehicle charging), the DDD device opens.		P
Bbis.7.3.2	Test results		P

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Clause	Requirement + Test	result – Remark	Verdict
			P
	In B1.2.5, Bbis.6.6, Bter.6.3 Automatic reactive power output according to a characteristic curve $\cos\phi(P)$		P
			P
	In E.2 Automatic reactive power output according to a $\cos\phi(P)$ characteristic curve		P
			P
Annex G	Operating regulations for production plants with an output of more than 11.08 kW in parallel with the DSO's LV grid		N/A

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Clause	Requirement + Test	result – Remark	Verdict						
Annex Gbis	Operating regulations for production plants up to 11.08 kW in parallel with the DSO's LV grid connected to the grid via inverters		N/A						
Annex L	Feed-in Limitation system (SLI)		N/A						
L.1	General		N/A						
	SLI systems may only be installed on single-phase plants whose PIR does not exceed 6 kW and the total rated power of the installed generation plants does not exceed 11.08 kW.		N/A						
L.2	Examples of schemes that can be used		N/A						
L.3	Minimum Requirements		N/A						
	- The measuring device for SLI control purposes must calculate the active P on the basis of a time of 200ms.		N/A						
	- With regard to the uncertainty class of the measuring device, this must be taken into account as it will be added to the other tolerances of the system and will contribute to defining the margin that must be considered in relation to the limit curve above in order to ensure that it is not exceeded under all operating conditions of the system.		N/A						
	- An error is permissible: - for P>1 kW: 2.5% - If P<=1 kW: 25 W		N/A						
L.3.1	SLI and contribution to generation system short-circuit		N/A						
L.3.2	SLI and generation plant network services		N/A						
L.4	Compliance test		N/A						
L.4.1	Test setup		N/A						
L.4.2	Verification of the SLI system's ability to respect the maximum input curve described in L.3 following a load variation		N/A						
	Adjust the test setup with the initial settings as shown in the table. Change at instant t0 the the power absorbed by the load as shown in the table.	Cut-off load	N/A						
	<table border="1"> <thead> <tr> <th>Parameter</th> <th>Test 1</th> <th>Test 2</th> </tr> </thead> <tbody> <tr> <td>PIR</td> <td>40%Pmax generator</td> <td>0%Pmax generator</td> </tr> </tbody> </table>	Parameter	Test 1	Test 2	PIR	40%Pmax generator	0%Pmax generator		N/A
Parameter	Test 1	Test 2							
PIR	40%Pmax generator	0%Pmax generator							

CEI 0-21/V2:2024				
Clause	Requirement + Test		result – Remark	Verdict
	Input limit	PIR – maximum error allowed as indicated in L.3		
	Generator power	100%Pmax generator		
	Initial input load power	100%Pmax generator		
	Power absorbed by the load at instant t0	0%Pmax generator		
	The measuring system must record the active power for at least 5s before time t0 and up to 60s after instant t0.			
	Evaluation criterion			N/A
	The test is passed if the power profile of the active power measured by the network analyser remains within the permissible profile in Figure 4 during the measurement period from time t0 to t0+60s.			
L.4.3	Verification of the SLI system's ability to comply with the maximum input curve described in L.3 following a power variation of the primary source			N/A
	Adjust the test setup with the initial settings as shown in the table. Change at instant t0 the power available from the primary source to match the table.		Primary source change	N/A
	Parameter	Test 1	Test 2	N/A
	PIR	35%Pmax generator	0%Pmax generator	
	Input limit	PIR – maximum error allowed as indicated in L.3		
	Initial generator power	40%Pmax generator	0%Pmax generator	
	Load power consumption	100%Pmax generator		
	Power available from primary source at time t0	110%Pmax generator		

