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CEI 0-21:2022-03 Annex Nbis.

EXPOFIN SOLID POWER

HV 261 KWH

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DICHIARAZIONE SOSTITUTIVA DI ATTO NOTORIO AI SENSI DEL D.P.R. 28 DICEMBRE 2000 N. 445

Dichiarazione di conformità alle prescrizioni della norma CEI 0-21:2022-03 e successive varianti applicabili (V1, V2, EC, EC2)
Declaration of compliance with the requirements of CEI standard 0-21:2022-03 and subsequent applicable variants (V1, V2, EC, EC2)

Regola tecnica di riferimento per la connessione di utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica.
Technical reference rule for connecting active and passive users to the LV networks of electricity distribution providers.

Con la presente si attesta che ilprodotto:
We hereby declare that the product

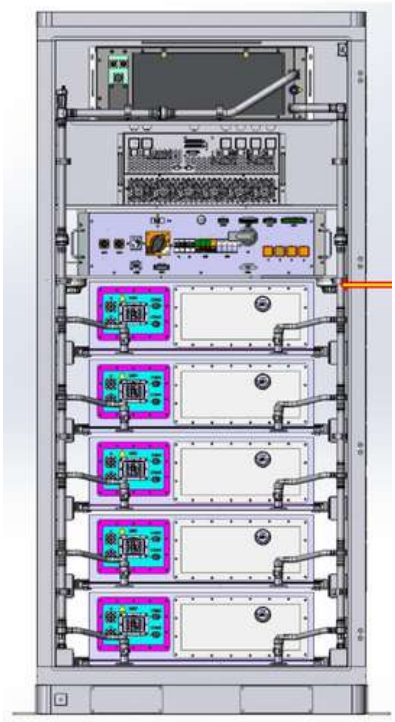
Famiglia di generatori – sistemi di accumulo
Family of generators – storage systems

Definiti da:
Defined by:

Expofin Solid Power HV 261

È CONFORME AGLI STANDARD
Is compliant to the standards

CEI 0-21:2022-03 Annex Bbis



1) **Expofin Solid Power HV 261**

Informazioni tecniche e descrizione del prodotto:
Il sistema trova applicazione principalmente in scenari industriali e commerciali.
1. Il sistema di accumulo di energia comprende un rack per batterie, un armadio PCS, un armadio di distribuzione dell'energia, un sistema di distribuzione ausiliario, un sistema di aria condizionata, una scatola di controllo BMS e un sistema antincendio.
a) La scatola di distribuzione ausiliaria serve a fornire l'alimentazione ausiliaria per l'intero sistema di controllo BMS e per il sistema di aria condizionata.
b) L'armadio della batteria si collega al PCS tramite la convergenza della barra collettrice e il PCS converte la corrente continua generata dalle batterie di accumulo di energia in corrente alternata, necessaria per il collegamento alla rete tramite trasformatori e altri componenti o richiesta dal cliente.
c) L'ESS è dotato di un controller locale nell'armadio di distribuzione dell'alimentazione e raccoglie informazioni sul funzionamento del PCS, della batteria e di altri dispositivi nel sistema. Inoltre carica le informazioni nel sistema di gestione dell'energia tramite lo sfondo e facilita la gestione del sistema di accumulo dell'energia.
d) La funzione di controllo principale integrata nella scatola di controllo BMS.

Technical Information and product description:
The system is mainly applied in industrial and commercial scenarios.
1. The Energy Storage System which include one battery rack, one PCS cabinet, one power distribution cabinet, auxiliary distribution system, Air-condition system, BMS control box and fire suppression system.
a) The auxiliary distribution box is for providing the auxiliary power for whole BMS control system, air-condition system.
b) Battery cabinet connects to PCS through the busbar convergence, and the PCS converts the DC power generated by the energy storage batteries into AC power which required for connecting to the grid through transformers and other components or required by client.
c) The ESS is equipped with the local controller in Power distribution cabinet, it collects running information of the PCS, battery, and other devices in the system. And it uploads the information to the energy management system via the background and facilitate the management of energy storage system.
d) The master control function integrated in BMS control box.

Test Report - Products

DICHIARA
che il sistema di accumulo energetico EXPOFIN SOLID POWER HV 261 è stato sottoposto a verifiche di conformità secondo la norma CEI 0-21:2022-03 e successive varianti applicabili, presso laboratorio TÜV Rheinland, con esito positivo;
che i relativi rapporti di prova originali e la documentazione tecnica di supporto sono conservati presso EXPOFIN S.r.l.;
che la documentazione potrà essere resa disponibile, su richiesta motivata, ai soggetti aventi titolo per verifiche tecniche/autorizzative/di connessione, nel rispetto degli obblighi di riservatezza e delle condizioni d'uso dei documenti del laboratorio;
che la presente dichiarazione non sostituisce i rapporti di prova originali emessi dal laboratorio, ma attesta quanto sopra sotto la responsabilità del dichiarante.

Cliente: **Client:**	EXPOFIN S.R.L. VIALE DELL'INDUSTRIA, N.19 – 35129 PADOVA (PD) – ITALY
Elemento di prova: **Test item:**	Energy Storage System (Integrated Battery Energy Storage System)
Identificazione / Numero di tipo: **Identification / Type no.:**	SOLID POWER HV 261
Specifiche del test: **Test specification:**	CEI 0-21:2022-03 CEI 0-21;V1:2022-11 CEI 0-21;V2:2024-01 CEI 0-21;V2/EC:2024-03 CEI 0-21;V2/EC2:2025-02
Laboratorio di prova: **Testing laboratory:**	TÜV Rheinland (Shanghai) Co., Ltd.
Risultato del test*: **Test result*:**	Pass/Approvato

TEST REPORT

CEI 0-21:2022-03+V1+V2:2024-01+V2/EC2:2024-03+V2/EC2:2025-02

Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica

/Reference technical rules for the connection of active and passive users to the LV electrical Utilities

Nome e indirizzo del richiedente: **Applicant's name and Address:**	EXPOFIN S.R.L. VIALE DELL'INDUSTRIA, N.19 – 35129 PADOVA (PD) – ITALY
Descrizione dell'elemento di prova: **Test item description:**	Energy Storage System (Integrated Battery Energy Storage System)
Marchio: **Trade Mark:**	
Produttore: **Manufacturer:**	EXPOFIN S.R.L. VIALE DELL'INDUSTRIA, N.19 – 35129 PADOVA (PD) – ITALY

NORME DI RIFERIMENTO:
Reference Standard:

CEI 0-21:2022-03+V1+V2:2024-01+V2/EC2:2024-03+V2/EC2:2025-02
Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica
/Reference technical rules for the connection of active and passive users to the LV electrical Utilities.

The standard refers to the following standards:

Allienamento al Regolamento UE 2016/631, UE 2016/1388 e UE 2016/1447 (RfG)
/ Allignment with the Regulation UE 2016/631, UE 2016/1388 e UE 2016/1447 (Requirements for Generators - RfG)

CEI EN 60068-2-2:2008-11
Prove ambientali - Parte 2-2: Prove - Prova B: Caldo secco
/Environmental testing - Part 2-2: Tests - Test B: Dry heat

CEI EN 60068-2-78:2002:03
Prove ambientali - Parte 2-78: Prove - Prova Cab: Caldo umido, regime stazionario
/Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state

CEI EN 60068-2-1:2007:11
Prove ambientali - Parte 2-1: Prove - Prova A: Freddo
/Environmental testing - Part 2-1: Tests - Test A: Cold

CEI EN 60068-2-14:2010
Prove ambientali - Parte 2-14: Prove - Prova N: Cambio di temperatura
/Environmental testing - Part 2-14: Tests - Test N: Change of temperature

CEI EN 60255-27:2023
Parte 27: requisiti di sicurezza dei prodotti
/Electrical Relays - Part 27: Product safety requirements

CEI EN 61000-3-2:2007-04 + CEI EN 61000-3-2/A1/A2:2011-09
Compatibilità elettromagnetica (EMC) Parte 3-2: Limiti - Limiti per le emissioni di corrente armonica (apparecchiature con corrente di ingresso <= 16 A per fase)
/Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)

CEI EN 61000-3-3:2009-09

Compatibilità elettromagnetica (EMC) Parte 3-3: Limiti - Limitazione delle variazioni di tensioni, fluttuazioni di tensione e del flicker in sistemi di alimentazione in bassa tensione per apparecchiature con corrente nominale <= 16 A per fase e non soggette ad allacciamento su condizione

/Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection.

CEI EN 61000-3-12:2012

Compatibilità elettromagnetica (EMC) Limiti per le correnti armoniche prodotte da apparecchiature collegate alla rete pubblica a bassa tensione aventi correnti di ingresso > 16 A e <= 75 A per fase

/ Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current =<16 A per phase)

IEC 61400-21 & IEC 61000-3-6(Irate d ＞ 75A single-phase)

Parte 21: Misurazione e valutazione delle caratteristiche di qualità dell'energia delle turbine eoliche collegate alla rete IEC/TR 61000-3-6, Compatibilità elettromagnetica (EMC) – Parte 3-6: Limiti – Valutazione dei limiti di emissione per il collegamento di impianti di distorsione a sistemi di alimentazione MV, HV ed EHV

Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines IEC/TR 61000-3-6, Electromagnetic compatibility (EMC) – Part 3-6: Limits – Assessment of emission limits for the connection of distorting installations to MV, HV and EHV power systems

CEI EN 61000-3-11:2011

Compatibilità elettromagnetica (EMC) Limitazione delle variazioni di tensione, delle fluttuazioni di tensione e del flicker in sistemi di alimetazione pubblici a bassa tensione - Apparecchiature con correnti nominali < 75A e soggetti ad allacciamento su condizione

/ Electromagnetic compatibility (EMC) - Part 3- 3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low voltage supply systems, for equipment with rated current =<16 A per phase and not subject to conditional connection

IEC 61400-21 & IEC 61000-3-6(I rated > 75A single-phase)

Parte 21: Misurazione e valutazione delle caratteristiche di qualità dell'energia delle turbine eoliche collegate alla rete IEC 61000-4-15, Compatibilità elettromagnetica (EMC) – Parte 4: Tecniche di prova e misurazione – Sezione 15: Flickermeter – Specifiche funzionali e di progettazione

Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines IEC 61000-4-15, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 15: Flickermeter – Functional and design specifications

CEI EN 60146-1-1:1997 + A1:1998

Convertitori a semiconduttori - Prescrizioni generali e convertitori commutati dalla linea Prove di isolamento (§ 4.2.1).

/ Semiconductor converters - General requirements and line commutated converters - Part 1-1: Specification of basic requirements Insulation tests (§. 4.2.1).

Test item particulars.....	:	
Equipment mobility	:	☐ Stationary ☒ fixed
Connection to the mains	:	☒ Permanent connection
Enviromental category	:	☒ outdoor
Over voltage category Mains	:	☒ OVC III
Over voltage category PV	:	N/A
Mains supply tolerance (%)	:	According to the specified supply range. see model list on the following pages for details.
Tested for power systems	:	TN, TT
IT testing, phase-phase voltage (V)	:	N/A
Class of equipment	:	Class I
Pollution degree	:	☐ PD 1 ☒ PD 2 (Inside) ☒ PD 3(Outside)

General product information:

DISPOSITIVO DI INTERFACCIA	PROTEZIONE DI INTERFACCIA	DISPOSITIVO DI CONVERSIONE STATICA	DISPOSITIVO DI GENERAZIONE ROTANTE
☒	☒	☒	☐

Description of tested item:

Verified Sample:

Descrizione /Description:	Energy Storage System
Costruttore / Manufacturer:	EXPOFIN S.R.L. VIALE DELL'INDUSTRIA, N.19 – 35129 PADOVA (PD) – ITALY
Modello/ Model	SOLID POWER HV 261
Number of phases	3

Test Setup:

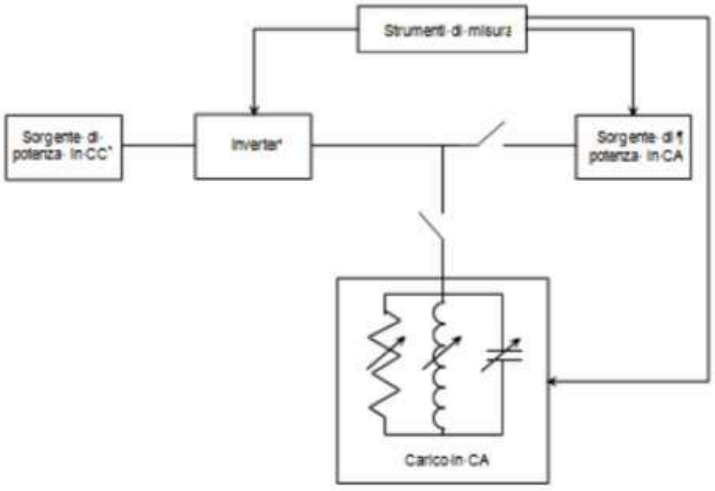
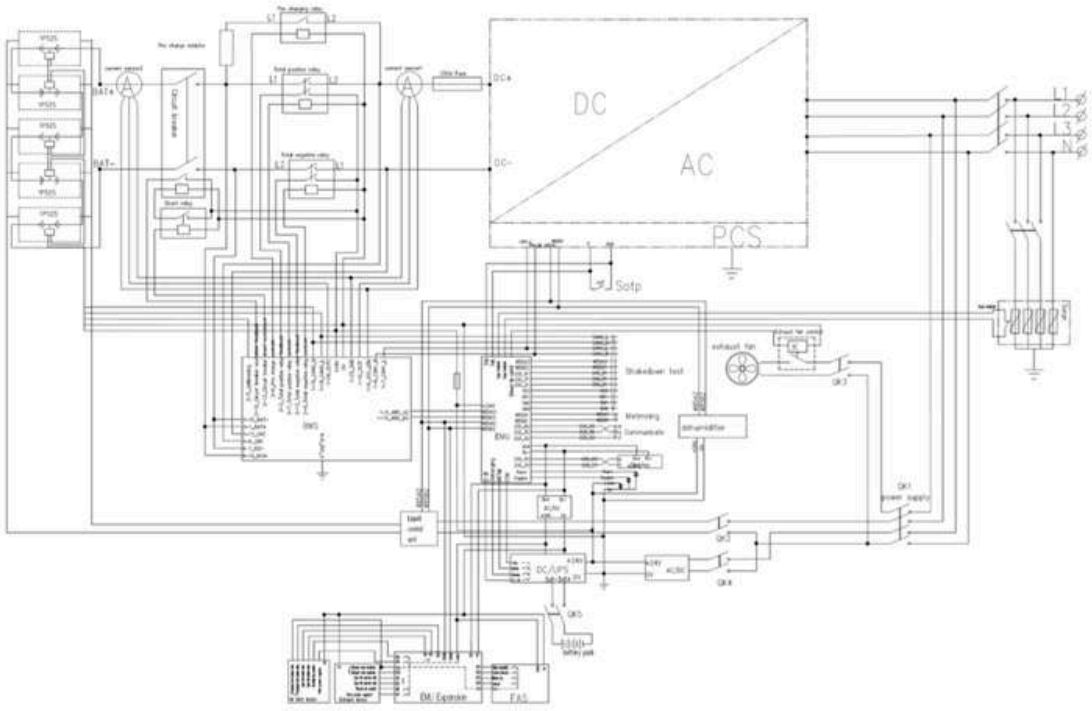
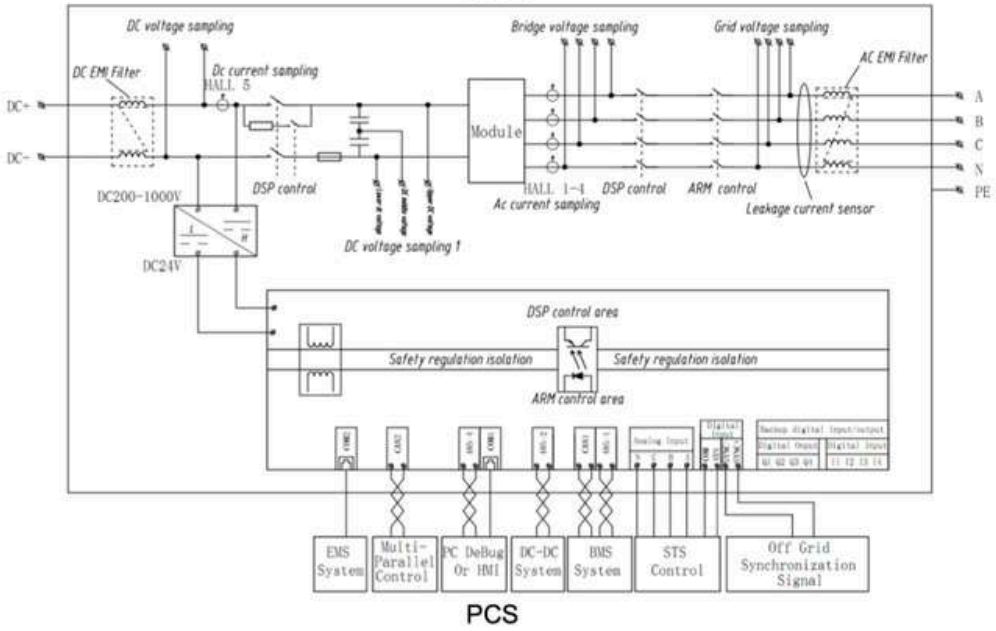


Figura 20 – Simulatore di rete BT

Block Diagram:





Test conditions:

Temperature: 25°C Relative humidity: 65%

Firmware version: DSP: 1.2.0.5
ARM: 1.9.1.7
EMU: V1.2

Copy of marking plate:

Product Name	Semi-Solid State Battery Energy Storage System Rechargeable Li-ion Battery System
Battery Designation	IFpP73/175/208/[(52S)5S]M/-30+50/95
Product Model	SOLID POWER HV 261
Nominal Voltage	832Vd.c
Rated Energy	261KWh
Rated Capacity	314Ah
Max. Charge Voltage	949Vd.c
Max. Charge Current	157A
Cut-off Discharge Voltage	650Vd.c
Max. Discharge Current	157A
Available SOC Range	10%~100%
Rate AC Voltage	400Va.c(3L+N)
Frequency	50/60Hz
Max. AC Current	180A
Aux Voltage	220Va.c 50/60Hz
Aux Rate Power	2.6KW
Ambient Temperature	-30℃ to +55℃
Dimensions (W*D*H)	1100*1400*2350mm
Weight	2440kg
Protection Class	I
Enclosure	IP55
CooLing Mode	Liquid-cooled
Working Altitude	≤3000m
Production Date	22-Sep.-2025
Series Number	EB250055-00001
manufacturer	EXPOFIN S.R.L.

⚠ CAUTION

Please read user manual before operating the system

* Prohibit to open the box unless authorized.
* Do not over charge & over discharge.
* One full charge needed per two months.
* Recharge at derated current by the first time.
* Recharge at derated current when system under voltage.
* Do not disassemble the battery pack.
* Do not short-circuit or reverse polarity.
* Do not step on it, drop it and avoid the strong shock.
* Do not use battery if it is damaged or deformed.
* Do not expose to temperatures above 60℃.
* Do not transport or store the battery with metallic items.

Emergency Situations

* If leaking, fire, wet or damaged, switch off the breaker, go away from the battery.
* Do not touch the leaking liquid, do not use water, but sand or drypowder extinguisher is usable.

Do not dispose of battery in trash, dispose of according to local regulations.

Made in China CE

DATASHEET:

Note: The information of importer provided on product prior marketing.

The main features of the product are shown as below:

	Cell	Module
Product	Solid State Battery Cell	Solid State Battery
Type/model	EFS314	GTEFS-166V52.25K-M05P
Cell Capacity [Ah]	314	314
Cell Quantity	1	52
Battery structure	-	1P52S
Nominal voltage [V]	3.2	166.4
Rated capacity [Wh]	1004.8	52249.6
Upper limit charging voltage [V]	3.8	197.6
Recommend charging current [A]	157	157
Maximum charging current [A]	314	195
Recommend discharging current [A]	157	157
Maximum discharging current [A]	314	195
Discharge cut-off voltage [V]	2.5	130
Lower limit discharging voltage [V]	2.0	104
Temperature range for charging [°C]	0 to 55	-30 to 50
Temperature range for discharging [°C]	-30 to 60	-30 to 50
Temperature threshold for protection	-	53
Overcharge protected voltage supply by battery system	-	≥197.6V
Recommend charging method by manufacturer	Charging the cell with 157A constant current until to 3.65V, then constant voltage 3.65V until charging current reduces to 15A	At constant Power 26100W till cell voltage reaches 3.65 V.
Dimension [mm]	TxWxH: (71.95±0.5) x (174.8±0.5) x (207.1±0.5)	1152±3*800±3*238±3
Weight [kg]	5.63±0.2	340±5
Ingress Protection (IP)	-	IP67
Protective Class	-	I
Cooling type	-	Liquid cooling
Altitude [m]	-	≤3000
Notes:		

	Battery system
Product	Integrated Battery Energy Storage System
Type/model	SOLID POWER HV 261
Cell Capacity [Ah]	314
Cell Quantity	260
Battery structure	(1P52S)5S
Nominal voltage [V]	832
Rated capacity [Wh]	261248
Upper limit charging voltage [V]	936
Recommend charging current [A]	157
Maximum charging current [A]	195
Recommend discharging current [A]	157
Maximum discharging current [A]	195
End-of-charge voltage [V]	936
Discharge cut-off voltage [V]	728
Temperature range for charging [°C]	-30 to 50*
Temperature range for discharging [°C]	-30 to 50
Operating ambient temperature [°C]	-30 to 50
Temperature threshold for protection	53
Overcharge protected voltage supply by battery system	≥3.7V/cell
Recommend charging method by manufacturer	At constant Power 125kW till cell voltage reaches 3.65 V
Dimension [mm]	1100*1400*2350
Weight [kg]	2440
Ingress Protection (IP)	IP55
Protective Class	I
Cooling type	Liquid-cooled
Altitude[m]	≤3000
*Notes: When the cell temperature is less than 0°C, the battery system will stop working and the liquid cooling unit will start heating. It will start derating when ambient temperature is 0°C to 10°C and more than 45°C.	

	MODELS LIST	INPPCS-125/0L4-W-14-A2-0S
DC Side	VMAX DC [Vdc]	1000
	Voltage Range V[Vdc]	600-1000
	Max. DC current [Ad.c.]	198
	Rated DC power [kW]	125
	Max. DC power [kW]	137.5
	Overvoltage Category (OVC)	II
AC Side	Rated Output Voltage Ur [Vac]	3L / N / PE, 230 / 400
	AC rated Input /Output active Power PE [kW]	125
	Rated Output Frequency FNETZ [Hz]	50/60±2.5
	Harmonic (THDi)	≤5% (at nominal Power)
	Max. AC Input/Output current [Aa.c.]	180
	AC voltage tolerance	-15%~+15%
	Adjustable reactive Power range	-100%–100%
	Power Factor cosφ [λ]	-0.99-+0.99, At nominal Power
	Overvoltage Category (OVC)	III
System	Max. efficiency	99%
	Protective Class	I
	Ingress Protection (IP)	IP20
	Operating Temperature Range [°C]	-30 to 50(>45 derating)
	Cooling Type	Air Cooling
	Pollution degree (PD)	3
	Altitude [m]	3000(>2,000 derating)
	Weight [kg]	70
	Size [mm]	W520×H240×D680

3. Energy Storage System

MODELS LIST		Integrated Battery Energy Storage System
DC side	VMAX DC[Vdc]	936
	Battery Nominal Voltage [Vd.c.]	832
	Rated capacity[Wh]	261248
	Max. Current Imax [A]	195
	Voltage Range [Vd.c.]	728 to 936
AC side	PCS Cabinet Model	INPPCS-125/0.4-W-14-A2-OS
	Rated H.V. voltage [kVa.c.]	400
	Rated H.V. current [A a.c.]	180
	Rated grid frequency [Hz]	50/60
	Max. Current [A a.c.]	198
	Rated AC power [kVA]	125
	Overvoltage Category (OVC)	III
Battery Energy Storage System	IP rating/ Enclosure index / type	IP55
	Protective Class	I
	Operating Temperature Range [°C]	-30 to 50 (>45 derating)
	Pollution degree (PD)	PD3(PD2 inside)
	Altitude [m]	≤3000 (>2000 derating)
	Weight [kg]	2440
	Size (W x D x H) [mm]	1100*1400*2350

Tests performed (name of test and test clause):
Allegato A: Caratteristiche e prove per il Sistema di Protezione di Interfaccia (SPI) ***Annex A: Requirements and test for Interface Protection System (SPI)***

Sample 1: Hybrid inverter and battery are housed in a single cabinet, model name:
- **Expofin Solid Power HV 261**

A.4 Verifiche e prove sul SPI[1] */test and inspection on SPI*

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Prove funzionali sull'SPI */Functional test on SPI*	**A.4.3** **A.4.3.1** **A.4.3.2** **A.4.7** (limit conditions)	Condizioni di riferimento / Reference conditions (20 °C) – **Tab.9**	N/A	N/A
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.12**	N/A	N/A
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.12**	N/A	N/A
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.12**	N/A	N/A

A.4.3.3 Prescrizioni aggiuntive per le prove funzionali
/Additional requirements of the functional test

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Insensibilità delle armoniche del relè di frequenza	**A.4.3.3.1**	CEI 0-21:2022-03	N/A	N/A
Segnale di telescatto	**A.4.3.3.2**	CEI 0-21:2022-03	N/A	N/A
Segnale di telecomnicazione	**A.4.3.3.3**	CEI 0-21:2022-03	N/A	N/A
Verifica di insensibilità alla derivata di frequenza (ROCOF)	**A.4.3.4**	CEI 0-21:2022-03	PASS	1
Autotest	**A.4.4**	CEI 0-21:2022-03	N/A	N/A
Single Fault tolerance	**A.4.5**	CEI 0-21:2022-03	PASS	1

A.4.6: Prove di compatibilità EMC

Test	Ref. CEI 0-21	Ref. standard	Result	Sample

[1] Interface protection System (SPI) can be integrated to inverter with output power up to 11.08KW.

Compatibilità elettromagnetica /Electromagnetic compatibility	**A.4.6**	CEI EN 60255-26 CEI EN 50263 (Severità classe 2 – Livello industriale) – **Tab.11**	PASS	1

Note 1) Please refer to EMC report no. CN25UYGT 001, issued by TÜV Rheinland (Shanghai) Co., Ltd.
(Remarks: This report is the original EMC report for model GTEFS-832V261KWh/125KW.)

A.4.7 Compatibilità Climatica / Climatic compatibility

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Compatibilità Climatica /Climatic compatibility **Storage conditions**	**A.4.7** (limit conditions)	Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.12**	PASS	1
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.12**	PASS	1
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.12**	PASS	1
		Ciclo termico /changing temperature CEI EN 60068-2-14 - **Tab.12**	PASS	1
Compatibilità Climatica /Climatic compatibility **Inverter in working conditions**	**A.4.7** (limit conditions)	Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.12**	PASS	1
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.12**	PASS	1
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.12**	PASS	1
		Ciclo termico /changing temperature CEI EN 60068-2-14 - **Tab.12**	PASS	1

A.4.8 Prove di isolamento *Insulating test*

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Tenuta ad impulso /Pulse test	**A.4.8**	CEI EN 60255-27 Note[2]	PASS	1
Rigidità Dielettrica /Dielectric Strength		CEI EN 60255-27 Note [1]	PASS	1
Resistenza di Isolamento /insulation resistance		CEI EN 60255-27 Note [1]	PASS	1

A.4.9 Prove di sovraccaricabilità dei circuiti di misura / *Measurement circuits Overload*

Test	Ref. CEI 0-21	Ref. standard	Result	Sample

[2] In case of integrated SPI, reference standard for insulating test is the CEI 60146-1-1.

Prove di sovraccaricabilità dei circuiti di misura */ Measurement circuits Overload*	**A.4.9**	CEI 0-21:2022-03	N/A	N/A
			N/A	N/A
			N/A	N/A

Allegato B: Prove sugli inverter per impianti indirettamente connessi
Allegato B: Inverter tests for PV plants not directly connected to the grid

Note: The tested product has no PV ports, so this section(*Allegato B*) is not applicable.

B.1 Prove sull'inverter / inverter tests

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Armoniche di corrente /Harmonics measurement (full power, 66% and 33% of max. power) ☐ CEI EN 61000-3-2 ☐ CEI EN 61000-3-12 ☒ IEC 61400-21 & IEC 61000-3-6	**B.1 Tab. 14 Tab. 15**	Condizioni di riferimento / Reference conditions (20 °C) – **Tab.14**	N/A	N/A
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.15**	N/A	N/A
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.15**	N/A	N/A
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.15**	N/A	N/A
Fluttuazioni di tensione /Flicker measurement (full power, 66% and 33% of max. power) ☐ CEI EN 61000-3-3 ☐ CEI EN 61000-3-11 ☒ IEC 61400-21 & IEC 61000-4-15	**B.1 Tab. 14 Tab. 15**	Condizioni di riferimento / Reference conditions (20 °C) – **Tab.14**	N/A	N/A
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.15**	N/A	N/A
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.15**	N/A	N/A
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.15**	N/A	N/A

B.1.1 Condizioni di connessione, riconnessione ed erogazione graduale della potenza
Connection, re-connection conditions, and gradual increase of the power production

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Verifica delle condizioni di connessione e riconnessione */Check of the connection and re-connection conditions*	**8.4.1.3 B.1.1.1**	CEI 0-21:2022-03	N/A	N/A
Verifica della erogazione graduale della potenza attiva */Check of the gradual increase of the power production*	**8.4.1.3 B.1.1.2**	CEI 0-21:2022-03	N/A	N/A

B.1.2 Erogazione della potenza reattiva /*Reactive power production (or adsorbtion)*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica dei requisiti costruttivi: capability erogazione della potenza reattiva */ Check of the constructive requirements: reactive power production capability* *Not Applicable for plant with power <800W.*	**8.4.4.2** **B.1.2.1**	CEI 0-21:2022-03	N/A	N/A
Erogazione di potenza reattiva secondo un livello assegnato */ Reactive power production according to an assigned level* *Applicable for plant with power >11.08KW.*	**B.1.2.3**	CEI 0-21:2022-03	N/A	N/A
Tempo di risposta ad una variazione a gradino del livello assegnato */Reaction time after a step variation of the assigned level.* *Applicable for plant with power >11.08KW.*	**B.1.2.4**	CEI 0-21:2022-03	N/A	N/A
Erogazione automatica di potenza reattiva secondo una curva caratteristica cosphi= f(P) */ Automatic reactive power production according to a characteristic curve cos(phi)*	**B.1.2.5** *Annex E* **E.2**	CEI 0-21;V2:2024-01 CEI 0-21:2022-03	N/A	N/A
Erogazione automatica di potenza reattiva secondo una curva caratteristica Q=f(V) */ Automatic reactive power production according to a characteristic curve Q=f(V)* *Applicable for plant with power >11.08KW.*	**B.1.2.6** *Annex E* **E.2.1**	CEI 0-21:2022-03	N/A	N/A

B.1.3 Limitazione della potenza attiva / Active power limitation				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Limitazione della potenza attiva per valori di tensione prossimi al 110 % di Un / *Active power limitation for voltage values near to 100 % di Un*	**8.5.3.1 B.1.3.1 Annex F.3**	CEI 0-21:2022-03	N/A	N/A
Regolazione della potenza attiva in presenza di transitori sulla rete di trasmissione / *Active power regulation in coincidence with transitory on the transmission grid*	**8.5.3.4 B.1.3.2 Annex F.3**	CEI 0-21:2022-03	N/A	N/A
Verifica del campo di funzionamento in tensione e frequenza /*Check the voltage and frequency operating range*	**8.4.4 B.1.3.3**	CEI 0-21:2022-03	N/A	N/A
Riduzione della potenza attiva in presenza di transitori di sottofrequenza sulla rete di trasmissione. / *Active power reduction in coincidence with transitory on the transmission grid* *Not mandatory on static generator*	**8.5.3.4 B.1.3.3.1**	CEI 0-21:2022-03	N/A	N/A
Limitazione della potenza attiva su comando esterno proveniente dal Distributore / *Active power limitation in coincidence with external command coming from the Electricity Distributor* *Not Applicable for plant with power <800W.*	**8.5.3.3 B.1.3.4 Annex F.4**	CEI 0-21:2022-03	N/A	N/A

B.1.4 Emissione di componente continua nella corrente di uscita / *DC current injection on the output*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica della emissione di componente continua */Check of DC current injection*	**8.4.4.1 B.1.4.1**	Condizioni di riferimento / Reference conditions (20 °C)	N/A	N/A
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B)	N/A	N/A
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab)	N/A	N/A
		Freddo / Cold test CEI EN 60068-2-1 (Test A)	N/A	N/A
Verifica delle protezioni contro l'immissione di componente continua */ Check of protections against the DC current injection.*	**8.4.4.1 B.1.4.2**	Condizioni di riferimento / Reference conditions (20 °C)	N/A	N/A
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B)	N/A	N/A
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab)	N/A	N/A
		Freddo / Cold test CEI EN 60068-2-1 (Test A)	N/A	N/A

B.1.5 Verifica della insensibilità agli abbassamenti di tensione (LVFRT capability) / *Check of the LVFRT capability* **Test non accreditato Accredia** */Test not Accredia accredited*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
LVFRT Capability *Applicable for plant with power >11.08KW.*	**8.5.1 B.1.5**	CEI 0-21:2022-03	N/A	N/A

B.1.6 Verifica della insensibilità alle richiusure automatiche in discordanza di fase / *Check of the insensibility to the re-closures when phases are in discordance*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica della insensibilità alle richiusure automatiche in discordanza di fase */ Check of the insensibility to the re-closures when phases are in discordance*	**B.1.6** ☒ **B.1.6.1** ☐ **B.1.6.2** ☐ **B.1.6.3**	CEI 0-21:2022-03	N/A	N/A

Allegato B: Prove di compatibilità EMC				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Compatibilità elettromagnetica /Electromagnetic compatibility	**Annex B**	CEI EN 61000-6-3 CEI EN 61000-6-2	N/A	N/A

Allegato L: Sistema di Limitazione dell'Immissione (SLI) / *Annex L: System power limitation*				
Sistema di Limitazione dell'Immissione (SLI) /*System power limitation* (<11.08kW)	**L.3**	CEI 0-21;V2/EC2:2025-02	N/A	N/A

Allegato B bis: Prove sui sistemi di accumulo
/ Annex Bbis: Tests on Energy storage systems

Bbis.3 Prove sull'inverter / inverter tests

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Scalarità e modularità: /Scalability and modularity ☐ Case A ☒ Case B ☐ Case C ☐ Case D *Not Applicable for plant with power <800W.*	**Bbis.2.2**	CEI 0-21:2022-03	PASS	1
Armoniche di corrente /Harmonics measurement (full power, 66% and 33% of Ps_{max}) (full power, 66% and 33% of Pc_{max} *only for bidirectional converters*) ☐ CEI EN 61000-3-2 ☐ CEI EN 61000-3-12 ☒ IEC 61400-21 & IEC 61000-3-6	**Bbis.3 Tab. 2Bbis Tab. 3Bbis**	Condizioni di riferimento / Reference conditions (20 °C) – **Tab.2Bbis**	PASS	1
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.3Bbis**	PASS	1
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.3Bbis**	PASS	1
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.3Bbis**	PASS	1
Fluttuazioni di tensione /Flicker measurement (full power, 66% and 33% of Ps_{max}) (full power, 66% and 33% of Pc_{max} *only for bidirectional converters*) ☐ CEI EN 61000-3-3 ☐ CEI EN 61000-3-11 ☒ IEC 61400-21 & IEC 61000-4-15	**Bbis.3 Tab. 2Bbis Tab. 3Bbis**	Condizioni di riferimento / Reference conditions (20 °C) – **Tab.2Bbis**	PASS	1
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B) - **Tab.3Bbis**	PASS	1
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab) - **Tab.3Bbis**	PASS	1
		Freddo / Cold test CEI EN 60068-2-1 (Test A) - **Tab.3Bbis**	PASS	1

Bbis.4 Verifica del campo di funzionamento in tensione e frequenza
Check the operating range in voltage and frequency

Test	Ref. CEI 0-21	Ref. standard	Result	Sample
Verifica del campo di funzionamento /*Check the operating range*	**Bbis.4**	CEI 0-21:2022-03	PASS	1

Bbis.5 Condizioni di connessione, riconnessione ed erogazione graduale della potenza *Connection, re-connection conditions, and gradual increase of the power production*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica delle condizioni di connessione e riconnessione */Check of the connection and re-connection conditions*	**8.4.1.3 Bbis.5.1**	CEI 0-21:2022-03	PASS	1
Verifica della erogazione graduale della potenza attiva */Check of the gradual increase of the power production*	**8.4.1.3 Bbis.5.2**	CEI 0-21:2022-03	PASS	1

Bbis.6 Erogazione della potenza reattiva */Reactive power production (or adsorbtion)*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica dei requisiti costruttivi: capability erogazione della potenza reattiva */ Check of the constructive requirements: reactive power production capability*	**Bbis.6.1**	CEI 0-21:2022-03	PASS	1
Erogazione di potenza reattiva secondo un livello assegnato */ Reactive power production according to an assigned level* *Applicable for plant with power >11.08KW.*	**Bbis.6.3**	CEI 0-21:2022-03	PASS	1
Tempo di risposta ad una variazione a gradino del livello assegnato */Reaction time after a step variation of the assigned level.* *Applicable for plant with power >11.08KW.*	**Bbis.6.5**	CEI 0-21:2022-03	PASS	1
Erogazione automatica di potenza reattiva secondo una curva caratteristica cosphi= f(P) */ Automatic reactive power production according to a characteristic curve cos(phi)*	**Bbis.6.6** *Annex E* **E.2**	CEI 0-21;V2:2024-01 CEI 0-21:2022-03	PASS	1
Erogazione automatica di potenza reattiva secondo una curva caratteristica Q=f(V) */ Automatic reactive power production according to a characteristic curve Q=f(V)* *Applicable for plant with power >11.08KW.*	**Bbis.6.8** *Annex E* **E.2.1**	CEI 0-21:2022-03	PASS	1

Bbis.7 Limitazione della potenza attiva *// Active power limitation*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Limitazione della potenza attiva per valori di tensione prossimi al 110 % di Un *// Active power limitation for voltage values near to 100 % di Un*	**8.5.3.1 Bbis.7.1 Annex F.3**	CEI 0-21:2022-03	PASS	1
Regolazione della potenza attiva in presenza di transitori di sovrafrequenza sulla rete di trasmissione *// Active power regulation in coincidence with transitory on the transmission grid*	**8.5.3.4 Bbis.7.2 Annex F.3**	CEI 0-21:2022-03	PASS	1
Riduzione della potenza attiva in presenza di transitori di sottofrequenza sulla rete di trasmissione. *// Active power regulation in coincidence with transitory on the transmission grid*	**8.5.3.4 Bbis.7.3**	CEI 0-21;V2/EC:2024-03; CEI 0-21:2022-03	PASS	1
Limitazione della potenza attiva su comando esterno proveniente dal Distributore *// Active power limitation in coincidence with external command coming from the Electricity Distributor*	**Bbis7.4**	CEI 0-21:2022-03	PASS	1
Verifica del tempo di assestamento ad un comando di incremento/riduzione di potenza *// Check settling time with command to increase/decrease of power*	**Bbis7.4.1**	CEI 0-21:2022-03	PASS	1

Bbis.8 Emissione di componente continua nella corrente di uscita *// DC current injection on the output*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica della emissione di componente continua *//Check of DC current injection*	**Bbis.8.1**	Condizioni di riferimento / Reference conditions (20 °C)	PASS	1
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B)	PASS	1
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab)	PASS	1
		Freddo / Cold test CEI EN 60068-2-1 (Test A)	PASS	1
Verifica delle protezioni contro l'immissione di componente continua *// Check of protections against the DC current injection.*	**Bbis.8.2**	Condizioni di riferimento / Reference conditions (20 °C)	PASS	1
		Caldo secco / Dry heat test CEI EN 60068-2-2 (Test B)	PASS	1
		Umidità / Humidity test CEI EN 60068-2-78 (Test Cab)	PASS	1
		Freddo / Cold test CEI EN 60068-2-1 (Test A)	PASS	1

Bbis.9 Verifica della insensibilità agli abbassamenti di tensione (LVFRT capability) *// Check of the LVFRT capability* **Test non accreditato Accredia** *//Test not Accredia accredited*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
LVFRT Capability *Applicable for plant with power >11.08KW.*	**8.5.1 Bbis.9**	CEI 0-21:2022-03	PASS	1

Bbis.10 Verifica della insensibilità alle richiusure automatiche in discordanza di fase *// Check of the insensibility to the re-closures when phases are in discordance*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Verifica della insensibilità alle richiusure automatiche in discordanza di fase *// Check of the insensibility to the re-closures when phases are in discordance*	**Bbis.10** ☒ **Bbis.10.1** ☐ **Bbis.10.2** ☐ **Bbis.10.3**	CEI 0-21:2022-03	PASS	1

Bbis.5.2.2 Funzionamento di porzioni di rete BT di distribuzione in isola intenzionale / *Operation of portions of the LV distribution network in intentional islanding*				
Test	**Ref. CEI 0-21**	**Ref. standard**	**Result**	**Sample**
Funzionamento di porzioni di rete BT di distribuzione in isola intenzionale / *Operation of portions of the LV distribution network in intentional islanding*	**Bbis.5.2.2**	CEI 0-21; V1:2022-11	N/A	N/A

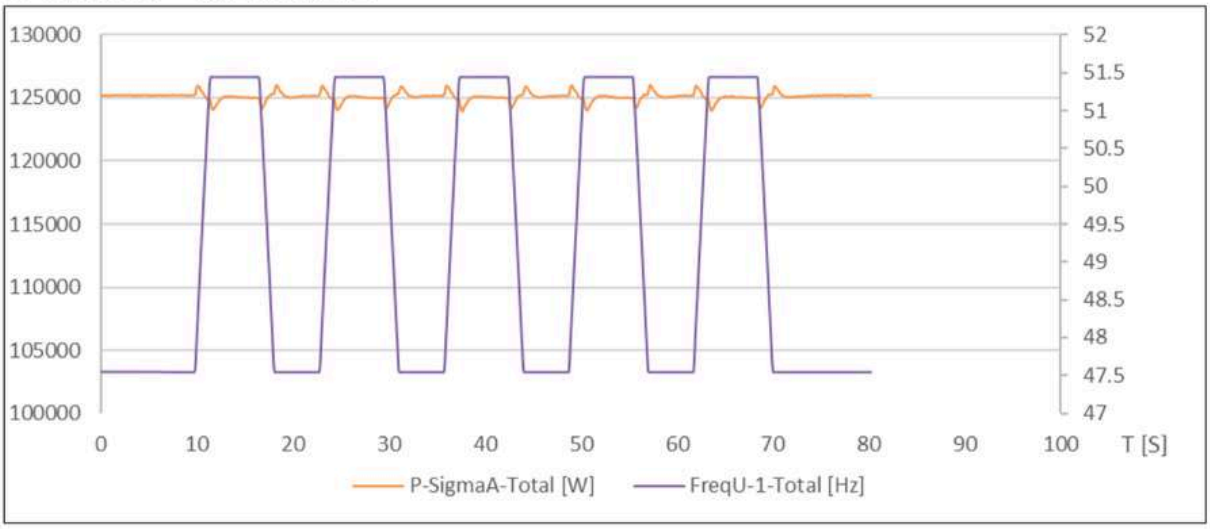
TESTING RESULTS

A.4.3.4	**TABLE: Verifica di insensibilità alla derivata di frequenza (ROCOF)** / *Check of immunity at the frequency derived (ROCOF)*	P
Ambient temperature (°C) .....:	20°C ± 2°C	
Humidity (RH %) .....:	35% - 75% RH	
Instrumentation list.....:	See table "Measurement equipment and instrumentation"	
Uncertainty .....:	See table	

Grafico: Test verifica di insensibilità alla derivata di frequenza (ROCOF)

/ Graph: Check of immunity test at the frequency derived (ROCOF)

[81>S2] ROCOF – 51.50 Hz-47.5HZ



RESULT: The Inverter doesn't disconnects from the grid after ROCOF test

A.4.5	TABLE: Single Fault tolerance	P
Ambient temperature (°C) .....:	20°C ± 2°C	
Humidity (RH %) .....:	35% - 75% RH	
Instrumentation list.....:	See table "Measurement equipment and instrumentation"	
Uncertainty .....:	See table	

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
Cell voltage sampling of BMU							
1.	R118	O-C	832.0	10min	-	-	Cut off the main circuit contactor
2.	C110	S-C	832.0	10min	-	-	Cut off the main circuit contactor
3.	C122	S-C	832.0	10min	-	-	Cut off the main circuit contactor
Temperature voltage sampling of BMU							
4.	R123	O-C	832.0	10min	-	-	Cut off the main circuit contactor
5.	R100	O-C	832.0	10min	-	-	Cut off the main circuit contactor
6.	C165	S-C	832.0	10min	-	-	Cut off the main circuit contactor
Communication on BMU							
7.	UC1 PIN6&PIN7	S-C	832.0	10min	-	-	Cut off the main circuit contactor
8.	C25	S-C	832.0	10min	-	-	Cut off the main circuit contactor
Power Supply							
9.	C50	S-C	832.0	10min	-	-	Cut off the main circuit contactor
10.	C37	S-C	832.0	10min	-	-	Cut off the main circuit contactor
11.	C60	S-C	832.0	10min	-	-	Cut off the main circuit contactor

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
12.	C20	S-C	832.0	10min	-	-	Cut off the main circuit contactor
13.	R156	O-C	832.0	10min	-	-	Cut off the main circuit contactor
MCU							
14.	Y1	S-C	832.0	10min	-	-	Cut off the main circuit contactor
Power Supply of BCU							
15.	R192	O-C	832.0	10min	-	-	The main control MCU power supply is open circuit, unable to provide relay pull-in current, the main circuit relays are disconnected
16.	C14	S-C	832.0	10min	-	-	The main control MCU power supply short circuit, unable to provide relay pull-in current, the main circuit relays are disconnected
Communication of BCU							
17.	UN3 PIN6&PIN7	S-C	832.0	10min	-	-	The communication between the main control and EMS is interrupted, and main circuit relays are disconnected
18.	U2 PIN33&PIN34	S-C	832.0	10min	-	-	The total voltage is detected to be 0 compared with the monomer accumulation sum, and the difference is too large to disconnect the main circuit relays
Current sampling of BCU							
19.	RA5	O-C	832.0	10min	-	-	The charging current acquisition is abnormal, which triggers the high charging current protection and disconnects the main circuit relays
20.	R164	O-C	832.0	10min	-	-	HALL_5V power supply mining is abnormal, affecting the current sampling calculation value is too large, triggering the charging current too high protection, the main circuit relays is disconnected
MOS of BCU							

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
21.	QHL1	S-C, then simulate V/I/T fault	832.0	10min	-	-	QHL1 is short-circuited and the main positive relay remains closed to simulate the high voltage fault of the monomer, trigger the high voltage fault protection of the monomer and disconnect the main negative relay
22.	QHL2	S-C, then simulate V/I/T fault	832.0	10min	-	-	QHL2 is short-circuited and the main negative relay remains closed to simulate the charging current too high fault, triggering the charging current too high protection and the main positive relay disconnects
RELAY Ctrl of BCU							
23.	D20	O-C	832.0	10min	-	-	The relay pull-in current is interrupted, and main circuit relays is disconnected and cannot be closed
LOCK FUNCTION of BCU							
24.	V/I/T	simulate V/I/T fault	832.0	10min	-	-	The high voltage box is locked in the energy storage cabinet. When voltage, current and temperature faults occur, the fault alarm is locked and the user cannot open the energy storage cabinet and restart the high voltage box without permission
Liquid Cooling System							
25.	Liquid cooling unit water supply pump communication	O-C	832.0	10min	-	-	Liquid-cooled unit pump, compressor stop running, reported circulating water pump frequency converter communication failure
26.	Liquid-cooled unit outlet water pressure sensor	O-C	832.0	10min	-	-	Liquid-cooled unit pump can run normally, the compressor works, reported the outlet water pressure sensor, the equipment alarm

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
27.	Liquid-cooled unit outlet water temperature sensor	O-C	832.0	10min	-	-	Liquid-cooled unit pump can run normally, the compressor works, reported the water temperature sensor failure, equipment alarms
28.	Evaporative fan	O-C	832.0	10min	-	-	The pump of liquid cooling unit can run normally, the compressor is working, and the evaporator fan is reported to be faulty, and the equipment alarms.
Main circuits and Aux power							
29.	Exchange breaker	O-C	832.0	10min	-	-	Node alarm, system stops running
30.	System emergency	O-C	832.0	10min	-	-	Emergency stop disconnect, system failure shutdown.
31.	Direct-current breaker	O-C	832.0	10min	-	-	System failure shutdown, battery disconnected, liquid cooled unit running normally, report node failure
32.	AC Lightning Protector	S-C	832.0	10min	-	-	Node alarm, system stops running
33.	BMS Sampling Fault	S-C	832.0	10min	-	-	BMS communication failure and controls system failure shutdown, uploads rack BMS communication failure
34.	BMS and EMU communication	O-C	832.0	10min	-	-	EMU detects BMS communication failure and control system failure shutdown and reports BMS communication failure
35.	EMU and PCS communication	O-C	832.0	10min	-	-	EMU detects PCS unit failure and control system failure shutdown
Fire Protection							
36.	Fire system primary alarm (smoke alarm)	O-C	832.0	10min	-	-	EMU alarm,fire fighting fan starts, control system stops running, report node fault.

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
37.	Fire system secondary alarm (smoke sensor alarm, temperature sensor alarm)	O-C	832.0	10min	-	-	EMU alarm,fire fighting fan starts, control system stops running, report node fault.
38.	Combustible gas concentration over limit	O-C	832.0	10min	-	-	EMU alarm,fire fighting fan starts, control system stops running, report node fault.
39.	Fire fighting gas release	O-C	832.0	10min	-	-	EMU alarm, control system stops running, report node fault.
40.	Fire-fighting fan communication	O-C	832.0	10min	-	-	EMU alarm, control system stops running, report fire fan fault signal.

Note(s):

1:Failures or faults may be short-circuits in the PCS, or to exposed conductive parts, earth faults, or short-circuit in the output circuits, failure in the control circuits, or blocking of a motor fed by power EE.

There shall be no emission of molten metal, burning insulation, or flaming or glowing particles FIDom the fire enclosure, and there shall be no charring, glowing, or flaming of the tissue paper or cheesecloth, or glowing or flaming of surgical cotton.

Faults protected by "UL certified current fuse only" shall be performed and repeated 3 times.

In case of components damaged other than fuse, the evaluation should be repeated 3 times.

Report in result section:

- Measure transformer temperature at all times
- Fuse opened Yes / No?
- Components damaged?
- Emit Flames?
- Emit molten metal?
- Did it pass the electric strength test?

What happened to the SPS? Shutdown / cycle protection / normal operation

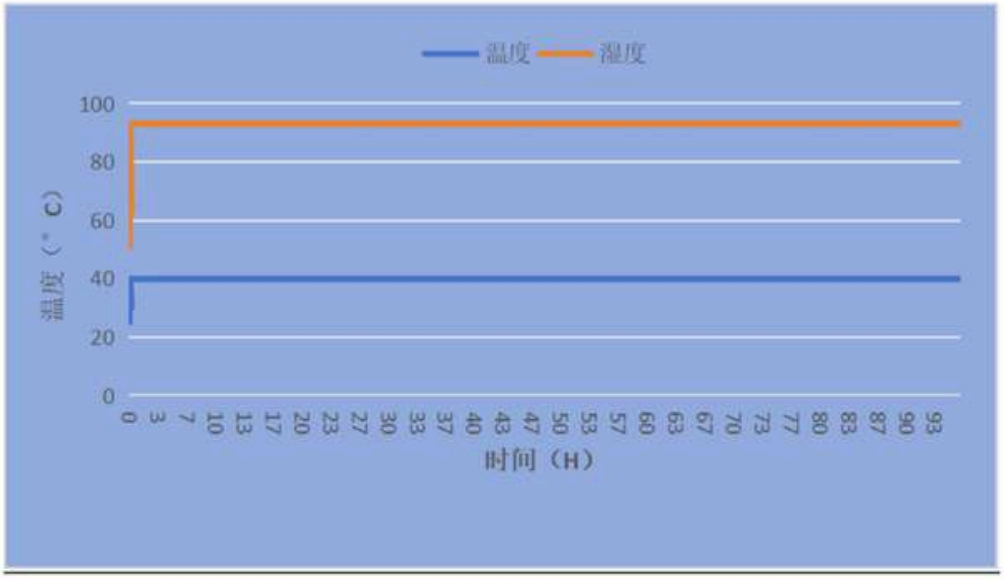
Compatibilità Climatica / Climatic compatibility

A.4.7	**TABLE : Dry heat (Test B) – storage conditions.**	P
CEI EN 60068-2-2:2008-11 Prove ambientali - Parte 2-2: Prove - Prova B: Caldo secco */Environmental testing - Part 2-2: Tests - Test B: Dry heat*		
Condizioni di test */Test conditions*	dissipa calore /heat -dissipating	
Tipo di campione */Specimen type*	Bb: graduale / gradual	
Tipo di ventilazione */Air circulation*	forzata / forced air	
Temperatura misurata */Measured temperature:*	70 °C	
Duration:	16 h	
Precondizionamento */Preconditioning* --		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		

Image: Dry heat (Test B) – storage conditions.

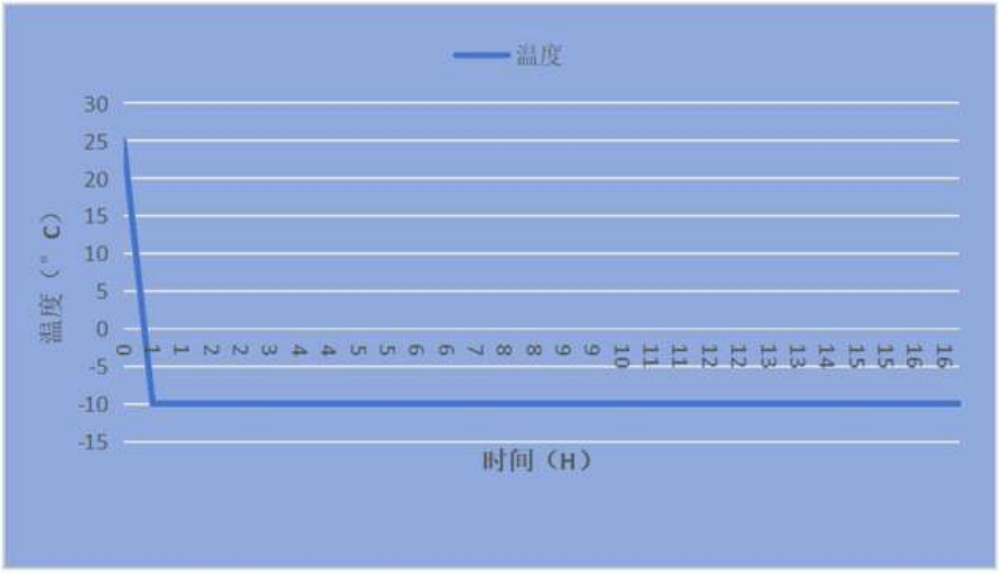
A.4.7	TABLE : Humidity test (Test Cab) - storage conditions.	P
CEI EN 60068-2-78:2002:03 Prove ambientali - Parte 2-78: Prove - Prova Cab: Caldo umido, regime stazionario /Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state		
Temperatura misurata */Measured temperature:*	40 °C	
Umidità misurata */measured humidity:*	93 RH%	
Duration:	96 h	
Instrumentation list	See table "Measurement equipment and instrumentation"	
Uncertainty	See table	
Precondizionamento */Preconditioning* -		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Humidity test (Test Cab) - storage conditions.



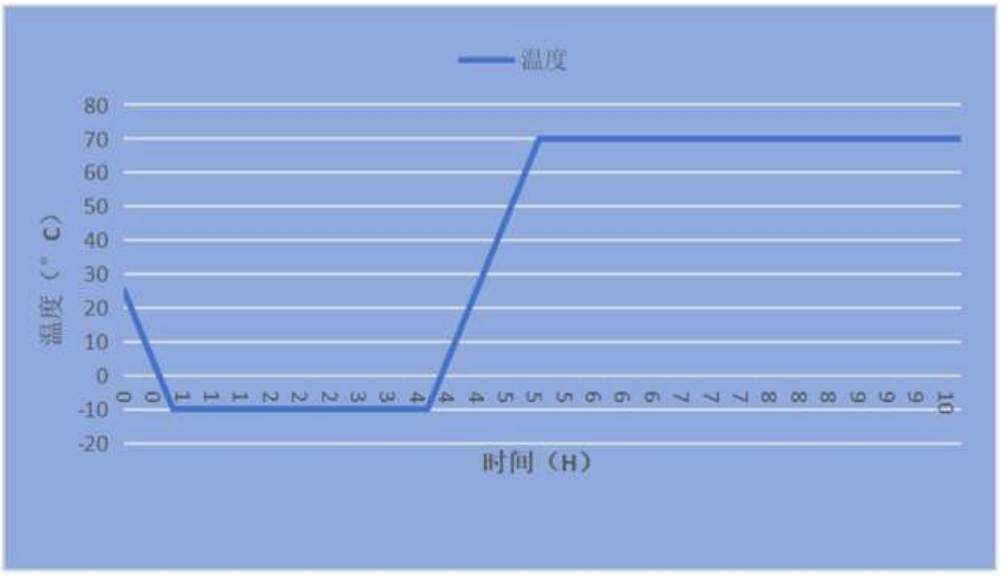
A.4.7	TABLE : Cold test (Test A) – storage conditions.	P
CEI EN 60068-2-1:2007:11 Prove ambientali - Parte 2-1: Prove - Prova A: Freddo */Environmental testing - Part 2-1: Tests - Test A: Cold*		
Condizioni di test */Test conditions*	dissipa calore /heat -dissipating	
Tipo di campione */Specimen type*	Bb: graduale / gradual	
Tipo di raffreddamento del campione */Specimen cooling type*	senza raffreddamneto artificiale /without artificial cooling	
Tipo di ventilazione */Air circulation*	forzata / forced air	
Temperatura misurata */Measured temperature:*	-10 °C	
Duration:	16 h	
Instrumentation list:	See table “Measurement equipment and instrumentation”	
Uncertainty:	See table	
Precondizionamento */Preconditioning* -		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Cold test (Test A) – storage conditions



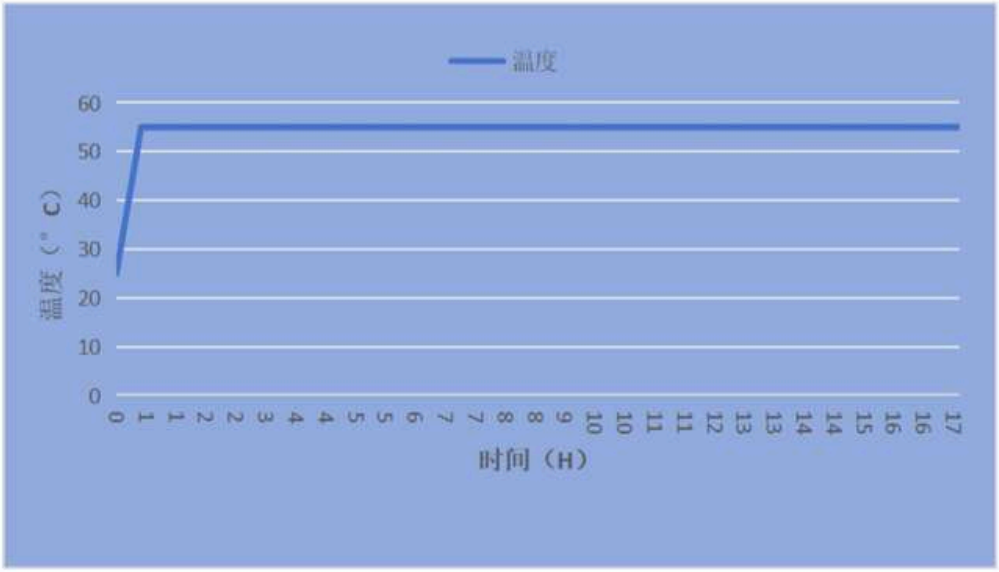
A.4.7	TABLE : Change of temperature (Test N) – storage conditions.	P
CEI EN 60068-2-14:2010 Prove ambientali - Parte 2-14: Prove - Prova N: Cambio di temperatura */Environmental testing - Part 2-14: Tests - Test N: Change of temperature*		
Prova/*Test*	NB: Cambio a velocità controllata */NB Change with specified rate of change*	
Tipo di ventilazione */Air circulation*	forzata / forced air	
N° cicli */Number of cycle:*	1	
Temperatura minima T_A */Minimum temperature T_A* ....:	- 10 ± 2 °C	
Temperatura massima T_B */Maximum temperature T_B* :	+70 ± 2°C	
Durata di esposizione t1 */Exposure time t_1* .....:	3 h	
Tempo di trasferimento t_2 */Transition time t_2* ...:	3 h	
Instrumentation list:	See table “Measurement equipment and instrumentation”	
Uncertainty:	See table	
Precondizionamento */Preconditioning* -		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Change of temperature (Test N) – storage conditions.



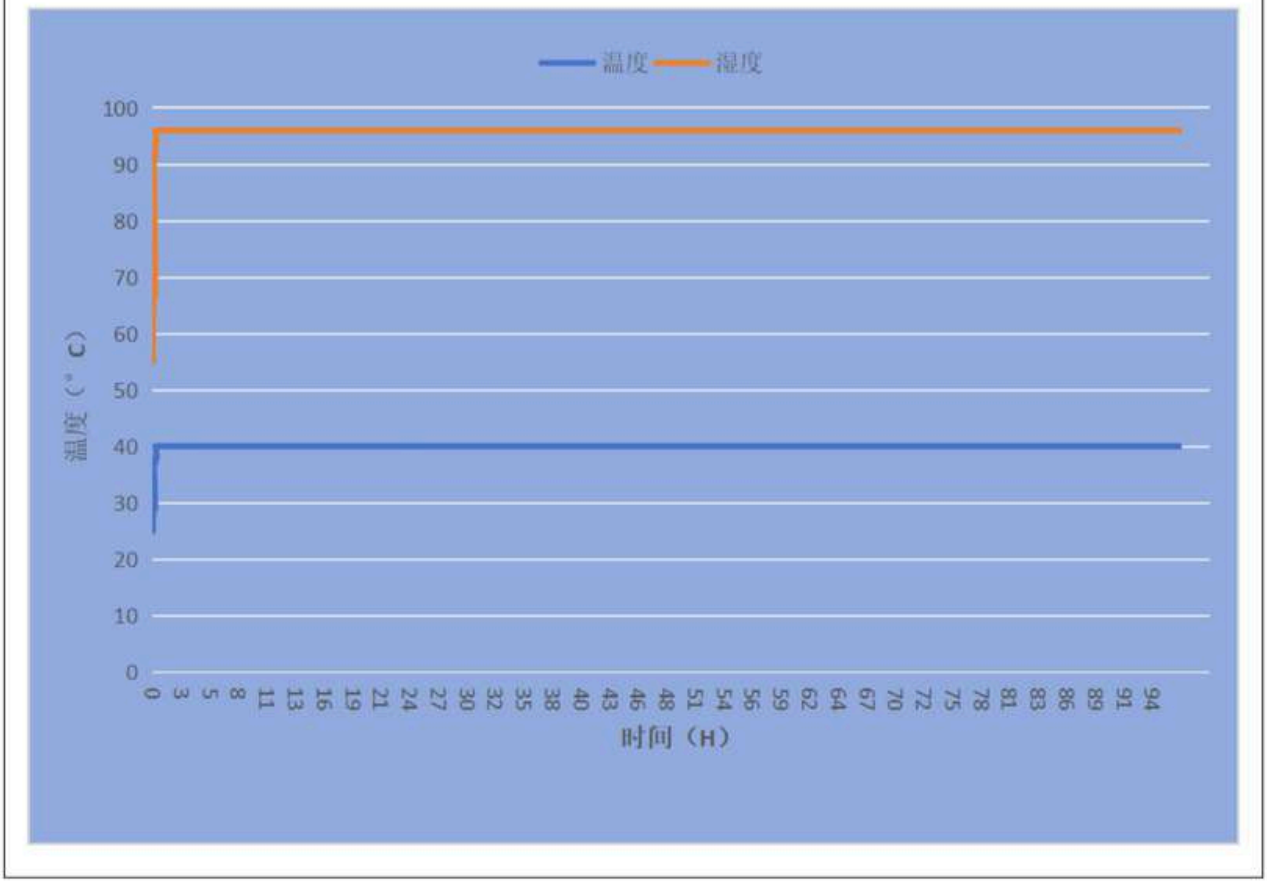
A.4.7	TABLE : Dry heat (Test B) – working conditions.	P
CEI EN 60068-2-2:2008-11 Prove ambientali - Parte 2-2: Prove - Prova B: Caldo secco */Environmental testing - Part 2-2: Tests - Test B: Dry heat*		
Condizioni di test */Test conditions*	dissipa calore /heat -dissipating	
Tipo di campione */Specimen type*	Bb: graduale / gradual	
Tipo di ventilazione */Air circulation*	forzata / forced air	
Temperatura misurata */Measured temperature:*	55 °C	
Duration:	16 h	
Precondizionamento */Preconditioning* --		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Dry heat (Test B) – working conditions.



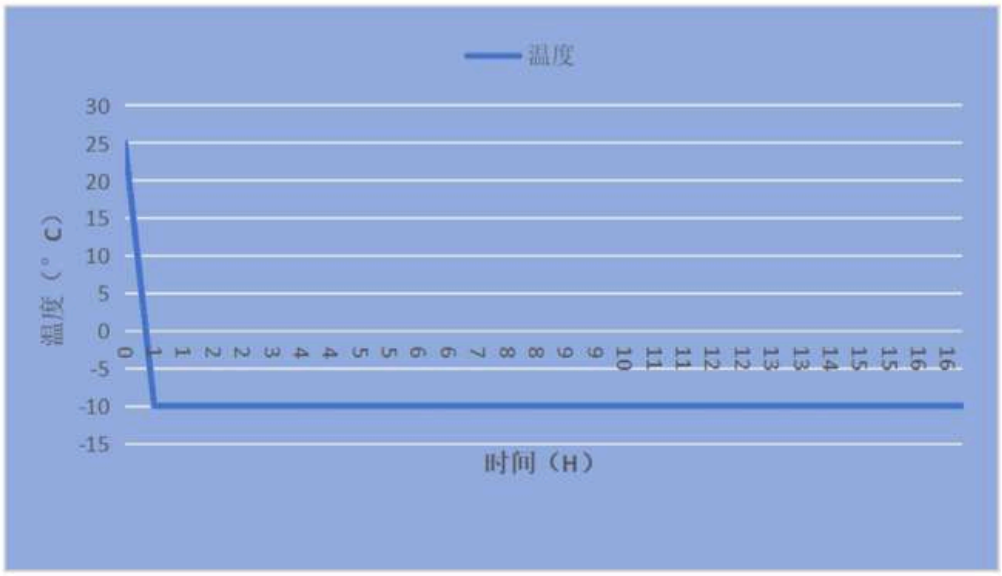
A.4.7	TABLE : Humidity test (Test Cab) - working conditions.	P
CEI EN 60068-2-78:2002:03 Prove ambientali - Parte 2-78: Prove - Prova Cab: Caldo umido, regime stazionario /Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state		
Temperatura misurata */Measured temperature:*	40 °C	
Umidità misurata */measured humidity:*	93 RH%	
Duration:	96 h	
Instrumentation list	See table "Measurement equipment and instrumentation"	
Uncertainty	See table	
Precondizionamento */Preconditioning* -		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Humidity test (Test Cab) - working conditions.



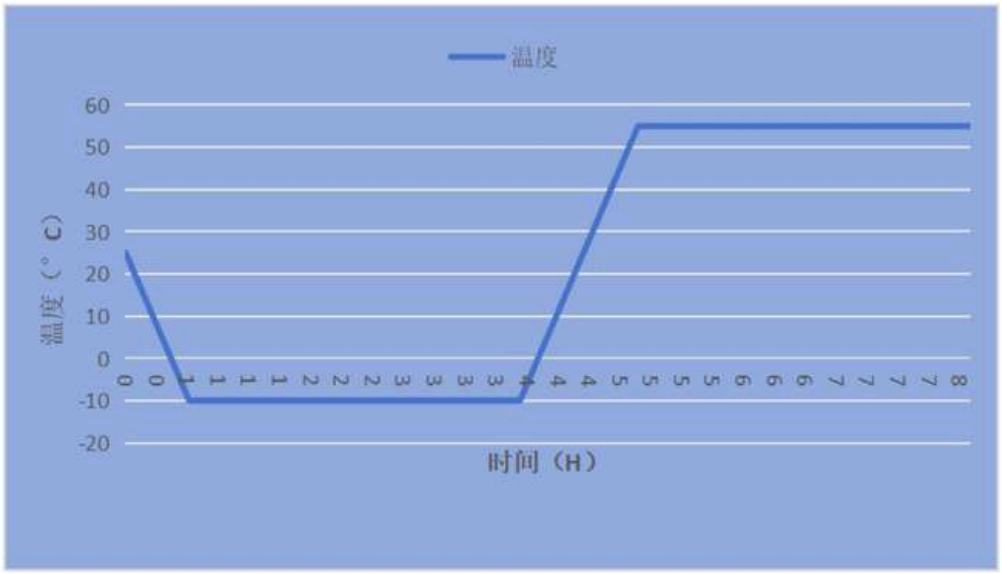
A.4.7	TABLE : Cold test (Test A) – working conditions.	P
CEI EN 60068-2-1:2007:11 Prove ambientali - Parte 2-1: Prove - Prova A: Freddo */Environmental testing - Part 2-1: Tests - Test A: Cold*		
Condizioni di test */Test conditions*	dissipa calore /heat -dissipating	
Tipo di campione */Specimen type*	Bb: graduale / gradual	
Tipo di raffreddamento del campione */Specimen cooling type*	senza raffreddamneto artificiale /without artificial cooling	
Tipo di ventilazione */Air circulation*	forzata / forced air	
Temperatura misurata */Measured temperature:*	-10 °C	
Duration:	16 h	
Instrumentation list:	See table “Measurement equipment and instrumentation”	
Uncertainty:	See table	
Precondizionamento */Preconditioning* -		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Cold test (Test A) – working conditions



A.4.7	TABLE : Change of temperature (Test N) – working conditions.	P
CEI EN 60068-2-14:2010 Prove ambientali - Parte 2-14: Prove - Prova N: Cambio di temperatura */Environmental testing - Part 2-14: Tests - Test N: Change of temperature*		
Prova/*Test*	NB: Cambio a velocità controllata */NB Change with specified rate of change*	
Tipo di ventilazione */Air circulation*	forzata / forced air	
N° cicli */Number of cycle:*	1	
Temperatura minima T_A */Minimum temperature T_A* ....:	- 10 ± 2 °C	
Temperatura massima T_B */Maximum temperature T_B* :	+55 ± 2°C	
Durata di esposizione t1 */Exposure time t_1* .....:	3 h	
Tempo di trasferimento t_2 */Transition time t_2* ...:	3 h	
Instrumentation list:	See table “Measurement equipment and instrumentation”	
Uncertainty:	See table	
Precondizionamento */Preconditioning* -		
Verifiche iniziali */Initial measurement* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Verifiche finali */Final measurement* Dopo il ciclo termico / *after thermal cycle* Verifica della corretta funzionalità del dispositivo / *verification of correct device functionality* Verifica del corretto funzionamento della protezione di interfaccia / *verification of correct interface protection*		
Condizioni particolari di prova */Particular test condition* Apparato non operativo (non alimentato) / device not operative (not powered)		
Supplementary information: After the conditions, the inverter still work without any problem.		

Image: Change of temperature (Test N) – working conditions.



A.4.8	TABLE: Insulation tests	P

☐ CEI EN 60255-27:2023

Parte 27: requisiti di sicurezza dei prodotti
/Electrical Relays - Part 27: Product safety requirements

☒ CEI EN 60146-1-1:1997 + A1:1998
Convertitori a semiconduttori - Prescrizioni generali e convertitori commutati dalla linea
Prove di isolamento (§ 4.2.1).
/ Semiconductor converters - General requirements and line commutated converters - Part 1-1: Specification of basic requirements Insulation tests (§. 4.2.1).

Ambient temperature (°C) ..... :	20°C ± 2°C
Humidity (RH %) ..... :	35% - 75% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table

Resistenza di isolamento /Insulation Resistance

Test	Test Voltage (V)	R measured	Limit
Between PE and AC output shorted	500 Vdc	>50G	≥1MΩ
Between PE and DC input shorted	500 Vdc	>50G	≥1MΩ
Between PE and DC + AC shorted	500 Vdc	>50G	≥1MΩ

Prova di rigidità dielettrica/ Dielectric strenght test

Test	Test Voltage (V)	R Measured after test MΩ @ 500Vdc	Comments
Between PE and AC output shorted	2120 Vdc	>50G	No discharge.
Between PE and DC + AC shorted	2120 Vdc	>50G	No discharge.

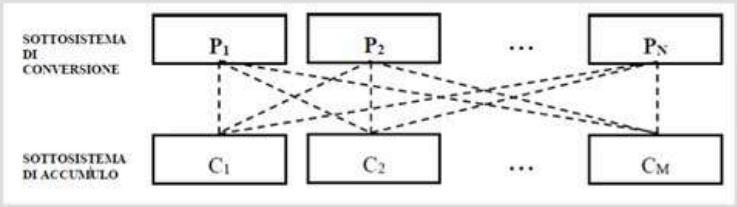
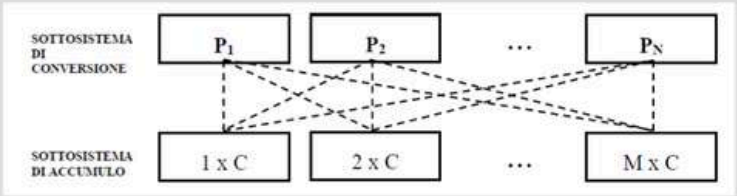
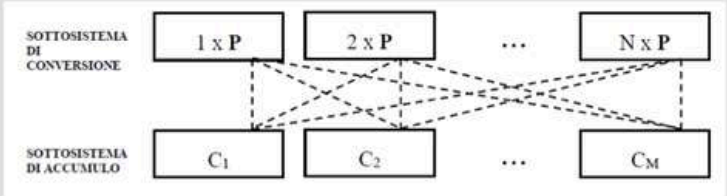
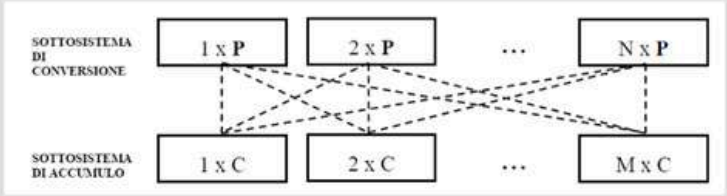
Supplementary information:
Tested on 2025030005-001(model : GTEFS-832V261KWh/125KW).

TESTING RESULTS
Allegato B bis: Prove sui sistemi di accumulo */ Annex B bis: Tests on Energy Storage Systems*

Terminologia e definizioni degli EESS in accordo al par. 8.5.3.4
/ Terminology and definitions for EESS systems in according to clause 8.5.3.4 :

CUS:	*Capacity of the storage system*	125000W
PSN:	*Power from Battery to the Grid*	125000W
PCN:	*Power from the Grid to the Battery*	125000W
PS_{MAX}:	*Power from Battery to the Grid within the CUS – (range of 10% - 90%)*	125000W
PC_{MAX}:	*Power from Grid to the Battery within the CUS – (range of 10% - 90%)*	125000W
PN_{INV}:	*Rated Power from the Inverter*	125000W

Operation Condition
$PS_{MAX} \geq PSN$
$PC_{MAX} \geq PCN$
$PS_{MAX} \leq PN_{INV}$
$PC_{MAX} \leq PN_{INV}$

Bbis.2.2: TABLE: Scalarità e modularità ***/Table: Scalarity and modularity***	
Ambient temperature (°C) .....:	N/A
Humidity (RH %) .....:	N/A
Instrumentation list.....:	N/A
Uncertainty .....:	N/A
☐ Caso A	
☒ Caso B	
☐ Caso C	
☐ Caso D	

Configurazione di Energy Storage System
/ Energy Storage system configuration

Inverter:			
P_{MIN}		**P_{MAX}**	
P_1:	125kW	**P_N:**	125kW
$N_{module\ min}$:	--	**$N_{module\ max}$:**	--

Storage:			
E_{MIN}		**E_{MAX}**	
C_1:	261kWh	**C_M:**	261kWh
$M_{module\ min}$:	--	**$M_{module\ max}$:**	--

Tabella di prove per EESS:
/ Table of tests for EESS

Caso A		Potenza sottosistema di conversione (W)		
		P_1 (P_{MIN})	...	P_N (P_{MAX})
Capacità sottosistema di accumulo (Wh)	C_1 (E_{MIN})	**Prove parziali Allegato Bbis**	non sono richieste ulteriori prove	**Prove parziali Allegato Bbis**
	...	non sono richieste ulteriori prove	non sono richieste ulteriori prove	non sono richieste ulteriori prove
	C_M (E_{MAX})	non sono richieste ulteriori prove	non sono richieste ulteriori prove	**Prove complete Allegato Bbis**

Caso C		Potenza sottosistema di conversione (W)			
		modulo base P (P_{MIN})	2 moduli	≥ 3 moduli	N moduli (P_{MAX})
Capacità sottosistema di accumulo (Wh)	C_1 (E_{MIN})	**Prove parziali Allegato Bbis**	non sono richieste ulteriori prove	**Prove parziali Allegato Bbis in una qualunque delle configurazioni con (almeno) 3 moduli del sottosistema di conversione**	non sono richieste ulteriori prove
	...	non sono richieste ulteriori prove	non sono richieste ulteriori prove		non sono richieste ulteriori prove
	C_M (E_{MAX})	**Prove complete Allegato Bbis**	non sono richieste ulteriori prove		non sono richieste ulteriori prove

Caso B		Potenza sottosistema di conversione (W)		
		P_1 (P_{MIN})	...	P_N (P_{MAX})
Capacità sottosistema di accumulo (Wh)	modulo base C (E_{MIN})	**Prove parziali Allegato Bbis**	non sono richieste ulteriori prove	**Prove parziali Allegato Bbis**
	...	non sono richieste ulteriori prove	non sono richieste ulteriori prove	non sono richieste ulteriori prove
	M moduli (E_{MAX})	non sono richieste ulteriori prove	non sono richieste ulteriori prove	**Prove complete Allegato Bbis**

Caso D		Potenza sottosistema di conversione (W)			
		modulo base P (P_{MIN})	2 moduli	≥ 3 moduli	N moduli (P_{MAX})
Capacità sottosistema di accumulo (Wh)	modulo base C (E_{MIN})	**Prove parziali Allegato Bbis**	non sono richieste ulteriori prove	**Prove parziali Allegato Bbis in una qualunque delle configurazioni con 3 moduli del sottosistema di conversione**	non sono richieste ulteriori prove
	...	non sono richieste ulteriori prove	non sono richieste ulteriori prove		non sono richieste ulteriori prove
	M moduli (E_{MAX})	**Prove complete Allegato Bbis**	non sono richieste ulteriori prove		non sono richieste ulteriori prove

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement (full power, 66% and 33% of Ps_{max})	
☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6(I_{rated} > 75A single-phase)	
Ambient temperature (°C) ..... :	**25 °C ± 5 °C**
Humidity (RH %) ..... :	65% ± 10% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	
Operator ..... :	See cover page
Supervisor ..... :	See cover page
Test Date..... :	See cover page

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.865	33.590	121.277	66.930	181.746	100.301	--	P
2	0.399	0.220	0.390	0.215	0.473	0.261	--	P
3	0.606	0.335	1.212	0.669	1.628	0.898	--	P
4	0.136	0.075	0.153	0.084	0.222	0.122	--	P
5	1.360	0.751	1.360	0.750	1.300	0.717	--	P
6	0.205	0.113	0.345	0.190	0.448	0.247	--	P
7	0.271	0.150	0.584	0.322	0.887	0.489	--	P
8	0.038	0.021	0.069	0.038	0.089	0.049	--	P
9	0.382	0.211	0.248	0.137	0.089	0.049	--	P
10	0.027	0.015	0.072	0.040	0.059	0.032	--	P
11	0.264	0.146	0.597	0.329	0.611	0.337	--	P
12	0.087	0.048	0.036	0.020	0.077	0.043	--	P
13	0.139	0.077	0.292	0.161	0.433	0.239	--	P
14	0.024	0.013	0.068	0.037	0.069	0.038	--	P
15	0.044	0.024	0.322	0.177	0.276	0.152	--	P
16	0.029	0.016	0.038	0.021	0.051	0.028	--	P
17	0.262	0.144	0.329	0.181	0.311	0.172	--	P
18	0.105	0.058	0.088	0.048	0.064	0.035	--	P
19	0.124	0.068	0.568	0.314	0.402	0.222	--	P
20	0.065	0.036	0.061	0.034	0.050	0.027	--	P
21	0.030	0.016	0.100	0.055	0.152	0.084	--	P
22	0.030	0.017	0.039	0.022	0.045	0.025	--	P
23	0.170	0.094	0.274	0.151	0.398	0.220	--	P
24	0.030	0.017	0.044	0.024	0.063	0.035	--	P
25	0.167	0.092	0.424	0.234	0.679	0.375	--	P
26	0.092	0.051	0.014	0.008	0.016	0.009	--	P
27	0.083	0.046	0.122	0.067	0.160	0.088	--	P
28	0.086	0.048	0.030	0.016	0.054	0.030	--	P
29	0.246	0.136	0.160	0.088	0.381	0.210	--	P
30	0.026	0.014	0.053	0.029	0.049	0.027	--	P
31	0.171	0.095	0.189	0.104	0.498	0.275	--	P
32	0.041	0.023	0.073	0.040	0.023	0.013	--	P
33	0.053	0.029	0.029	0.016	0.185	0.102	--	P
34	0.049	0.027	0.042	0.023	0.059	0.033	--	P
35	0.261	0.144	0.076	0.042	0.408	0.225	--	P
36	0.086	0.047	0.095	0.053	0.044	0.025	--	P
37	0.166	0.092	0.400	0.221	0.330	0.182	--	P
38	0.074	0.041	0.093	0.051	0.017	0.009	--	P
39	0.015	0.008	0.072	0.040	0.064	0.035	--	P
40	0.043	0.024	0.079	0.044	0.031	0.017	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	58.620	32.351	116.305	64.186	177.201	97.793	--	P
2	0.421	0.232	0.421	0.232	0.356	0.196	--	P
3	0.538	0.297	1.057	0.583	1.231	0.680	--	P
4	0.266	0.147	0.317	0.175	0.446	0.246	--	P
5	0.918	0.507	1.078	0.595	1.291	0.712	--	P
6	0.071	0.039	0.069	0.038	0.041	0.023	--	P
7	0.308	0.170	0.413	0.228	0.584	0.322	--	P
8	0.058	0.032	0.088	0.048	0.083	0.046	--	P
9	0.173	0.096	0.126	0.070	0.118	0.065	--	P
10	0.070	0.039	0.096	0.053	0.153	0.084	--	P
11	0.237	0.131	0.309	0.170	0.281	0.155	--	P
12	0.064	0.036	0.015	0.008	0.047	0.026	--	P
13	0.086	0.047	0.161	0.089	0.308	0.170	--	P
14	0.021	0.012	0.038	0.021	0.047	0.026	--	P
15	0.094	0.052	0.223	0.123	0.225	0.124	--	P
16	0.034	0.019	0.051	0.028	0.028	0.015	--	P
17	0.250	0.138	0.207	0.114	0.164	0.091	--	P
18	0.097	0.053	0.038	0.021	0.029	0.016	--	P
19	0.105	0.058	0.395	0.218	0.283	0.156	--	P
20	0.030	0.016	0.070	0.039	0.045	0.025	--	P
21	0.027	0.015	0.047	0.026	0.140	0.077	--	P
22	0.030	0.017	0.048	0.027	0.022	0.012	--	P
23	0.170	0.094	0.253	0.139	0.267	0.148	--	P
24	0.063	0.035	0.042	0.023	0.038	0.021	--	P
25	0.117	0.064	0.351	0.194	0.538	0.297	--	P
26	0.061	0.034	0.015	0.008	0.042	0.023	--	P
27	0.078	0.043	0.078	0.043	0.078	0.043	--	P
28	0.062	0.034	0.018	0.010	0.057	0.031	--	P
29	0.253	0.140	0.205	0.113	0.443	0.244	--	P
30	0.058	0.032	0.019	0.011	0.042	0.023	--	P
31	0.194	0.107	0.194	0.107	0.400	0.221	--	P
32	0.034	0.019	0.058	0.032	0.023	0.013	--	P
33	0.119	0.066	0.038	0.021	0.068	0.038	--	P
34	0.067	0.037	0.067	0.037	0.078	0.043	--	P
35	0.269	0.149	0.123	0.068	0.504	0.278	--	P
36	0.104	0.057	0.058	0.032	0.035	0.019	--	P
37	0.180	0.099	0.353	0.195	0.276	0.152	--	P
38	0.059	0.033	0.089	0.049	0.017	0.009	--	P
39	0.054	0.030	0.056	0.031	0.072	0.040	--	P
40	0.025	0.014	0.086	0.048	0.030	0.017	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	61.129	33.735	121.572	67.093	182.104	100.499	--	P
2	0.933	0.515	1.108	0.611	1.266	0.699	--	P
3	1.095	0.605	1.641	0.905	1.913	1.056	--	P
4	0.290	0.160	0.475	0.262	0.659	0.364	--	P
5	1.225	0.676	1.328	0.733	1.386	0.765	--	P
6	0.023	0.013	0.058	0.032	0.070	0.039	--	P
7	0.252	0.139	0.414	0.228	0.549	0.303	--	P
8	0.182	0.100	0.094	0.052	0.055	0.031	--	P
9	0.341	0.188	0.223	0.123	0.202	0.111	--	P
10	0.098	0.054	0.105	0.058	0.136	0.075	--	P
11	0.195	0.107	0.435	0.240	0.419	0.231	--	P
12	0.057	0.032	0.027	0.015	0.065	0.036	--	P
13	0.142	0.078	0.243	0.134	0.402	0.222	--	P
14	0.048	0.026	0.139	0.077	0.095	0.052	--	P
15	0.039	0.022	0.389	0.215	0.350	0.193	--	P
16	0.085	0.047	0.052	0.029	0.077	0.043	--	P
17	0.352	0.194	0.247	0.136	0.157	0.087	--	P
18	0.041	0.023	0.025	0.014	0.023	0.013	--	P
19	0.128	0.070	0.468	0.258	0.353	0.195	--	P
20	0.070	0.038	0.061	0.034	0.053	0.029	--	P
21	0.073	0.040	0.090	0.050	0.155	0.085	--	P
22	0.062	0.034	0.035	0.019	0.027	0.015	--	P
23	0.193	0.107	0.261	0.144	0.336	0.185	--	P
24	0.040	0.022	0.054	0.030	0.069	0.038	--	P
25	0.161	0.089	0.370	0.204	0.613	0.339	--	P
26	0.045	0.025	0.043	0.024	0.067	0.037	--	P
27	0.032	0.018	0.101	0.056	0.027	0.015	--	P
28	0.060	0.033	0.018	0.010	0.041	0.023	--	P
29	0.229	0.126	0.174	0.096	0.429	0.237	--	P
30	0.050	0.027	0.032	0.018	0.060	0.033	--	P
31	0.185	0.102	0.190	0.105	0.415	0.229	--	P
32	0.038	0.021	0.076	0.042	0.051	0.028	--	P
33	0.059	0.033	0.102	0.056	0.050	0.028	--	P
34	0.044	0.024	0.026	0.015	0.067	0.037	--	P
35	0.273	0.151	0.117	0.065	0.455	0.251	--	P
36	0.141	0.078	0.105	0.058	0.043	0.024	--	P
37	0.211	0.117	0.392	0.216	0.236	0.130	--	P
38	0.021	0.011	0.081	0.045	0.021	0.012	--	P
39	0.084	0.046	0.091	0.050	0.065	0.036	--	P
40	0.096	0.053	0.035	0.019	0.054	0.030	--	P

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement **(full power, 66% and 33% of PC_{max})** ☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6	
Ambient temperature (°C) ..... :	25 °C ± 5 °C
Humidity (RH %) ..... :	65% ± 10% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information: - *Test not applicable to unidirectional generators*	