CEI 0-21/V2:2024					
Clause	Requirement + Test		result – Remark	Verdict	
	The measuring system must record the active power for at least 5s before time t0 and up to 60s after instant t0.				
	Evaluation criterion The test is passed if the measured power profile falls within the curve defined in L.3.			N/A	
L.4.4	Verification of the SLI system's ability to comply with the limit on power fed into the grid under stationary conditions			N/A	
	Adjust the test setup with the settings as shown in the table.			N/A	
	Parameter	Test		N/A	
	PIR	60%Pmax generator			
	Input limit	PIR – maximum error allowed as indicated in L.3			
	Generator power	100%Pmax generator			
	Load power consumption	20%Pmax generator			
	The measurement system must record the active power measurement for at least 15 minutes after the SLI control has limited the power input to a value below the PIR				
	Evaluation criterion The test is passed if, during the measurement period, the power fed into the grid by the generator is continuously lower than the PIR with a measurement tolerance of 2.5% for powers above 1kW and 25W for powers up to 1kW.			N/A	
L.4.5	Verification of SLI system first fault tolerance			N/A	
	Adjust the test setup with the initial settings as shown in the table. At time t0 apply the fault condition identified in the table			N/A	
	Parameter	Test 1	Test 2	Test 3 only for indirect insertion SLI measuring device	N/A
	PIR	60%Pmax generator			



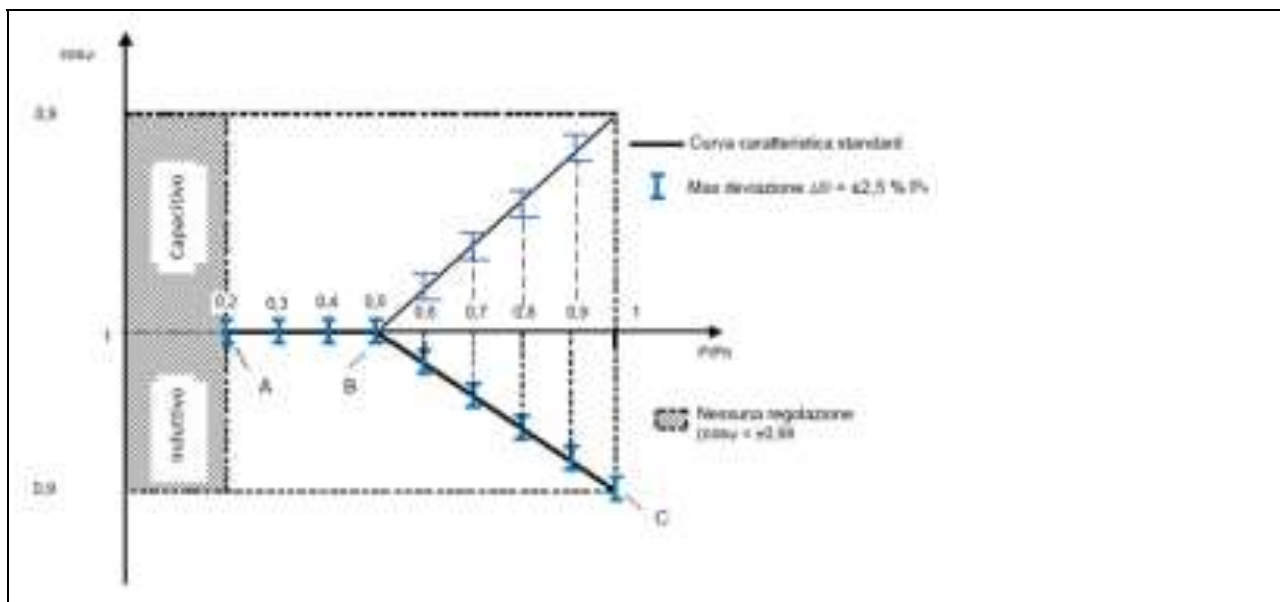
CEI 0-21/V2:2024

Clause	Requirement + Test	result – Remark	Verdict																				
	<table border="1"> <tr> <td>Maximum power fed into the grid under fault conditions</td> <td colspan="3">0%Pmax generator</td> </tr> <tr> <td>Input limit</td> <td colspan="3">PIR - maximum error allowed as indicated in L.3</td> </tr> <tr> <td>Generator power</td> <td colspan="3">100%Pmax generator</td> </tr> <tr> <td>Load power consumption</td> <td colspan="3">0%Pmax generator</td> </tr> <tr> <td>Fault condition at time t0</td> <td>Switching off the SLI control system</td> <td>Switching off the measuring device for SLI purposes</td> <td>Break in connection between transducer and measuring device</td> </tr> </table> <p>The measuring system must record the active power for at least 5s before time t0 and 60s after instant t0.</p>	Maximum power fed into the grid under fault conditions	0%Pmax generator			Input limit	PIR - maximum error allowed as indicated in L.3			Generator power	100%Pmax generator			Load power consumption	0%Pmax generator			Fault condition at time t0	Switching off the SLI control system	Switching off the measuring device for SLI purposes	Break in connection between transducer and measuring device		
Maximum power fed into the grid under fault conditions	0%Pmax generator																						
Input limit	PIR - maximum error allowed as indicated in L.3																						
Generator power	100%Pmax generator																						
Load power consumption	0%Pmax generator																						
Fault condition at time t0	Switching off the SLI control system	Switching off the measuring device for SLI purposes	Break in connection between transducer and measuring device																				
	<p>Evaluation criterion</p> <p>The test is passed if the power fed into the grid after 3s is less than or equal to the power fed into the grid before the SLI fault was inserted.</p>		N/A																				
L.5	Field tests for the validation of the SLI system		N/A																				
	Upon completion of the installation and configuration of the SLI, the Installer must perform the tests in the following section and complete the Test Report referred to in Section L.6, which must be sent to the DSO.		N/A																				
L.5.1	Verification of correct SLI system configuration		N/A																				
L.6	Test report		N/A																				

Annex Bbis: Test on storage system

Bbis.6.6 and 6.7	Automatic delivery of reactive power according to a characteristic curve $\cos\varphi = f(P)$						P
Model	HESP4860S100-H with 1 piece LFPWall-5000 battery system and with PV supply						
P/P _{Smax} or P _{NINV} [%] (*)	Active power P [W]	Vout [V]	Reactive power Q(Var)	Cos φ measured	Cos φ set-point	$\Delta \cos\varphi$	Limit $\Delta \cos\varphi$
20 % P _{Smax} or P _{NINV}	800	1.04 Vn	101	0.992	1.00	-0.008	$\leq \pm 0.01$
30 % P _{Smax} or P _{NINV}	1202	1.04 Vn	154	0.992	1.00	-0.008	$\leq \pm 0.01$
40 % P _{Smax} or P _{NINV}	1601	1.04 Vn	218	0.991	1.00	-0.009	$\leq \pm 0.01$
50 % P _{Smax} or P _{NINV}	2000	1.04 Vn	257	0.992	1.00	-0.008	$\leq \pm 0.01$
60 % P _{Smax} or P _{NINV}	2403	1.04 Vn	287	0.993	1.00	-0.007	$\leq \pm 0.01$
60 % P _{Smax} or P _{NINV}	2399	1.06 Vn	483	0.980	0.98_cap	0.000	$\leq \pm 0.01$
70 % P _{Smax} or P _{NINV}	2804	1.06 Vn	804	0.961	0.96_cap	0.001	$\leq \pm 0.01$
80 % P _{Smax} or P _{NINV}	3205	1.06 Vn	1162	0.940	0.94_cap	0.000	$\leq \pm 0.01$
90 % P _{Smax} or P _{NINV}	3612	1.06 Vn	1549	0.919	0.92_cap	-0.001	$\leq \pm 0.01$
100% P _{Smax} or P _{NINV}	4005	1.06 Vn	1958	0.898	0.90_cap	-0.002	$\leq \pm 0.01$
100% P _{Smax} or P _{NINV}	4016	1.00 Vn	1959	0.899	0.90_cap	-0.001	$\leq \pm 0.01$
100% P _{Smax} or P _{NINV}	4000	0.99 Vn	340	0.996	1.00	-0.004	$\leq \pm 0.01$

Supplementary information:
 Default lock-in voltage: 1.05Vn ; Default lock-out voltage: 0.99Vn
 (*) Ensure that the minimum requirement for $\cos\varphi$ is sustained steadily when thermal balance is achieved.