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.326	32.740	119.823	66.127	180.987	99.882	--	P
2	0.379	0.209	0.319	0.176	0.271	0.150	--	P
3	0.377	0.208	0.223	0.123	0.121	0.067	--	P
4	0.033	0.018	0.131	0.073	0.193	0.107	--	P
5	1.032	0.570	1.228	0.678	1.585	0.875	--	P
6	0.106	0.058	0.132	0.073	0.298	0.165	--	P
7	0.451	0.249	0.426	0.235	0.442	0.244	--	P
8	0.025	0.014	0.035	0.019	0.070	0.039	--	P
9	0.087	0.048	0.130	0.072	0.177	0.098	--	P
10	0.105	0.058	0.051	0.028	0.061	0.034	--	P
11	0.219	0.121	0.112	0.062	0.288	0.159	--	P
12	0.045	0.025	0.117	0.064	0.127	0.070	--	P
13	0.242	0.134	0.429	0.237	0.445	0.246	--	P
14	0.093	0.051	0.020	0.011	0.079	0.044	--	P
15	0.126	0.070	0.023	0.013	0.125	0.069	--	P
16	0.015	0.008	0.117	0.064	0.097	0.054	--	P
17	0.101	0.056	0.496	0.274	0.573	0.316	--	P
18	0.087	0.048	0.035	0.020	0.100	0.055	--	P
19	0.053	0.029	0.180	0.099	0.097	0.054	--	P
20	0.032	0.017	0.063	0.035	0.054	0.030	--	P
21	0.059	0.033	0.204	0.113	0.271	0.149	--	P
22	0.044	0.024	0.035	0.019	0.080	0.044	--	P
23	0.301	0.166	0.148	0.082	0.263	0.145	--	P
24	0.100	0.055	0.070	0.039	0.106	0.058	--	P
25	0.157	0.086	0.301	0.166	0.619	0.341	--	P
26	0.124	0.068	0.041	0.022	0.078	0.043	--	P
27	0.056	0.031	0.028	0.015	0.144	0.080	--	P
28	0.122	0.067	0.043	0.024	0.088	0.049	--	P
29	0.081	0.044	0.058	0.032	0.388	0.214	--	P
30	0.123	0.068	0.080	0.044	0.069	0.038	--	P
31	0.136	0.075	0.066	0.037	0.409	0.225	--	P
32	0.179	0.099	0.125	0.069	0.057	0.031	--	P
33	0.043	0.024	0.058	0.032	0.096	0.053	--	P
34	0.089	0.049	0.075	0.041	0.046	0.025	--	P
35	0.120	0.066	0.101	0.056	0.376	0.208	--	P
36	0.052	0.029	0.076	0.042	0.071	0.039	--	P
37	0.119	0.066	0.155	0.085	0.076	0.042	--	P
38	0.093	0.052	0.092	0.051	0.015	0.008	--	P
39	0.083	0.046	0.062	0.034	0.099	0.055	--	P
40	0.079	0.044	0.013	0.007	0.042	0.023	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.723	33.511	119.924	66.183	179.804	99.230	--	P
2	0.571	0.315	0.657	0.363	0.748	0.413	--	P
3	0.488	0.269	0.525	0.290	0.410	0.226	--	P
4	0.341	0.188	0.284	0.157	0.421	0.232	--	P
5	0.687	0.379	0.924	0.510	1.287	0.710	--	P
6	0.067	0.037	0.042	0.023	0.085	0.047	--	P
7	0.350	0.193	0.350	0.193	0.475	0.262	--	P
8	0.044	0.025	0.040	0.022	0.069	0.038	--	P
9	0.363	0.200	0.343	0.189	0.254	0.140	--	P
10	0.036	0.020	0.021	0.012	0.059	0.033	--	P
11	0.162	0.089	0.084	0.046	0.171	0.095	--	P
12	0.056	0.031	0.017	0.009	0.057	0.031	--	P
13	0.229	0.126	0.458	0.253	0.426	0.235	--	P
14	0.028	0.016	0.084	0.046	0.063	0.035	--	P
15	0.052	0.029	0.172	0.095	0.077	0.042	--	P
16	0.067	0.037	0.046	0.025	0.075	0.041	--	P
17	0.084	0.047	0.498	0.275	0.517	0.285	--	P
18	0.090	0.050	0.051	0.028	0.045	0.025	--	P
19	0.098	0.054	0.209	0.115	0.157	0.086	--	P
20	0.041	0.023	0.102	0.056	0.057	0.032	--	P
21	0.065	0.036	0.135	0.074	0.185	0.102	--	P
22	0.060	0.033	0.030	0.017	0.081	0.044	--	P
23	0.299	0.165	0.142	0.079	0.264	0.146	--	P
24	0.066	0.036	0.084	0.047	0.109	0.060	--	P
25	0.143	0.079	0.263	0.145	0.505	0.279	--	P
26	0.110	0.061	0.025	0.014	0.056	0.031	--	P
27	0.104	0.057	0.046	0.025	0.109	0.060	--	P
28	0.032	0.017	0.063	0.035	0.057	0.031	--	P
29	0.129	0.071	0.096	0.053	0.424	0.234	--	P
30	0.070	0.038	0.067	0.037	0.050	0.028	--	P
31	0.122	0.067	0.120	0.066	0.350	0.193	--	P
32	0.097	0.054	0.066	0.036	0.080	0.044	--	P
33	0.023	0.013	0.025	0.014	0.076	0.042	--	P
34	0.070	0.039	0.083	0.046	0.020	0.011	--	P
35	0.074	0.041	0.161	0.089	0.408	0.225	--	P
36	0.038	0.021	0.078	0.043	0.042	0.023	--	P
37	0.196	0.108	0.144	0.079	0.038	0.021	--	P
38	0.065	0.036	0.070	0.039	0.035	0.019	--	P
39	0.018	0.010	0.044	0.024	0.104	0.057	--	P
40	0.066	0.036	0.030	0.016	0.030	0.016	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.316	32.735	119.825	66.129	180.972	99.874	--	P
2	0.806	0.445	0.682	0.376	0.666	0.368	--	P
3	0.906	0.500	0.712	0.393	0.631	0.348	--	P
4	0.409	0.226	0.528	0.291	0.736	0.406	--	P
5	0.976	0.539	1.131	0.624	1.445	0.797	--	P
6	0.135	0.075	0.158	0.087	0.217	0.120	--	P
7	0.430	0.237	0.386	0.213	0.463	0.255	--	P
8	0.115	0.064	0.125	0.069	0.094	0.052	--	P
9	0.222	0.122	0.072	0.040	0.143	0.079	--	P
10	0.114	0.063	0.070	0.039	0.080	0.044	--	P
11	0.089	0.049	0.127	0.070	0.116	0.064	--	P
12	0.093	0.051	0.046	0.026	0.056	0.031	--	P
13	0.224	0.124	0.377	0.208	0.367	0.203	--	P
14	0.038	0.021	0.020	0.011	0.040	0.022	--	P
15	0.050	0.028	0.094	0.052	0.051	0.028	--	P
16	0.048	0.026	0.055	0.030	0.027	0.015	--	P
17	0.042	0.023	0.471	0.260	0.556	0.307	--	P
18	0.096	0.053	0.069	0.038	0.046	0.026	--	P
19	0.083	0.046	0.156	0.086	0.105	0.058	--	P
20	0.035	0.019	0.086	0.047	0.051	0.028	--	P
21	0.020	0.011	0.176	0.097	0.196	0.108	--	P
22	0.046	0.025	0.021	0.011	0.053	0.029	--	P
23	0.285	0.157	0.062	0.034	0.265	0.146	--	P
24	0.113	0.062	0.073	0.040	0.089	0.049	--	P
25	0.157	0.087	0.259	0.143	0.569	0.314	--	P
26	0.061	0.034	0.011	0.006	0.039	0.022	--	P
27	0.120	0.066	0.034	0.019	0.097	0.054	--	P
28	0.096	0.053	0.039	0.021	0.041	0.023	--	P
29	0.078	0.043	0.080	0.044	0.356	0.197	--	P
30	0.056	0.031	0.072	0.040	0.092	0.051	--	P
31	0.141	0.078	0.129	0.071	0.399	0.220	--	P
32	0.124	0.068	0.063	0.035	0.059	0.032	--	P
33	0.067	0.037	0.048	0.026	0.097	0.053	--	P
34	0.029	0.016	0.036	0.020	0.024	0.013	--	P
35	0.100	0.055	0.209	0.115	0.355	0.196	--	P
36	0.083	0.046	0.099	0.055	0.111	0.061	--	P
37	0.196	0.108	0.171	0.094	0.079	0.043	--	P
38	0.092	0.051	0.052	0.028	0.048	0.027	--	P
39	0.039	0.021	0.119	0.066	0.100	0.055	--	P
40	0.054	0.030	0.017	0.010	0.065	0.036	--	P

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement **(full power, 66% and 33% of Ps_{max})** ☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6	
Ambient temperature (°C) ..... :	**+55 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.326	32.740	119.823	66.127	180.987	99.882	--	P
2	0.379	0.209	0.319	0.176	0.271	0.150	--	P
3	0.377	0.208	0.223	0.123	0.121	0.067	--	P
4	0.033	0.018	0.131	0.073	0.193	0.107	--	P
5	1.032	0.570	1.228	0.678	1.585	0.875	--	P
6	0.106	0.058	0.132	0.073	0.298	0.165	--	P
7	0.451	0.249	0.426	0.235	0.442	0.244	--	P
8	0.025	0.014	0.035	0.019	0.070	0.039	--	P
9	0.087	0.048	0.130	0.072	0.177	0.098	--	P
10	0.105	0.058	0.051	0.028	0.061	0.034	--	P
11	0.219	0.121	0.112	0.062	0.288	0.159	--	P
12	0.045	0.025	0.117	0.064	0.127	0.070	--	P
13	0.242	0.134	0.429	0.237	0.445	0.246	--	P
14	0.093	0.051	0.020	0.011	0.079	0.044	--	P
15	0.126	0.070	0.023	0.013	0.125	0.069	--	P
16	0.015	0.008	0.117	0.064	0.097	0.054	--	P
17	0.101	0.056	0.496	0.274	0.573	0.316	--	P
18	0.087	0.048	0.035	0.020	0.100	0.055	--	P
19	0.053	0.029	0.180	0.099	0.097	0.054	--	P
20	0.032	0.017	0.063	0.035	0.054	0.030	--	P
21	0.059	0.033	0.204	0.113	0.271	0.149	--	P
22	0.044	0.024	0.035	0.019	0.080	0.044	--	P
23	0.301	0.166	0.148	0.082	0.263	0.145	--	P
24	0.100	0.055	0.070	0.039	0.106	0.058	--	P
25	0.157	0.086	0.301	0.166	0.619	0.341	--	P
26	0.124	0.068	0.041	0.022	0.078	0.043	--	P
27	0.056	0.031	0.028	0.015	0.144	0.080	--	P
28	0.122	0.067	0.043	0.024	0.088	0.049	--	P
29	0.081	0.044	0.058	0.032	0.388	0.214	--	P
30	0.123	0.068	0.080	0.044	0.069	0.038	--	P
31	0.136	0.075	0.066	0.037	0.409	0.225	--	P
32	0.179	0.099	0.125	0.069	0.057	0.031	--	P
33	0.043	0.024	0.058	0.032	0.096	0.053	--	P
34	0.089	0.049	0.075	0.041	0.046	0.025	--	P
35	0.120	0.066	0.101	0.056	0.376	0.208	--	P
36	0.052	0.029	0.076	0.042	0.071	0.039	--	P
37	0.119	0.066	0.155	0.085	0.076	0.042	--	P
38	0.093	0.052	0.092	0.051	0.015	0.008	--	P
39	0.083	0.046	0.062	0.034	0.099	0.055	--	P
40	0.079	0.044	0.013	0.007	0.042	0.023	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.723	33.511	119.924	66.183	179.804	99.230	--	P
2	0.571	0.315	0.657	0.363	0.748	0.413	--	P
3	0.488	0.269	0.525	0.290	0.410	0.226	--	P
4	0.341	0.188	0.284	0.157	0.421	0.232	--	P
5	0.687	0.379	0.924	0.510	1.287	0.710	--	P
6	0.067	0.037	0.042	0.023	0.085	0.047	--	P
7	0.350	0.193	0.350	0.193	0.475	0.262	--	P
8	0.044	0.025	0.040	0.022	0.069	0.038	--	P
9	0.363	0.200	0.343	0.189	0.254	0.140	--	P
10	0.036	0.020	0.021	0.012	0.059	0.033	--	P
11	0.162	0.089	0.084	0.046	0.171	0.095	--	P
12	0.056	0.031	0.017	0.009	0.057	0.031	--	P
13	0.229	0.126	0.458	0.253	0.426	0.235	--	P
14	0.028	0.016	0.084	0.046	0.063	0.035	--	P
15	0.052	0.029	0.172	0.095	0.077	0.042	--	P
16	0.067	0.037	0.046	0.025	0.075	0.041	--	P
17	0.084	0.047	0.498	0.275	0.517	0.285	--	P
18	0.090	0.050	0.051	0.028	0.045	0.025	--	P
19	0.098	0.054	0.209	0.115	0.157	0.086	--	P
20	0.041	0.023	0.102	0.056	0.057	0.032	--	P
21	0.065	0.036	0.135	0.074	0.185	0.102	--	P
22	0.060	0.033	0.030	0.017	0.081	0.044	--	P
23	0.299	0.165	0.142	0.079	0.264	0.146	--	P
24	0.066	0.036	0.084	0.047	0.109	0.060	--	P
25	0.143	0.079	0.263	0.145	0.505	0.279	--	P
26	0.110	0.061	0.025	0.014	0.056	0.031	--	P
27	0.104	0.057	0.046	0.025	0.109	0.060	--	P
28	0.032	0.017	0.063	0.035	0.057	0.031	--	P
29	0.129	0.071	0.096	0.053	0.424	0.234	--	P
30	0.070	0.038	0.067	0.037	0.050	0.028	--	P
31	0.122	0.067	0.120	0.066	0.350	0.193	--	P
32	0.097	0.054	0.066	0.036	0.080	0.044	--	P
33	0.023	0.013	0.025	0.014	0.076	0.042	--	P
34	0.070	0.039	0.083	0.046	0.020	0.011	--	P
35	0.074	0.041	0.161	0.089	0.408	0.225	--	P
36	0.038	0.021	0.078	0.043	0.042	0.023	--	P
37	0.196	0.108	0.144	0.079	0.038	0.021	--	P
38	0.065	0.036	0.070	0.039	0.035	0.019	--	P
39	0.018	0.010	0.044	0.024	0.104	0.057	--	P
40	0.066	0.036	0.030	0.016	0.030	0.016	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.316	32.735	119.825	66.129	180.972	99.874	--	P
2	0.806	0.445	0.682	0.376	0.666	0.368	--	P
3	0.906	0.500	0.712	0.393	0.631	0.348	--	P
4	0.409	0.226	0.528	0.291	0.736	0.406	--	P
5	0.976	0.539	1.131	0.624	1.445	0.797	--	P
6	0.135	0.075	0.158	0.087	0.217	0.120	--	P
7	0.430	0.237	0.386	0.213	0.463	0.255	--	P
8	0.115	0.064	0.125	0.069	0.094	0.052	--	P
9	0.222	0.122	0.072	0.040	0.143	0.079	--	P
10	0.114	0.063	0.070	0.039	0.080	0.044	--	P
11	0.089	0.049	0.127	0.070	0.116	0.064	--	P
12	0.093	0.051	0.046	0.026	0.056	0.031	--	P
13	0.224	0.124	0.377	0.208	0.367	0.203	--	P
14	0.038	0.021	0.020	0.011	0.040	0.022	--	P
15	0.050	0.028	0.094	0.052	0.051	0.028	--	P
16	0.048	0.026	0.055	0.030	0.027	0.015	--	P
17	0.042	0.023	0.471	0.260	0.556	0.307	--	P
18	0.096	0.053	0.069	0.038	0.046	0.026	--	P
19	0.083	0.046	0.156	0.086	0.105	0.058	--	P
20	0.035	0.019	0.086	0.047	0.051	0.028	--	P
21	0.020	0.011	0.176	0.097	0.196	0.108	--	P
22	0.046	0.025	0.021	0.011	0.053	0.029	--	P
23	0.285	0.157	0.062	0.034	0.265	0.146	--	P
24	0.113	0.062	0.073	0.040	0.089	0.049	--	P
25	0.157	0.087	0.259	0.143	0.569	0.314	--	P
26	0.061	0.034	0.011	0.006	0.039	0.022	--	P
27	0.120	0.066	0.034	0.019	0.097	0.054	--	P
28	0.096	0.053	0.039	0.021	0.041	0.023	--	P
29	0.078	0.043	0.080	0.044	0.356	0.197	--	P
30	0.056	0.031	0.072	0.040	0.092	0.051	--	P
31	0.141	0.078	0.129	0.071	0.399	0.220	--	P
32	0.124	0.068	0.063	0.035	0.059	0.032	--	P
33	0.067	0.037	0.048	0.026	0.097	0.053	--	P
34	0.029	0.016	0.036	0.020	0.024	0.013	--	P
35	0.100	0.055	0.209	0.115	0.355	0.196	--	P
36	0.083	0.046	0.099	0.055	0.111	0.061	--	P
37	0.196	0.108	0.171	0.094	0.079	0.043	--	P
38	0.092	0.051	0.052	0.028	0.048	0.027	--	P
39	0.039	0.021	0.119	0.066	0.100	0.055	--	P
40	0.054	0.030	0.017	0.010	0.065	0.036	--	P

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement **(full power, 66% and 33% of Ps_{max})** ☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6	
Ambient temperature (°C) .....:	**+55 °C ± 2 °C**
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Supplementary information:	

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.768	33.536	121.108	66.837	181.692	100.271	--	P
2	0.406	0.224	0.384	0.212	0.466	0.257	--	P
3	0.608	0.336	1.206	0.665	1.604	0.885	--	P
4	0.139	0.077	0.151	0.083	0.226	0.125	--	P
5	1.367	0.754	1.338	0.738	1.189	0.656	--	P
6	0.205	0.113	0.346	0.191	0.432	0.238	--	P
7	0.277	0.153	0.567	0.313	0.767	0.423	--	P
8	0.034	0.019	0.065	0.036	0.064	0.035	--	P
9	0.380	0.210	0.239	0.132	0.028	0.015	--	P
10	0.026	0.014	0.075	0.042	0.051	0.028	--	P
11	0.259	0.143	0.604	0.334	0.635	0.351	--	P
12	0.085	0.047	0.033	0.018	0.088	0.048	--	P
13	0.142	0.078	0.290	0.160	0.431	0.238	--	P
14	0.025	0.014	0.063	0.034	0.051	0.028	--	P
15	0.045	0.025	0.324	0.179	0.246	0.136	--	P
16	0.030	0.017	0.042	0.023	0.040	0.022	--	P
17	0.260	0.144	0.328	0.181	0.302	0.167	--	P
18	0.108	0.060	0.090	0.050	0.048	0.027	--	P
19	0.121	0.067	0.557	0.307	0.338	0.187	--	P
20	0.068	0.038	0.055	0.031	0.051	0.028	--	P
21	0.031	0.017	0.104	0.057	0.182	0.100	--	P
22	0.029	0.016	0.040	0.022	0.042	0.023	--	P
23	0.177	0.098	0.269	0.149	0.375	0.207	--	P
24	0.035	0.019	0.045	0.025	0.060	0.033	--	P
25	0.165	0.091	0.435	0.240	0.608	0.336	--	P
26	0.095	0.052	0.016	0.009	0.029	0.016	--	P
27	0.085	0.047	0.119	0.066	0.118	0.065	--	P
28	0.087	0.048	0.028	0.015	0.032	0.018	--	P
29	0.234	0.129	0.153	0.085	0.365	0.201	--	P
30	0.023	0.013	0.052	0.029	0.054	0.030	--	P
31	0.175	0.097	0.172	0.095	0.552	0.304	--	P
32	0.044	0.024	0.070	0.039	0.027	0.015	--	P
33	0.052	0.028	0.041	0.023	0.176	0.097	--	P
34	0.058	0.032	0.038	0.021	0.042	0.023	--	P
35	0.260	0.144	0.078	0.043	0.380	0.210	--	P
36	0.087	0.048	0.091	0.050	0.037	0.020	--	P
37	0.167	0.092	0.407	0.225	0.317	0.175	--	P
38	0.072	0.040	0.088	0.048	0.018	0.010	--	P
39	0.016	0.009	0.069	0.038	0.112	0.062	--	P
40	0.037	0.020	0.077	0.043	0.032	0.018	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	58.217	32.129	116.899	64.514	176.324	97.309	--	P
2	0.426	0.235	0.423	0.234	0.358	0.198	--	P
3	0.580	0.320	0.997	0.550	1.171	0.646	--	P
4	0.263	0.145	0.318	0.176	0.417	0.230	--	P
5	0.928	0.512	1.056	0.583	1.212	0.669	--	P
6	0.067	0.037	0.067	0.037	0.037	0.020	--	P
7	0.305	0.168	0.399	0.220	0.495	0.273	--	P
8	0.063	0.035	0.082	0.045	0.080	0.044	--	P
9	0.171	0.094	0.103	0.057	0.121	0.067	--	P
10	0.064	0.035	0.104	0.057	0.162	0.089	--	P
11	0.230	0.127	0.330	0.182	0.292	0.161	--	P
12	0.064	0.035	0.013	0.007	0.046	0.026	--	P
13	0.094	0.052	0.139	0.077	0.310	0.171	--	P
14	0.021	0.011	0.040	0.022	0.062	0.034	--	P
15	0.095	0.053	0.222	0.123	0.204	0.113	--	P
16	0.038	0.021	0.051	0.028	0.024	0.013	--	P
17	0.245	0.135	0.215	0.119	0.143	0.079	--	P
18	0.094	0.052	0.034	0.019	0.035	0.020	--	P
19	0.110	0.061	0.383	0.211	0.238	0.131	--	P
20	0.032	0.018	0.068	0.037	0.034	0.019	--	P
21	0.023	0.013	0.055	0.030	0.160	0.088	--	P
22	0.027	0.015	0.047	0.026	0.028	0.015	--	P
23	0.179	0.099	0.249	0.137	0.239	0.132	--	P
24	0.070	0.039	0.039	0.022	0.029	0.016	--	P
25	0.112	0.062	0.363	0.200	0.494	0.273	--	P
26	0.065	0.036	0.014	0.008	0.048	0.026	--	P
27	0.081	0.045	0.077	0.042	0.075	0.041	--	P
28	0.062	0.034	0.024	0.013	0.034	0.019	--	P
29	0.245	0.135	0.200	0.110	0.349	0.193	--	P
30	0.053	0.029	0.017	0.009	0.034	0.019	--	P
31	0.196	0.108	0.174	0.096	0.468	0.258	--	P
32	0.038	0.021	0.060	0.033	0.030	0.017	--	P
33	0.118	0.065	0.042	0.023	0.076	0.042	--	P
34	0.074	0.041	0.060	0.033	0.069	0.038	--	P
35	0.267	0.147	0.118	0.065	0.465	0.256	--	P
36	0.106	0.058	0.054	0.030	0.034	0.019	--	P
37	0.178	0.098	0.367	0.202	0.259	0.143	--	P
38	0.055	0.030	0.090	0.050	0.013	0.007	--	P
39	0.056	0.031	0.060	0.033	0.058	0.032	--	P
40	0.033	0.018	0.088	0.048	0.042	0.023	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	61.029	33.680	121.400	66.998	182.031	100.459	--	P
2	0.942	0.520	1.099	0.606	1.244	0.687	--	P
3	1.089	0.601	1.626	0.897	1.863	1.028	--	P
4	0.288	0.159	0.469	0.259	0.657	0.363	--	P
5	1.231	0.680	1.307	0.721	1.314	0.725	--	P
6	0.020	0.011	0.052	0.029	0.042	0.023	--	P
7	0.257	0.142	0.390	0.215	0.407	0.225	--	P
8	0.181	0.100	0.094	0.052	0.055	0.031	--	P
9	0.345	0.190	0.214	0.118	0.217	0.120	--	P
10	0.099	0.055	0.098	0.054	0.113	0.062	--	P
11	0.189	0.104	0.445	0.245	0.457	0.252	--	P
12	0.057	0.031	0.024	0.013	0.070	0.038	--	P
13	0.141	0.078	0.242	0.133	0.380	0.210	--	P
14	0.047	0.026	0.141	0.078	0.080	0.044	--	P
15	0.038	0.021	0.382	0.211	0.317	0.175	--	P
16	0.085	0.047	0.053	0.029	0.085	0.047	--	P
17	0.353	0.195	0.247	0.136	0.118	0.065	--	P
18	0.041	0.023	0.023	0.013	0.021	0.012	--	P
19	0.131	0.072	0.456	0.251	0.301	0.166	--	P
20	0.067	0.037	0.060	0.033	0.051	0.028	--	P
21	0.073	0.040	0.102	0.056	0.198	0.109	--	P
22	0.067	0.037	0.032	0.018	0.019	0.010	--	P
23	0.199	0.110	0.252	0.139	0.298	0.165	--	P
24	0.041	0.023	0.054	0.030	0.057	0.032	--	P
25	0.151	0.083	0.378	0.208	0.545	0.301	--	P
26	0.044	0.024	0.042	0.023	0.051	0.028	--	P
27	0.031	0.017	0.093	0.051	0.063	0.035	--	P
28	0.060	0.033	0.020	0.011	0.037	0.021	--	P
29	0.219	0.121	0.172	0.095	0.351	0.193	--	P
30	0.049	0.027	0.034	0.019	0.056	0.031	--	P
31	0.187	0.103	0.162	0.089	0.483	0.266	--	P
32	0.039	0.022	0.075	0.041	0.059	0.033	--	P
33	0.061	0.034	0.107	0.059	0.041	0.022	--	P
34	0.043	0.024	0.024	0.013	0.060	0.033	--	P
35	0.272	0.150	0.111	0.061	0.422	0.233	--	P
36	0.139	0.076	0.099	0.054	0.030	0.016	--	P
37	0.215	0.119	0.395	0.218	0.233	0.128	--	P
38	0.020	0.011	0.085	0.047	0.022	0.012	--	P
39	0.079	0.044	0.090	0.050	0.047	0.026	--	P
40	0.098	0.054	0.025	0.014	0.050	0.027	--	P

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement **(full power, 66% and 33% of $P_{C_{max}}$)** ☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6	
Ambient temperature (°C) ..... :	**+55 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information: - *Test not applicable to unidirectional generators*	

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.235	32.690	119.560	65.982	181.360	100.088	--	P
2	0.372	0.206	0.315	0.174	0.266	0.147	--	P
3	0.366	0.202	0.223	0.123	0.128	0.070	--	P
4	0.028	0.015	0.135	0.075	0.218	0.120	--	P
5	1.035	0.571	1.213	0.669	1.537	0.848	--	P
6	0.100	0.055	0.132	0.073	0.317	0.175	--	P
7	0.456	0.252	0.409	0.225	0.322	0.178	--	P
8	0.026	0.014	0.035	0.019	0.074	0.041	--	P
9	0.083	0.046	0.132	0.073	0.185	0.102	--	P
10	0.104	0.057	0.047	0.026	0.075	0.041	--	P
11	0.216	0.119	0.113	0.062	0.319	0.176	--	P
12	0.044	0.024	0.118	0.065	0.130	0.072	--	P
13	0.240	0.132	0.436	0.241	0.466	0.257	--	P
14	0.095	0.052	0.023	0.013	0.077	0.043	--	P
15	0.126	0.070	0.027	0.015	0.105	0.058	--	P
16	0.017	0.009	0.121	0.067	0.102	0.056	--	P
17	0.095	0.052	0.495	0.273	0.511	0.282	--	P
18	0.086	0.047	0.031	0.017	0.096	0.053	--	P
19	0.053	0.029	0.184	0.102	0.165	0.091	--	P
20	0.029	0.016	0.062	0.034	0.052	0.028	--	P
21	0.065	0.036	0.197	0.109	0.200	0.111	--	P
22	0.041	0.023	0.034	0.019	0.070	0.039	--	P
23	0.301	0.166	0.157	0.087	0.385	0.212	--	P
24	0.099	0.054	0.070	0.039	0.075	0.041	--	P
25	0.160	0.088	0.285	0.157	0.455	0.251	--	P
26	0.117	0.065	0.038	0.021	0.091	0.050	--	P
27	0.053	0.029	0.038	0.021	0.208	0.115	--	P
28	0.123	0.068	0.048	0.026	0.080	0.044	--	P
29	0.078	0.043	0.050	0.028	0.247	0.136	--	P
30	0.125	0.069	0.079	0.044	0.082	0.045	--	P
31	0.134	0.074	0.070	0.039	0.558	0.308	--	P
32	0.181	0.100	0.128	0.070	0.065	0.036	--	P
33	0.044	0.024	0.061	0.034	0.073	0.040	--	P
34	0.095	0.052	0.074	0.041	0.049	0.027	--	P
35	0.133	0.073	0.113	0.062	0.465	0.256	--	P
36	0.052	0.029	0.081	0.044	0.060	0.033	--	P
37	0.117	0.064	0.166	0.092	0.065	0.036	--	P
38	0.107	0.059	0.093	0.051	0.019	0.010	--	P
39	0.086	0.048	0.065	0.036	0.093	0.052	--	P
40	0.075	0.041	0.014	0.007	0.020	0.011	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.647	33.470	119.810	66.121	180.967	99.871	--	P
2	0.568	0.314	0.657	0.362	0.729	0.403	--	P
3	0.514	0.283	0.482	0.266	0.470	0.259	--	P
4	0.343	0.189	0.278	0.154	0.394	0.218	--	P
5	0.687	0.379	0.910	0.502	1.250	0.690	--	P
6	0.064	0.035	0.040	0.022	0.066	0.036	--	P
7	0.346	0.191	0.331	0.183	0.373	0.206	--	P
8	0.044	0.024	0.037	0.021	0.065	0.036	--	P
9	0.365	0.201	0.332	0.183	0.251	0.139	--	P
10	0.033	0.018	0.021	0.011	0.059	0.033	--	P
11	0.162	0.089	0.075	0.041	0.223	0.123	--	P
12	0.055	0.030	0.019	0.010	0.037	0.021	--	P
13	0.235	0.130	0.478	0.264	0.452	0.249	--	P
14	0.026	0.014	0.080	0.044	0.071	0.039	--	P
15	0.050	0.027	0.173	0.095	0.093	0.051	--	P
16	0.066	0.037	0.047	0.026	0.063	0.035	--	P
17	0.078	0.043	0.493	0.272	0.487	0.269	--	P
18	0.089	0.049	0.045	0.025	0.030	0.017	--	P
19	0.103	0.057	0.218	0.120	0.226	0.125	--	P
20	0.039	0.022	0.105	0.058	0.075	0.041	--	P
21	0.065	0.036	0.131	0.072	0.169	0.093	--	P
22	0.060	0.033	0.030	0.017	0.070	0.039	--	P
23	0.298	0.164	0.152	0.084	0.375	0.207	--	P
24	0.066	0.036	0.086	0.047	0.111	0.061	--	P
25	0.148	0.081	0.248	0.137	0.366	0.202	--	P
26	0.107	0.059	0.024	0.013	0.064	0.036	--	P
27	0.102	0.057	0.046	0.026	0.152	0.084	--	P
28	0.027	0.015	0.064	0.036	0.057	0.032	--	P
29	0.127	0.070	0.090	0.049	0.297	0.164	--	P
30	0.072	0.040	0.065	0.036	0.067	0.037	--	P
31	0.121	0.067	0.127	0.070	0.488	0.269	--	P
32	0.098	0.054	0.070	0.038	0.059	0.032	--	P
33	0.021	0.012	0.029	0.016	0.061	0.033	--	P
34	0.067	0.037	0.083	0.046	0.031	0.017	--	P
35	0.089	0.049	0.168	0.093	0.498	0.275	--	P
36	0.041	0.023	0.081	0.045	0.031	0.017	--	P
37	0.194	0.107	0.154	0.085	0.060	0.033	--	P
38	0.068	0.038	0.071	0.039	0.042	0.023	--	P
39	0.014	0.008	0.044	0.025	0.101	0.056	--	P
40	0.065	0.036	0.032	0.018	0.031	0.017	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.234	32.690	119.567	65.986	181.352	100.084	--	P
2	0.801	0.442	0.679	0.375	0.678	0.374	--	P
3	0.921	0.508	0.705	0.389	0.568	0.314	--	P
4	0.412	0.227	0.526	0.290	0.708	0.391	--	P
5	0.977	0.539	1.121	0.619	1.398	0.772	--	P
6	0.133	0.073	0.156	0.086	0.216	0.119	--	P
7	0.438	0.242	0.374	0.206	0.359	0.198	--	P
8	0.114	0.063	0.131	0.072	0.130	0.071	--	P
9	0.222	0.122	0.076	0.042	0.139	0.077	--	P
10	0.113	0.062	0.069	0.038	0.083	0.046	--	P
11	0.087	0.048	0.121	0.067	0.173	0.096	--	P
12	0.092	0.051	0.049	0.027	0.055	0.031	--	P
13	0.222	0.123	0.389	0.215	0.407	0.225	--	P
14	0.036	0.020	0.022	0.012	0.037	0.020	--	P
15	0.051	0.028	0.089	0.049	0.066	0.037	--	P
16	0.047	0.026	0.056	0.031	0.037	0.020	--	P
17	0.039	0.022	0.471	0.260	0.510	0.281	--	P
18	0.096	0.053	0.067	0.037	0.053	0.029	--	P
19	0.087	0.048	0.157	0.086	0.158	0.087	--	P
20	0.038	0.021	0.087	0.048	0.054	0.030	--	P
21	0.021	0.012	0.174	0.096	0.158	0.087	--	P
22	0.044	0.024	0.021	0.011	0.051	0.028	--	P
23	0.283	0.156	0.074	0.041	0.343	0.190	--	P
24	0.111	0.061	0.071	0.039	0.089	0.049	--	P
25	0.159	0.088	0.253	0.140	0.415	0.229	--	P
26	0.056	0.031	0.013	0.007	0.042	0.023	--	P
27	0.119	0.066	0.036	0.020	0.129	0.071	--	P
28	0.099	0.055	0.038	0.021	0.040	0.022	--	P
29	0.079	0.043	0.072	0.040	0.247	0.136	--	P
30	0.056	0.031	0.072	0.040	0.091	0.050	--	P
31	0.141	0.078	0.132	0.073	0.528	0.291	--	P
32	0.125	0.069	0.060	0.033	0.036	0.020	--	P
33	0.071	0.039	0.050	0.027	0.098	0.054	--	P
34	0.034	0.019	0.033	0.018	0.033	0.018	--	P
35	0.107	0.059	0.218	0.121	0.437	0.241	--	P
36	0.076	0.042	0.100	0.055	0.089	0.049	--	P
37	0.195	0.108	0.179	0.099	0.103	0.057	--	P
38	0.099	0.054	0.049	0.027	0.063	0.035	--	P
39	0.030	0.017	0.121	0.067	0.092	0.051	--	P
40	0.050	0.028	0.021	0.011	0.028	0.015	--	P

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement **(full power, 66% and 33% of Ps_{max})** ☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6	
Ambient temperature (°C) ..... :	**-10 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.963	33.644	121.073	66.818	181.743	100.299	--	P
2	0.403	0.222	0.386	0.213	0.457	0.252	--	P
3	0.610	0.337	1.208	0.667	1.619	0.894	--	P
4	0.135	0.075	0.151	0.083	0.216	0.119	--	P
5	1.361	0.751	1.344	0.742	1.262	0.697	--	P
6	0.204	0.113	0.348	0.192	0.428	0.236	--	P
7	0.276	0.152	0.571	0.315	0.841	0.464	--	P
8	0.036	0.020	0.065	0.036	0.072	0.039	--	P
9	0.382	0.211	0.243	0.134	0.061	0.033	--	P
10	0.026	0.015	0.073	0.040	0.046	0.025	--	P
11	0.261	0.144	0.603	0.333	0.614	0.339	--	P
12	0.087	0.048	0.034	0.019	0.087	0.048	--	P
13	0.139	0.077	0.290	0.160	0.432	0.238	--	P
14	0.024	0.013	0.063	0.035	0.059	0.032	--	P
15	0.045	0.025	0.323	0.178	0.267	0.147	--	P
16	0.030	0.016	0.041	0.023	0.046	0.025	--	P
17	0.260	0.144	0.330	0.182	0.309	0.170	--	P
18	0.105	0.058	0.089	0.049	0.048	0.026	--	P
19	0.121	0.067	0.561	0.310	0.369	0.204	--	P
20	0.066	0.037	0.058	0.032	0.058	0.032	--	P
21	0.030	0.017	0.104	0.057	0.165	0.091	--	P
22	0.029	0.016	0.040	0.022	0.041	0.022	--	P
23	0.172	0.095	0.270	0.149	0.388	0.214	--	P
24	0.033	0.018	0.046	0.025	0.058	0.032	--	P
25	0.166	0.092	0.430	0.237	0.644	0.356	--	P
26	0.091	0.050	0.016	0.009	0.030	0.016	--	P
27	0.085	0.047	0.119	0.066	0.147	0.081	--	P
28	0.087	0.048	0.028	0.015	0.039	0.021	--	P
29	0.242	0.133	0.154	0.085	0.365	0.201	--	P
30	0.025	0.014	0.052	0.028	0.051	0.028	--	P
31	0.171	0.094	0.177	0.098	0.522	0.288	--	P
32	0.042	0.023	0.072	0.040	0.030	0.017	--	P
33	0.053	0.029	0.038	0.021	0.178	0.098	--	P
34	0.052	0.029	0.038	0.021	0.054	0.030	--	P
35	0.261	0.144	0.080	0.044	0.392	0.216	--	P
36	0.086	0.048	0.094	0.052	0.043	0.024	--	P
37	0.167	0.092	0.407	0.224	0.313	0.173	--	P
38	0.074	0.041	0.090	0.050	0.014	0.008	--	P
39	0.015	0.008	0.068	0.038	0.077	0.042	--	P
40	0.041	0.023	0.079	0.044	0.033	0.018	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	58.377	32.217	116.896	64.512	176.558	97.438	--	P
2	0.423	0.233	0.423	0.234	0.361	0.199	--	P
3	0.591	0.326	1.046	0.578	1.246	0.688	--	P
4	0.267	0.147	0.320	0.176	0.431	0.238	--	P
5	0.927	0.512	1.087	0.600	1.283	0.708	--	P
6	0.070	0.039	0.066	0.036	0.032	0.018	--	P
7	0.306	0.169	0.415	0.229	0.557	0.307	--	P
8	0.059	0.033	0.086	0.048	0.093	0.052	--	P
9	0.174	0.096	0.099	0.055	0.114	0.063	--	P
10	0.067	0.037	0.101	0.056	0.152	0.084	--	P
11	0.231	0.128	0.332	0.183	0.294	0.163	--	P
12	0.064	0.035	0.014	0.008	0.042	0.023	--	P
13	0.092	0.051	0.141	0.078	0.320	0.176	--	P
14	0.020	0.011	0.039	0.022	0.057	0.031	--	P
15	0.095	0.052	0.217	0.120	0.219	0.121	--	P
16	0.034	0.019	0.052	0.028	0.019	0.011	--	P
17	0.248	0.137	0.215	0.119	0.156	0.086	--	P
18	0.094	0.052	0.035	0.019	0.036	0.020	--	P
19	0.108	0.060	0.386	0.213	0.261	0.144	--	P
20	0.031	0.017	0.070	0.039	0.045	0.025	--	P
21	0.027	0.015	0.053	0.029	0.149	0.082	--	P
22	0.029	0.016	0.048	0.027	0.016	0.009	--	P
23	0.169	0.093	0.244	0.135	0.252	0.139	--	P
24	0.066	0.037	0.040	0.022	0.030	0.017	--	P
25	0.111	0.061	0.360	0.198	0.520	0.287	--	P
26	0.062	0.034	0.015	0.008	0.043	0.024	--	P
27	0.080	0.044	0.080	0.044	0.068	0.038	--	P
28	0.062	0.034	0.022	0.012	0.045	0.025	--	P
29	0.249	0.138	0.201	0.111	0.398	0.220	--	P
30	0.057	0.032	0.017	0.009	0.044	0.024	--	P
31	0.193	0.106	0.180	0.099	0.427	0.235	--	P
32	0.033	0.018	0.061	0.034	0.019	0.010	--	P
33	0.118	0.065	0.040	0.022	0.075	0.041	--	P
34	0.069	0.038	0.062	0.034	0.075	0.041	--	P
35	0.268	0.148	0.118	0.065	0.490	0.270	--	P
36	0.107	0.059	0.056	0.031	0.038	0.021	--	P
37	0.179	0.099	0.366	0.202	0.251	0.138	--	P
38	0.059	0.033	0.090	0.050	0.022	0.012	--	P
39	0.056	0.031	0.060	0.033	0.064	0.036	--	P
40	0.027	0.015	0.087	0.048	0.036	0.020	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	61.226	33.789	121.368	66.980	182.093	100.493	--	P
2	0.936	0.517	1.099	0.607	1.262	0.696	--	P
3	1.095	0.604	1.629	0.899	1.902	1.050	--	P
4	0.290	0.160	0.470	0.260	0.666	0.367	--	P
5	1.226	0.677	1.312	0.724	1.358	0.749	--	P
6	0.022	0.012	0.051	0.028	0.074	0.041	--	P
7	0.255	0.141	0.397	0.219	0.503	0.278	--	P
8	0.181	0.100	0.093	0.051	0.054	0.030	--	P
9	0.344	0.190	0.216	0.119	0.207	0.114	--	P
10	0.100	0.055	0.101	0.056	0.117	0.065	--	P
11	0.192	0.106	0.446	0.246	0.436	0.241	--	P
12	0.057	0.031	0.026	0.014	0.074	0.041	--	P
13	0.140	0.078	0.243	0.134	0.398	0.220	--	P
14	0.049	0.027	0.141	0.078	0.087	0.048	--	P
15	0.039	0.022	0.386	0.213	0.338	0.187	--	P
16	0.084	0.046	0.052	0.028	0.075	0.042	--	P
17	0.352	0.194	0.245	0.135	0.136	0.075	--	P
18	0.041	0.022	0.023	0.013	0.015	0.008	--	P
19	0.128	0.071	0.459	0.253	0.324	0.179	--	P
20	0.068	0.038	0.061	0.034	0.046	0.025	--	P
21	0.074	0.041	0.100	0.055	0.175	0.097	--	P
22	0.063	0.035	0.033	0.018	0.024	0.013	--	P
23	0.194	0.107	0.256	0.141	0.321	0.177	--	P
24	0.040	0.022	0.055	0.031	0.048	0.027	--	P
25	0.156	0.086	0.378	0.209	0.594	0.328	--	P
26	0.043	0.024	0.041	0.023	0.062	0.034	--	P
27	0.032	0.018	0.096	0.053	0.033	0.018	--	P
28	0.060	0.033	0.019	0.010	0.041	0.023	--	P
29	0.225	0.124	0.172	0.095	0.400	0.221	--	P
30	0.050	0.028	0.032	0.018	0.057	0.031	--	P
31	0.184	0.101	0.168	0.092	0.452	0.249	--	P
32	0.038	0.021	0.077	0.042	0.059	0.033	--	P
33	0.059	0.032	0.107	0.059	0.054	0.030	--	P
34	0.044	0.024	0.024	0.013	0.060	0.033	--	P
35	0.273	0.151	0.111	0.061	0.457	0.252	--	P
36	0.140	0.077	0.101	0.056	0.034	0.019	--	P
37	0.214	0.118	0.396	0.218	0.215	0.119	--	P
38	0.020	0.011	0.084	0.047	0.018	0.010	--	P
39	0.083	0.046	0.091	0.050	0.056	0.031	--	P
40	0.096	0.053	0.028	0.016	0.049	0.027	--	P

Bbis.3: TABLE: Armoniche di corrente /Harmonics measurement **(full power, 66% and 33% of Pc_{max})** ☐ CEI EN 61000-3-2 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-12 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-3-6	
Ambient temperature (°C) .....:	**-10 °C ± 2 °C**
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Supplementary information: - *Test not applicable to unidirectional generators*	

Harmonics current measured on L1 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.373	32.766	119.553	65.979	181.380	100.099	--	P
2	0.377	0.208	0.318	0.175	0.281	0.155	--	P
3	0.372	0.205	0.224	0.124	0.124	0.069	--	P
4	0.026	0.015	0.136	0.075	0.200	0.110	--	P
5	1.031	0.569	1.218	0.672	1.571	0.867	--	P
6	0.098	0.054	0.132	0.073	0.297	0.164	--	P
7	0.459	0.253	0.413	0.228	0.393	0.217	--	P
8	0.028	0.016	0.033	0.018	0.082	0.045	--	P
9	0.084	0.046	0.132	0.073	0.188	0.104	--	P
10	0.103	0.057	0.048	0.026	0.070	0.039	--	P
11	0.213	0.118	0.114	0.063	0.294	0.162	--	P
12	0.048	0.026	0.118	0.065	0.122	0.068	--	P
13	0.244	0.135	0.436	0.241	0.455	0.251	--	P
14	0.092	0.051	0.022	0.012	0.075	0.042	--	P
15	0.127	0.070	0.025	0.014	0.127	0.070	--	P
16	0.018	0.010	0.120	0.066	0.098	0.054	--	P
17	0.095	0.053	0.496	0.274	0.552	0.305	--	P
18	0.087	0.048	0.032	0.018	0.096	0.053	--	P
19	0.056	0.031	0.180	0.099	0.118	0.065	--	P
20	0.030	0.017	0.062	0.034	0.054	0.030	--	P
21	0.064	0.035	0.200	0.111	0.245	0.135	--	P
22	0.040	0.022	0.034	0.019	0.076	0.042	--	P
23	0.302	0.167	0.152	0.084	0.312	0.172	--	P
24	0.099	0.055	0.070	0.039	0.091	0.050	--	P
25	0.166	0.092	0.289	0.160	0.552	0.305	--	P
26	0.117	0.065	0.041	0.023	0.083	0.046	--	P
27	0.054	0.030	0.034	0.019	0.173	0.096	--	P
28	0.124	0.068	0.047	0.026	0.087	0.048	--	P
29	0.075	0.042	0.052	0.029	0.321	0.177	--	P
30	0.125	0.069	0.082	0.045	0.076	0.042	--	P
31	0.134	0.074	0.067	0.037	0.485	0.267	--	P
32	0.180	0.099	0.127	0.070	0.060	0.033	--	P
33	0.044	0.024	0.059	0.033	0.080	0.044	--	P
34	0.095	0.052	0.075	0.041	0.047	0.026	--	P
35	0.126	0.070	0.109	0.060	0.437	0.241	--	P
36	0.054	0.030	0.080	0.044	0.067	0.037	--	P
37	0.114	0.063	0.161	0.089	0.053	0.029	--	P
38	0.104	0.058	0.092	0.051	0.021	0.011	--	P
39	0.086	0.047	0.064	0.035	0.106	0.058	--	P
40	0.073	0.040	0.012	0.007	0.037	0.020	--	P

Harmonics current measured on L2 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	60.477	33.376	120.192	66.331	180.457	99.590	--	P
2	0.565	0.312	0.662	0.365	0.727	0.401	--	P
3	0.485	0.268	0.529	0.292	0.429	0.237	--	P
4	0.336	0.186	0.282	0.156	0.408	0.225	--	P
5	0.687	0.379	0.920	0.508	1.282	0.708	--	P
6	0.062	0.034	0.042	0.023	0.072	0.040	--	P
7	0.350	0.193	0.339	0.187	0.439	0.242	--	P
8	0.043	0.024	0.036	0.020	0.065	0.036	--	P
9	0.366	0.202	0.332	0.183	0.253	0.140	--	P
10	0.032	0.017	0.021	0.012	0.063	0.035	--	P
11	0.157	0.087	0.077	0.043	0.187	0.103	--	P
12	0.052	0.029	0.019	0.010	0.039	0.021	--	P
13	0.236	0.130	0.478	0.264	0.425	0.235	--	P
14	0.026	0.015	0.081	0.045	0.066	0.036	--	P
15	0.051	0.028	0.175	0.097	0.082	0.045	--	P
16	0.068	0.037	0.047	0.026	0.067	0.037	--	P
17	0.080	0.044	0.499	0.276	0.511	0.282	--	P
18	0.087	0.048	0.047	0.026	0.036	0.020	--	P
19	0.101	0.056	0.215	0.119	0.183	0.101	--	P
20	0.038	0.021	0.104	0.057	0.062	0.034	--	P
21	0.061	0.034	0.134	0.074	0.169	0.093	--	P
22	0.060	0.033	0.030	0.017	0.080	0.044	--	P
23	0.297	0.164	0.144	0.079	0.309	0.170	--	P
24	0.068	0.037	0.086	0.047	0.108	0.060	--	P
25	0.143	0.079	0.251	0.139	0.444	0.245	--	P
26	0.107	0.059	0.025	0.014	0.059	0.033	--	P
27	0.101	0.055	0.049	0.027	0.126	0.070	--	P
28	0.032	0.018	0.064	0.035	0.057	0.032	--	P
29	0.128	0.071	0.090	0.050	0.366	0.202	--	P
30	0.070	0.039	0.066	0.036	0.057	0.032	--	P
31	0.122	0.068	0.122	0.068	0.420	0.232	--	P
32	0.097	0.053	0.069	0.038	0.068	0.037	--	P
33	0.022	0.012	0.026	0.015	0.065	0.036	--	P
34	0.071	0.039	0.083	0.046	0.025	0.014	--	P
35	0.086	0.047	0.164	0.090	0.469	0.259	--	P
36	0.040	0.022	0.080	0.044	0.034	0.019	--	P
37	0.194	0.107	0.148	0.082	0.051	0.028	--	P
38	0.066	0.037	0.070	0.039	0.039	0.021	--	P
39	0.014	0.008	0.044	0.024	0.111	0.061	--	P
40	0.067	0.037	0.030	0.017	0.027	0.015	--	P