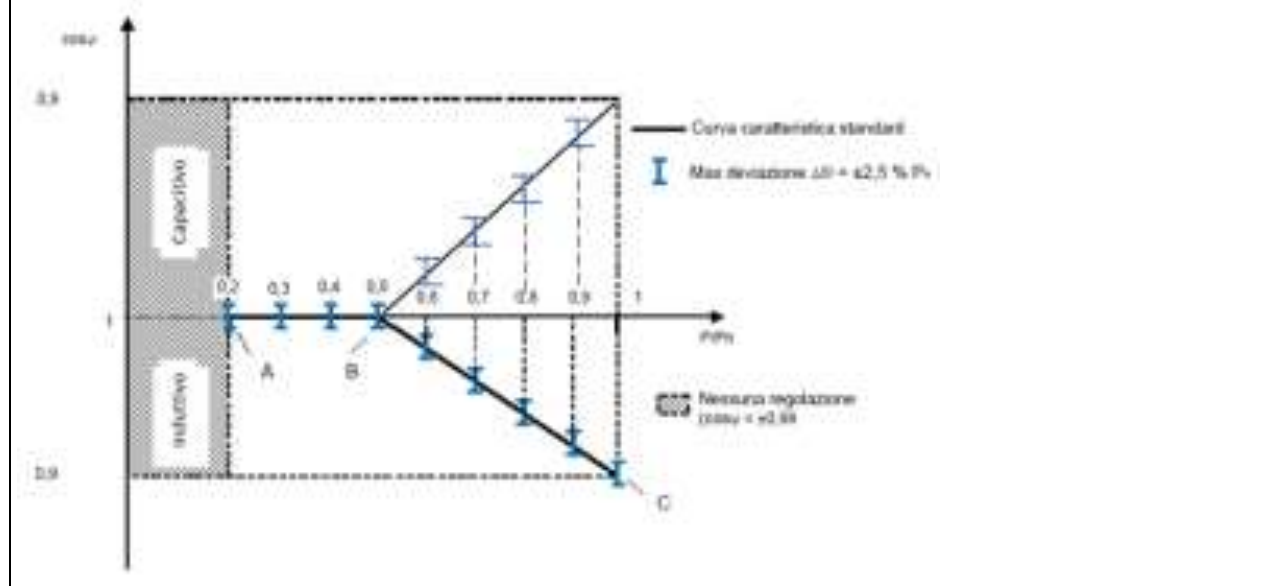
Bbis.6.6 and 6.7		Automatic delivery of reactive power according to a characteristic curve $\cos\varphi = f(P)$					P	
Model		HESP4860S100-H with 1 piece LFPWall-5000 battery system and with PV supply						
P/P _{Smax} or P _{NINV} [%] (*)	Active power P [W]	Vout [V]	Reactive power Q(Var)	Cos φ measured	Cos φ set-point	Δ cosφ	Limit Δcosφ	
20 % P _{Smax} or P _{NINV}	1206	1.04 Vn	144	0.993	1.00	-0.007	≤± 0.01	
30 % P _{Smax} or P _{NINV}	1806	1.04 Vn	240	0.991	1.00	-0.009	≤± 0.01	
40 % P _{Smax} or P _{NINV}	2408	1.04 Vn	272	0.994	1.00	-0.006	≤± 0.01	
50 % P _{Smax} or P _{NINV}	3008	1.04 Vn	285	0.996	1.00	-0.004	≤± 0.01	
60 % P _{Smax} or P _{NINV}	3606	1.04 Vn	302	0.996	1.00	-0.004	≤± 0.01	
60 % P _{Smax} or P _{NINV}	3613	1.06 Vn	749	0.979	0.98_cap	-0.001	≤± 0.01	
70 % P _{Smax} or P _{NINV}	4208	1.06 Vn	1195	0.962	0.96_cap	0.002	≤± 0.01	
80 % P _{Smax} or P _{NINV}	4811	1.06 Vn	1754	0.939	0.94_cap	-0.001	≤± 0.01	
90 % P _{Smax} or P _{NINV}	5410	1.06 Vn	2279	0.922	0.92_cap	0.002	≤± 0.01	
100% P _{Smax} or P _{NINV}	5996	1.06 Vn	2922	0.899	0.90_cap	-0.001	≤± 0.01	

100% P _{Smax} or P _{NINV}	5981	1.00 Vn	2914	0.899	0.90_cap	-0.001	≤± 0.01
100% P _{Smax} or P _{NINV}	5991	0.99 Vn	428	0.997	1.00	-0.003	≤± 0.01

Supplementary information:

Default lock-in voltage: 1.05Vn ; Default lock-out voltage: 0.99Vn

(*) Ensure that the minimum requirement for cosφ is sustained steadily when thermal balance is achieved.