Harmonics current measured on L3 phase								
	33%		66%		100%			
Order [h]	I [A]	I/In [%]	I [A]	I/In [%]	I [A]	I/In [%]	Limits [A]	Results
1	59.372	32.766	119.552	65.978	181.372	100.095	--	P
2	0.805	0.444	0.683	0.377	0.665	0.367	--	P
3	0.918	0.507	0.705	0.389	0.608	0.335	--	P
4	0.412	0.227	0.528	0.292	0.721	0.398	--	P
5	0.972	0.537	1.124	0.621	1.436	0.793	--	P
6	0.135	0.074	0.156	0.086	0.210	0.116	--	P
7	0.443	0.245	0.376	0.208	0.413	0.228	--	P
8	0.114	0.063	0.131	0.073	0.109	0.060	--	P
9	0.227	0.125	0.074	0.041	0.138	0.076	--	P
10	0.115	0.063	0.071	0.039	0.084	0.046	--	P
11	0.086	0.047	0.124	0.068	0.132	0.073	--	P
12	0.092	0.051	0.048	0.027	0.058	0.032	--	P
13	0.225	0.124	0.385	0.212	0.393	0.217	--	P
14	0.033	0.018	0.022	0.012	0.037	0.020	--	P
15	0.050	0.028	0.090	0.050	0.058	0.032	--	P
16	0.047	0.026	0.055	0.030	0.031	0.017	--	P
17	0.042	0.023	0.470	0.259	0.544	0.300	--	P
18	0.096	0.053	0.069	0.038	0.051	0.028	--	P
19	0.088	0.049	0.155	0.086	0.120	0.066	--	P
20	0.037	0.021	0.087	0.048	0.054	0.030	--	P
21	0.018	0.010	0.176	0.097	0.190	0.105	--	P
22	0.048	0.027	0.020	0.011	0.050	0.028	--	P
23	0.284	0.157	0.068	0.038	0.292	0.161	--	P
24	0.112	0.062	0.072	0.040	0.084	0.046	--	P
25	0.164	0.090	0.255	0.141	0.507	0.280	--	P
26	0.057	0.031	0.014	0.008	0.043	0.024	--	P
27	0.121	0.067	0.035	0.019	0.109	0.060	--	P
28	0.100	0.055	0.038	0.021	0.039	0.022	--	P
29	0.076	0.042	0.075	0.041	0.304	0.168	--	P
30	0.059	0.033	0.073	0.040	0.093	0.051	--	P
31	0.143	0.079	0.132	0.073	0.462	0.255	--	P
32	0.124	0.069	0.062	0.034	0.041	0.023	--	P
33	0.069	0.038	0.048	0.026	0.103	0.057	--	P
34	0.029	0.016	0.033	0.018	0.028	0.015	--	P
35	0.103	0.057	0.215	0.119	0.413	0.228	--	P
36	0.084	0.046	0.101	0.055	0.100	0.055	--	P
37	0.193	0.107	0.174	0.096	0.094	0.052	--	P
38	0.097	0.053	0.051	0.028	0.057	0.031	--	P
39	0.035	0.019	0.120	0.066	0.107	0.059	--	P
40	0.054	0.030	0.021	0.011	0.052	0.029	--	P

Bbis.3: TABLE: Fluttuazioni di tensione /Flicker measurement **(full power, 66% and 33% of Ps_{max})** ☐ CEI EN 61000-3-3 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-11 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-4-15	
Ambient temperature (°C) .....:	**25 °C ± 5 °C**
Humidity (RH %) .....:	65% ± 10% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Supplementary information:	

100% PS_{max}	L1	L2	L3	Limit
Pst	0.112	0.092	0.097	1.00
Plt	0.111	0.094	0.099	0.65
dc [%]	0.000	0.206	0.195	3.30
dmax [%]	0.000	0.821	0.769	6.00
dt [s]	0.000	0.000	0.000	0.50

66% PS_{max}	L1	L2	L3	Limit
Pst	0.102	0.110	0.115	1.00
Plt	0.098	0.102	0.113	0.65
dc [%]	0.000	0.172	0.238	3.30
dmax [%]	0.000	0.731	0.503	6.00
dt [s]	0.000	0.000	0.000	0.50

33% PS_{max}	L1	L2	L3	Limit
Pst	0.098	0.104	0.116	1.00
Plt	0.097	0.108	0.114	0.65
dc [%]	0.000	0.154	0.193	3.30
dmax [%]	0.000	0.813	0.725	6.00
dt [s]	0.000	0.000	0.000	0.50

Bbis.3: TABLE: Fluttuazioni di tensione /Flicker measurement **(full power, 66% and 33% of Pc_{max})** ☐ CEI EN 61000-3-3 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-11 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-4-15	
Ambient temperature (°C) .....:	**25 °C ± 5 °C**
Humidity (RH %) .....:	65% ± 10% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Supplementary information: - *Test not applicable to unidirectional generators*	

100% PC_{max}	L1	L2	L3	Limit
Pst	0.109	0.099	0.105	1.00
Plt	0.107	0.097	0.106	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

66% PC_{max}	L1	L2	L3	Limit
Pst	0.106	0.095	0.109	1.00
Plt	0.106	0.096	0.111	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

33% PC_{max}	L1	L2	L3	Limit
Pst	0.117	0.101	0.110	1.00
Plt	0.119	0.166	0.108	0.65
dc [%]	0.152	0.223	0.095	3.30
dmax [%]	0.693	0.724	0.726	6.00
dt [s]	0.000	0.000	0.000	0.50

Bbis.3: TABLE: Fluttuazioni di tensione /Flicker measurement **(full power, 66% and 33% of Ps_{max})** ☐ CEI EN 61000-3-3 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-11 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-4-15	
Ambient temperature (°C) ..... :	**+55 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	

100% PS_{max}	L1	L2	L3	Limit
Pst	0.112	0.096	0.099	1.00
Plt	0.111	0.096	0.105	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

66% PS_{max}	L1	L2	L3	Limit
Pst	0.105	0.104	0.117	1.00
Plt	0.100	0.104	0.115	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

33% PS_{max}	L1	L2	L3	Limit
Pst	0.100	0.110	0.118	1.00
Plt	0.099	0.113	0.117	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

Bbis.3: TABLE: Fluttuazioni di tensione /Flicker measurement **(full power, 66% and 33% of Pc_{max})** ☐ CEI EN 61000-3-3 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-11 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-4-15	
Ambient temperature (°C) ..... :	**+55 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	
Operator ..... :	See cover page
Supervisor ..... :	See cover page
Test Date..... :	See cover page

100% PC_{max}	L1	L2	L3	Limit
Pst	0.111	0.099	0.106	1.00
Plt	0.108	0.098	0.107	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

66% PC_{max}	L1	L2	L3	Limit
Pst	0.111	0.101	0.114	1.00
Plt	0.106	0.099	0.113	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

33% PC_{max}	L1	L2	L3	Limit
Pst	0.119	0.105	0.115	1.00
Plt	0.121	0.102	0.113	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

Bbis.3: TABLE: Fluttuazioni di tensione /Flicker measurement **(full power, 66% and 33% of Ps_{max})** ☐ CEI EN 61000-3-3 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-11 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-4-15	
Ambient temperature (°C) ..... :	**-10 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	

100% PS_{max}	L1	L2	L3	Limit
Pst	0.112	0.100	0.107	1.00
Plt	0.109	0.099	0.108	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

66% PS_{max}	L1	L2	L3	Limit
Pst	0.103	0.102	0.116	1.00
Plt	0.103	0.101	0.118	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

33% PS_{max}	L1	L2	L3	Limit
Pst	0.098	0.115	0.116	1.00
Plt	0.100	0.116	0.119	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

Bbis.3: TABLE: Fluttuazioni di tensione /Flicker measurement **(full power, 66% and 33% of $P_{C_{max}}$)** ☐ CEI EN 61000-3-3 (I_{rated} ≤ 16 A single-phase) ☐ CEI EN 61000-3-11 (16A < I_{rated} ≤ 75A single-phase) ☒ IEC 61400-21 & IEC 61000-4-15	
Ambient temperature (°C) ..... :	**-10 °C ± 2 °C**
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information:	

100% PC_{max}	L1	L2	L3	Limit
Pst	0.110	0.100	0.109	1.00
Plt	0.111	0.100	0.106	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

66% PC_{max}	L1	L2	L3	Limit
Pst	0.104	0.103	0.115	1.00
Plt	0.107	0.100	0.114	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

33% PC_{max}	L1	L2	L3	Limit
Pst	0.116	0.105	0.104	1.00
Plt	0.122	0.107	0.108	0.65
dc [%]	0.000	0.000	0.000	3.30
dmax [%]	0.000	0.000	0.000	6.00
dt [s]	0.000	0.000	0.000	0.50

Bbis.4	**TABLE: Verifica del campo di funzionamento in tensione e frequenza** *// Check the operating range in voltage and frequency*
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Supplementary information:	
Operator .....:	See cover page
Supervisor .....:	See cover page
Test Date.....:	See cover page

Test Point	Range of operation	Pout [W]	Cosφ	Test time [s]	Limit [%]	Result
Test 1	85% U_n – 47.5Hz	100% Ps_{max} (o P_{NINV})	1.00	at least 300	±5% Sn	No Disconnection
Test 2	110% U_n - 51.5Hz	100% Ps_{max} (o P_{NINV})	1.00	at least 300	±5% Sn	No Disconnection
Test 3	85% U_n – 47.5Hz	100% Pc_{max}	1.00	at least 300	±5% Sn	No Disconnection
Test 4	110% U_n - 51.5Hz	100% Pc_{max}	1.00	at least 300	±5% Sn	No Disconnection

Grafico Test 1: 110% U_n - 51.5Hz / 100%Ps_{max}

/ Graph Test 1: 110% Un - 51.5Hz

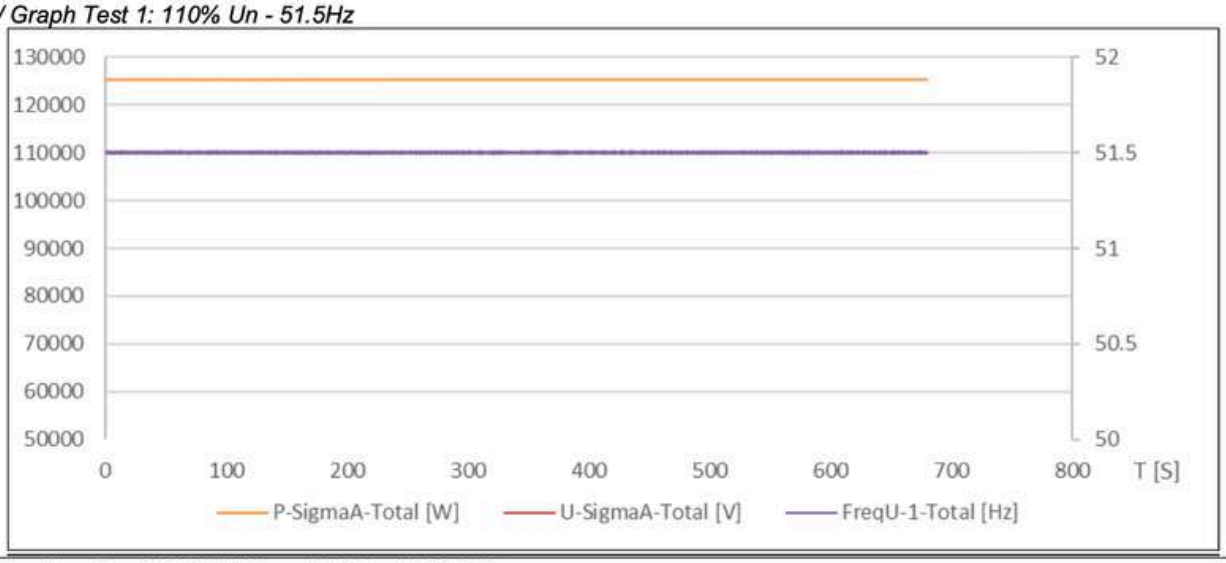


Grafico Test 2: 85% U_n – 47.5Hz / 100%Ps_{max}

/ Graph Test 2: 85% Un – 47.5Hz

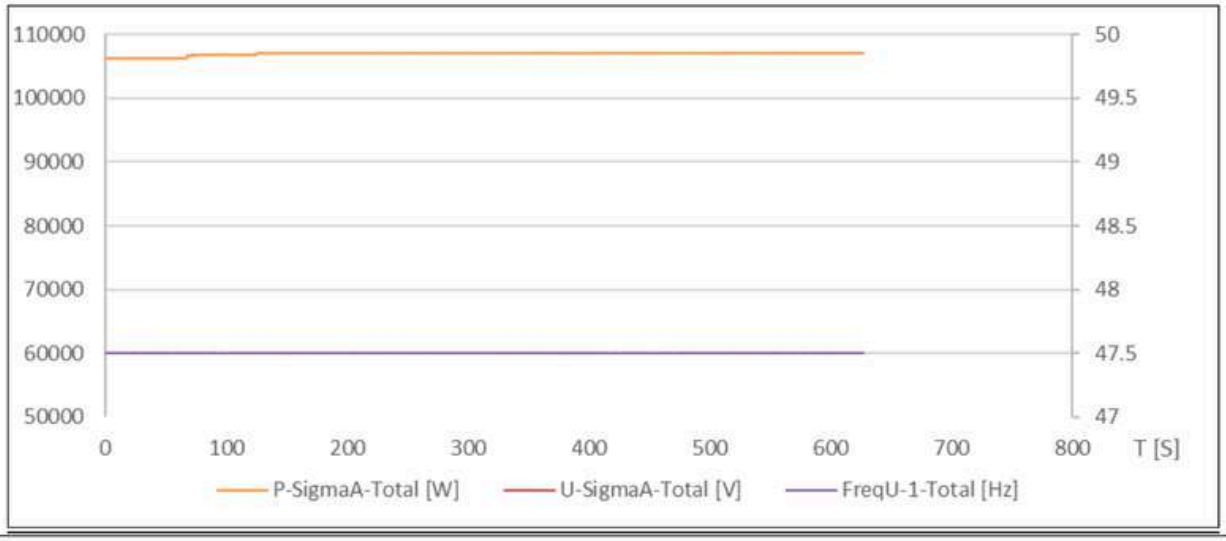


Grafico Test 3: 110% U_n - 51.5Hz / 100%Pc_{max}

/ Graph Test 1: 110% Un - 51.5Hz

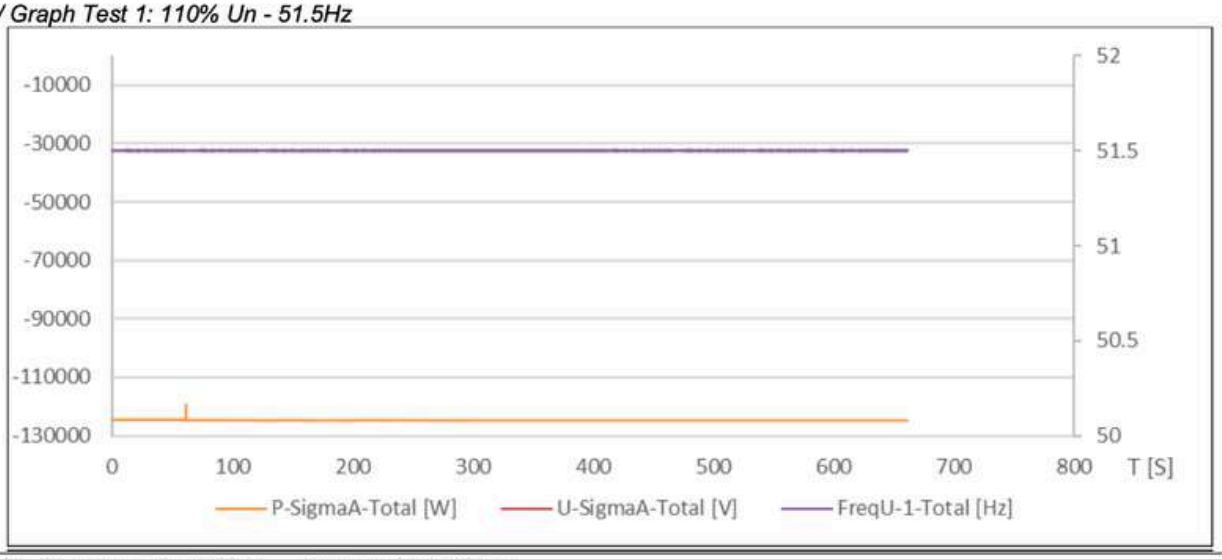
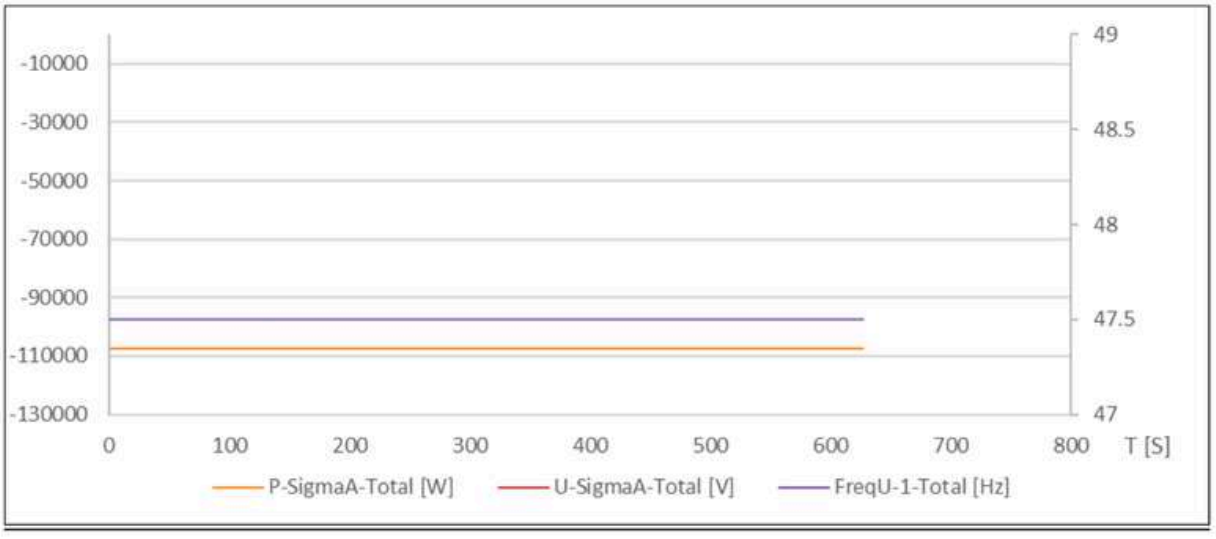


Grafico Test 4: 85% U_n – 47.5Hz / 100%Pc_{max}

/ Graph Test 4: 85% Un – 47.5Hz

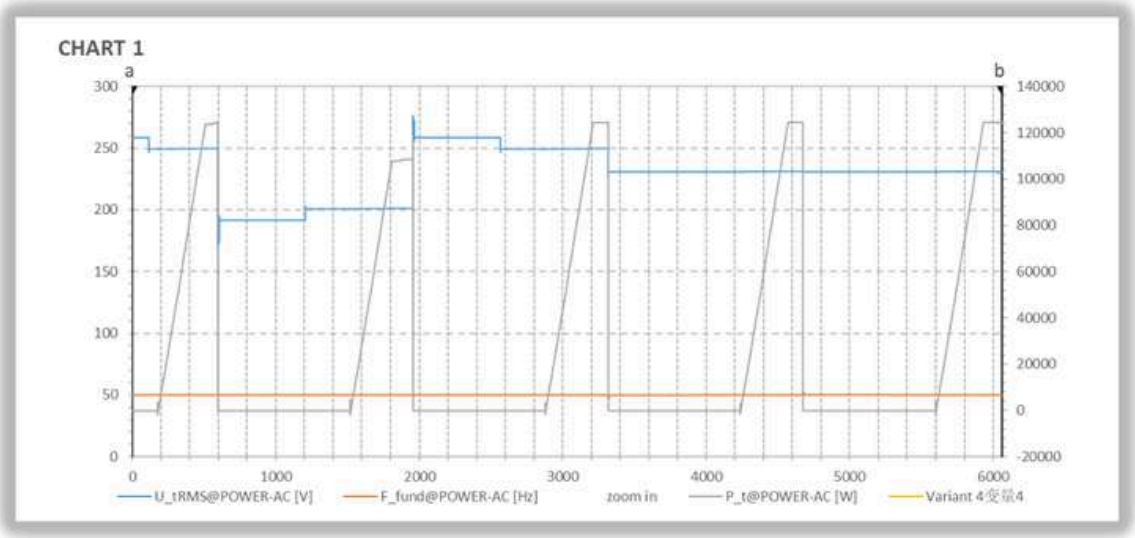


8.4.1.3 **Par. a) & b)** **Bbis.5.1** **Bbis.5.2**	**TABLE: Verifica delle condizioni di connessione e riconnessione** ***/ Check of the connection and re-connection conditions*** **TABLE: Verifica della erogazione graduale della potenza attiva** ***/ Check of the gradual increase of the power production***	
Ambient temperature (°C) ..... :		25 °C ± 5 °C
Humidity (RH %) ..... :		65% ± 5% RH
Instrumentation list ..... :		See table "Measurement equipment and instrumentation"
Uncertainty ..... :		See table
Supplementary information:		

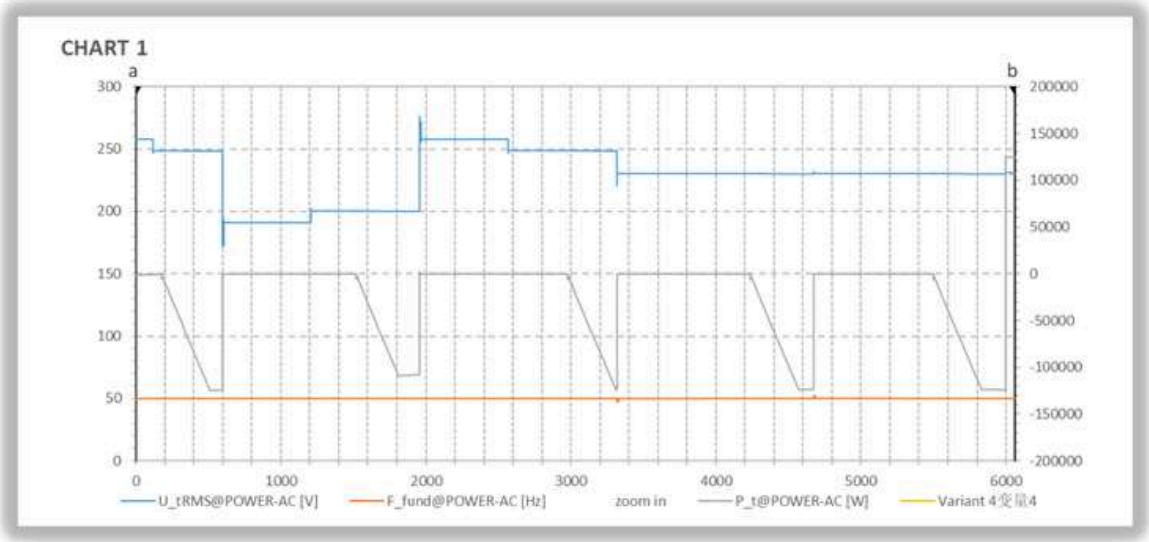
Voltage [Vac]	Voltage Condition [Vac]	Frequency [Hz]	Frequency condition [Hz]	Output Power [W]	Rec. Time [sec]	Ramp Time [sec]	Ramp gradient [%Pn/s]	Acceptability criteria	Note
1.12Un	V < 85% or V > 110%	50	49.9Hz < f < 50.1Hz	---	---	---	---	no connection after 30s	First connection
1.08Un	85%< V <110%	50	49.9Hz < f < 50.1Hz	124607	142	330	0.30	Connection Delay for Reconnection ≥30 s Ramp ratio P < 0.333 % Pn/s	Connection to grid (no after fault of the grid- ex. First connection) **Ref. a) 8.4.1.3**
0.83Un	V < 85%	50	49.9Hz < f < 50.1Hz	---	---	---	---	no connection after 300 s	UV **Ref. b) 8.4.1.3**
0.87Un	85%< V <110%	50	49.9Hz < f < 50.1Hz	105706	310	300	0.28	Connection Delay for Reconnection ≥300 s Ramp ratio P < 0.333 % Pn/s	Reconnection after fault recovery **Ref. b) 8.4.1.3**
1.12Un	V > 110%	50	49.9Hz < f < 50.1Hz	---	---	---	---	no connection after 300 s	OV **Ref. b) 8.4.1.3**
1.08Un	85%< V <110%	50	49.9Hz < f < 50.1Hz	124890	330	329	0.30	Connection Delay for Reconnection ≥300 s Ramp ratio P < 0.333 % Pn/s	Reconnection after fault recovery **Ref. b) 8.4.1.3**
Un	85%< V <110%	48.85	f < 47.5Hz	---	---	---	---	no connection after 300 s	UF **Ref. b) 8.4.1.3**
Un	85%< V <110%	49.95	49.9Hz < f < 50.1Hz	125200	318	326	0.30	Connection Delay for Reconnection ≥300 s Ramp ratio P < 0.333 % Pn/s	Reconnection after fault recovery **Ref. b) 8.4.1.3**
Un	85%< V <110%	50.15	f > 51.1Hz	---	---	---	---	no connection after 300 s	OF **Ref. b) 8.4.1.3**
Un	85%< V <110%	50.05	49.9Hz < f < 50.1Hz	124600	313	332	0.30	Connection Delay for Reconnection ≥300 s Ramp ratio P < 0.333 % Pn/s	Reconnection after fault recovery **Ref. b) 8.4.1.3**

Grafico Bbis.5.2: Verifica della erogazione graduale della Potenza attiva
/ Graph Bbis.5.2: *Check of the gradual increase of the power production*

Test in discharging mode (Ps_{max})



Test in charging mode (Pc_{max})



8.4.4.2 Bbis.6.1	TABLE: check of the constructive requirements: reactive power production capability
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Max. cosφ declared.....:	☐ cosφ: 0.9 → Pout ≤ 11.08 KW (triangular) ☒ Q/Pn% = 48.43% →Pout > 11.08 KW (rectangular)

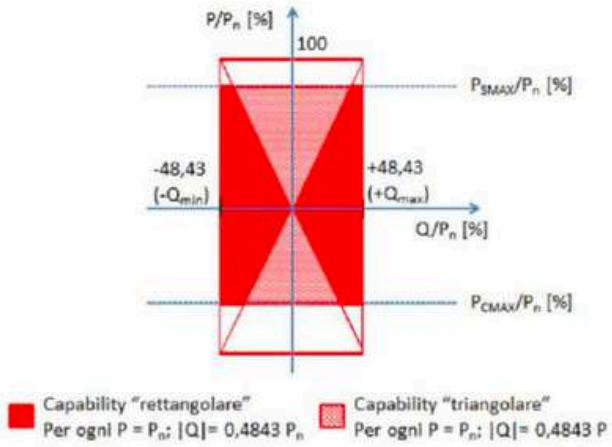


Figura 3Bbis – Capability per un sistema di accumulo con inverter bidirezionale.

Supplementary information:

For each of the 10 levels of active power, 1 value of inductive reactive power and 1 value of conductive reactive power shall be registered as average values in 1 min, based on the measurements at the fundamental in a window of 200ms.

TABLE: Reactive power production with set point Q = 0								
Power Step	Active Power		Reactive Power		Power Factor	Deviation	Target value	Limit
	[W]	[%Sn]	[VAr]	[%Sn]	Cosφ	ΔQ/Sn[%]	Q/Sn[%]	ΔQ/Sn
90% - 100% Ps_{max}	124317	99.5	246.0912	0.002	1.00	0.002	0	<±5%
70% - 80% Ps_{max}	99807	79.8	55.98046	0.000	1.00	0.000	0	<±5%
50% - 60% Ps_{max}	75952	60.8	43.0424	0.000	1.00	0.000	0	<±5%
30% - 40% Ps_{max}	50479	40.4	15.8946	0.000	1.00	0.000	0	<±5%
10% - 20% Ps_{max}	25879	20.7	-98.5046	-0.001	1.00	-0.001	0	<±10%
10% - 20% Pc_{max}	-25583	-20.5	-54.2855	0.000	1.00	0.000	0	<±10%
30% - 40% Pc_{max}	-50240	-40.2	-158.48	-0.009	1.00	-0.009	0	<±5%
50% - 60% Pc_{max}	-75572	-60.5	61.38192	0.000	1.00	0.000	0	<±5%
70% - 80% Pc_{max}	-100233	-80.2	-143.762	-0.001	1.00	-0.001	0	<±5%
90% - 100% Pc_{max}	-124922	-99.9	-449.185	-0.004	1.00	-0.004	0	<±5%

TABLE: Reactive power adsorbed with set point Q = Qmin								
Power Step	Active Power		Reactive Power		Power Factor	Deviation	Target value	Limit
	[W]	[%Sn]	[VAr]	[%Sn]	Cosφ	ΔQ/Sn	Q/Sn[%]	ΔQ/Sn
90% - 100% Ps_{max}	4797	3.8	-125171	-100.1	-0.034	0.1	-100	<±5%
70% - 80% Ps_{max}	3783	3.0	-125201	-100.2	-0.034	0.2	-100	<±5%
50% - 60% Ps_{max}	2878	2.3	-125262	-100.2	-0.032	0.2	-100	<±5%
30% - 40% Ps_{max}	3779	3.0	-125223	-100.2	-0.034	0.2	-100	<±5%
10% - 20% Ps_{max}	3783	3.0	-125020	-100.0	-0.034	0	-100	<±5%
10% - 20% Pc_{max}	-4270	-3.4	-125151	-100.1	-0.034	0.1	-100	<±5%
30% - 40% Pc_{max}	-4365	-3.5	-125173	-100.1	-0.034	0.1	-100	<±5%
50% - 60% Pc_{max}	-5112	-4.1	-125199	-100.2	-0.033	0.2	-100	<±5%
70% - 80% Pc_{max}	-4276	-3.4	-125150	-100.1	-0.034	0.1	-100	<±5%
90% - 100% Pc_{max}	-4273	-3.4	-125149	-100.1	-0.034	0.1	-100	<±5%

TABLE: Reactive power produced with set point Q = Qmax								
Power Step	Active Power		Reactive Power		Power Factor	Deviation	Target value	Limit
	[W]	[%Sn]	[VAr]	[%Sn]	Cosφ	ΔQ/Sn[%]	Q/Sn[%]	ΔQ/Sn
90% - 100% Ps_{max}	3185	2.5	125350	100.3	0.025	0.3	100	<±5%
70% - 80% Ps_{max}	2320	1.9	125315	100.3	0.017	0.3	100	<±5%
50% - 60% Ps_{max}	3186	2.5	125350	100.3	0.025	0.3	100	<±5%
30% - 40% Ps_{max}	3184	2.5	125357	100.3	0.025	0.3	100	<±5%
10% - 20% Ps_{max}	3182	2.5	125360	100.3	0.025	0.3	100	<±5%
10% - 20% Pc_{max}	-5861	-4.7	125343	100.3	-0.047	0.3	100	<±5%
30% - 40% Pc_{max}	-5858	-4.7	125339	100.3	-0.047	0.3	100	<±5%
50% - 60% Pc_{max}	-5859	-4.7	125349	100.3	-0.047	0.3	100	<±5%
70% - 80% Pc_{max}	-6711	-5.4	125309	100.2	-0.0	0.2	100	<±5%
90% - 100% Pc_{max}	-5959	-4.8	125306	100.2	-0.047	0.2	100	<±5%

Bbis.6.3	TABLE: reactive power production according to an assigned level Required for inverter used in plant > 11.08KW (applicable for inverter with Pnom < 11.08 KW as well)
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Max. cosφ declared.....: SET-POINT	☐ cosφ: 0.9 → Pout ≤ 11.08 KW ☒ Q/Pn% = 48.43% →Pout > 11.08 KW
Supplementary information: - Output power during test set at 50%Pn (power level set by DC simulator). - Maintain each set point at least 60 s. - Calculate the average values in 1 min, based on measurements at the fundamental frequency in a window of 200ms.	
Operator .....:	See cover page
Supervisor .....:	See cover page
Test Date.....:	See cover page

Tabella Bbis.6.3: Misura dell' accuratezza della regolazione della potenza reattiva in base ad un comando esterno

/ Tabella Bbis.6.3 : reactive power production according to an assigned level

Output Power [%]	Set point Q/Sn [%]	Output Power measured [W]	Reactive Power measured [Var]	Deviation ΔQ/Sn [%]	ΔQ Limit [%]	RESULT
50% PS_{MAX}	40.0 %	62590	50850	0.68	≤ 5% Sn	PASS
50% PC_{MAX}	40.0 %	-61894	50727	0.58	≤ 5% Sn	PASS

Bbis.6.5	**TABLE: Tempo di risposta ad una variazione a gradino del livello assegnato** ***/ Reaction time after a step variation of the assigned level.*** **Required for inverter used in plant > 11.08KW** **(applicable for inverter with Pnom < 11.08 KW as well)**
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Max. cosφ declared.....:	☐ cosφ: 0.9 → Pout ≤ 11.08 KW ☒ Q/Pn% = 48.43% →Pout > 11.08 KW

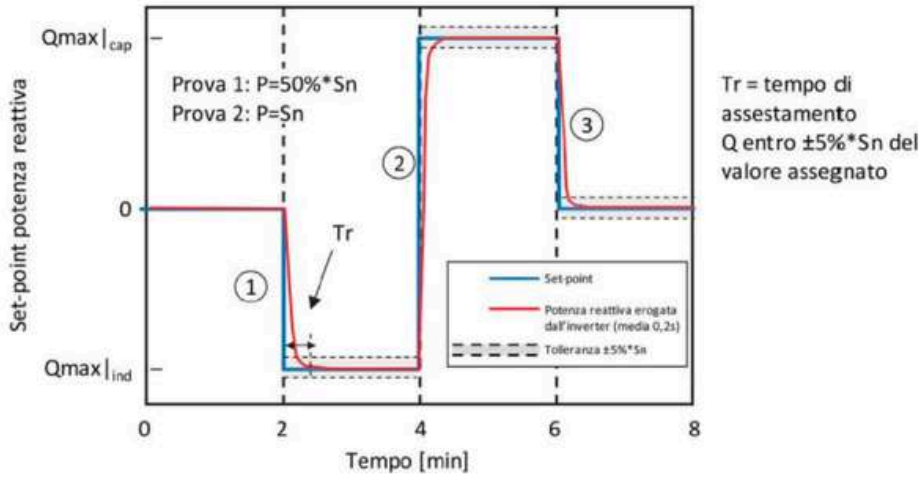


Figura 6Bbis – Misura del tempo di risposta a variazioni a gradino del set-point assegnato per la potenza reattiva

Supplementary information:

- Measurements performed with output power set at 50%Pnom and 100%Pnom
- Sample rate: at least 200ms.

Tabella Bbis.6.5 : Misura del tempo di risposta a variazioni a gradino del set-point assegnato per la potenza reattiva

/ Table: Reaction time after a step variation of the assigned level

Test 1 : 100% output power						
Step	Output Power [W]	transient	Output Voltage [V]	Reactive Power [Var]	Tr [s]	Limit [s]
1	99266	**0 → -Qmin**	229.98	-74046	7.4	10
2	98807	**-Qmin→ +Qmax**	231.04	75264	8.4	10
3	123517	**+Qmax → 0**	230.57	115	8.0	10
Test 2 : 50% output power						
Step	Output Power [W]	transient	Output Voltage [V]	Reactive Power [Var]	Tr [s]	Limit [s]
1	62982	**0 → -Qmin**	228.58	-74875	9.2	10
2	61371	**-Qmin→ +Qmax**	231.71	74920	9.6	10
3	62244	**+Qmax → 0**	230.18	1281	9.4	10
Descrizione del metodo di controllo adottato */ description of control method used:*						

Grafico: Tempo di risposta ad una variazione a gradino del livello assegnato (Test 1 – 100% Pn).

/Graph of the reaction time after a step variation of the assigned level (Test 1 - 100%).

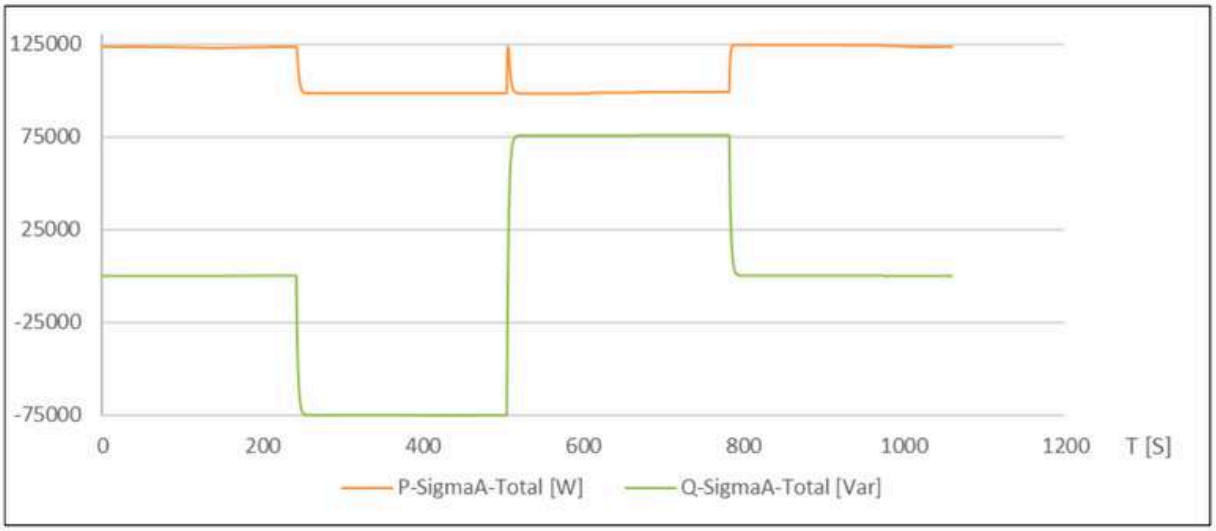
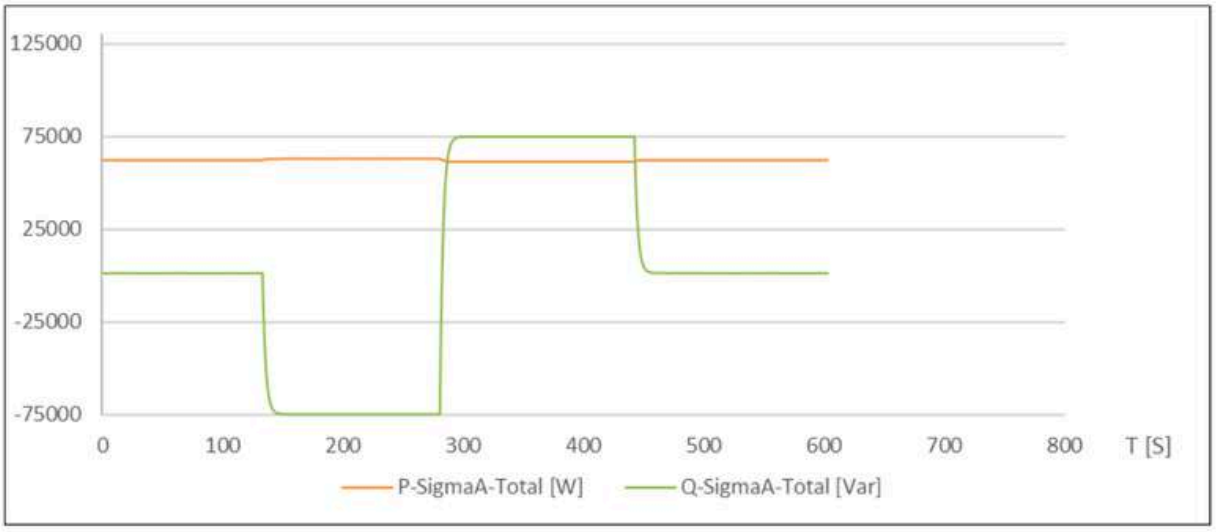
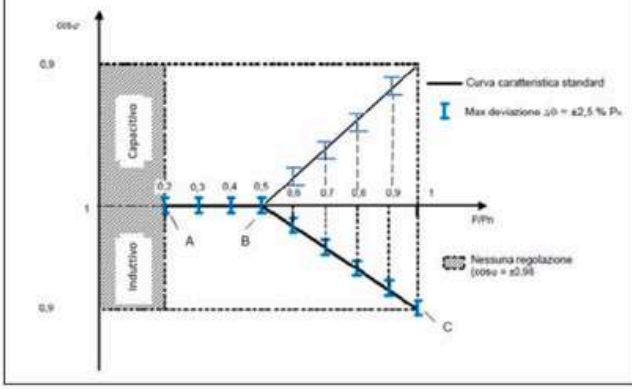
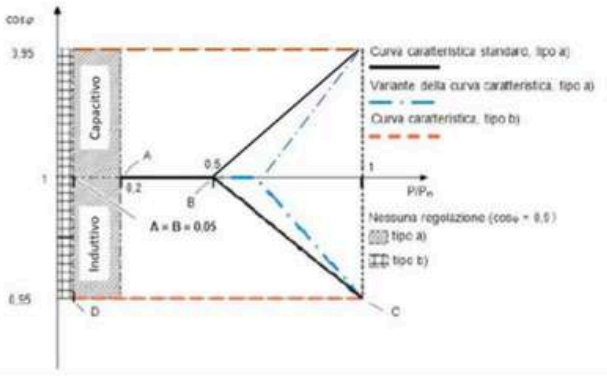


Grafico: Tempo di risposta ad una variazione a gradino del livello assegnato (Test 2 – 50% Pn).

/ Graph of the reaction time after a step variation of the assigned level (Test 2 – 50%).



Bbis.6.6 *Annex E* **E.2**	**TABLE: Erogazione automatica di potenza reattiva secondo una curva caratteristica cosφ= f(P)** ***/ Automatic production of reactive power according to a characteristic curve cosφ= f(P)***
Ambient temperature (°C) ..... :	25 °C ± 5 °C
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Max. cosφ declared..... :	☐ cosφ: 0.9 → Pout ≤ 11.08 KW ☒ Q/Pn% = 48.43% →Pout > 11.08 KW
Set value..... :	Lock-in: 1.05 Vn (Induttivo) *(Vn and 1.1 Vn with steps of 0.01)* Lock-out: 230 V or 50%PS_{max} *(0.9 Vn and Vn with steps of 0.01)* Lock-in: 0.95 Vn (Capacitivo) *(0.9 Vn and Vn with steps of 0.01)* Lock-out: 230 V or 50%PS_{max} *(Vn and 1.1 Vn with steps of 0.01)*
	

Supplementary information:

- Function must be anable by a local command of the converter.
- Each value must be reach in < 10s.
- Describe the Lock-in value defined by the manufacturer

Tabella Bbis.7: Erogazione automatica di potenza reattiva secondo una curva caratteristica cosφ= f(P)

/ Table Bbis.7: *cosφ= f(P)*

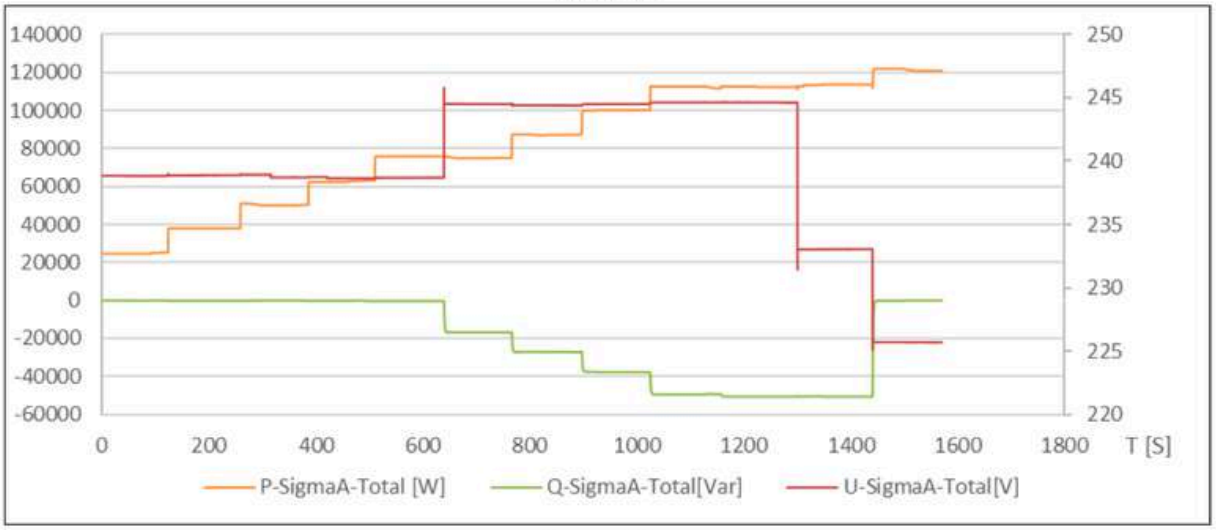
Induttivo								
P/Pn [%]	P [W]	Vout [V]	Q [Var]	Cosφ measured	Cosφ Set-point	ΔQ/Pn	Limit ΔQ/Pn	RESULT
20	25263	239.24	1116	0.9999	1.00	0.89%	± 2.5% Pn	P
30	37961	239.29	958	0.9999	1.00	0.77%	± 2.5% Pn	P
40	50625	239.34	804	1.0000	1.00	0.64%	± 2.5% Pn	P
50	63336	239.40	675	1.0000	1.00	0.54%	± 2.5% Pn	P
60	75992	239.45	533	1.0000	1.00	0.43%	± 2.5% Pn	P
60	76213	244.04	-14852	0.9802	0.98	0.50%	± 2.5% Pn	P
70	89082	244.08	-25463	0.9601	0.96	0.42%	± 2.5% Pn	P
80	99334	244.13	-34311	0.9400	0.94	1.39%	± 2.5% Pn	P
90	113399	244.17	-47288	0.9209	0.92	0.82%	± 2.5% Pn	P
100	116810	244.19	-50650	0.9154	0.90*	4.74%	± 2.5% Pn	P
100	116990	232.72	-50771	0.9153	0.90*	4.71%	± 2.5% Pn	P
100	123455	225.89	-267	1.0000	1.00	-0.21%	± 2.5% Pn	P
Note*:Reduced reactive power output is permitted for the reason that the apparent power is limited.								

Capacitivo								
P/Pn [%]	P [W]	Vout [V]	Q [Var]	Cosφ measured	Cosφ Set-point	ΔQ/Pn	Limit ΔQ/Pn	RESULT
20	25588	220.86	-979	0.9998	1.00	-0.78%	± 2.5% Pn	P
30	38298	220.91	-1183	0.9999	1.00	-0.95%	± 2.5% Pn	P
40	51121	220.97	-1346	0.9999	1.00	-1.08%	± 2.5% Pn	P
50	63694	221.02	-1466	1.0000	1.00	-1.17%	± 2.5% Pn	P
60	75171	221.07	-1600	1.0000	1.00	-1.28%	± 2.5% Pn	P
60	74976	216.49	12856	0.9817	0.98	-1.89%	± 2.5% Pn	P
70	87528	216.55	23209	0.9617	0.96	-1.86%	± 2.5% Pn	P
80	100021	216.60	33965	0.9424	0.94	-1.87%	± 2.5% Pn	P
90	115382	216.66	48613	0.9225	0.92	-0.43%	± 2.5% Pn	P
100	115411	216.68	48638	0.9184	0.90*	-5.81%	± 2.5% Pn	P
100	115365	228.14	48759	0.9183	0.90*	-5.69%	± 2.5% Pn	P
100	123626	235.06	-2133	1.0000	1	-1.71%	± 2.5% Pn	P
Note*:Reduced reactive power output is permitted for the reason that the apparent power is limited.								

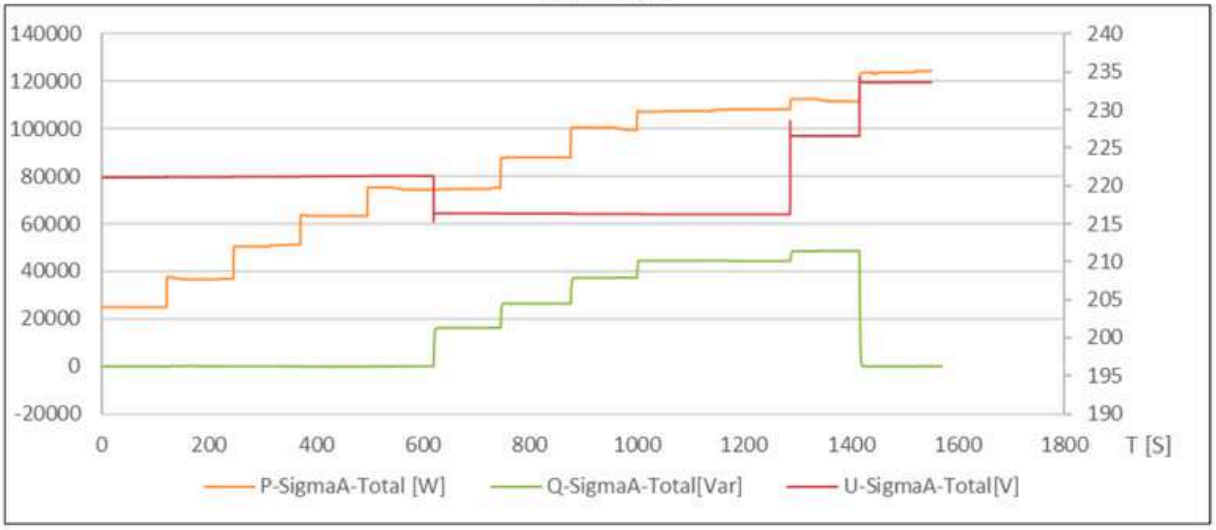
Grafico: Erogazione automatica di potenza reattiva secondo una curva caratteristica cosφ= f(P)

/ Graph: Reactive power production according to a characteristic curve cos(phi) = f(P)

Induttivo



Capacitivo



Bbis.6.8 *Annex E* **E.2.1**	**TABLE: Erogazione automatica di potenza reattiva secondo una curva caratteristica Q=f(V)** ***/ Automatic reactive power production according to a characteristic curve Q=f(V)*** **Required for inverter used in plant > 11.08KW**
Ambient temperature (°C) ..... :	25 °C ± 5 °C
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Set value..... :	Lock-in: 0.2*PS_{max} (or 0.2*P_{NINV}) and 0.2*PC_{max} Lock-out: 0.05*PS_{max}
Activation settings..... :	Activation of the protection with a delay from 0 to 30 s with step of 1 s (Default setting: 3 s)

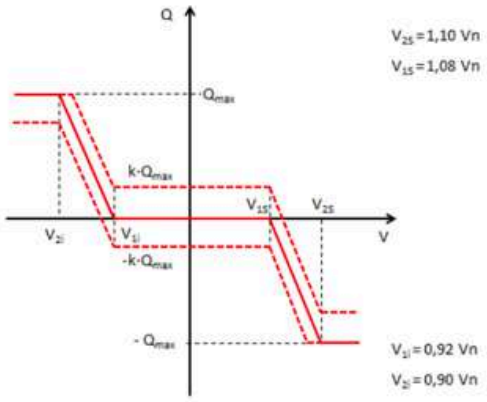


Figura 39 – Curve caratteristiche standard Q = f(V) [87]

Default settings:	V/Vn	Q/Pn%
V2i	0.90	Q_{MAX}
V1i	0.92	0.00%
V1s	1.08	0.00%
V2s	1.10	Q_{MIN}

Supplementary information:

The setting of k = 0 ÷ 1 with steps of 0.01

The setting of Q(V) function is enabled by a local command of the inverter.

Parametri definiti dal costruttore:
/ Parameters defined by the customer

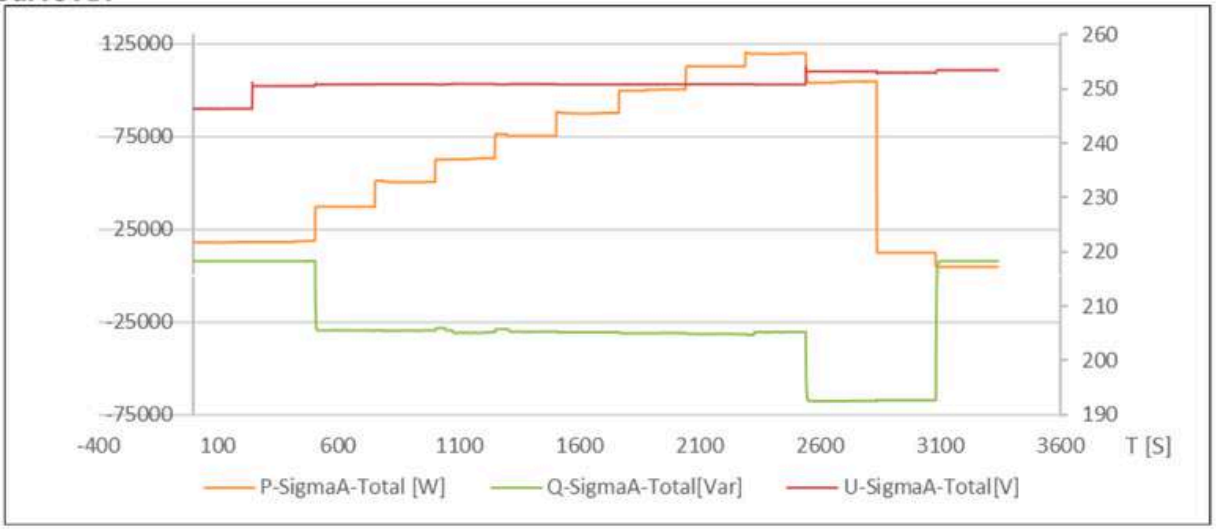
Discharge mode: Ps_{max}	k=0.1	V_{1s} = 1.08%Vn	V_{2s} = 1.1%Vn	Table A.1
		V_{1i} = 0.92%Vn	V_{2i} = 0.9%Vn	Table A.2
Discharge mode: Ps_{max}	k= - 0.1	V_{1s} = 1.08%Vn	V_{2s} = 1.1%Vn	Table A.3
		V_{1i} = 0.92%Vn	V_{2i} = 0.9%Vn	Table A.4
Charge mode: Pc_{max}	k=0.1	V_{1s} = 1.08%Vn	V_{2s} = 1.1%Vn	Table B.1
		V_{1i} = 0.92%Vn	V_{2i} = 0.9%Vn	Table B.2
Charge mode: Pc_{max}	k= - 0.1	V_{1s} = 1.08%Vn	V_{2s} = 1.1%Vn	Table B.3
		V_{1i} = 0.92%Vn	V_{2i} = 0.9%Vn	Table B.4

Table A.1: Discharge mode with k=0.1

Set Point		Measure			Q/Sn[%] expected	Δ Q %	LIMITS	RESULT
P/Ps_{max} [%]	V/Vn	P/Ps_{max} [%]	Vout [V]	Q [Var]				
<20%	1.07	14.30	246.35	7739	≈k Q_{max} (< ± 5 % Sn)	0.2	≤ ± 5% Sn	P
<20%	1.09	14.49	250.83	7788	≈k Q_{max} (< ± 5 % Sn)	0.2	≤ ± 5% Sn	P
<20 % → 30 %	1.09	29.72	250.86	-29565	-0.4 Q_{max} (< 10 sec)	0.3	≤ ± 5% Sn	P
40%	1.09	40.39	250.89	-29598	-0.4 Q_{max}	0.3	≤ ± 5% Sn	P
50%	1.09	50.73	250.80	-30610	-0.4 Q_{max}	-0.5	≤ ± 5% Sn	P
60%	1.09	60.35	250.84	-30810	-0.4 Q_{max}	-0.6	≤ ± 5% Sn	P
70%	1.09	69.99	250.83	-30573	-0.4 Q_{max}	-0.5	≤ ± 5% Sn	P
80%	1.09	79.80	250.86	-30991	-0.4 Q_{max}	-0.8	≤ ± 5% Sn	P
90%	1.09	90.12	250.86	-31128	-0.4 Q_{max}	-0.9	≤ ± 5% Sn	P
100%	1.09	96.01	250.82	-30462	-0.4 Q_{max}	-0.4	≤ ± 5% Sn	P
100%	1.10	83.83	253.23	-67524	-0.9 Q_{max}	0.1	≤ ± 5% Sn	P
100 % → 10%	1.10	9.84	253.00	-67687	-0.9 Q_{max}	0.1	≤ ± 5% Sn	P
10 % → ≤ 5%	1.10	3.84	253.14	7558	≈k Q_{max} (< ± 5 % Sn)	0.2	≤ ± 5% Sn	P

Table A.2: Discharge mode with k= 0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Ps_{max} [%]	V/Vn	P/Ps_{max} [%]	Vout [V]	Q [Var]				
<20%	0.93	15.15	214.18	7673	≈k Q_{max} (< ± 5 % Sn)	0.14	≤ ± 5% Sn	P
<20%	0.91	15.07	209.25	7621	≈k Q_{max} (< ± 5 % Sn)	0.10	≤ ± 5% Sn	P
<20 % → 30 %	0.91	29.89	209.35	44789	0.6 Q_{max} (< 10 sec)	-0.17	≤ ± 5% Sn	P
40%	0.91	40.34	209.28	45492	0.6 Q_{max}	0.39	≤ ± 5% Sn	P
50%	0.91	50.53	209.27	44972	0.6 Q_{max}	-0.02	≤ ± 5% Sn	P
60%	0.91	59.93	209.22	45182	0.6 Q_{max}	0.15	≤ ± 5% Sn	P
70%	0.91	69.91	209.15	46160	0.6 Q_{max}	0.93	≤ ± 5% Sn	P
80%	0.91	79.80	209.25	44487	0.6 Q_{max}	-0.41	≤ ± 5% Sn	P
90%	0.91	82.21	209.26	44486	0.6 Q_{max}	-0.41	≤ ± 5% Sn	P
100%	0.91	83.63	209.06	43944	0.6 Q_{max}	-0.84	≤ ± 5% Sn	P
100%	0.90	67.42	207.16	74299	Q_{max}	-0.56	≤ ± 5% Sn	P
100 % → 10%	0.90	9.05	206.96	75618	Q_{max}	0.49	≤ ± 5% Sn	P
10 % → ≤ 5%	0.90	3.34	206.36	7307	≈k Q_{max} (< ± 5 % Sn)	-0.15	≤ ± 5% Sn	P

Graph curve Q=f(V)
Curve A.1



Graph curve Q=f(V)
Curve A.2

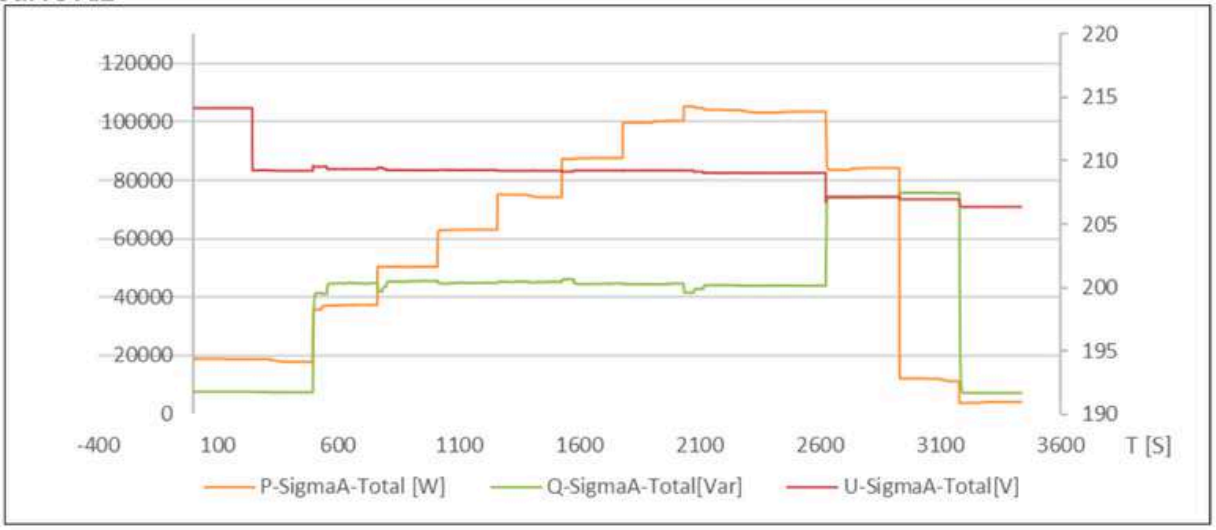
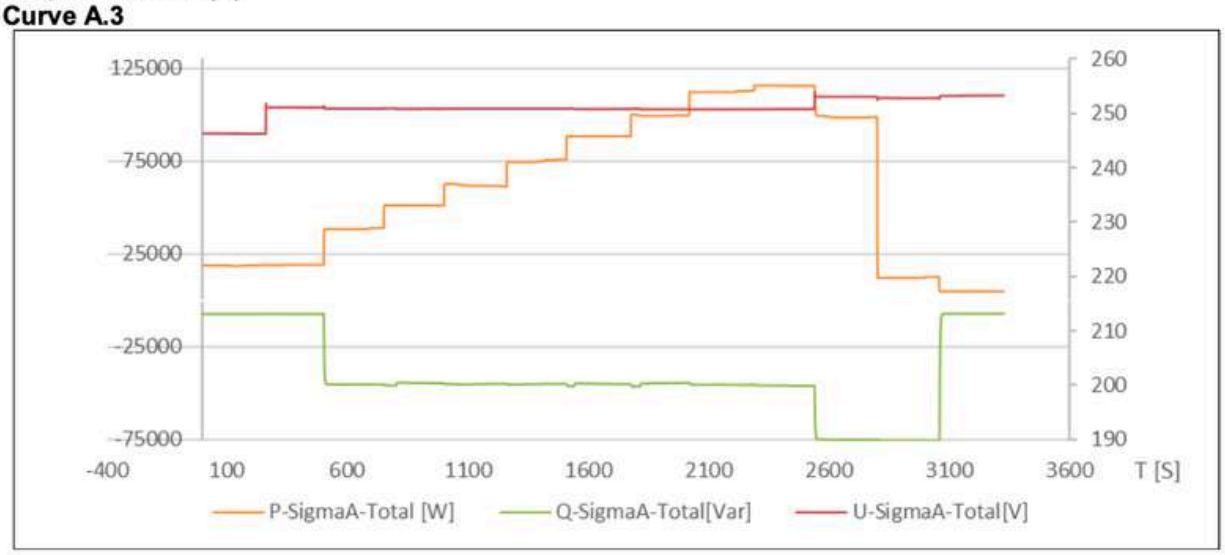


Table A.3: Discharge mode with k= -0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Ps_{max} [%]	V/Vn	P/Ps_{max} [%]	Vout [V]	Q [Var]				
<20%	1.07	15.01	246.30	-7421	≈-k Q_{max} (< ± 5 % Sn)	0.06	≤ ± 5% Sn	P
<20%	1.09	15.24	251.10	-7340	≈-k Q_{max} (< ± 5 % Sn)	0.13	≤ ± 5% Sn	P
<20 % → 30 %	1.09	31.10	250.91	-45489	-0.6 Q_{max} (< 10 sec)	-0.39	≤ ± 5% Sn	P
40%	1.09	40.95	250.94	-45926	-0.6 Q_{max}	-0.74	≤ ± 5% Sn	P
50%	1.09	49.97	250.90	-45461	-0.6 Q_{max}	-0.37	≤ ± 5% Sn	P
60%	1.09	59.62	250.89	-45395	-0.6 Q_{max}	-0.32	≤ ± 5% Sn	P
70%	1.09	70.77	250.92	-46385	-0.6 Q_{max}	-1.11	≤ ± 5% Sn	P
80%	1.09	79.57	250.79	-44926	-0.6 Q_{max}	0.06	≤ ± 5% Sn	P
90%	1.09	89.85	250.81	-45543	-0.6 Q_{max}	-0.43	≤ ± 5% Sn	P
100%	1.09	92.62	250.81	-45930	-0.6 Q_{max}	-0.74	≤ ± 5% Sn	P
100%	1.10	78.86	253.09	-75211	-Q_{max}	-0.17	≤ ± 5% Sn	P
100 % → 10%	1.10	9.64	252.83	-75774	-Q_{max}	-0.62	≤ ± 5% Sn	P
10 % → ≤ 5%	1.10	3.74	253.30	-7239	≈-k Q_{max} (< ± 5 % Sn)	0.21	≤ ± 5% Sn	P

Table A.4: Discharge mode with k= -0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Ps_{max} [%]	V/Vn	P/Ps_{max} [%]	Vout [V]	Q [Var]				
<20%	0.93	14.77	214.25	-7690	≈-k Q_{max} (< ± 5 % Sn)	-0.15	≤ ± 5% Sn	P
<20%	0.91	15.27	208.93	-7735	≈-k Q_{max} (< ± 5 % Sn)	-0.19	≤ ± 5% Sn	P
<20 % → 30 %	0.91	30.79	209.32	30606	0.4 Q_{max} (< 10 sec)	0.48	≤ ± 5% Sn	P
40%	0.91	39.72	209.35	29440	0.4 Q_{max}	-0.45	≤ ± 5% Sn	P
50%	0.91	50.02	209.36	28471	0.4 Q_{max}	-1.22	≤ ± 5% Sn	P
60%	0.91	60.66	209.15	31592	0.4 Q_{max}	1.27	≤ ± 5% Sn	P
70%	0.91	69.48	209.17	30327	0.4 Q_{max}	0.26	≤ ± 5% Sn	P
80%	0.91	79.75	209.11	29751	0.4 Q_{max}	-0.20	≤ ± 5% Sn	P
90%	0.91	86.95	209.18	29312	0.4 Q_{max}	-0.55	≤ ± 5% Sn	P
100%	0.91	87.25	209.12	29853	0.4 Q_{max}	-0.12	≤ ± 5% Sn	P
100%	0.90	71.13	206.85	67093	0.9 Q_{max}	-0.33	≤ ± 5% Sn	P
100 % → 10%	0.90	10.17	206.62	68233	0.9 Q_{max}	0.59	≤ ± 5% Sn	P
10 % → ≤ 5%	0.90	3.88	206.22	-7586	≈-k Q_{max} (< ± 5 % Sn)	-0.07	≤ ± 5% Sn	P

Graph curve Q=f(V)
Curve A.3



Graph curve Q=f(V)
Curve A.4

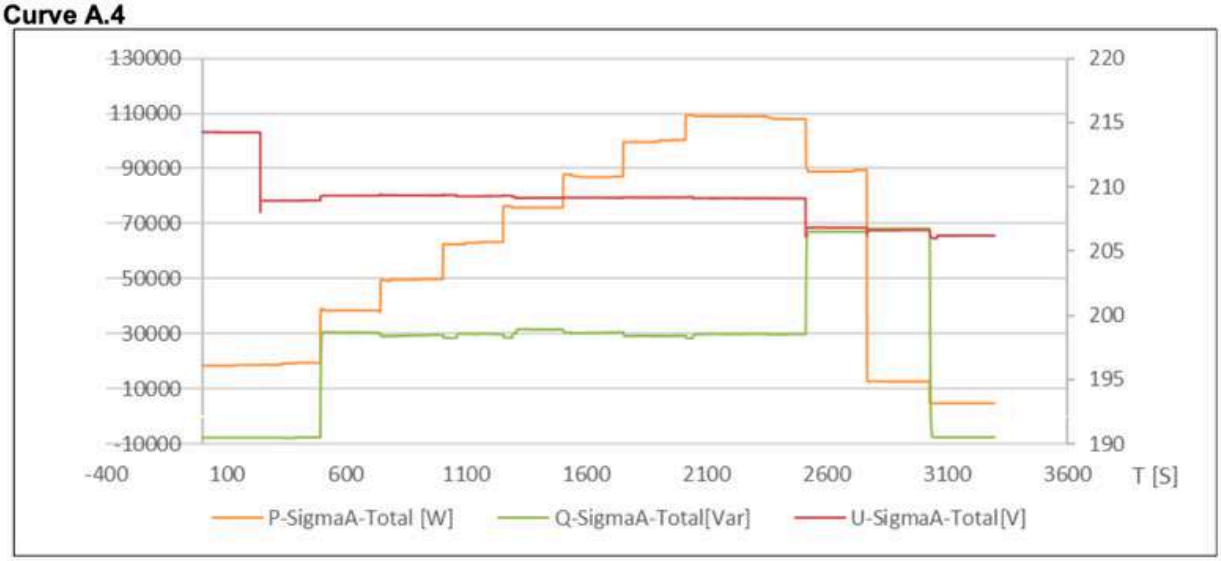
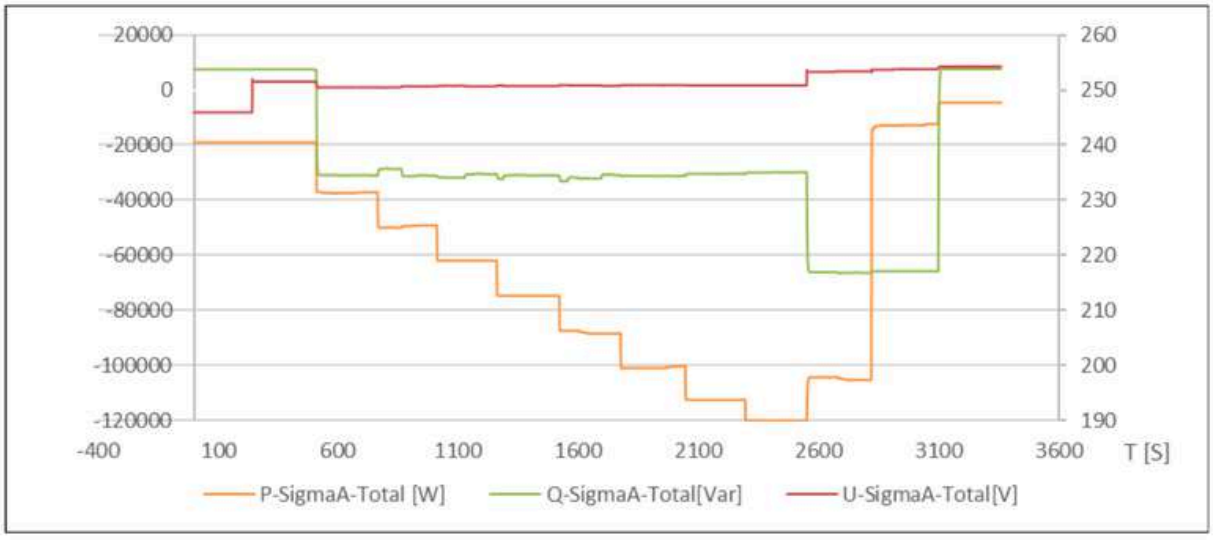


Table B.1: Charge mode with k=0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Pc_{max} [%]	V/Vn	P/Pc_{max} [%]	Vout [V]	Q [Var]				
<20%	1.07	-15.20	245.95	7422	≈-k Q_{max} (< ± 5 % Sn)	-0.06	≤ ± 5% Sn	P
<20%	1.09	-15.46	251.53	7189	≈ -k Q_{max} (< ± 5 % Sn)	-0.25	≤ ± 5% Sn	P
<20 % → 30 %	1.09	-29.75	250.47	-30997	-0.4 Q_{max} (< 10 sec)	-0.80	≤ ± 5% Sn	P
40%	1.09	-39.33	250.65	-31118	-0.4 Q_{max}	-0.89	≤ ± 5% Sn	P
50%	1.09	-49.53	250.67	-30554	-0.4 Q_{max}	-0.44	≤ ± 5% Sn	P
60%	1.09	-59.74	250.74	-31006	-0.4 Q_{max}	-0.80	≤ ± 5% Sn	P
70%	1.09	-70.74	250.75	-30682	-0.4 Q_{max}	-0.55	≤ ± 5% Sn	P
80%	1.09	-80.77	250.88	-31132	-0.4 Q_{max}	-0.91	≤ ± 5% Sn	P
90%	1.09	-90.00	250.85	-30462	-0.4 Q_{max}	-0.37	≤ ± 5% Sn	P
100%	1.09	-96.11	250.83	-29953	-0.4 Q_{max}	0.04	≤ ± 5% Sn	P
100%	1.10	-83.44	253.28	-66155	-0.9 Q_{max}	1.08	≤ ± 5% Sn	P
100 % → 10%	1.10	-10.29	253.67	-65793	-0.9 Q_{max}	1.37	≤ ± 5% Sn	P
10 % → ≤ 5%	1.10	-3.71	254.27	7590	≈-k Q_{max} (< ± 5 % Sn)	0.07	≤ ± 5% Sn	P

Table B.2: Charge mode with k=0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Pc_{max} [%]	V/Vn	P/Pc_{max} [%]	Vout [V]	Q [Var]				
<20%	0.93	-15.12	214.39	7688	≈k Q_{max} (< ± 5 % Sn)	0.15	≤ ± 5% Sn	P
<20%	0.91	-15.04	209.46	7636	≈k Q_{max} (< ± 5 % Sn)	0.11	≤ ± 5% Sn	P
<20 % → 30 %	0.91	-29.83	209.56	44879	0.6 Q_{max} (< 10 sec)	-0.10	≤ ± 5% Sn	P
40%	0.91	-40.26	209.49	45583	0.6 Q_{max}	0.47	≤ ± 5% Sn	P
50%	0.91	-50.43	209.48	45062	0.6 Q_{max}	0.05	≤ ± 5% Sn	P
60%	0.91	-59.81	209.43	45272	0.6 Q_{max}	0.22	≤ ± 5% Sn	P
70%	0.91	-69.77	209.36	46252	0.6 Q_{max}	1.00	≤ ± 5% Sn	P
80%	0.91	-79.64	209.46	44576	0.6 Q_{max}	-0.34	≤ ± 5% Sn	P
90%	0.91	-82.05	209.47	44575	0.6 Q_{max}	-0.34	≤ ± 5% Sn	P
100%	0.91	-83.46	209.27	44032	0.6 Q_{max}	-0.77	≤ ± 5% Sn	P
100%	0.90	-68.29	207.37	74448	Q_{max}	-0.44	≤ ± 5% Sn	P
100 % → 10%	0.90	-9.03	207.17	75769	Q_{max}	0.62	≤ ± 5% Sn	P
10 % → ≤ 5%	0.90	-3.33	206.57	7322	≈k Q_{max} (< ± 5 % Sn)	-0.14	≤ ± 5% Sn	P

Graph curve Q=f(V)
Curve B.1



Graph curve Q=f(V)
Curve B.2

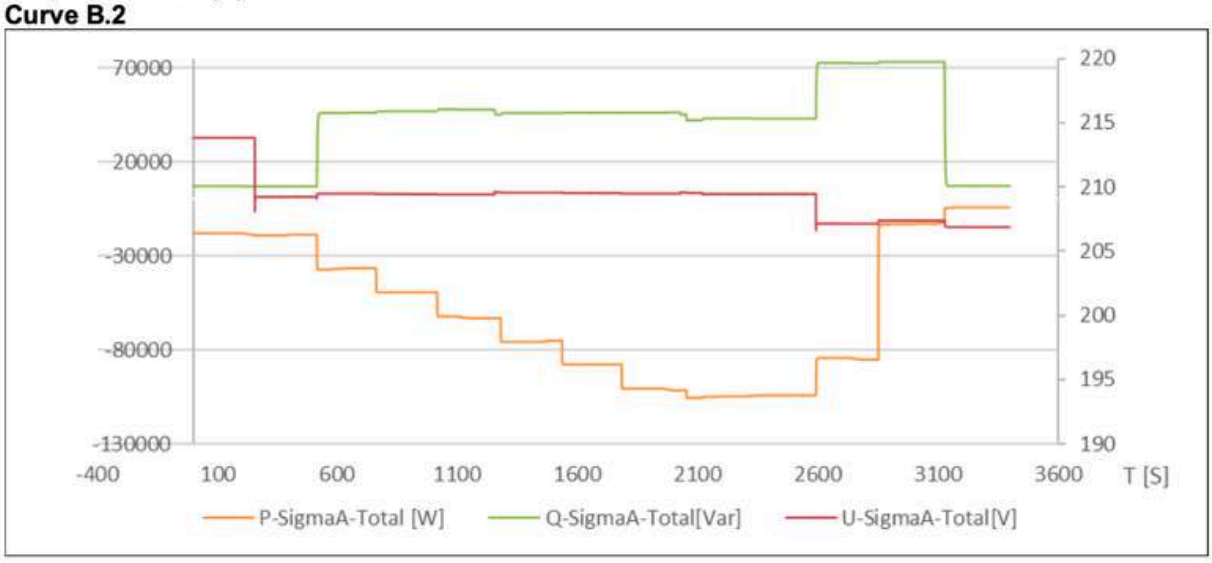
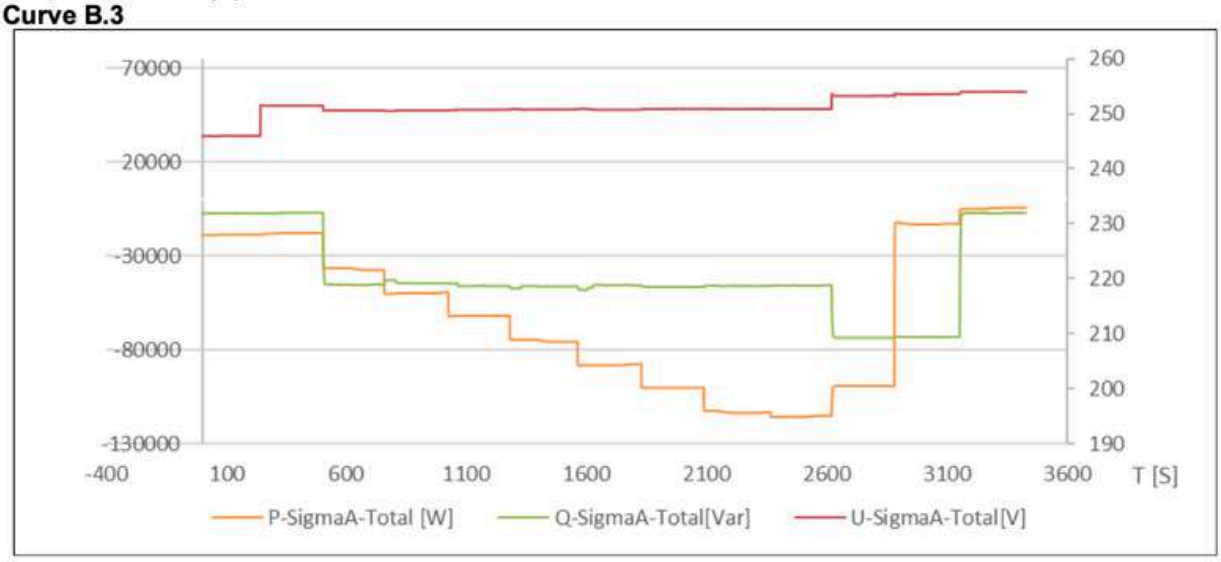


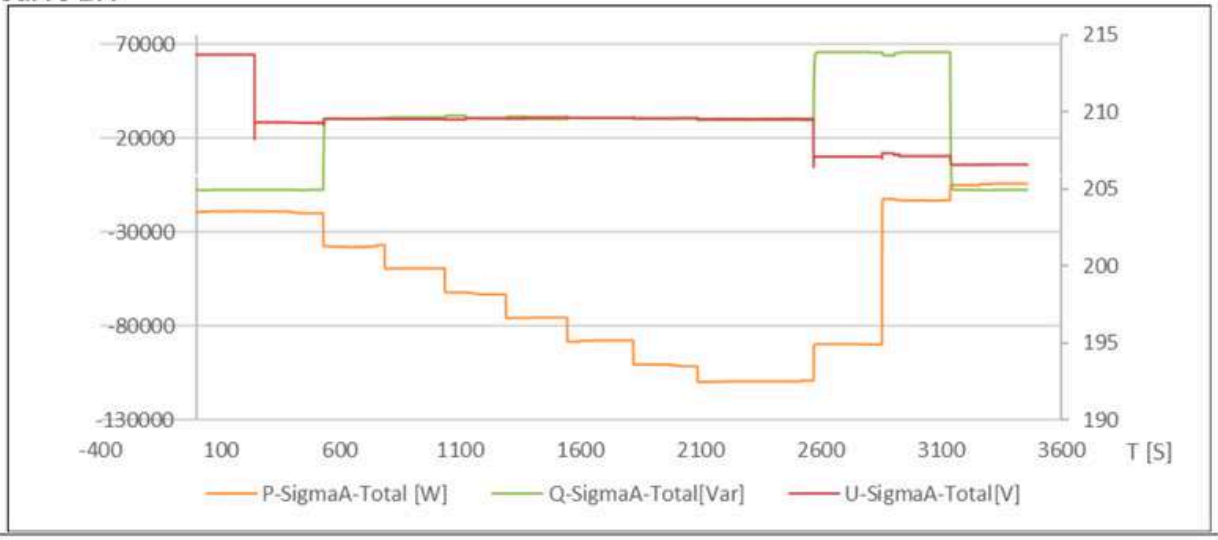
Table B.3: Charge mode with k= -0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Pc_{max} [%]	V/Vn	P/Pc_{max} [%]	Vout [V]	Q [Var]				
<20%	1.07	-15.04	246.79	-7436	≈-k Q_{max} (< ± 5 % Sn)	0.05	≤ ± 5% Sn	P
<20%	1.09	-15.27	251.60	-7355	≈-k Q_{max} (< ± 5 % Sn)	0.12	≤ ± 5% Sn	P
<20 % → 30 %	1.09	-31.16	251.41	-45580	-0.6 Q_{max} (< 10 sec)	-0.46	≤ ± 5% Sn	P
40%	1.09	-41.03	251.44	-46018	-0.6 Q_{max}	-0.81	≤ ± 5% Sn	P
50%	1.09	-50.07	251.40	-45552	-0.6 Q_{max}	-0.44	≤ ± 5% Sn	P
60%	1.09	-59.74	251.39	-45486	-0.6 Q_{max}	-0.39	≤ ± 5% Sn	P
70%	1.09	-70.91	251.42	-46478	-0.6 Q_{max}	-1.18	≤ ± 5% Sn	P
80%	1.09	-79.73	251.29	-45016	-0.6 Q_{max}	-0.01	≤ ± 5% Sn	P
90%	1.09	-90.03	251.31	-45634	-0.6 Q_{max}	-0.51	≤ ± 5% Sn	P
100%	1.09	-92.81	251.31	-46022	-0.6 Q_{max}	-0.82	≤ ± 5% Sn	P
100%	1.10	-79.02	253.60	-75361	-Q_{max}	-0.29	≤ ± 5% Sn	P
100 % → 10%	1.10	-9.66	253.34	-75926	-Q_{max}	-0.74	≤ ± 5% Sn	P
10 % → ≤ 5%	1.10	-3.75	253.81	-7253	≈-k Q_{max} (< ± 5 % Sn)	0.20	≤ ± 5% Sn	P

Table B.4: Charge mode with k= -0.1								
Set Point		Measure			Q/Qn[%] expected	Δ Q %	LIMIT	RESULT
P/Pc_{max} [%]	V/Vn	P/Pc_{max} [%]	Vout [V]	Q [Var]				
<20%	0.93	-14.81	214.68	-7713.07	≈-k Q_{max} (< ± 5 % Sn)	-0.17	≤ ± 5% Sn	P
<20%	0.91	-15.32	209.35	-7758.21	≈-k Q_{max} (< ± 5 % Sn)	-0.21	≤ ± 5% Sn	P
<20 % → 30 %	0.91	-30.88	209.74	30697.82	0.4 Q_{max} (< 10 sec)	0.56	≤ ± 5% Sn	P
40%	0.91	-39.84	209.77	29528.32	0.4 Q_{max}	-0.38	≤ ± 5% Sn	P
50%	0.91	-50.17	209.78	28556.41	0.4 Q_{max}	-1.15	≤ ± 5% Sn	P
60%	0.91	-60.84	209.57	31686.78	0.4 Q_{max}	1.35	≤ ± 5% Sn	P
70%	0.91	-69.69	209.59	30417.98	0.4 Q_{max}	0.33	≤ ± 5% Sn	P
80%	0.91	-79.99	209.53	29840.25	0.4 Q_{max}	-0.13	≤ ± 5% Sn	P
90%	0.91	-87.21	209.60	29399.94	0.4 Q_{max}	-0.48	≤ ± 5% Sn	P
100%	0.91	-87.51	209.54	29942.56	0.4 Q_{max}	-0.05	≤ ± 5% Sn	P
100%	0.90	-71.34	207.26	67294.28	0.9 Q_{max}	-0.16	≤ ± 5% Sn	P
100 % → 10%	0.90	-10.20	207.03	68437.70	0.9 Q_{max}	0.75	≤ ± 5% Sn	P
10 % → ≤ 5%	0.90	-3.93	206.63	-7601.17	≈-k Q_{max} (< ± 5 % Sn)	-0.08	≤ ± 5% Sn	P

Graph curve Q=f(V)
Curve B.3



Graph curve Q=f(V)
Curve B.4

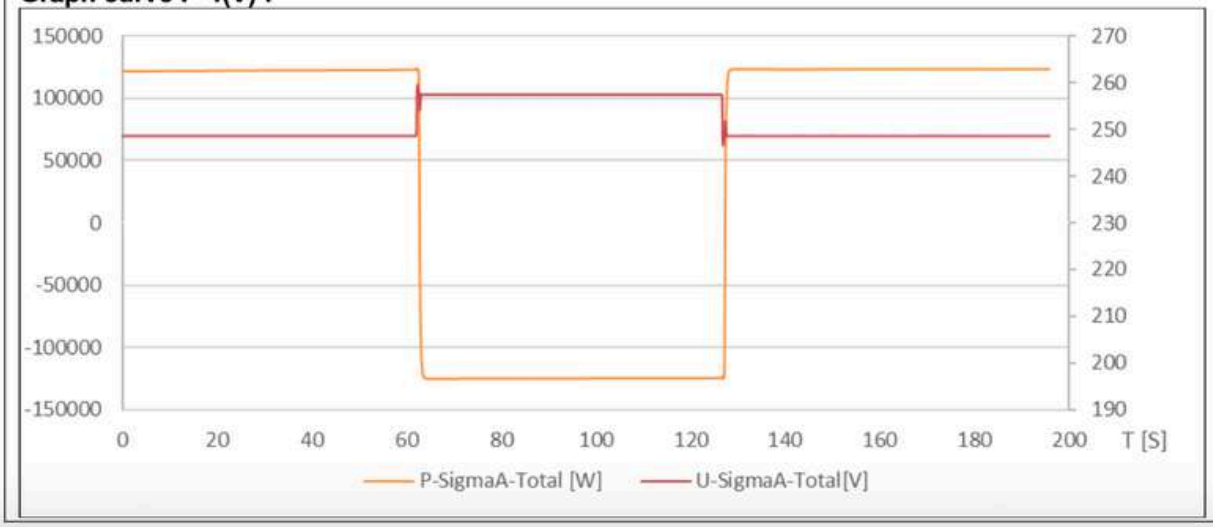


8.5.3.1 Bbis.7.1	**TABLE: Limitazione della potenza attiva per valori di tensione prossimi al 110 % di Un** */ Active power limitation for voltage values near to 100 % di Un*

Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Supplementary information: Active power was been measured with an average of 1 second.	
Operator .....:	See cover page
Supervisor .....:	See cover page
Test Date.....:	See cover page

Set Point	Measure		Limits	Result
$V/V_{110\%}$ [%]	P_{out} [W]	V_{out} [V]		
-2%	121917	248.6	-	P
+2%	-125026	257.5	≤ 20% P_{Smax} *(for unidirectional)* ≥ 80% P_{Cmax} *(for bidirectional)*	P
-2%	123501	248.6	-	P

Graph curve P=f(V) :



8.5.3.4 **8.5.3.5** **Bbis.7.2**	**TABLE: Verifica della riduzione automatica della potenza attiva in presenza di transitori di sovrafrequenza sulla rete** ***/ Active power regulation in coincidence with transitory on the transmission grid***
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table

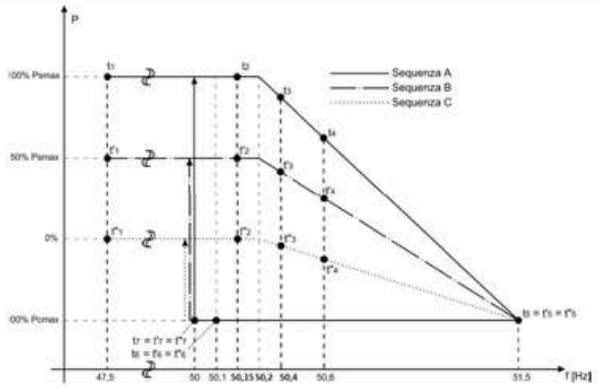


Figura 9Bbis – Curve di limitazione della potenza attiva per convertitori bidirezionali

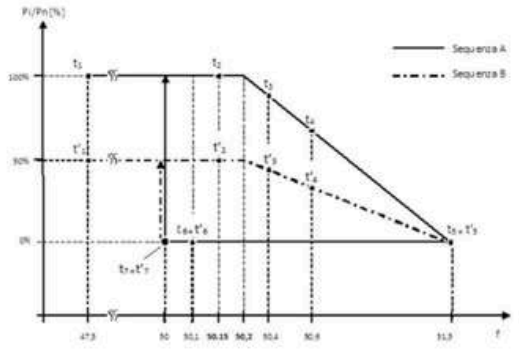


Figura 10Bbis – Curve di limitazione della potenza attiva per convertitori unidirezionali

Sequence test for Bi-directional EESS	*Sequence test for Uni-directional EESS*

Supplementary information:
Test was performed with a sampling time of 200ms
Sn is an active nominal power of the inverter

Sequence A						
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**Limits**	**Graph point**
1	100% P_{Smax}	47.50	125000	123373	± 2.5% S_n	t1
2	100% P_{Smax}	50.15	125000	123325	± 2.5% S_n	t2
3	100% P_{Smax}	50.40	84275	84825	± 2.5% S_n	t3
4	100% P_{Smax}	50.60	46225	46659	± 2.5% S_n	t4
5	100% P_{Smax}	51.49	-123097	-125631	± 2.5% S_n	t5
6	100% P_{Smax}	50.11	-123097	-125614	± 2.5% S_n	t6
Step #	**Set output power [%]**	**frequency [Hz]**	**Wait time [s]**	**Power Gradient [% P_{ref}/min]**	**Limits**	
					Wait time [s]	**Power Gradient [% P_{ref}/min]**
6→7	100% P_{Smax}	50.00	601	9.03	≥ 300	⩽20%
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**Limits**	**Graph point**
7	100% P_{Smax}	50.00	125000	122355	± 2.5% S_n	t7
Sequence B						
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**limits**	**Graph point**
1	50% P_{Smax}	47.50	62500	62030	± 2.5% S_n	t1'
2	50% P_{Smax}	50.15	62500	62001	± 2.5% S_n	t2'
3	50% P_{Smax}	50.40	33832	34070	± 2.5% S_n	t3'
4	50% P_{Smax}	50.60	4958	5141	± 2.5% S_n	t4'
5	50% P_{Smax}	51.49	-123534	-125899	± 2.5% S_n	t5'

6	50% P_{Smax}	50.11	-123534	-125853	± 2.5% S_n	t6'
Step #	**Set output power [%]**	**frequency [Hz]**	**Wait time [s]**	**Power Gradient [% P_{ref}/min]**	**Limits**	
					Wait time [s]	**Power Gradient [% P_{ref}/min]**
6→7	100% P_{Smax}	50.00	602	9.02	≥ 300	⩽20%
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**Limits**	**Graph point**
7	50% P_{Smax}	50.00	62500	62931	± 2.5% S_n	t7'
Sequence C*						
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**limits**	**Graph point**
1	0% PS_{max}	47.50	0	-841	± 2.5% S_n	t1"
2	0% PS_{max}	50.15	0	-909	± 2.5% S_n	t2"
3	0% PS_{max}	50.40	-19995	-20963	± 2.5% S_n	t3"
4	0% PS_{max}	50.60	-39082	-40463	± 2.5% S_n	t4"
5	0% PS_{max}	51.49	-123550	-126476	± 2.5% S_n	t5"
6	0% PS_{max}	50.11	-123550	-126419	± 2.5% S_n	t6"
Step #	**Set output power [%]**	**frequency [Hz]**	**Wait time [s]**	**Power Gradient [% P_{ref}/min]**	**Limits**	
					Wait time [s]	**Power Gradient [% P_{ref}/min]**
6→7	100% P_{Smax}	50.00	601	9.02	≥ 300	⩽20%
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**Limits**	**Graph point**
7	0% P_{Smax}	50.00	0	-686	± 2.5% S_n	t7'

Sequence C applicable only for bidirectional converters.