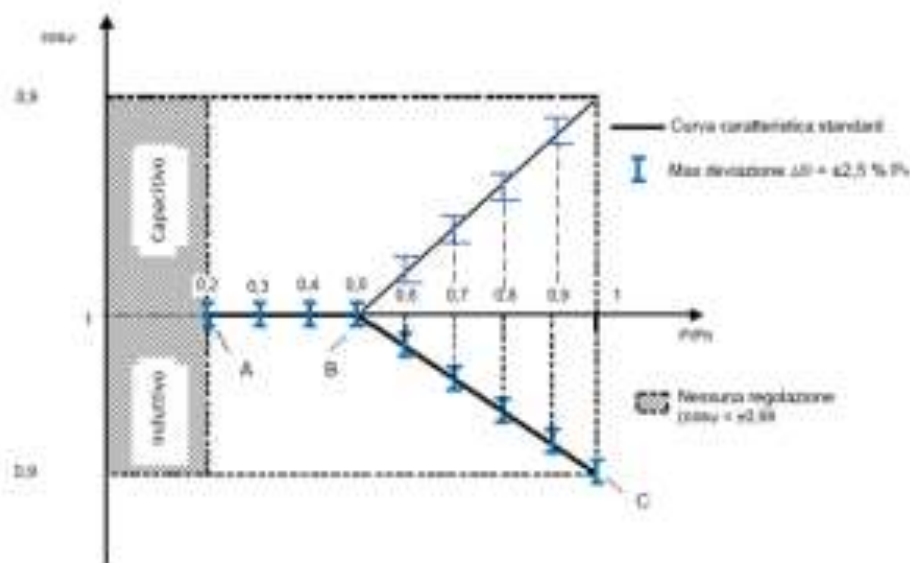
Bbis.6.6 and 6.7		Automatic delivery of reactive power according to a characteristic curve $\cos\phi = f(P)$					P	
Model		HES4840S100-H with 8 pieces LFPWall-5000battery system and with PV supply						
P/P _{SMAX} or P _{NINV} [%] (*)	Active power P [W]	Vout [V]	Reactive power Q(Var)	Cos φ measured	Cos φ set-point	Δ cosφ	Limit Δcosφ	
20 % P _{Smax} or P _{NINV}	1201	1.04 Vn	163	0.991	1.00	-0.005	≤± 0.01	
30 % P _{Smax} or P _{NINV}	1801	1.04 Vn	230	0.992	1.00	-0.002	≤± 0.01	
40 % P _{Smax} or P _{NINV}	2406	1.04 Vn	272	0.994	1.00	-0.001	≤± 0.01	
50 % P _{Smax} or P _{NINV}	3006	1.04 Vn	284	0.995	1.00	-0.001	≤± 0.01	
60 % P _{Smax} or P _{NINV}	3602	1.04 Vn	301	0.996	1.00	-0.001	≤± 0.01	
60 % P _{Smax} or P _{NINV}	3614	1.06 Vn	745	0.979	0.98_cap	0	≤± 0.01	

70 % P _{Smax} or P _{NINV}	4204	1.06 Vn	1190	0.962	0.96_cap	0.004	≤± 0.01
80 % P _{Smax} or P _{NINV}	4807	1.06 Vn	1747	0.940	0.94_cap	0.006	≤± 0.01
90 % P _{Smax} or P _{NINV}	5407	1.06 Vn	2273	0.922	0.92_cap	0	≤± 0.01
100% P _{Smax} or P _{NINV}	5999	1.06 Vn	2917	0.899	0.90_cap	0.002	≤± 0.01
100% P _{Smax} or P _{NINV}	5989	1.00 Vn	449	0.996	0.90_cap	0.004	≤± 0.01
100% P _{Smax} or P _{NINV}	5987	0.99 Vn	418	0.998	1.00	-0.001	≤± 0.01

Supplementary information:

Default lock-in voltage: 1.05Vn ; Default lock-out voltage: 0.99Vn

(*) Ensure that the minimum requirement for cosφ is sustained steadily when thermal balance is achieved.



---End of the test report---