Grafico Sequenza A: Curva di limitazione della potenza attiva rispetto alla frequenza

/ Graph Sequence A: Active power regulation in coincidence with transitory on the transmission grid

Sequence A line graph:

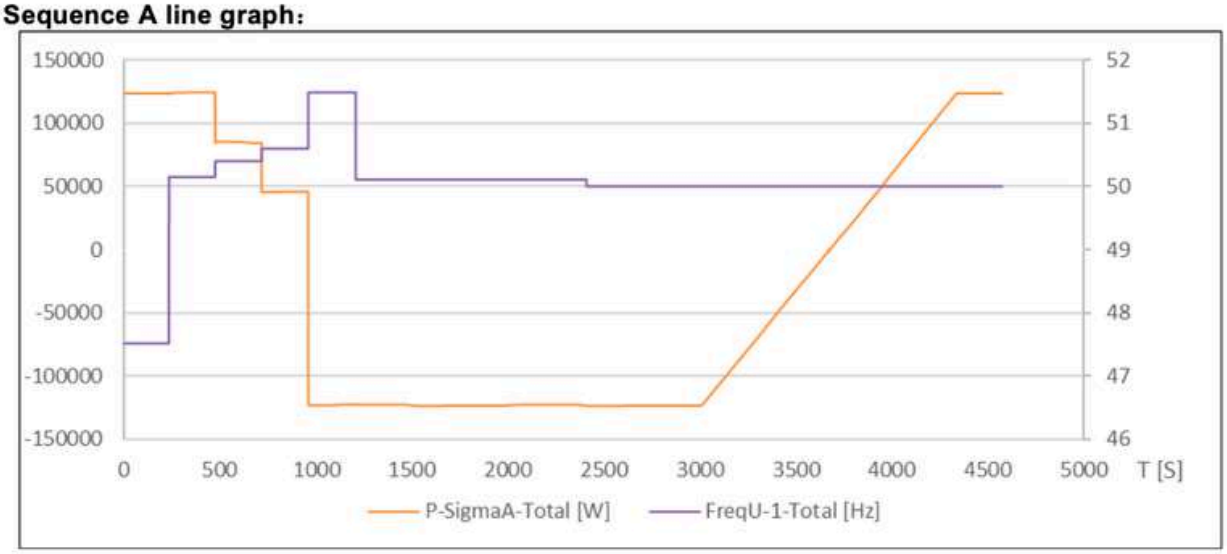


Grafico Sequenza B: Curva di limitazione della potenza attiva rispetto alla frequenza

/ Graph Sequence B: Active power regulation in coincidence with transitory on the transmission grid

Sequence B line graph:

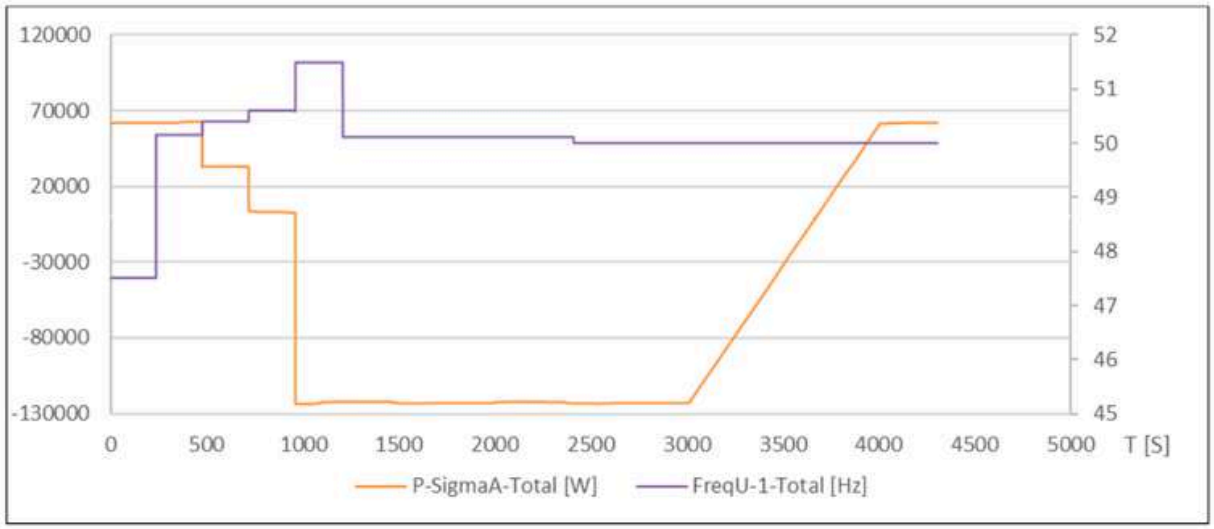
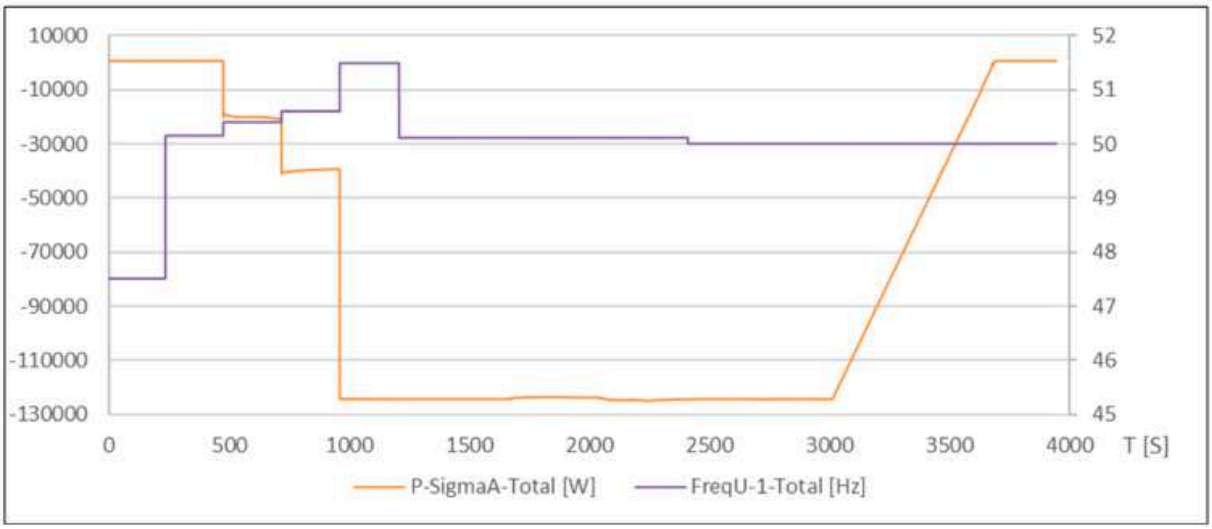


Grafico Sequenza C*: Curva di limitazione della potenza attiva rispetto alla frequenza

/ Graph Sequence C: Active power regulation in coincidence with transitory on the transmission grid*

Sequence C line graph:



8.5.3.4 8.5.3.5 Bbis.7.3	**TABLE:** Regolazione della potenza attiva in presenza di transitori sulla rete di trasmissione */Active power regulation in coincidence with transitory on the transmission grid*

Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table

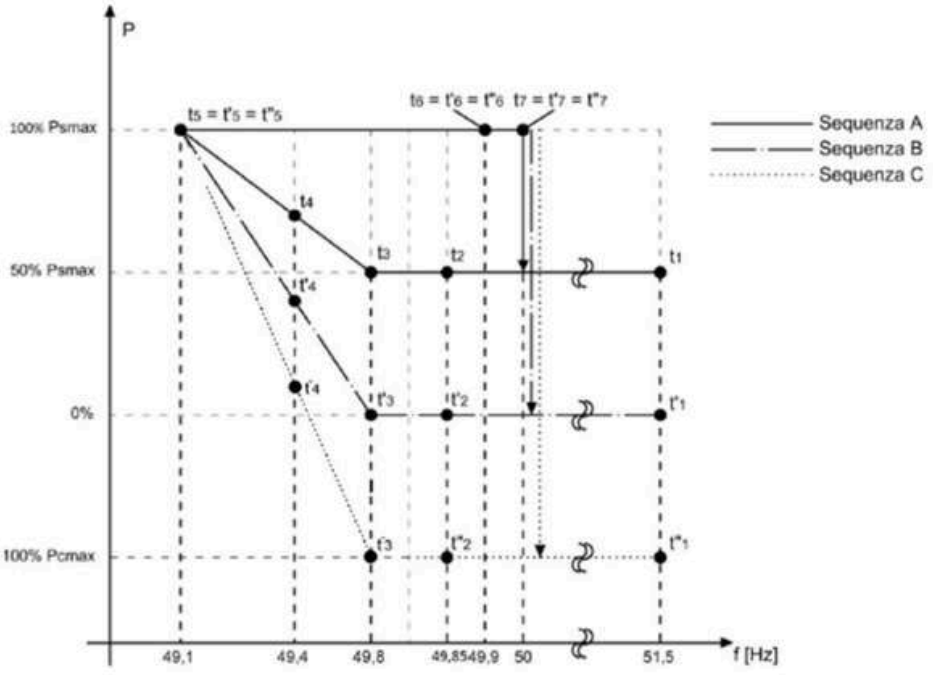


Figura 70 – Curve di limitazione della potenza attiva

Supplementary information:
The storage needs an energy capacity of 20% of CUS
Test was performed with a sampling time of 200ms
Sn is an active nominal power of the inverter

Sequence A						
Step #	Set output power [%]	frequency [Hz]	Expected power value [W]	Actual power values [W]	limits	Graph point
1	50% PS_{max}	51.50	62500	62590	± 2.5% S_n	t1
2	50% PS_{max}	49.85	62500	62532	± 2.5% S_n	t2
3	50% PS_{max}	49.60	80452	80599	± 2.5% S_n	t3
4	50% PS_{max}	49.40	98271	97633	± 2.5% S_n	t4
5	50% PS_{max}	49.11	124109	123275	± 2.5% S_n	t5
6	50% PS_{max}	49.89	124109	123256	± 2.5% S_n	t6
Step #	Set output power [%]	frequency [Hz]	Wait time [s]	Power Gradient [% P_{ref}/min]	Limits	
					Wait time [s]	Power Gradient [% P_{ref}/min]
6→7	50% PS_{max}	50.00	603	9.04	≥ 300	20%
Step #	Set output power [%]	frequency [Hz]	Expected power value [W]	Actual power values [W]	Limits	Graph point
7	50% PS_{max}	50.00	62500	62648	± 2.5% S_n	t7

Sequence B						
Step #	Set output power [%]	frequency [Hz]	Expected power value [W]	Actual power values [W]	limits	Graph point
1	0% PS_{max}	51.50	0	-140	± 2.5% S_n	t1'
2	0% PS_{max}	49.85	0	-137	± 2.5% S_n	t2'
3	0% PS_{max}	49.60	34804	35074	± 2.5% S_n	t3'
4	0% PS_{max}	49.40	70882	70796	± 2.5% S_n	t4'
5	0% PS_{max}	49.11	123196	122264	± 2.5% S_n	t5'

6	0% P_{Smax}	49.89	123196	122224	± 2.5% S_n	t6'
Step #	**Set output power [%]**	**frequency [Hz]**	**Wait time [s]**	**Power Gradient [% P_{ref}/min]**	**Limits**	
					Wait time [s]	**Power Gradient [% P_{ref}/min]**
6→7	0% P_{Smax}	50.00	604	9.02	≥ 300	20%
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**Limits**	**Graph point**
7	0% P_{Smax}	50.00	0	-475	± 2.5% S_n	t7'

Sequence C'						
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**limits**	**Graph point**
1	100% P_{Cmax}	51.50	-125000	-125742	± 2.5% S_n	t1''
2	100% P_{Cmax}	49.85	-125000	-125732	± 2.5% S_n	t2''
3	100% P_{Cmax}	49.60	-54094	-52231	± 2.5% S_n	t3''
4	100% P_{Cmax}	49.40	17544	19009	± 2.5% S_n	t4''
5	100% P_{Cmax}	49.11	121418	121688	± 2.5% S_n	t5''
6	100% P_{Cmax}	49.89	121418	121971	± 2.5% S_n	t6''
Step #	**Set output power [%]**	**frequency [Hz]**	**Wait time [s]**	**Power Gradient [% P_{ref}/min]**	**Limits**	
					Wait time [s]	**Power Gradient [% P_{ref}/min]**
6→7	100% P_{Cmax}	50.00	605	9.04	≥ 300	20%
Step #	**Set output power [%]**	**frequency [Hz]**	**Expected power value [W]**	**Actual power values [W]**	**Limits**	**Graph point**
7	100% P_{Cmax}	50.00	-125000	-125624	± 2.5% S_n	t7''

**Sequence C applicable only for bidirectional converters.*

Grafico Sequenza A: Curva di limitazione della potenza attiva rispetto alla frequenza

/ Graph Sequence A: Active power regulation in coincidence with transitory on the transmission grid

Sequence A line graph:

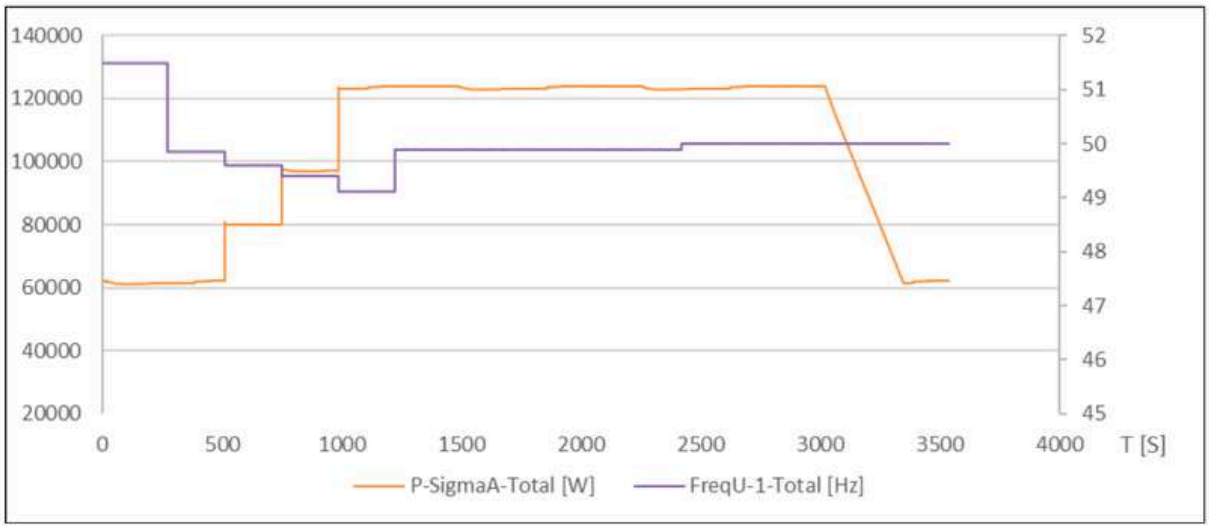


Grafico Sequenza B: Curva di limitazione della potenza attiva rispetto alla frequenza

/ Graph Sequence B: Active power regulation in coincidence with transitory on the transmission grid

Sequence B line graph:

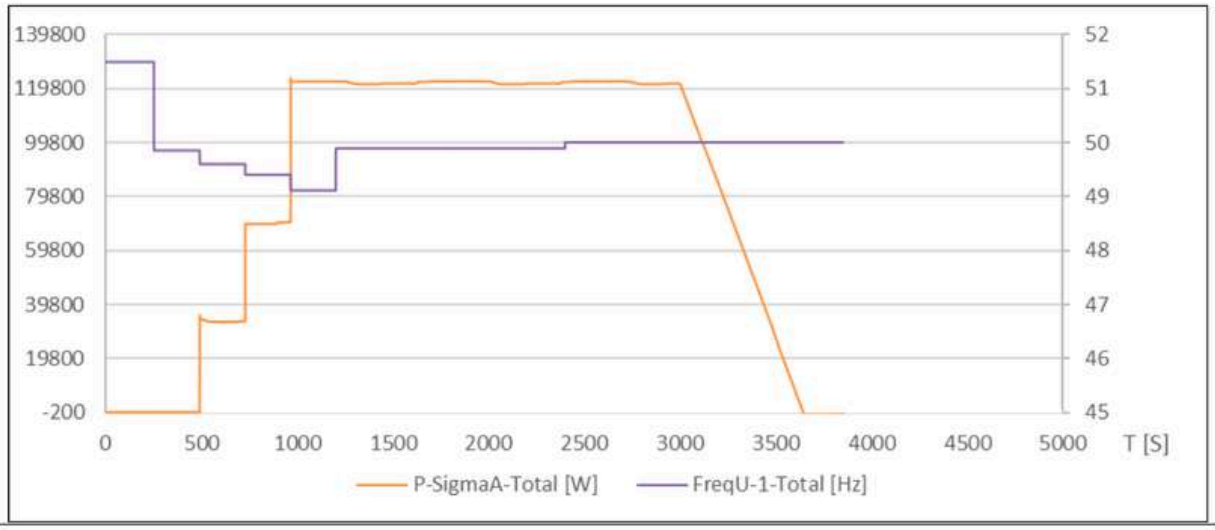
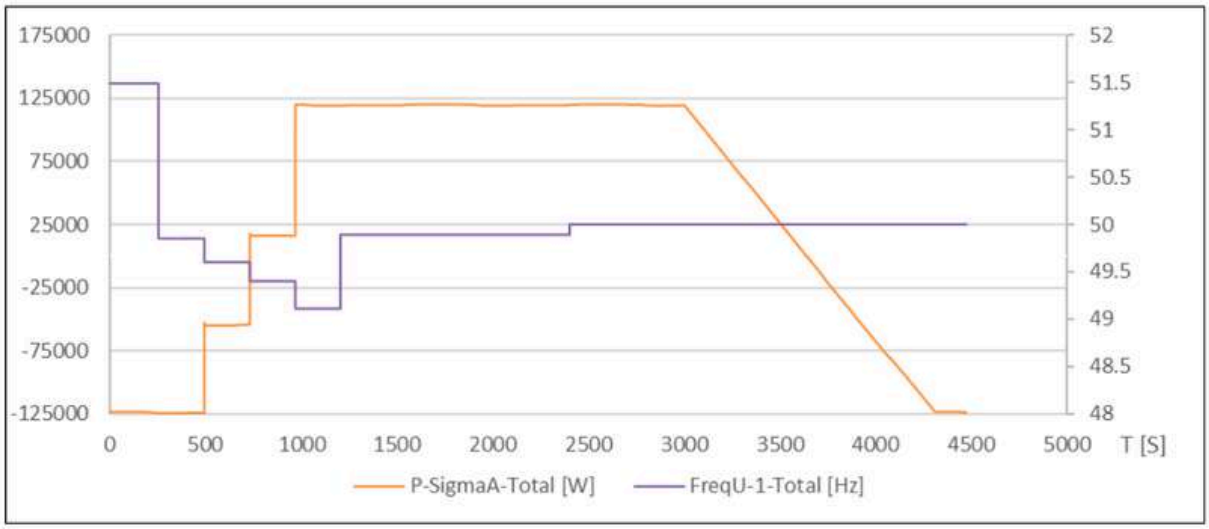


Grafico Sequenza C*: Curva di limitazione della potenza attiva rispetto alla frequenza

/ Graph Sequence C: Active power regulation in coincidence with transitory on the transmission grid*

Sequence C line graph:



Bbis.7.4	**TABLE: Limitazione della potenza attiva su comando esterno proveniente dal Distributore** / ***Active power limitation in coincidence with external command coming from the Electricity Distributor***
Ambient temperature (°C) ..... :	25 °C ± 5 °C
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information: The setting point time's of active power command is 60 seconds. The active power was been measured with average value of 1 minute and its measure is checked at least after 30 seconds from the set-point of active power command.	

Test	Set Point	Output Power expected [W]	Output Power measured [W]	Δ P/Pn [%]	Limit [%]	RESULT
1	50%PS_{max} → 30%PS_{max}	37500	37614	0.09	± 2.5% PS_{max}	P
2	50%PS_{max} →30% Pc_{max}*	-37500	-37681	0.09	± 2.5% PS_{max}	P
Test applicable only for bidirectional converters.						

Grafico Test 1: Limitazione della potenza attiva in risposta a comando esterno

/ Graph Test 1: Active power limitation in coincidence with external command coming from the Electricity Distributor

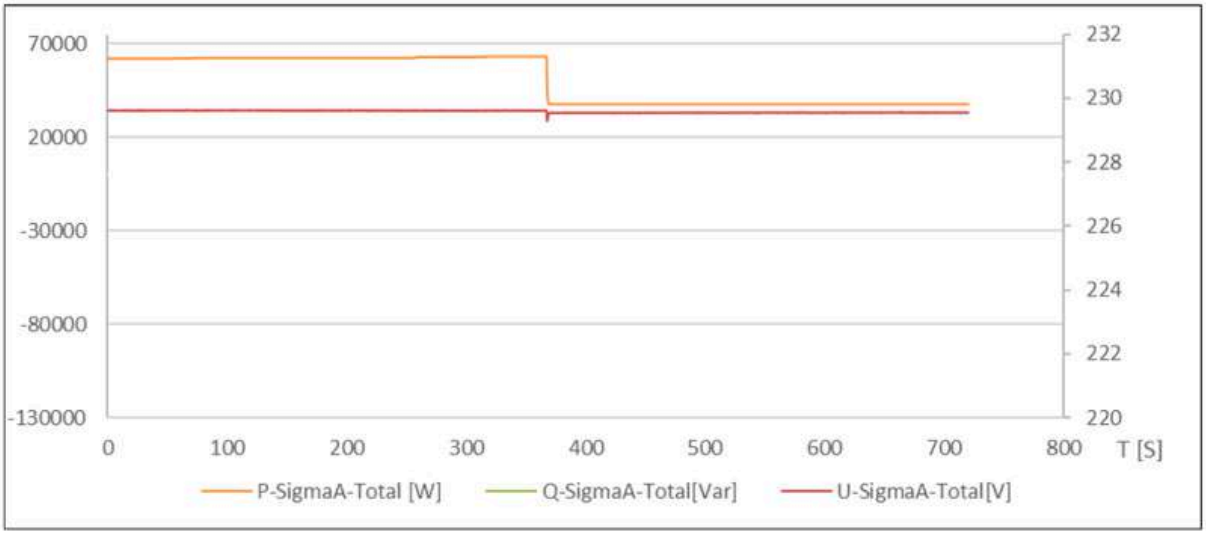
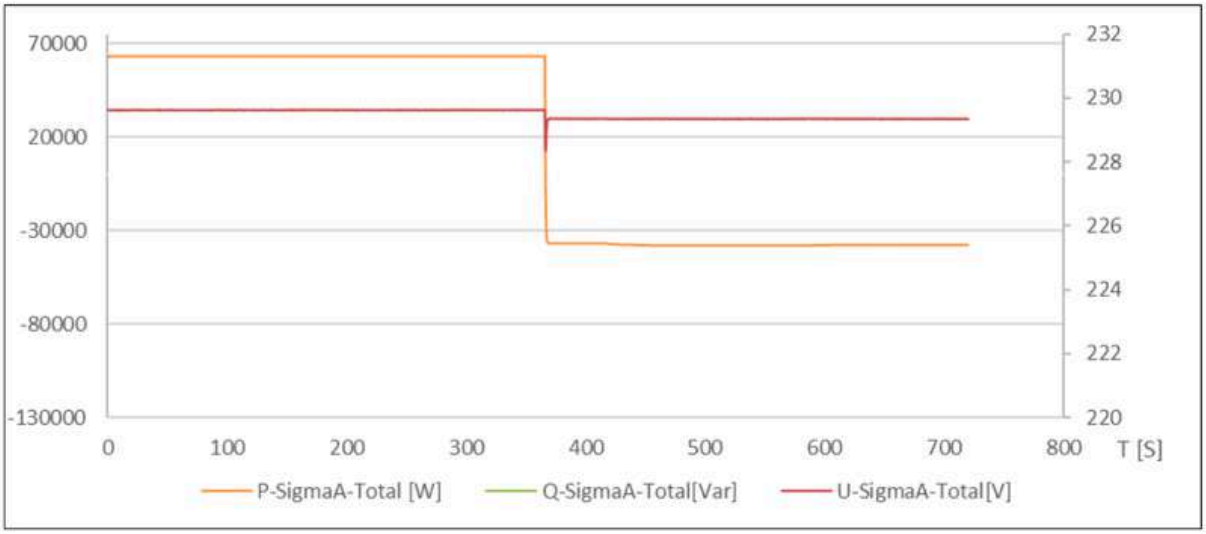


Grafico Test 2: Limitazione della potenza attiva in risposta a comando esterno

/ Graph Test 2: Active power limitation in coincidence with external command coming from the Electricity Distributor



Bbis.7.4.1	**TABLE: Verifica del tempo di assestamento ad un comando di incremento/riduzione di potenza** / ***Check the settling time with external command to increase/decrease the power***
Ambient temperature (°C) ..... :	25 °C ± 5 °C
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table
Supplementary information	

Tabella A: Tempo di assestamento ad un comando di riduzione della potenza attiva

/ Table A: Time of allignment after an active power reduction command

Test	Set Point	Output Power expected [W]	Output Power measured [W]	Output Power limit [%]	Settling Time [s]	Settling Time limit [s]	RESULT
A.1*	100% P_{Smax} → 30% P_{Cmax}	-37500	-38423	± 2.5% S_n	1.4	< 50	P
A.2	100% P_{Smax} → 30% P_{Smax}	37500	36491	± 2.5% S_n	1.2	< 50	P

Table B: Tempo di assestamento ad un comando di incremento della potenza attiva

/ Table B: Time of allignment after an active power increasing command

Test	Set Point	Output Power expected [W]	Output Power measured [W]	Output Power limit [%]	Settling Time [s]	Settling Time limit [s]	RESULT
B.1*	100% P_{Cmax} → 50% P_{Smax}	62500	63204	± 2.5% S_n	1.0	< 50	P
B.2	0% P_{Smax} → 50% P_{Smax}	62500	62062	± 2.5% S_n	1.0	< 50	P

Test applicable only for bidirectional converters.

Grafico Test A.1: Limitazione della potenza attiva in risposta a comando esterno

/ Graph Test A.1: Active power limitation in coincidence with external command coming from the Electricity Distributor

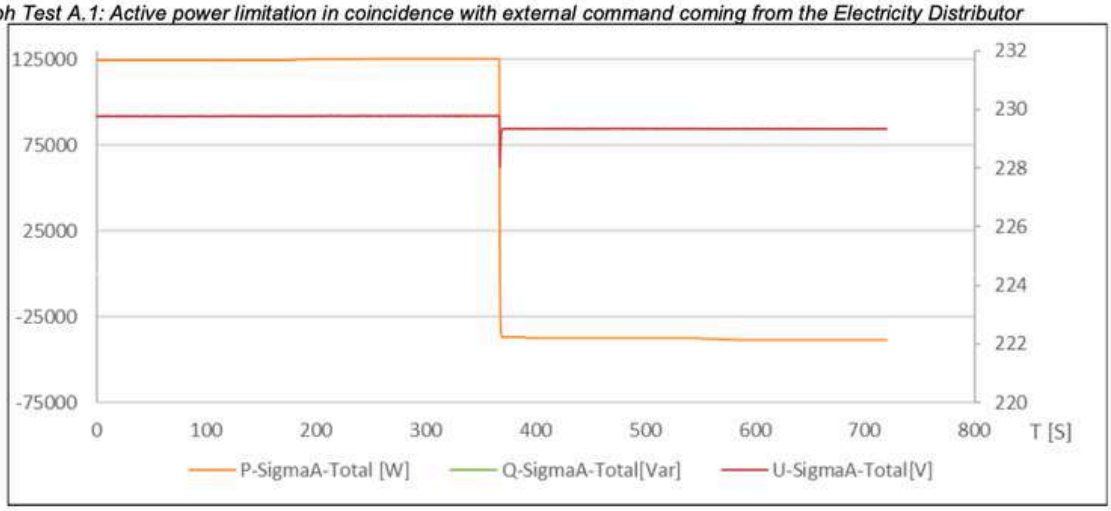


Grafico Test A.2: Limitazione della potenza attiva in risposta a comando esterno

/ Graph Test A.2: Active power limitation in coincidence with external command coming from the Electricity Distributor

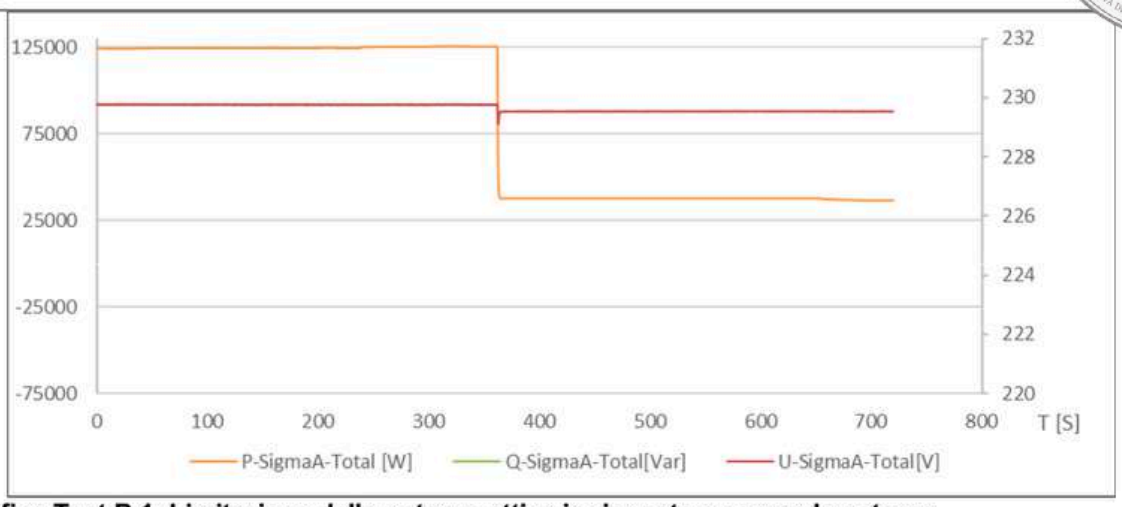


Grafico Test B.1: Limitazione della potenza attiva in risposta a comando esterno

/ Graph Test B.1: Active power limitation in coincidence with external command coming from the Electricity Distributor

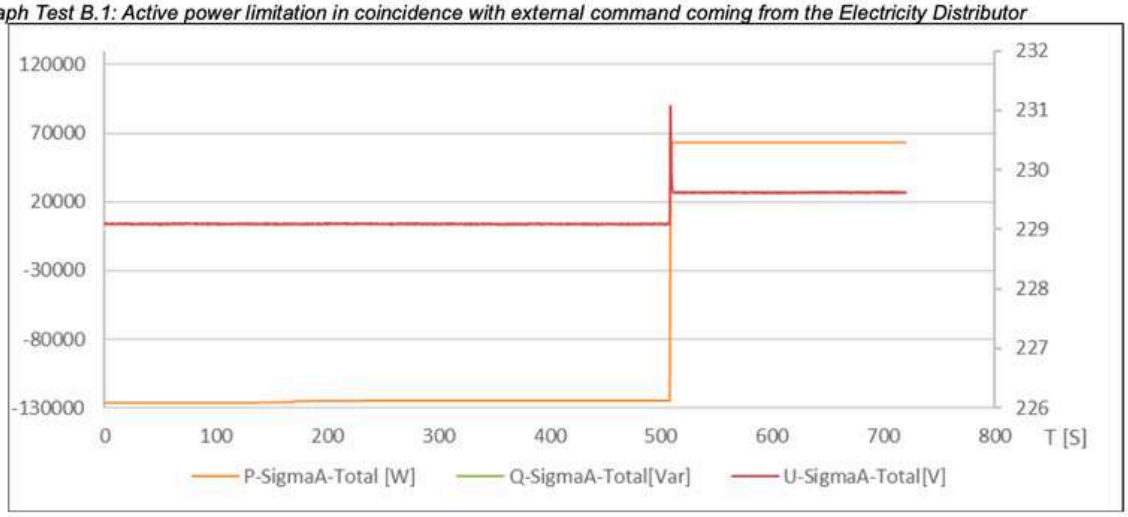
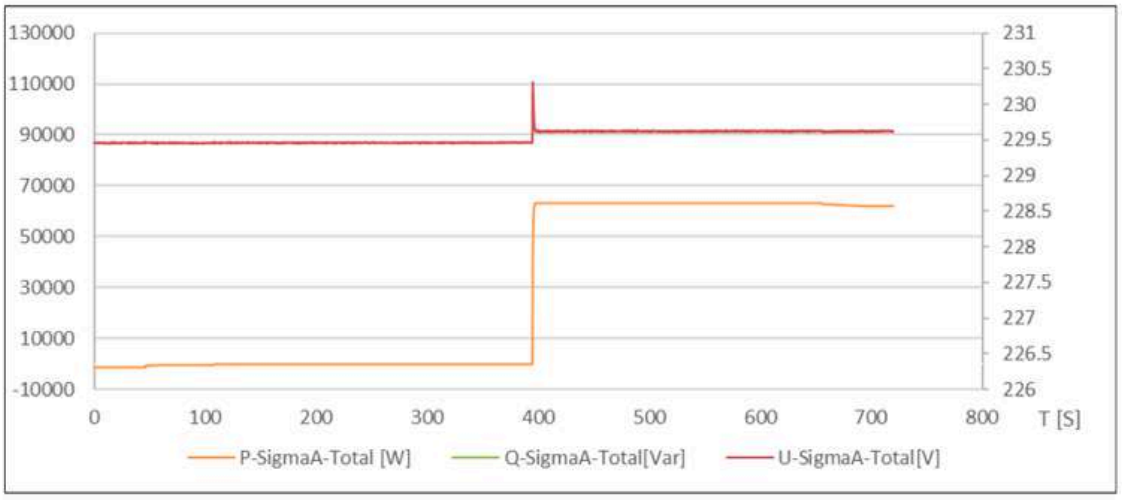


Grafico Test B.2: Limitazione della potenza attiva in risposta a comando esterno

/ Graph Test B.2: Active power limitation in coincidence with external command coming from the Electricity Distributor



Bbis.8	**TABLE: Emissione di componente continua nella corrente di uscita** *(Check of DC current injection*
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Temperature test:	**Reference Conditions**

Bbis.8.1 **TABLE: Verifica della emissione di componente continua** */ Check of DC current injection.*

Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [A]			Injected value D.C. [mA]			Injected value D.C. [%In]			Limit [%In]
				R	S	T	R	S	T	R	S	T	
33± 5	41663	230.1	1.00	59.6	60.4	62.1	275.0	212.5	233.3	0.15	0.12	0.13	0.5
66± 5	83325	230.3	1.00	118.7	119.6	117.1	245.8	237.5	262.5	0.14	0.13	0.14	0.5
100 ± 5	126250	230.5	1.00	180.8	182.5	182.1	320.8	295.8	354.1	0.18	0.16	0.20	0.5

Bbis.8.2 **TABLE: Verifica delle protezioni contro l'immissione di componente continua** */ Check of protections against the DC current injection.*

Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [A]			Intervention value D.C.			Trip Time [ms]	Limit [s]
				R	S	T	[mA]	[%In]	I_{dc} >		
33± 5	42488	229.9	1.00	58.7	59.6	60.4	2670	1.47	0.5% In	891	1
66± 5	84975	230.2	1.00	116.6	117.9	117.9	2730	1.51	0.5% In	878	1
100 ± 5	123750	230.3	1.00	181.2	181.6	180.4	2700	1.49	0.5% In	890	1
Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [A]			Intervention value D.C.			Trip Time [ms]	Limit [s]
				R	S	T	[A]	[%In]	I_{dc} >>		
33± 5	41126	229.6	1.00	60.4	59.6	61.7	11.4	6.29	1A	167	0.2
66± 5	82253	230.2	1.00	118.3	117.9	119.1	12.3	6.79	1A	178	0.2
100 ± 5	125025	230.5	1.00	181.2	181.8	181.0	11.7	6.46	1A	181	0.2

Bbis.8	TABLE: Emissione di componente continua nella corrente di uscita /Check of DC current injection
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Temperature test:	**+55°C ± 2°C**

Bbis.8.1 **TABLE: Verifica della emissione di componente continua** */ Check of DC current injection.*

Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [Arms]			Injected value D.C. [mA]			Injected value D.C. [%In]			Limit [%In]
				R	S	T	R	S	T	R	S	T	
33± 5	41656	230.1	1.00	60.3	60.2	62.1	265.0	212.5	243.3	0.15	0.12	0.13	0.5
66± 5	83706	230.7	1.00	118.3	119.1	117.3	255.8	237.5	262.5	0.14	0.13	0.14	0.5
100 ± 5	125257	230.2	1.00	180.1	182.3	182.1	321.8	295.8	284.1	0.18	0.16	0.16	0.5

Bbis.8.2 **TABLE: Verifica delle protezioni contro l'immissione di componente continua** */ Check of protections against the DC current injection.*

Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [Arms]			Intervention value D.C.			Trip Time [ms]	Limit [s]
				R	S	T	[mA]	[%In]	I_{dc} >		
33± 5	42445	229.5	1.00	58.2	59.3	60.3	2676	1.48	0.5% In	837	1
66± 5	85007	230.2	1.00	115.9	118.3	118.0	2735	1.51	0.5% In	859	1
100 ± 5	124750	230.5	1.00	181.1	181.1	180.5	2715	1.50	0.5% In	889	1
Power [%nominal VA]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [Arms]			Intervention value D.C.			Trip Time [ms]	Limit [s]
				R	S	T	[A]	[%In]	I_{dc} >>		
33± 5	42134	229.5	1.00	60.5	59.9	61.2	11.4	6.29	1A	167	0.2
66± 5	84250	230.3	1.00	118.7	117.4	119.5	12.2	6.73	1A	178	0.2
100 ± 5	124024	230.1	1.00	181.8	181.0	181.7	11.3	6.24	1A	181	0.2

Bbis.8	TABLE: Emissione di componente continua nella corrente di uscita */Check of DC current injection*
Ambient temperature (°C) .....:	25 °C ± 5 °C
Humidity (RH %) .....:	65% ± 5% RH
Instrumentation list.....:	See table "Measurement equipment and instrumentation"
Uncertainty .....:	See table
Temperature test:	**-10 °C ± 2 °C**

Bbis.8.1 — **TABLE: Verifica della emissione di componente continua**
/ Check of DC current injection.

Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [Arms]			Injected value D.C. [mA]			Injected value D.C. [%In]			Limit [%In]
				R	S	T	R	S	T	R	S	T	
33± 5	42400	230.1	1.00	60.7	61.9	62.1	265.6	212.2	243.2	0.15	0.12	0.13	0.5
66± 5	84806	230.7	1.00	118.3	119.1	117.3	256.0	237.5	262.7	0.14	0.13	0.14	0.5
100 ± 5	125350	230.2	1.00	180.1	182.3	182.1	321.8	295.2	284.3	0.18	0.16	0.16	0.5

Bbis.8.2 — **TABLE: Verifica delle protezioni contro l'immissione di componente continua**
/ Check of protections against the DC current injection.

Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [Arms]			Intervention value D.C.			Trip Time [ms]	Limit [s]
				R	S	T	[mA]	[%In]	I_{dc} >		
33± 5	42436	229.5	1.00	58.2	59.3	60.3	2678	1.48	0.5% In	785	1
66± 5	84046	230.2	1.00	116.9	118.4	118.7	2766	1.53	0.5% In	893	1
100 ± 5	124768	230.5	1.00	182.1	181.3	180.6	2785	1.54	0.5% In	773	1
Power [%]	Power [W]	Rated Voltage [Vrms]	Cosφ	Rated Current [Arms]			Intervention value D.C.			Trip Time [ms]	Limit [s]
				R	S	T	[A]	[%In]	I_{dc} >>		
33± 5	42167	229.5	1.00	61.8	62.0	61.9	11.3	6.24	1A	156	0.2
66± 5	84290	230.3	1.00	118.3	118.4	119.1	12.0	6.62	1A	180	0.2
100 ± 5	124469	230.1	1.00	181.2	181.5	181.7	11.9	6.57	1A	167	0.2

Bbis.9	**TABLE: Verifica della insensibilità agli abbassamenti di tensione (LVFRT capability)** *// Check of the LVFRT capability*
Ambient temperature (°C) ..... :	25 °C ± 5 °C
Humidity (RH %) ..... :	65% ± 5% RH
Instrumentation list..... :	See table "Measurement equipment and instrumentation"
Uncertainty ..... :	See table

Tabella 8ter – Parametri relativi alla Figura 14b per la fault-ride-through capability dei parchi di generazione oltre 11,08 kW

Uret	0,05 [p.u.]	Tclear	0,2 s
Uclear	0,15 [p.u.]	Trec1	0,2 s
Urec1	0,15 [p.u.]	Trec2	0,2 s
Urec2	0,85 [p.u.]	Trec3	1,5 s

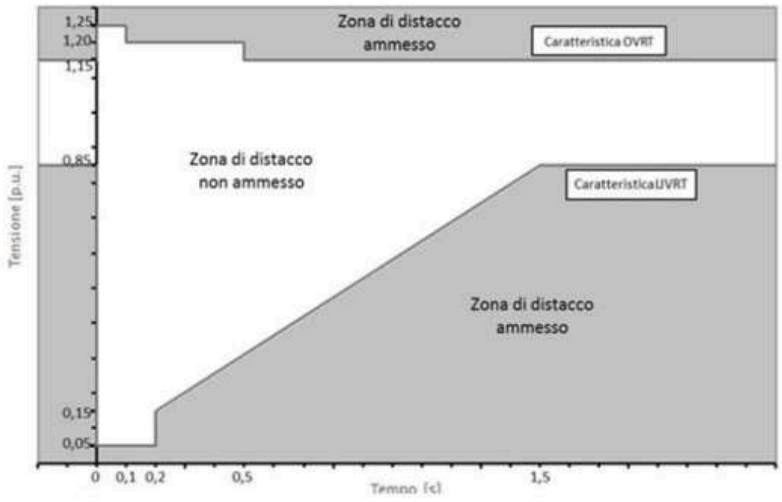


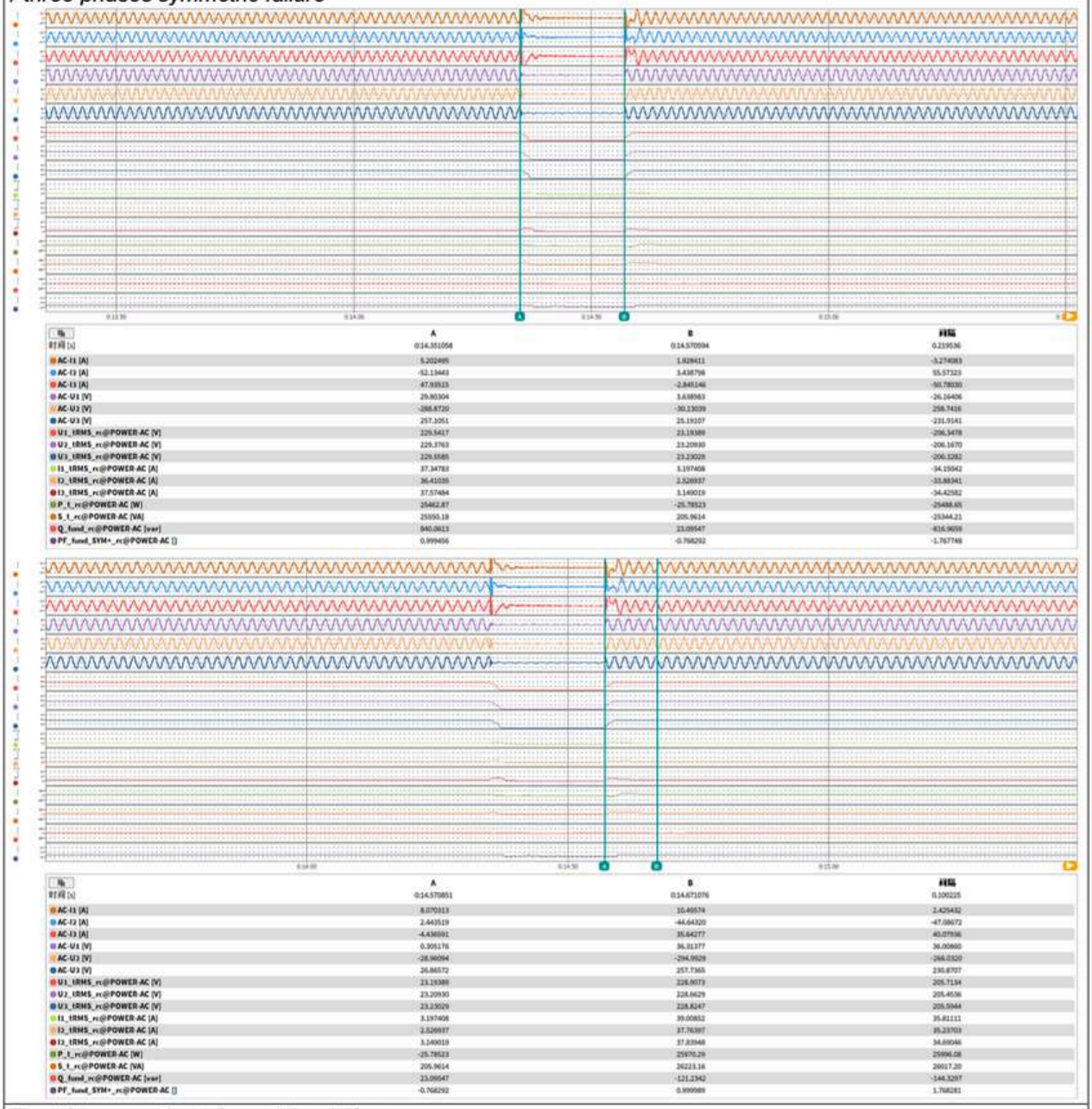
Figura 30 – Caratteristica (V - t): UVRT e OVRT per i parchi di generazione oltre 11,08 kW

Supplementary information:

Output power: 25000W				**Limit: from 10 % to 30% P_{Smax}.**					
Test	**Residual magnitude [V/Vn]**			**phase angle [°]**			**Duration**	**Recovery time**	**Recovery time limit**
	R	S	T	φ_1	φ_2	φ_3	[ms]	[ms]	[ms]
1s – guasto simmetrico trifase */ three phases symmetric failure*	0.10 ± 0.05	0.10 ± 0.05	0.10 ± 0.05	0°	-120°	120°	200 ± 20	100	400
1a – guasto asimmetrico bifase */ two phases asymmetric failure*	0.87 ± 0.05	0.87 ± 0.05	0.10 ± 0.05	27°	-147°	120°	200 ± 20	102	400
2s – guasto simmetrico trifase */ three phases symmetric failure*	0.25 ± 0.05	0.25 ± 0.05	0.25 ± 0.05	0°	-120°	120°	400 ± 20	110	400
2a – guasto asimmetrico bifase */ two phases asymmetric failure*	0.88 ± 0.05	0.88 ± 0.05	0.25 ± 0.05	22°	-142°	120°	400 ± 20	102	400
3s – guasto simmetrico trifase */ three phases symmetric failure*	0.50 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0°	-120°	120°	850 ± 20	104	400
3a – guasto asimmetrico bifase */ two phases asymmetric failure*	0.90 ± 0.05	0.90 ± 0.05	0.50 ± 0.05	14°	-134°	120°	850 ± 20	107	400
4s – guasto simmetrico trifase */ three phases symmetric failure*	0.75 ± 0.05	0.75 ± 0.05	0.75 ± 0.05	0°	-120°	120°	1300 ± 20	134	400
4a – guasto simmetrico bifase */ two phases asymmetric failure*	0.94 ± 0.05	0.94 ± 0.05	0.75 ± 0.05	7°	-127°	120°	1300 ± 20	107	400
5 guasto asimmetrico bifase in BT */ two phases asymmetric failure*	0.10 ± 0.05	1.0 ± 0.05	0.10 ± 0.05	0°	-120°	120°	200 ± 20	95	400
6 guasto asimmetrico bifase in BT */ three phases symmetric failure*	0.50 ± 0.05	1.0 ± 0.05	0.50 ± 0.05	0°	-120°	120°	850 ± 20	222	400
7 OV1 - three-phase symmetrical overvoltage	1.25± 0.05	1.25± 0.05	1.25± 0.05	0°	-120°	120	100± 20	114	400
8 OV2 - three-phase symmetrical overvoltage	1.20± 0.05	1.20± 0.05	1.20± 0.05	0°	-120°	120	500± 20	142	400

Grafici: LVFRT
/ Graphs: LVFRT

Test 1s -- guasto simmetrico trifase
/ three phases symmetric failure



	A	B	
t [s]	0:14.351056	0:14.570694	0.219536
AC-I1 [A]	5.202495	1.928411	-3.274083
AC-I2 [A]	-52.13443	3.438796	55.57323
AC-I3 [A]	47.93515	-2.841146	-50.78030
AC-U1 [V]	29.80304	3.638983	-26.16406
AC-U2 [V]	-288.8720	-30.13039	258.7416
AC-U3 [V]	257.1051	25.19107	-231.9141
U1_tRMS_rc@POWER-AC [V]	229.5417	23.19389	-206.3478
U2_tRMS_rc@POWER-AC [V]	229.3763	23.20930	-206.1670
U3_tRMS_rc@POWER-AC [V]	229.5585	23.23029	-206.3282
I1_tRMS_rc@POWER-AC [A]	37.34783	3.197408	-34.15042
I2_tRMS_rc@POWER-AC [A]	36.41035	2.326937	-33.88341
I3_tRMS_rc@POWER-AC [A]	37.57484	3.149019	-34.42582
P_t_rc@POWER-AC [W]	25462.87	-25.78523	-25488.65
S_t_rc@POWER-AC [VA]	25550.18	205.9614	-25344.21
Q_fund_rc@POWER-AC [var]	840.0013	23.09547	-816.9059
PF_fund_SYM+_rc@POWER-AC []	0.999456	-0.768292	-1.767748

	A	B	
t [s]	0:14.570851	0:14.671076	0.100225
AC-I1 [A]	8.070313	10.49574	2.425432
AC-I2 [A]	2.443519	-44.64320	-47.08672
AC-I3 [A]	-4.436991	35.64277	40.07936
AC-U1 [V]	0.305176	36.31377	36.00860
AC-U2 [V]	-28.96094	-294.9929	-266.0320
AC-U3 [V]	26.86572	257.7365	230.8707
U1_tRMS_rc@POWER-AC [V]	23.19389	228.9073	205.7134
U2_tRMS_rc@POWER-AC [V]	23.20930	228.0629	205.4536
U3_tRMS_rc@POWER-AC [V]	23.23029	228.8247	205.5944
I1_tRMS_rc@POWER-AC [A]	3.197408	39.00852	35.81111
I2_tRMS_rc@POWER-AC [A]	2.326937	37.76397	35.23703
I3_tRMS_rc@POWER-AC [A]	3.149019	37.83948	34.69046
P_t_rc@POWER-AC [W]	-25.78523	25970.29	25996.08
S_t_rc@POWER-AC [VA]	205.9614	26223.16	26017.20
Q_fund_rc@POWER-AC [var]	23.09547	-121.2342	-144.3297
PF_fund_SYM+_rc@POWER-AC []	-0.768292	0.999989	1.768281

Test 1a -- guasto asimmetrico bifase
/ two phases asymmetric failure

	A	B	
时间 [s]	0:19.3429000	0:19.5625076	0.2196075
AC-I1 [A]	-5.443015	-1.000204	4.442811
AC-I2 [A]	-32.13481	8.393017	40.52782
AC-I3 [A]	45.43495	-3.053286	-48.46824
AC-U1 [V]	-35.41589	67.83081	103.2467
AC-U2 [V]	-264.8089	-96.74717	168.0617
AC-U3 [V]	295.0316	29.57130	-265.4603
U1_tRMS_rc@POWER-AC [V]	229.5425	198.6474	-30.89507
U2_tRMS_rc@POWER-AC [V]	229.3792	198.5396	-30.83961
U3_tRMS_rc@POWER-AC [V]	229.5627	23.28406	-206.2786
I1_tRMS_rc@POWER-AC [A]	37.38811	4.691273	-32.69684
I2_tRMS_rc@POWER-AC [A]	31.61423	9.383096	-22.23114
I3_tRMS_rc@POWER-AC [A]	37.51912	2.751948	-34.76717
P_t_rc@POWER-AC [W]	24351.64	-2460.012	-26811.66
S_t_rc@POWER-AC [VA]	24446.80	2858.902	-21587.90
Q_fund_rc@POWER-AC [var]	845.7688	775.7791	-70.00970
PF_fund_SYM+_rc@POWER-AC []	0.999398	-0.989580	-1.988978

	A	B	
时间 [s]	0:19.5622439	0:19.6645854	0.1023415
AC-I1 [A]	-1.461186	26.81788	28.27907
AC-I2 [A]	8.381930	-48.52167	-56.90360
AC-I3 [A]	-2.956653	30.90920	33.86586
AC-U1 [V]	45.58823	136.6682	91.09998
AC-U2 [V]	-74.99648	-324.4169	-249.4204
AC-U3 [V]	30.58315	188.9351	158.3519
U1_tRMS_rc@POWER-AC [V]	198.6474	231.7329	33.08548
U2_tRMS_rc@POWER-AC [V]	196.5396	231.2513	32.71169
U3_tRMS_rc@POWER-AC [V]	23.28406	230.2362	206.9521
I1_tRMS_rc@POWER-AC [A]	4.691273	38.88150	34.19023
I2_tRMS_rc@POWER-AC [A]	9.383096	32.72106	23.33796
I3_tRMS_rc@POWER-AC [A]	2.751948	37.89100	35.13905
P_t_rc@POWER-AC [W]	-2460.012	25036.67	27496.68
S_t_rc@POWER-AC [VA]	2858.902	25300.79	22441.89
Q_fund_rc@POWER-AC [var]	775.7791	244.7243	-531.0548
PF_fund_SYM+_rc@POWER-AC []	-0.989580	0.999952	1.989533

Test 2s -- guasto simmetrico trifase
/ three phases symmetric failure

	A	B	
时间 [s]	0:12.778695	0:13.198290	0.419595
AC-I1 [A]	-11.01450	1.753531	12.76803
AC-I2 [A]	-32.74707	2.353397	35.10046
AC-I3 [A]	47.75854	-5.315282	-53.11382
AC-U1 [V]	-74.26096	-28.02921	46.23676
AC-U2 [V]	-240.5346	-52.49501	188.0396
AC-U3 [V]	306.6602	77.92235	-228.7378
U1_tRMS_rc@POWER-AC [V]	229.5398	57.04803	-172.4918
U2_tRMS_rc@POWER-AC [V]	229.3902	57.01881	-172.3714
U3_tRMS_rc@POWER-AC [V]	229.5870	57.05802	-172.5089
I1_tRMS_rc@POWER-AC [A]	37.31462	3.496081	-33.81854
I2_tRMS_rc@POWER-AC [A]	36.45508	2.510359	-33.94472
I3_tRMS_rc@POWER-AC [A]	37.59569	3.475762	-34.11993
P_t_rc@POWER-AC [W]	25466.86	-182.6610	-25649.52
S_t_rc@POWER-AC [VA]	25558.36	540.9023	-25017.46
Q_fund_rc@POWER-AC [var]	845.0627	109.8400	-735.2228
PF_fund_SYN+_rc@POWER-AC []	0.999450	-0.859213	-1.858663

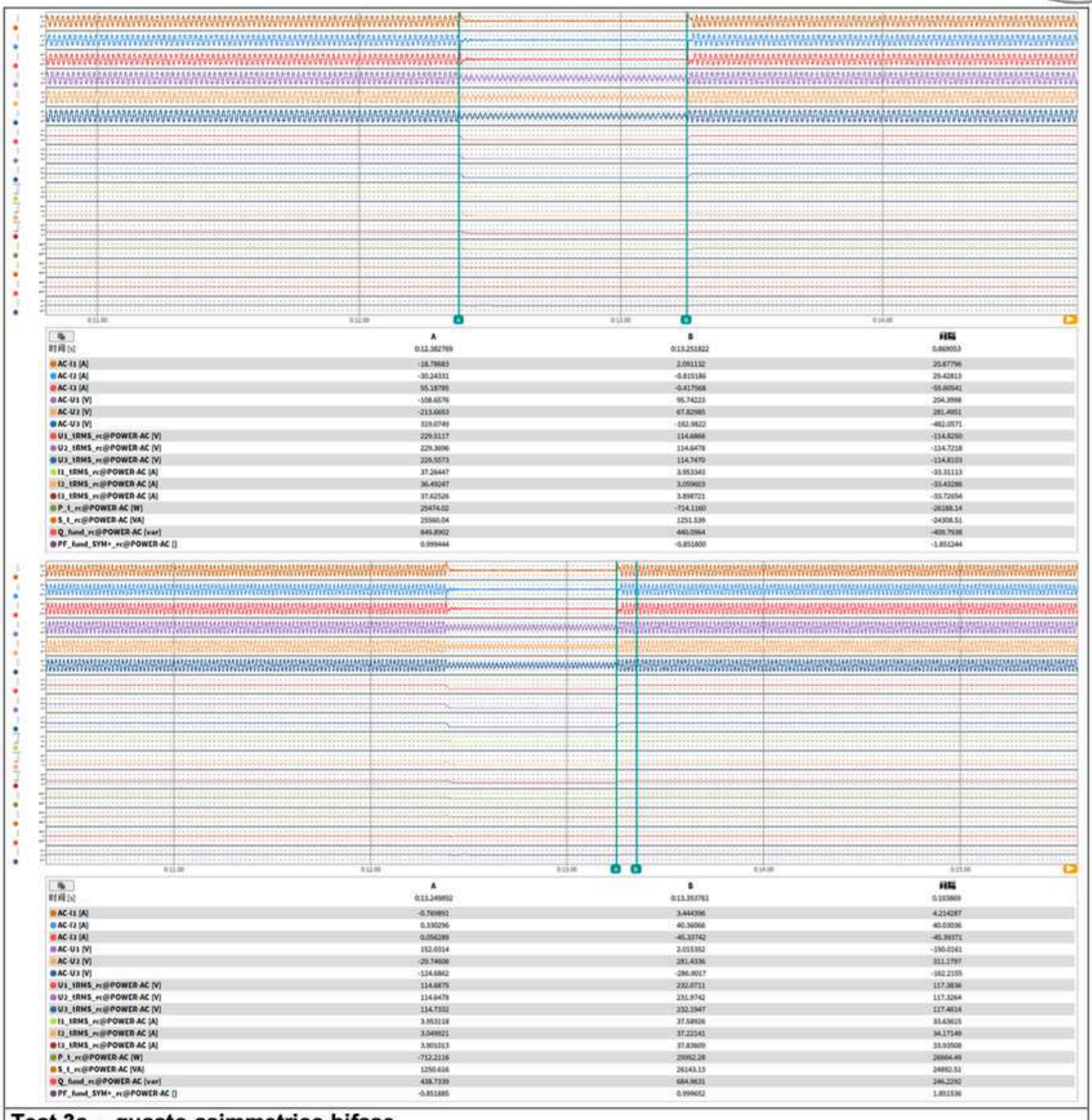
	A	B	
时间 [s]	0:13.196937	0:13.306600	0.109662
AC-I1 [A]	2.163373	36.47169	34.30832
AC-I2 [A]	4.044262	13.15641	9.114147
AC-I3 [A]	-5.484440	-49.88537	-44.40093
AC-U1 [V]	-66.86570	246.6970	301.5627
AC-U2 [V]	-21.77356	58.73871	80.51229
AC-U3 [V]	76.79868	-307.3905	-384.1892
U1_tRMS_rc@POWER-AC [V]	57.04277	230.6256	173.5829
U2_tRMS_rc@POWER-AC [V]	57.01733	230.4189	173.4185
U3_tRMS_rc@POWER-AC [V]	57.05586	230.7500	173.6942
I1_tRMS_rc@POWER-AC [A]	3.495555	38.08035	34.58479
I2_tRMS_rc@POWER-AC [A]	2.507060	36.78748	34.28042
I3_tRMS_rc@POWER-AC [A]	3.474670	37.49408	34.01941
P_t_rc@POWER-AC [W]	-182.8113	20498.01	20680.82
S_t_rc@POWER-AC [VA]	540.5923	25811.22	25270.63
Q_fund_rc@POWER-AC [var]	109.0352	58.51098	-50.52427
PF_fund_SYN+_rc@POWER-AC []	-0.860827	0.999997	1.860824

Test 2a -- guasto asimmetrico bifase
/ two phases asymmetric failure

	A	B	
时间 [s]	0:12.949515	0:13.368576	0.419060
AC-I1 [A]	-62.07589	-2.198560	59.81733
AC-I2 [A]	-95.60088	7.307974	102.9089
AC-I3 [A]	118.2573	-4.662598	-122.9099
AC-U1 [V]	187.2525	53.01452	-134.2380
AC-U2 [V]	-174.0551	-127.9519	46.10324
AC-U3 [V]	235.5144	75.95826	-159.5562
U1_tRMS_rc@POWER-AC [V]	229.5245	201.6408	-27.88373
U2_tRMS_rc@POWER-AC [V]	229.3697	201.5218	-27.84785
U3_tRMS_rc@POWER-AC [V]	229.5858	57.19228	-172.3935
I1_tRMS_rc@POWER-AC [A]	37.33377	4.568075	-32.76570
I2_tRMS_rc@POWER-AC [A]	32.85419	7.529777	-25.32441
I3_tRMS_rc@POWER-AC [A]	37.55305	3.061725	-34.49133
P_t_rc@POWER-AC [W]	24635.26	-2132.196	-26767.46
S_t_rc@POWER-AC [VA]	24726.42	2613.632	-22112.79
Q_fund_rc@POWER-AC [var]	826.0693	821.5232	-4.546082
PF_fund_SYM+_rc@POWER-AC []	0.999439	-0.957954	-1.957392

	A	B	
时间 [s]	0:13.368476	0:13.470698	0.102222
AC-I1 [A]	-1.079166	25.93025	27.00942
AC-I2 [A]	8.191315	-50.62131	-58.81262
AC-I3 [A]	-1.889420	30.02300	31.91242
AC-U1 [V]	45.43042	148.9675	103.5371
AC-U2 [V]	-120.3270	-322.5863	-202.2593
AC-U3 [V]	76.21313	180.0053	103.7922
U1_tRMS_rc@POWER-AC [V]	201.6408	232.3358	30.69498
U2_tRMS_rc@POWER-AC [V]	201.5218	231.7406	30.21883
U3_tRMS_rc@POWER-AC [V]	57.19228	231.7230	174.5307
I1_tRMS_rc@POWER-AC [A]	4.568075	39.04750	34.47943
I2_tRMS_rc@POWER-AC [A]	7.529777	33.91475	26.38497
I3_tRMS_rc@POWER-AC [A]	3.061725	38.08971	35.02798
P_t_rc@POWER-AC [W]	-2132.196	25503.14	27635.34
S_t_rc@POWER-AC [VA]	2613.632	25757.82	23144.19
Q_fund_rc@POWER-AC [var]	821.5232	322.0992	-499.4240
PF_fund_SYM+_rc@POWER-AC []	-0.957954	0.999920	1.957874

Test 3s -- guasto simmetrico trifase
/ three phases symmetric failure

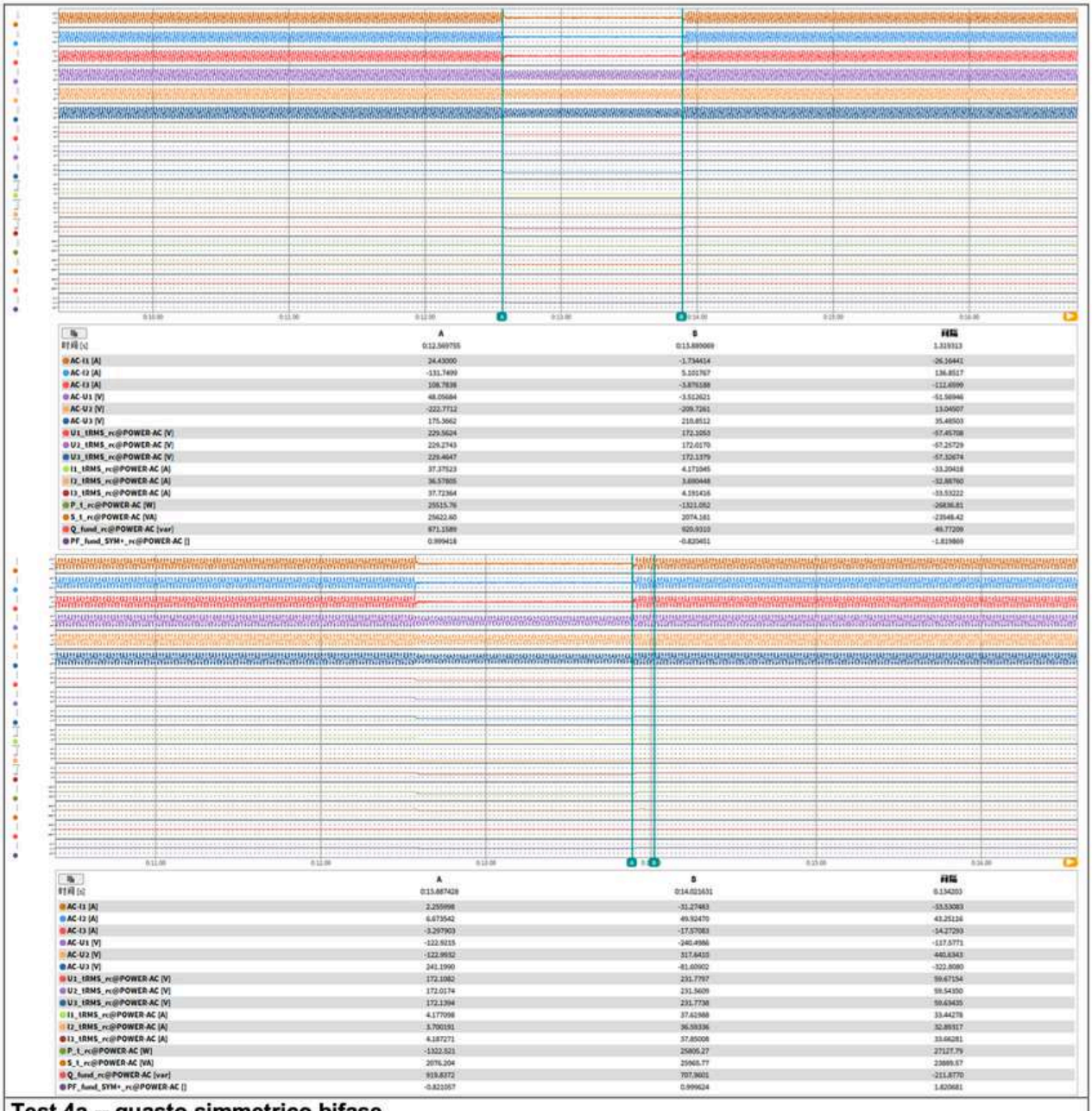


Test 3a -- guasto asimmetrico bifase
/ two phases asymmetric failure

	A	B	
时间 [s]	0:12.724928	0:13.594164	0.869236
AC-I1 [A]	-13.36304	4.891001	18.25404
AC-I2 [A]	-30.03195	-2.316508	27.71545
AC-I3 [A]	50.75290	-0.919478	-51.67258
AC-U1 [V]	-69.77795	73.53187	163.3098
AC-U2 [V]	-290.4020	88.40156	318.8036
AC-U3 [V]	314.4481	-162.5521	-477.0003
U1_tRMS_rc@POWER-AC [V]	229.5485	206.4864	-23.06219
U2_tRMS_rc@POWER-AC [V]	229.3771	206.3661	-23.01097
U3_tRMS_rc@POWER-AC [V]	229.5665	114.7269	-114.8396
I1_tRMS_rc@POWER-AC [A]	37.15602	4.212993	-32.94303
I2_tRMS_rc@POWER-AC [A]	35.13235	4.732093	-30.39941
I3_tRMS_rc@POWER-AC [A]	37.48545	3.639249	-33.84620
P_t_rc@POWER-AC [W]	25106.98	-1531.307	-26638.29
S_t_rc@POWER-AC [VA]	25193.07	2264.168	-22928.90
Q_fund_rc@POWER-AC [var]	753.3836	853.1781	99.79449
PF_fund_SYM+_rc@POWER-AC []	0.999550	-0.869894	-1.869444

	A	B	
时间 [s]	0:13.592893	0:13.699436	0.106543
AC-I1 [A]	1.253422	-47.50256	-48.75598
AC-I2 [A]	1.465765	39.23099	37.77123
AC-I3 [A]	0.908158	7.073663	6.165505
AC-U1 [V]	180.7237	-302.2299	-482.9536
AC-U2 [V]	-33.88548	263.5725	297.4580
AC-U3 [V]	-150.7409	37.09936	187.8402
U1_tRMS_rc@POWER-AC [V]	206.4915	232.1038	25.61234
U2_tRMS_rc@POWER-AC [V]	206.3662	231.8490	25.48282
U3_tRMS_rc@POWER-AC [V]	114.7275	231.1671	116.4396
I1_tRMS_rc@POWER-AC [A]	4.214156	39.10281	34.88865
I2_tRMS_rc@POWER-AC [A]	4.735647	36.09797	31.36233
I3_tRMS_rc@POWER-AC [A]	3.639061	38.53777	34.89870
P_t_rc@POWER-AC [W]	-1529.942	26209.95	27739.89
S_t_rc@POWER-AC [VA]	2264.965	26353.85	24088.89
Q_fund_rc@POWER-AC [var]	853.4478	447.4140	-406.0338
PF_fund_SYM+_rc@POWER-AC []	-0.869705	0.999855	1.869560

Test 4s -- guasto simmetrico trifase
/ three phases symmetric failure

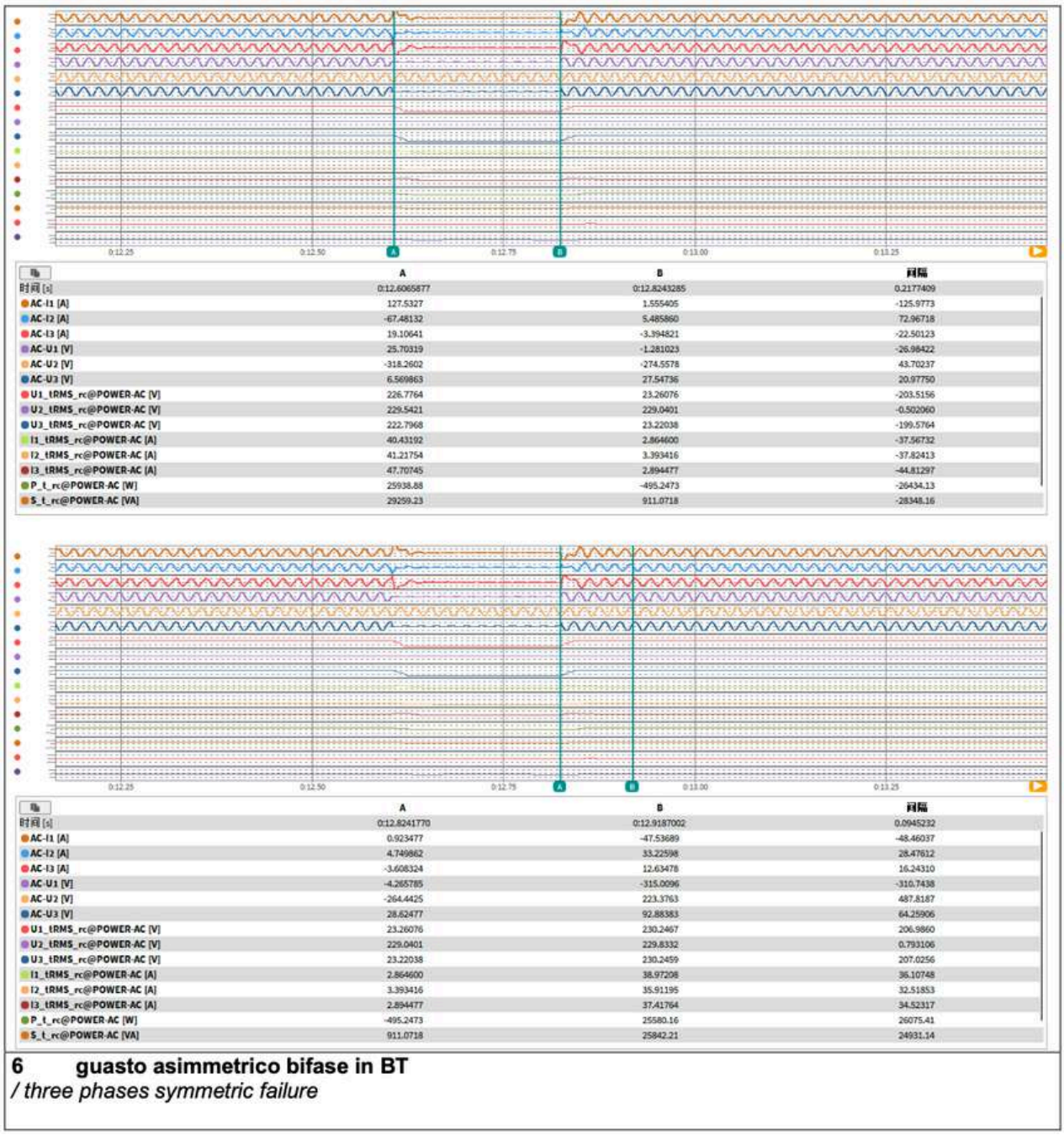


	A	B	
时间 [s]	0:12.569755	0:13.889069	1.319313
AC-I1 [A]	24.43000	-1.734414	-26.16441
AC-I2 [A]	-131.7499	5.101767	136.8517
AC-I3 [A]	108.7838	-3.876188	-112.6599
AC-U1 [V]	48.05684	-3.512621	-51.56946
AC-U2 [V]	-222.7712	-209.7261	13.04507
AC-U3 [V]	175.3662	210.8512	35.48503
U1_tRMS_rc@POWER-AC [V]	229.5624	172.1053	-57.45708
U2_tRMS_rc@POWER-AC [V]	229.2743	172.0170	-57.25729
U3_tRMS_rc@POWER-AC [V]	229.4647	172.1379	-57.32674
I1_tRMS_rc@POWER-AC [A]	37.37523	4.171045	-33.20418
I2_tRMS_rc@POWER-AC [A]	36.57805	3.690448	-32.88760
I3_tRMS_rc@POWER-AC [A]	37.72364	4.191416	-33.53222
P_t_rc@POWER-AC [W]	25515.76	-1321.052	-26836.81
S_t_rc@POWER-AC [VA]	25622.60	2074.181	-23548.42
Q_fund_rc@POWER-AC [var]	671.1589	920.9310	49.77209
PF_fund_SYM+_rc@POWER-AC []	0.999418	-0.820451	-1.819869

	A	B	
时间 [s]	0:13.887428	0:14.021631	0.134203
AC-I1 [A]	2.255998	-31.27483	-33.53083
AC-I2 [A]	6.673542	49.92470	43.25116
AC-I3 [A]	-3.297903	-17.57083	-14.27293
AC-U1 [V]	-122.9215	-240.4986	-117.5771
AC-U2 [V]	-122.9532	317.6410	440.6343
AC-U3 [V]	241.1990	-81.60902	-322.8080
U1_tRMS_rc@POWER-AC [V]	172.1082	231.7797	59.67154
U2_tRMS_rc@POWER-AC [V]	172.0174	231.5609	59.54350
U3_tRMS_rc@POWER-AC [V]	172.1394	231.7738	59.63435
I1_tRMS_rc@POWER-AC [A]	4.177098	37.62988	33.44278
I2_tRMS_rc@POWER-AC [A]	3.700191	36.59336	32.89317
I3_tRMS_rc@POWER-AC [A]	4.187271	37.85008	33.66281
P_t_rc@POWER-AC [W]	-1322.521	25805.27	27127.79
S_t_rc@POWER-AC [VA]	2076.204	25965.77	23889.67
Q_fund_rc@POWER-AC [var]	919.8372	707.9601	-211.8770
PF_fund_SYM+_rc@POWER-AC []	-0.821057	0.999624	1.820681

Test 4a -- guasto simmetrico bifase
/ two phases asymmetric failure

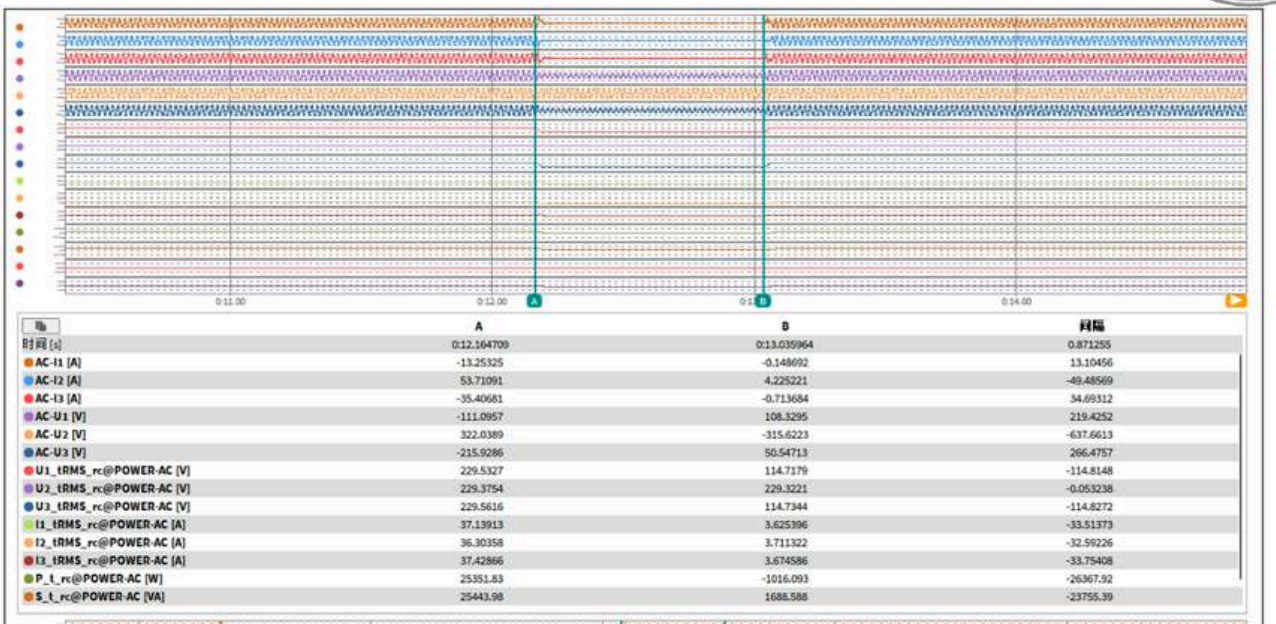
5 guasto asimmetrico bifase in BT
/ two phases asymmetric failure



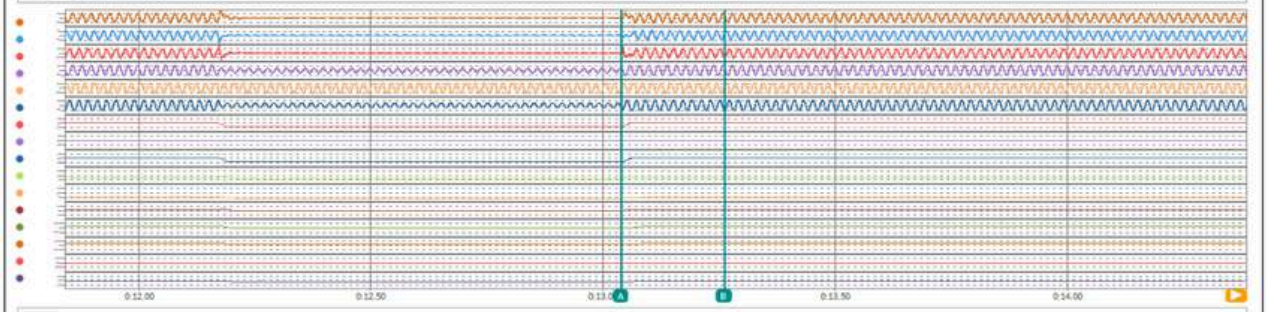
	A	B	间隔
时间 [s]	0:12.6065877	0:12.8243285	0.2177409
AC-I1 [A]	127.5327	1.555405	-125.9773
AC-I2 [A]	-67.48132	5.485860	72.96718
AC-I3 [A]	19.10641	-3.394821	-22.50123
AC-U1 [V]	25.70319	-1.281023	-26.98422
AC-U2 [V]	-318.2602	-274.5578	43.70237
AC-U3 [V]	6.569863	27.54736	20.97750
U1_tRMS_rc@POWER-AC [V]	226.7764	23.26076	-203.5156
U2_tRMS_rc@POWER-AC [V]	229.5421	229.0401	-0.502060
U3_tRMS_rc@POWER-AC [V]	222.7968	23.22038	-199.5764
I1_tRMS_rc@POWER-AC [A]	40.43192	2.864600	-37.56732
I2_tRMS_rc@POWER-AC [A]	41.21754	3.393416	-37.82413
I3_tRMS_rc@POWER-AC [A]	47.70745	2.894477	-44.81297
P_t_rc@POWER-AC [W]	25938.88	-495.2473	-26434.13
S_t_rc@POWER-AC [VA]	29259.23	911.0718	-28348.16

	A	B	间隔
时间 [s]	0:12.8241770	0:12.9187002	0.0945232
AC-I1 [A]	0.923477	-47.53689	-48.46037
AC-I2 [A]	4.749862	33.22598	28.47612
AC-I3 [A]	-3.608324	12.63478	16.24310
AC-U1 [V]	-4.265785	-315.0096	-310.7438
AC-U2 [V]	-264.4425	223.3763	487.8187
AC-U3 [V]	28.62477	92.88383	64.25906
U1_tRMS_rc@POWER-AC [V]	23.26076	230.2467	206.9860
U2_tRMS_rc@POWER-AC [V]	229.0401	229.8332	0.793106
U3_tRMS_rc@POWER-AC [V]	23.22038	230.2459	207.0256
I1_tRMS_rc@POWER-AC [A]	2.864600	38.97208	36.10748
I2_tRMS_rc@POWER-AC [A]	3.393416	35.91195	32.51853
I3_tRMS_rc@POWER-AC [A]	2.894477	37.41764	34.52317
P_t_rc@POWER-AC [W]	-495.2473	25580.16	26075.41
S_t_rc@POWER-AC [VA]	911.0718	25842.21	24931.14

6 guasto asimmetrico bifase in BT
/ three phases symmetric failure



	A	B	间隔
时间 [s]	0:12.164709	0:13.035964	0.871255
AC-I1 [A]	-13.25325	-0.148692	13.10456
AC-I2 [A]	53.71091	4.225221	-49.48569
AC-I3 [A]	-35.40681	-0.713684	34.69312
AC-U1 [V]	-111.0957	108.3295	219.4252
AC-U2 [V]	322.0389	-315.6223	-637.6613
AC-U3 [V]	-215.9286	50.54713	266.4757
U1_tRMS_rc@POWER-AC [V]	229.5327	114.7179	-114.8148
U2_tRMS_rc@POWER-AC [V]	229.3754	229.3221	-0.053238
U3_tRMS_rc@POWER-AC [V]	229.5616	114.7344	-114.8272
I1_tRMS_rc@POWER-AC [A]	37.13913	3.625396	-33.51373
I2_tRMS_rc@POWER-AC [A]	36.30358	3.711322	-32.59226
I3_tRMS_rc@POWER-AC [A]	37.42866	3.674586	-33.75408
P_t_rc@POWER-AC [W]	25351.83	-1016.093	-26367.92
S_t_rc@POWER-AC [VA]	25443.98	1688.588	-23755.39



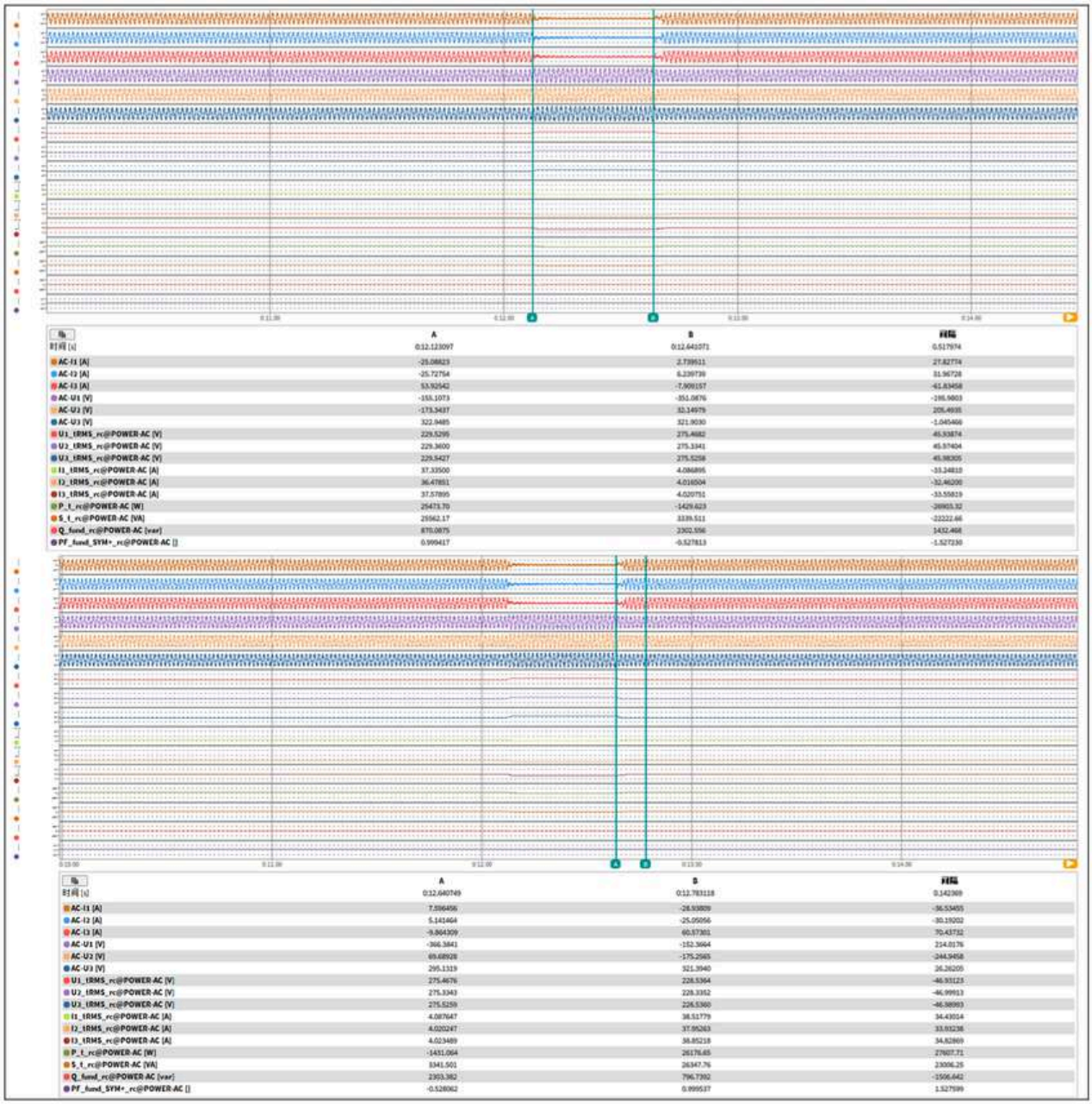
	A	B	间隔
时间 [s]	0:13.039709	0:13.261982	0.222272
AC-I1 [A]	-0.414409	30.67847	31.09288
AC-I2 [A]	0.177947	27.66201	27.48406
AC-I3 [A]	0.932119	-57.23820	-58.17032
AC-U1 [V]	151.6652	162.1487	10.48350
AC-U2 [V]	-61.10406	168.4613	229.5654
AC-U3 [V]	-124.5701	-327.7312	-203.1610
U1_tRMS_rc@POWER-AC [V]	114.7134	230.7964	116.0830
U2_tRMS_rc@POWER-AC [V]	229.3272	229.6589	0.331665
U3_tRMS_rc@POWER-AC [V]	114.7337	230.8745	116.1408
I1_tRMS_rc@POWER-AC [A]	3.620586	36.98877	33.36818
I2_tRMS_rc@POWER-AC [A]	3.728942	36.14717	32.41823
I3_tRMS_rc@POWER-AC [A]	3.669913	37.25819	33.58827
P_t_rc@POWER-AC [W]	-1018.284	25351.54	26369.83
S_t_rc@POWER-AC [VA]	1691.540	25440.36	23748.82

7 OV1 - three-phase symmetrical overvoltage

	A	B	
t [s]	0:13.0764442	0:13.1956501	0.1192059
AC-I1 [A]	-28.69956	2.601109	31.30067
AC-I2 [A]	-21.99677	5.710092	27.70686
AC-I3 [A]	53.91970	-6.900647	-60.82034
AC-U1 [V]	-172.9472	-292.1281	-119.1809
AC-U2 [V]	-151.8111	-100.2727	51.53847
AC-U3 [V]	320.6866	388.7780	68.09140
U1_tRMS_rc@POWER-AC [V]	229.0344	287.8879	58.33351
U2_tRMS_rc@POWER-AC [V]	229.3893	287.7525	58.36324
U3_tRMS_rc@POWER-AC [V]	229.9675	287.9024	58.39490
I1_tRMS_rc@POWER-AC [A]	37.25023	5.128650	-32.12158
I2_tRMS_rc@POWER-AC [A]	36.36969	5.098763	-31.27093
I3_tRMS_rc@POWER-AC [A]	37.69473	5.079058	-32.61568
P_t_rc@POWER-AC [W]	25437.83	-2258.473	-27696.30
S_t_rc@POWER-AC [VA]	25524.30	4406.236	-21118.07
Q_fund_rc@POWER-AC [var]	855.5940	2664.630	1809.036
PF_fund_SYM+_rc@POWER-AC []	0.999435	-0.646881	-1.646316

	A	B	
t [s]	0:13.1976504	0:13.3114087	0.1137582
AC-I1 [A]	-1.935400	-38.59798	-36.66258
AC-I2 [A]	6.598440	45.78158	39.18314
AC-I3 [A]	-3.256776	-6.005862	-2.749086
AC-U1 [V]	-76.40720	-274.6928	-198.2856
AC-U2 [V]	-312.2521	285.0509	597.3029
AC-U3 [V]	381.1302	-14.63366	-395.7639
U1_tRMS_rc@POWER-AC [V]	287.8851	229.3178	-58.56729
U2_tRMS_rc@POWER-AC [V]	287.7510	229.1433	-58.60770
U3_tRMS_rc@POWER-AC [V]	287.9611	229.3189	-58.64226
I1_tRMS_rc@POWER-AC [A]	5.116175	39.09543	33.93926
I2_tRMS_rc@POWER-AC [A]	5.079995	38.32766	33.25167
I3_tRMS_rc@POWER-AC [A]	4.920747	39.38332	34.46258
P_t_rc@POWER-AC [W]	-2209.213	26546.72	28757.94
S_t_rc@POWER-AC [VA]	4350.477	26769.97	22419.50
Q_fund_rc@POWER-AC [var]	2672.270	884.9025	-1787.367
PF_fund_SYM+_rc@POWER-AC []	-0.637448	0.999445	1.636893

8 OV2 - three-phase symmetrical overvoltage



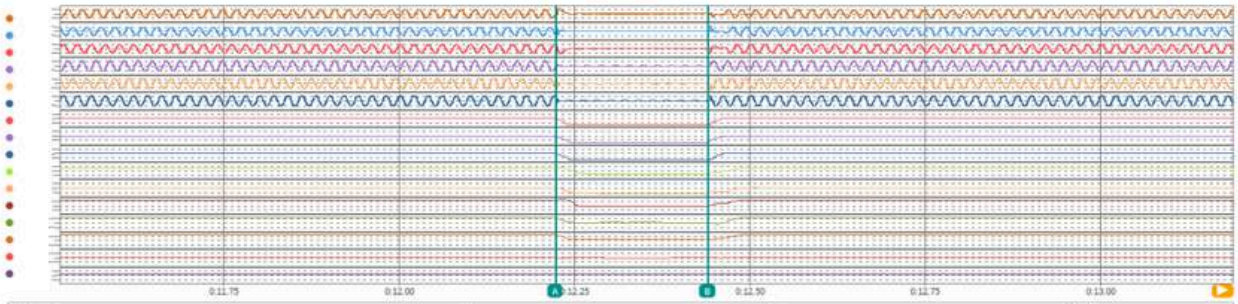
时间 [s]	A 0:12.123097	B 0:12.641071	Δ 0.517974
AC-I1 [A]	-25.08823	2.739511	27.82774
AC-I2 [A]	-25.72754	6.239739	31.96728
AC-I3 [A]	53.92542	-7.909157	-61.83458
AC-U1 [V]	-155.1073	-351.0876	-195.9803
AC-U2 [V]	-173.3437	32.14979	205.4935
AC-U3 [V]	322.9485	321.9030	-1.045466
U1_tRMS_rc@POWER-AC [V]	229.5295	275.4682	45.93874
U2_tRMS_rc@POWER-AC [V]	229.3600	275.3341	45.97404
U3_tRMS_rc@POWER-AC [V]	229.5427	275.5258	45.98305
I1_tRMS_rc@POWER-AC [A]	37.33500	4.086895	-33.24810
I2_tRMS_rc@POWER-AC [A]	36.47851	4.016504	-32.46200
I3_tRMS_rc@POWER-AC [A]	37.57895	4.020751	-33.55819
P_t_rc@POWER-AC [W]	25473.70	-1429.623	-26903.32
S_t_rc@POWER-AC [VA]	25562.17	3339.511	-22222.66
Q_fund_rc@POWER-AC [var]	870.0875	2302.556	1432.468
PF_fund_SYM+_rc@POWER-AC []	0.999417	-0.527813	-1.527230

时间 [s]	A 0:12.640749	B 0:12.783118	Δ 0.142369
AC-I1 [A]	7.596456	-28.93809	-36.53455
AC-I2 [A]	5.141464	-25.05056	-30.19202
AC-I3 [A]	-9.864309	60.57301	70.43732
AC-U1 [V]	-366.3841	-152.3664	214.0176
AC-U2 [V]	69.68928	-175.2565	-244.9458
AC-U3 [V]	295.1319	321.3940	26.26205
U1_tRMS_rc@POWER-AC [V]	275.4676	228.5364	-46.93123
U2_tRMS_rc@POWER-AC [V]	275.3343	228.3352	-46.99913
U3_tRMS_rc@POWER-AC [V]	275.5259	226.5360	-46.98993
I1_tRMS_rc@POWER-AC [A]	4.087647	38.51779	34.43014
I2_tRMS_rc@POWER-AC [A]	4.020247	37.95263	33.93238
I3_tRMS_rc@POWER-AC [A]	4.023489	38.85218	34.82869
P_t_rc@POWER-AC [W]	-1431.064	26176.65	27607.71
S_t_rc@POWER-AC [VA]	3341.501	26347.76	23006.25
Q_fund_rc@POWER-AC [var]	2303.382	796.7392	-1506.642
PF_fund_SYM+_rc@POWER-AC []	-0.528062	0.999537	1.527599

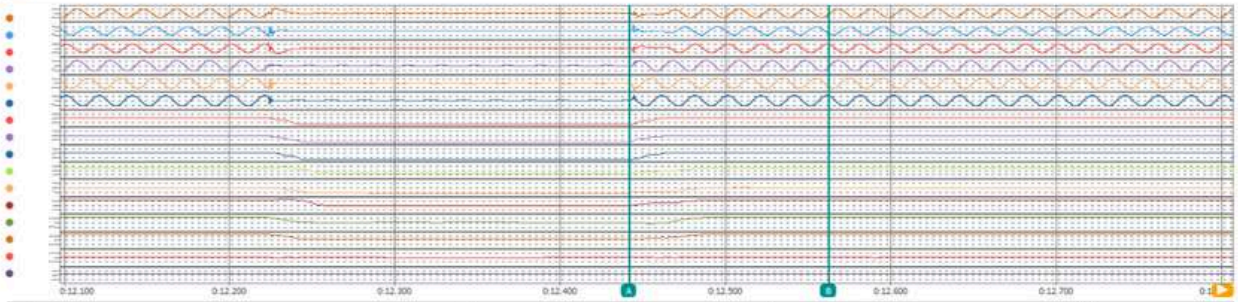
Output power: 125000W				**Limit: from > 90% P_{Smax}.**					
Test	**Residual magnitude [V/Vn]**			**phase angle [°]**			**Duration**	**Recovery time**	**Recovery time limit**
	R	S	T	φ_1	φ_2	φ_3	[ms]	[ms]	[ms]
1s – guasto simmetrico trifase */ three phases symmetric failure*	0.10 ± 0.05	0.10 ± 0.05	0.10 ± 0.05	0°	-120°	120°	200 ± 20	121	400
1a – guasto asimmetrico bifase */ two phases asymmetric failure*	0.87 ± 0.05	0.87 ± 0.05	0.10 ± 0.05	27°	-147°	120°	200 ± 20	181	400
2s – guasto simmetrico trifase */ three phases symmetric failure*	0.25 ± 0.05	0.25 ± 0.05	0.25 ± 0.05	0°	-120°	120°	400 ± 20	174	400
2a – guasto asimmetrico bifase */ two phases asymmetric failure*	0.88 ± 0.05	0.88 ± 0.05	0.25 ± 0.05	22°	-142°	120°	400 ± 20	152	400
3s – guasto simmetrico trifase */ three phases symmetric failure*	0.50 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0°	-120°	120°	850 ± 20	188	400
3a – guasto asimmetrico bifase */ two phases asymmetric failure*	0.90 ± 0.05	0.90 ± 0.05	0.50 ± 0.05	14°	-134°	120°	850 ± 20	245	400
4s – guasto simmetrico trifase */ three phases symmetric failure*	0.75 ± 0.05	0.75 ± 0.05	0.75 ± 0.05	0°	-120°	120°	1300 ± 20	250	400
4a – guasto simmetrico bifase */ two phases asymmetric failure*	0.94 ± 0.05	0.94 ± 0.05	0.75 ± 0.05	7°	-127°	120°	1300 ± 20	245	400
9 guasto asimmetrico bifase in BT */ two phases asymmetric failure*	0.10 ± 0.05	1.0 ± 0.05	0.10 ± 0.05	0°	-120°	120°	200 ± 20	174	400
10 guasto asimmetrico bifase in BT */ three phases symmetric failure*	0.50 ± 0.05	1.0 ± 0.05	0.50 ± 0.05	0°	-120°	120°	850 ± 20	205	400
11 OV1 - three-phase symmetrical overvoltage	1.25± 0.05	1.25± 0.05	1.25± 0.05	0°	-120°	120	100± 20	257	400
12 OV2 - three-phase symmetrical overvoltage	1.20± 0.05	1.20± 0.05	1.20± 0.05	0°	-120°	120	500± 20	284	400

Grafici: LVFRT
/ Graphs: LVFRT

Test 1s -- guasto simmetrico trifase
/ three phases symmetric failure

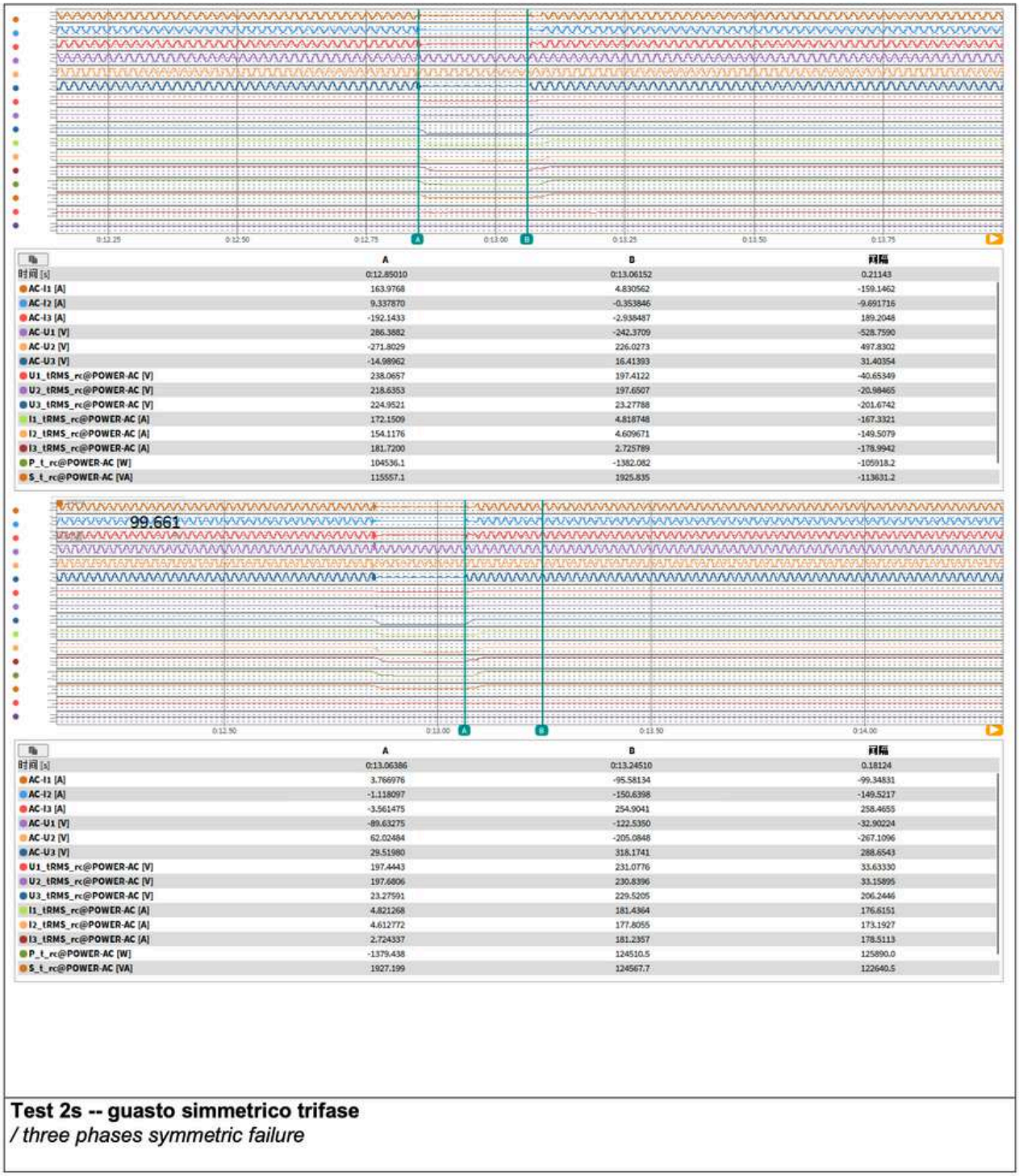


	A	B	
时间 [s]	0:12.223480	0:12.440581	0.217102
AC-I1 [A]	23.10177	3.602110	-19.49966
AC-I2 [A]	-227.0803	3.231374	230.3116
AC-I3 [A]	207.8206	-4.066088	-211.8867
AC-U1 [V]	26.83044	-25.03753	-51.86796
AC-U2 [V]	-295.5585	-6.595135	288.9633
AC-U3 [V]	265.7447	29.49000	-236.2547
U1_tRMS_rc@POWER-AC [V]	229.8868	23.17846	-206.7083
U2_tRMS_rc@POWER-AC [V]	229.5594	23.21684	-206.3425
U3_tRMS_rc@POWER-AC [V]	229.7999	23.22457	-206.5754
I1_tRMS_rc@POWER-AC [A]	181.8154	3.133007	-178.6824
I2_tRMS_rc@POWER-AC [A]	178.3326	2.413887	-175.9188
I3_tRMS_rc@POWER-AC [A]	182.1777	3.282357	-178.8953
P_t_rc@POWER-AC [W]	124541.6	-23.16486	-124564.8
S_t_rc@POWER-AC [VA]	124599.3	204.8924	-124394.4



	A	B	
时间 [s]	0:12.441736	0:12.562374	0.120638
AC-I1 [A]	2.879701	-65.14148	-68.02118
AC-I2 [A]	2.689210	-179.0365	-181.7258
AC-I3 [A]	-3.653028	253.2715	256.9245
AC-U1 [V]	-15.28788	-83.52352	-68.23564
AC-U2 [V]	-17.72642	-232.7624	-215.0359
AC-U3 [V]	29.91820	306.0100	276.0918
U1_tRMS_rc@POWER-AC [V]	23.17775	229.4470	206.2692
U2_tRMS_rc@POWER-AC [V]	23.21656	229.0068	205.7902
U3_tRMS_rc@POWER-AC [V]	23.22437	229.3152	206.0908
I1_tRMS_rc@POWER-AC [A]	3.142461	181.5171	178.3747
I2_tRMS_rc@POWER-AC [A]	2.427385	179.5239	177.0965
I3_tRMS_rc@POWER-AC [A]	3.288189	181.9820	178.6938
P_t_rc@POWER-AC [W]	-23.71183	124426.0	124449.7
S_t_rc@POWER-AC [VA]	205.5568	124492.0	124286.4

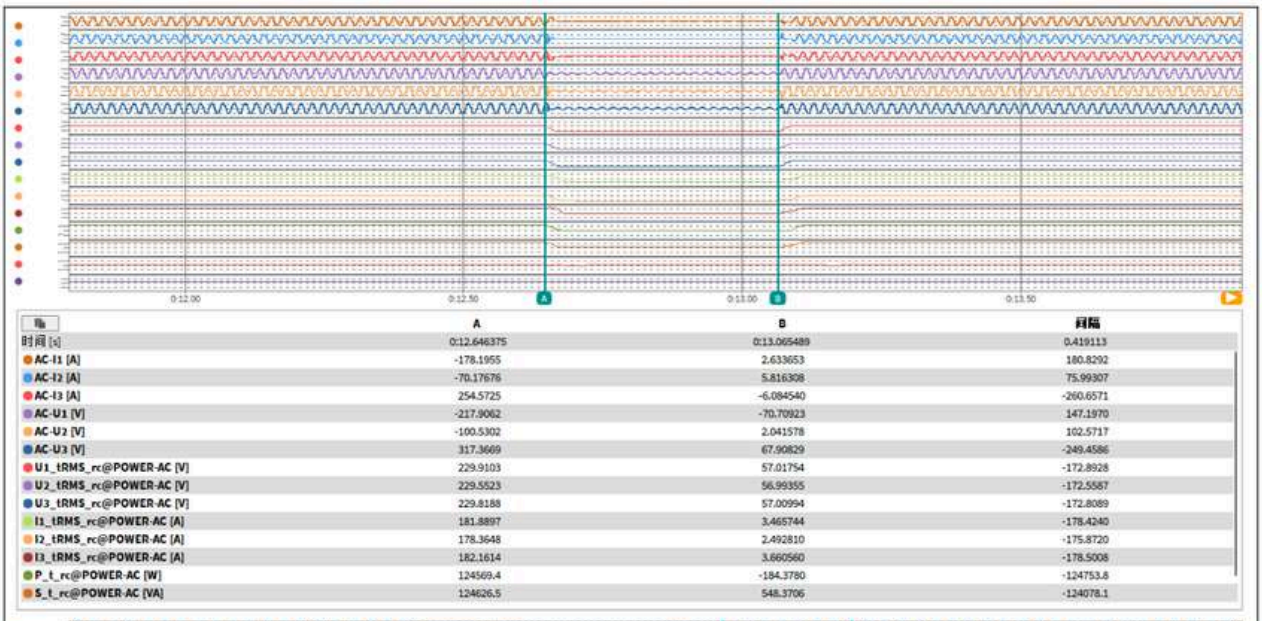
Test 1a -- guasto asimmetrico bifase
/ two phases asymmetric failure



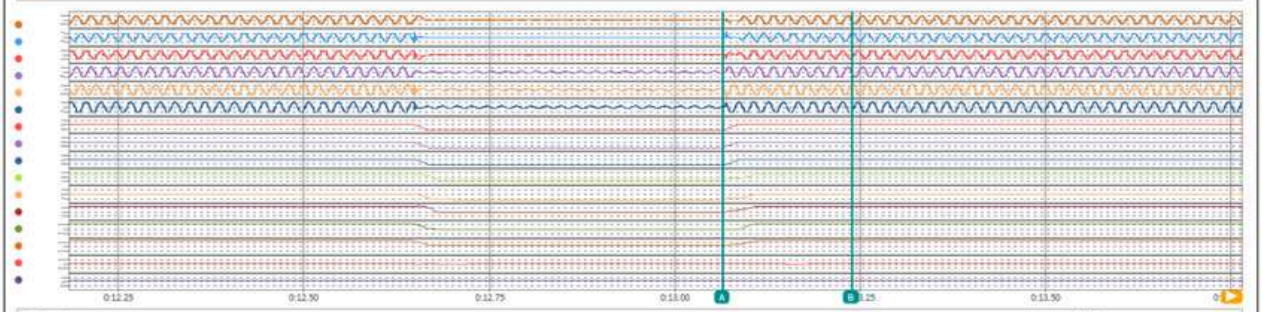
	A	B	对偏
时间 [s]	0:12.85010	0:13.06152	0.21143
AC-I1 [A]	163.9768	4.830562	-159.1462
AC-I2 [A]	9.337870	-0.353846	-9.691716
AC-I3 [A]	-192.1433	-2.938487	189.2048
AC-U1 [V]	286.3882	-242.3709	-528.7590
AC-U2 [V]	-271.8029	226.0273	497.8302
AC-U3 [V]	-14.98962	16.41393	31.40354
U1_tRMS_rc@POWER-AC [V]	238.0657	197.4122	-40.65349
U2_tRMS_rc@POWER-AC [V]	218.6353	197.6507	-20.98465
U3_tRMS_rc@POWER-AC [V]	224.9521	23.27788	-201.6742
I1_tRMS_rc@POWER-AC [A]	172.1509	4.818748	-167.3321
I2_tRMS_rc@POWER-AC [A]	154.1176	4.609671	-149.5079
I3_tRMS_rc@POWER-AC [A]	181.7200	2.725789	-178.9942
P_t_rc@POWER-AC [W]	104536.1	-1382.082	-105918.2
S_t_rc@POWER-AC [VA]	115557.1	1925.835	-113631.2

	A	B	对偏
时间 [s]	0:13.06386	0:13.24510	0.18124
AC-I1 [A]	3.766976	-95.58134	-99.34831
AC-I2 [A]	-1.118097	-150.6398	-149.5217
AC-I3 [A]	-3.561475	254.9041	258.4655
AC-U1 [V]	-89.63275	-122.5350	-32.90224
AC-U2 [V]	62.02484	-205.0848	-267.1096
AC-U3 [V]	29.51980	318.1741	288.6543
U1_tRMS_rc@POWER-AC [V]	197.4443	231.0776	33.63330
U2_tRMS_rc@POWER-AC [V]	197.6806	230.8396	33.15895
U3_tRMS_rc@POWER-AC [V]	23.27591	229.5205	206.2446
I1_tRMS_rc@POWER-AC [A]	4.821268	181.4364	176.6151
I2_tRMS_rc@POWER-AC [A]	4.612772	177.8055	173.1927
I3_tRMS_rc@POWER-AC [A]	2.724337	181.2357	178.5113
P_t_rc@POWER-AC [W]	-1379.438	124510.5	125890.0
S_t_rc@POWER-AC [VA]	1927.199	124567.7	122640.5

Test 2s -- guasto simmetrico trifase
/ three phases symmetric failure



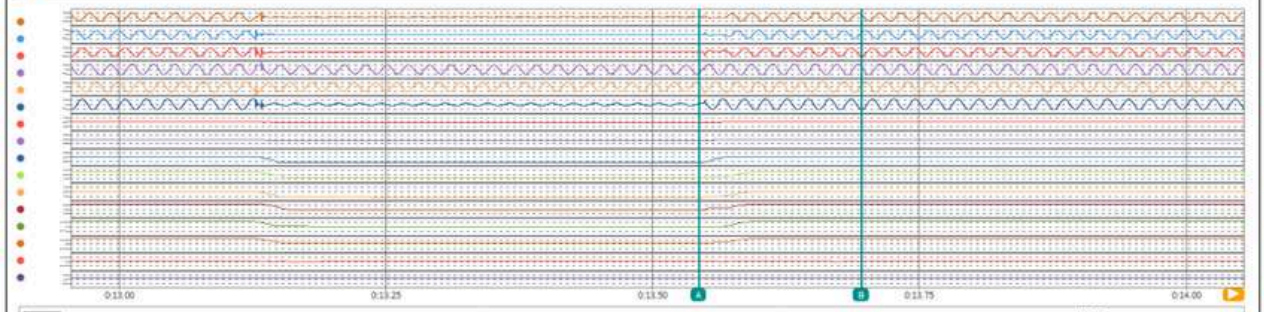
	A	B	间隔
时间 [s]	0:12.646375	0:13.065489	0.419113
AC-I1 [A]	-178.1955	2.633653	180.8292
AC-I2 [A]	-70.17676	5.816308	75.99307
AC-I3 [A]	254.5725	-6.084540	-260.6571
AC-U1 [V]	-217.9062	-70.70923	147.1970
AC-U2 [V]	-100.5302	2.041578	102.5717
AC-U3 [V]	317.3669	67.90829	-249.4586
U1_tRMS_rc@POWER-AC [V]	229.9103	57.01754	-172.8928
U2_tRMS_rc@POWER-AC [V]	229.5523	56.99355	-172.5587
U3_tRMS_rc@POWER-AC [V]	229.8188	57.00994	-172.8089
I1_tRMS_rc@POWER-AC [A]	181.8897	3.465744	-178.4240
I2_tRMS_rc@POWER-AC [A]	178.3648	2.492810	-175.8720
I3_tRMS_rc@POWER-AC [A]	182.1614	3.660560	-178.5008
P_t_rc@POWER-AC [W]	124569.4	-184.3780	-124753.8
S_t_rc@POWER-AC [VA]	124626.5	548.3706	-124078.1



	A	B	间隔
时间 [s]	0:13.064998	0:13.239027	0.174029
AC-I1 [A]	4.376732	-18.30832	-22.68505
AC-I2 [A]	2.530423	226.0200	223.4895
AC-I3 [A]	-4.795649	-203.9375	-199.1419
AC-U1 [V]	-75.40012	-29.71435	45.68577
AC-U2 [V]	11.12843	296.8941	285.7657
AC-U3 [V]	61.78117	-269.4392	-331.2204
U1_tRMS_rc@POWER-AC [V]	57.01754	232.1339	175.1164
U2_tRMS_rc@POWER-AC [V]	56.99355	231.8393	174.8458
U3_tRMS_rc@POWER-AC [V]	57.00994	232.1561	175.1461
I1_tRMS_rc@POWER-AC [A]	3.465744	179.3856	175.9198
I2_tRMS_rc@POWER-AC [A]	2.492810	176.2326	173.7398
I3_tRMS_rc@POWER-AC [A]	3.660560	179.7399	176.0794
P_t_rc@POWER-AC [W]	-184.3780	124170.4	124354.8
S_t_rc@POWER-AC [VA]	548.3706	124226.9	123678.5

Test 2a -- guasto asimmetrico bifase
/ two phases asymmetric failure

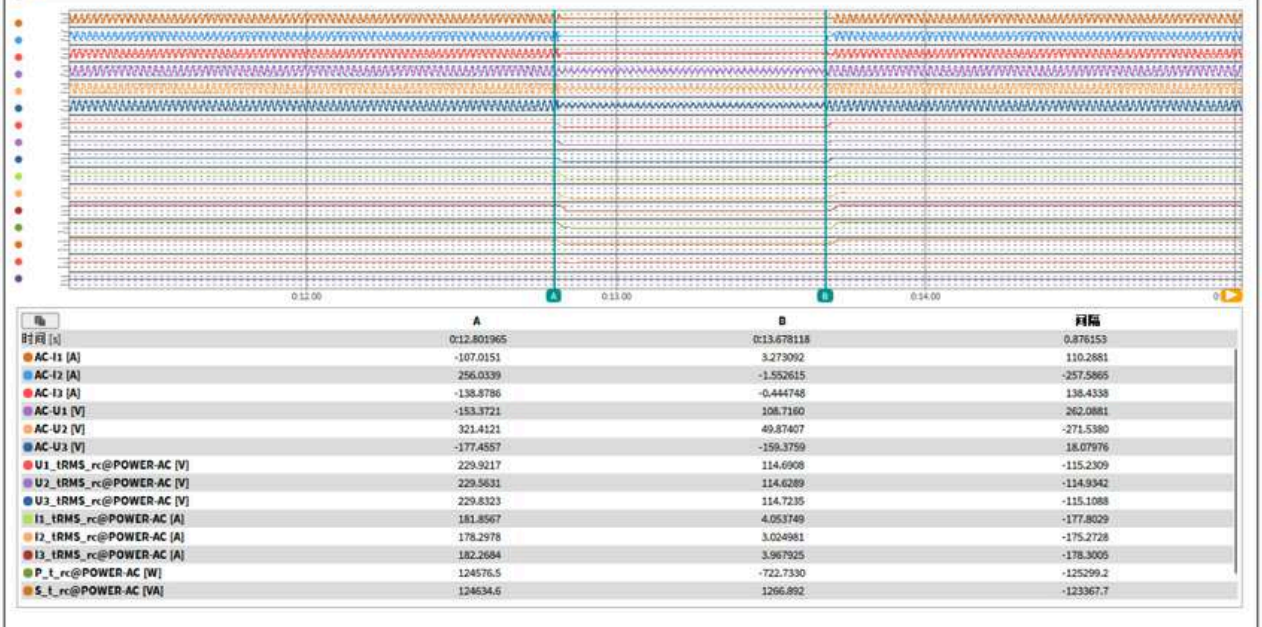
	A	B	间隔
时间 [s]	0:13.130619	0:13.546523	0.415904
AC-I1 [A]	-10.40188	1.634441	12.03632
AC-I2 [A]	-74.19149	4.659739	78.85123
AC-I3 [A]	63.92756	-4.183390	-68.11095
AC-U1 [V]	247.7443	-65.44543	-313.1898
AC-U2 [V]	-292.6758	-18.08977	274.5860
AC-U3 [V]	30.58291	79.42510	48.84219
U1_tRMS_rc@POWER-AC [V]	233.5079	201.4564	-32.05150
U2_tRMS_rc@POWER-AC [V]	224.7452	201.3524	-23.39272
U3_tRMS_rc@POWER-AC [V]	227.0005	57.02613	-169.9744
I1_tRMS_rc@POWER-AC [A]	180.8740	4.671188	-176.2029
I2_tRMS_rc@POWER-AC [A]	172.7093	4.341579	-168.3678
I3_tRMS_rc@POWER-AC [A]	181.8419	3.123329	-178.7186
P_t_rc@POWER-AC [W]	117083.2	-1384.093	-118467.2
S_t_rc@POWER-AC [VA]	122329.3	1993.340	-120336.0



	A	B	间隔
时间 [s]	0:13.543729	0:13.695973	0.152244
AC-I1 [A]	4.408561	185.1791	180.7705
AC-I2 [A]	-0.200424	67.26858	67.46900
AC-I3 [A]	-5.317070	-256.0446	-250.7275
AC-U1 [V]	-253.4547	224.2327	477.6874
AC-U2 [V]	208.3912	94.87630	-113.5149
AC-U3 [V]	44.54208	-319.7491	-364.2912
U1_tRMS_rc@POWER-AC [V]	201.4455	232.9748	31.52927
U2_tRMS_rc@POWER-AC [V]	201.3458	232.3086	30.96286
U3_tRMS_rc@POWER-AC [V]	57.01724	232.5533	175.5361
I1_tRMS_rc@POWER-AC [A]	4.665024	179.6920	175.0269
I2_tRMS_rc@POWER-AC [A]	4.344277	176.3954	172.0511
I3_tRMS_rc@POWER-AC [A]	3.111824	179.2552	176.1434
P_t_rc@POWER-AC [W]	-1382.594	124468.3	125850.8
S_t_rc@POWER-AC [VA]	1991.878	124528.3	122536.4

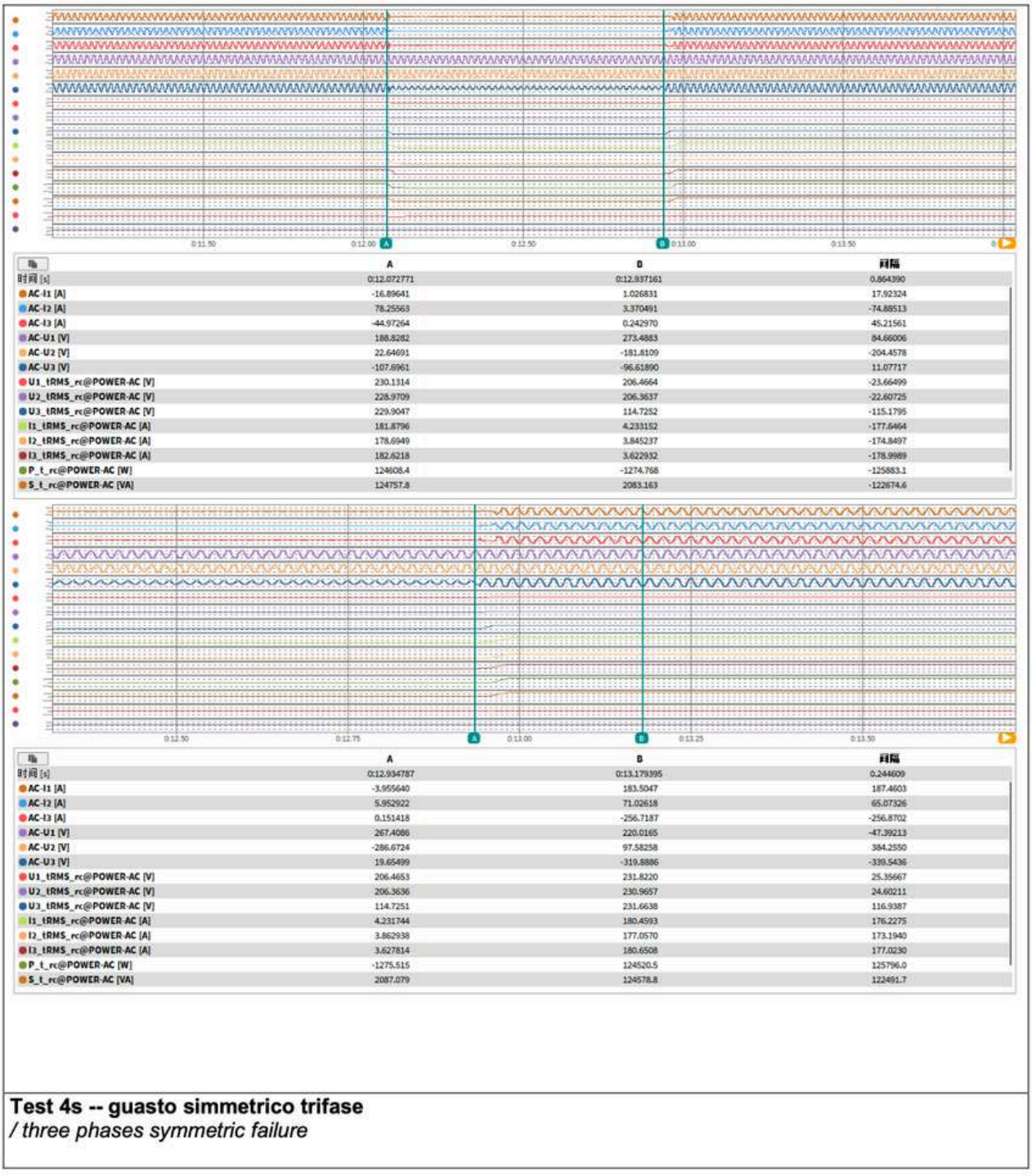
Test 3s -- guasto simmetrico trifase
/ three phases symmetric failure

时间 [s]	A	B	间隔
AC-I1 [A]	0:12.801965	0:13.678118	0.876153
AC-I2 [A]	-107.0151	3.273092	110.2881
AC-I3 [A]	256.0339	-1.552615	-257.5865
AC-U1 [V]	-138.8786	-0.444748	138.4338
AC-U2 [V]	-153.3721	108.7160	262.0881
AC-U3 [V]	321.4121	49.87407	-271.5380
U1_tRMS_rc@POWER-AC [V]	-177.4557	-159.3759	18.07976
U2_tRMS_rc@POWER-AC [V]	229.9217	114.6908	-115.2309
U3_tRMS_rc@POWER-AC [V]	229.5631	114.6289	-114.9342
I1_tRMS_rc@POWER-AC [A]	229.8323	114.7235	-115.1088
I2_tRMS_rc@POWER-AC [A]	181.8567	4.053749	-177.8029
I3_tRMS_rc@POWER-AC [A]	178.2978	3.024981	-175.2728
P_t_rc@POWER-AC [W]	182.2684	3.967925	-178.3005
S_t_rc@POWER-AC [VA]	124576.5	-722.7330	-125299.2
	124634.6	1266.892	-123367.7



时间 [s]	A	B	间隔
AC-I1 [A]	0:12.801965	0:13.678118	0.876153
AC-I2 [A]	-107.0151	3.273092	110.2881
AC-I3 [A]	256.0339	-1.552615	-257.5865
AC-U1 [V]	-138.8786	-0.444748	138.4338
AC-U2 [V]	-153.3721	108.7160	262.0881
AC-U3 [V]	321.4121	49.87407	-271.5380
U1_tRMS_rc@POWER-AC [V]	-177.4557	-159.3759	18.07976
U2_tRMS_rc@POWER-AC [V]	229.9217	114.6908	-115.2309
U3_tRMS_rc@POWER-AC [V]	229.5631	114.6289	-114.9342
I1_tRMS_rc@POWER-AC [A]	229.8323	114.7235	-115.1088
I2_tRMS_rc@POWER-AC [A]	181.8567	4.053749	-177.8029
I3_tRMS_rc@POWER-AC [A]	178.2978	3.024981	-175.2728
P_t_rc@POWER-AC [W]	182.2684	3.967925	-178.3005
S_t_rc@POWER-AC [VA]	124576.5	-722.7330	-125299.2
	124634.6	1266.892	-123367.7

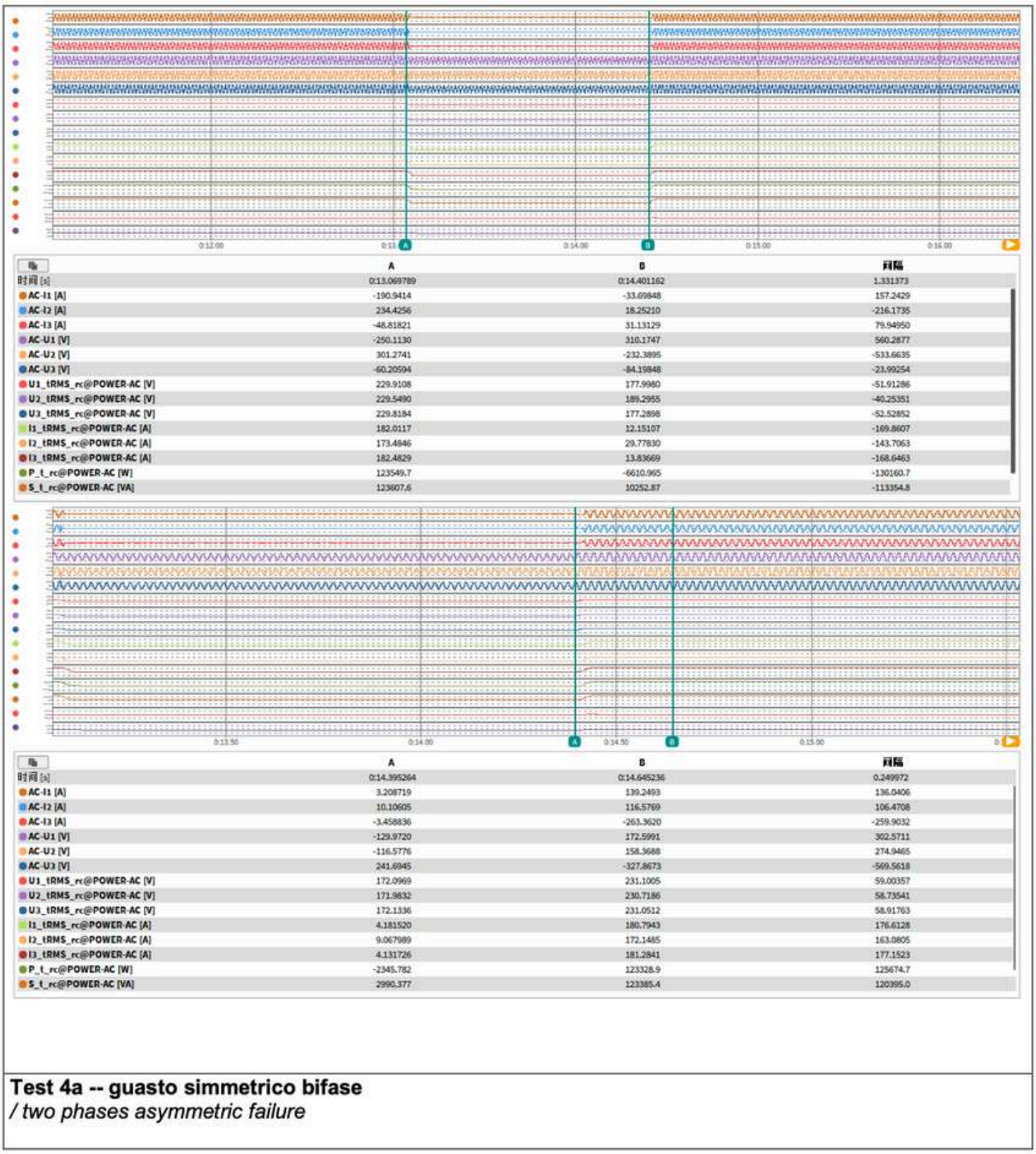
Test 3a -- guasto asimmetrico bifase
/ two phases asymmetric failure



时间 [s]	A	B	间隔
AC-I1 [A]	0:12.072771	0:12.937161	0.864390
AC-I2 [A]	-16.89641	1.026831	17.92324
AC-I3 [A]	78.25563	3.370491	-74.88513
AC-U1 [V]	-44.97264	0.242970	45.21561
AC-U2 [V]	188.8282	273.4883	84.66006
AC-U3 [V]	22.64691	-181.8109	-204.4578
U1_tRMS_rc@POWER-AC [V]	-107.6961	-96.61890	11.07717
U2_tRMS_rc@POWER-AC [V]	230.1314	206.4664	-23.66499
U3_tRMS_rc@POWER-AC [V]	228.9709	206.3637	-22.60725
I1_tRMS_rc@POWER-AC [A]	229.9047	114.7252	-115.1795
I2_tRMS_rc@POWER-AC [A]	181.8796	4.233152	-177.6464
I3_tRMS_rc@POWER-AC [A]	178.6949	3.845237	-174.8497
P_t_rc@POWER-AC [W]	182.6218	3.622932	-178.9989
S_t_rc@POWER-AC [VA]	124608.4	-1274.768	-125883.1
	124757.8	2083.163	-122674.6

时间 [s]	A	B	间隔
AC-I1 [A]	0:12.934787	0:13.179395	0.244609
AC-I2 [A]	-3.955640	183.5047	187.4603
AC-I3 [A]	5.952922	71.02618	65.07326
AC-U1 [V]	0.151418	-256.7187	-256.8702
AC-U2 [V]	267.4086	220.0165	-47.39213
AC-U3 [V]	-286.6724	97.58258	384.2550
U1_tRMS_rc@POWER-AC [V]	19.65499	-319.8886	-339.5436
U2_tRMS_rc@POWER-AC [V]	206.4653	231.8220	25.35667
U3_tRMS_rc@POWER-AC [V]	206.3636	230.9657	24.60211
I1_tRMS_rc@POWER-AC [A]	114.7251	231.6638	116.9387
I2_tRMS_rc@POWER-AC [A]	4.231744	180.4593	176.2275
I3_tRMS_rc@POWER-AC [A]	3.862938	177.0570	173.1940
P_t_rc@POWER-AC [W]	3.627814	180.6508	177.0230
S_t_rc@POWER-AC [VA]	-1275.515	124520.5	125796.0
	2087.079	124578.8	122491.7

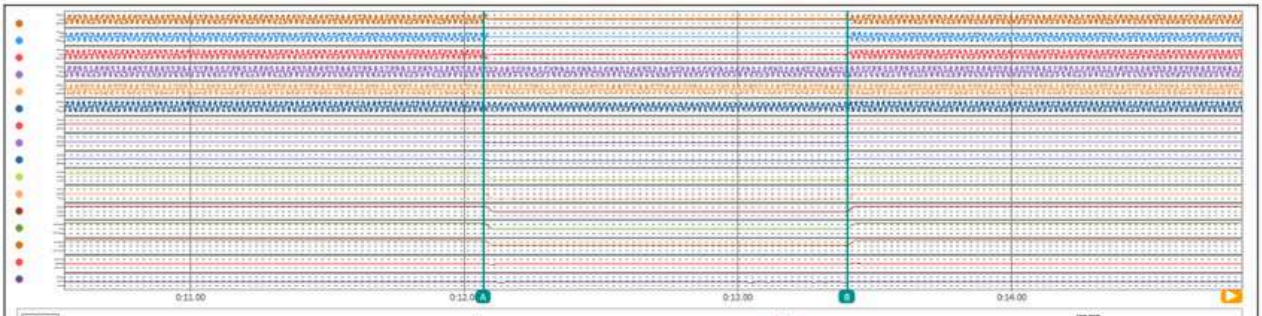
Test 4s -- guasto simmetrico trifase
/ three phases symmetric failure



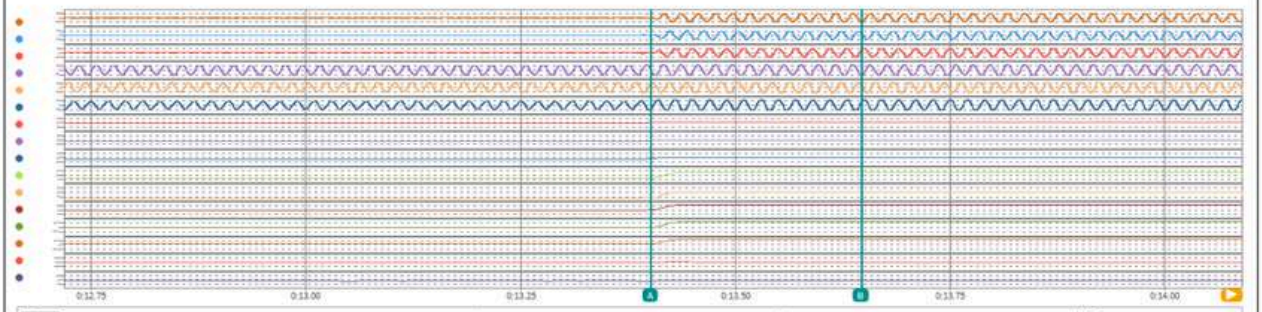
	A	B	间隔
时间 [s]	0:13.069789	0:14.401162	1.331373
AC-I1 [A]	-190.9414	-33.69848	157.2429
AC-I2 [A]	234.4256	18.25210	-216.1735
AC-I3 [A]	-48.81821	31.13129	79.94950
AC-U1 [V]	-250.1130	310.1747	560.2877
AC-U2 [V]	301.2741	-232.3895	-533.6635
AC-U3 [V]	-60.20594	-84.19848	-23.99254
U1_tRMS_rc@POWER-AC [V]	229.9108	177.9980	-51.91286
U2_tRMS_rc@POWER-AC [V]	229.5490	189.2955	-40.25351
U3_tRMS_rc@POWER-AC [V]	229.8184	177.2898	-52.52852
I1_tRMS_rc@POWER-AC [A]	182.0117	12.15107	-169.8607
I2_tRMS_rc@POWER-AC [A]	173.4846	29.77830	-143.7063
I3_tRMS_rc@POWER-AC [A]	182.4829	13.83669	-168.6463
P_t_rc@POWER-AC [W]	123549.7	-6610.965	-130160.7
S_t_rc@POWER-AC [VA]	123607.6	10252.87	-113354.8

	A	B	间隔
时间 [s]	0:14.395264	0:14.645236	0.249972
AC-I1 [A]	3.208719	139.2493	136.0406
AC-I2 [A]	10.10605	116.5769	106.4708
AC-I3 [A]	-3.458836	-263.3620	-259.9032
AC-U1 [V]	-129.9720	172.5991	302.5711
AC-U2 [V]	-116.5776	158.3688	274.9465
AC-U3 [V]	241.6945	-327.8673	-569.5618
U1_tRMS_rc@POWER-AC [V]	172.0969	231.1005	59.00357
U2_tRMS_rc@POWER-AC [V]	171.9832	230.7186	58.73541
U3_tRMS_rc@POWER-AC [V]	172.1336	231.0512	58.91763
I1_tRMS_rc@POWER-AC [A]	4.181520	180.7943	176.6128
I2_tRMS_rc@POWER-AC [A]	9.067989	172.1485	163.0805
I3_tRMS_rc@POWER-AC [A]	4.131726	181.2841	177.1523
P_t_rc@POWER-AC [W]	-2345.782	123328.9	125674.7
S_t_rc@POWER-AC [VA]	2990.377	123385.4	120395.0

Test 4a -- guasto simmetrico bifase
/ two phases asymmetric failure



	A	B	间隔
时间 [s]	0:12.073636	0:13.401327	1.327691
AC-I1 [A]	132.4651	-5.604305	-138.0694
AC-I2 [A]	-262.3678	-11.33052	251.0373
AC-I3 [A]	127.0163	9.151839	-117.8645
AC-U1 [V]	204.0177	36.89981	-167.1178
AC-U2 [V]	-290.2620	262.0590	552.3210
AC-U3 [V]	93.13274	-296.2794	-389.4122
U1_tRMS_rc@POWER-AC [V]	230.4356	222.3008	-8.134827
U2_tRMS_rc@POWER-AC [V]	227.8179	220.3696	-7.448257
U3_tRMS_rc@POWER-AC [V]	227.8741	196.9283	-30.94571
I1_tRMS_rc@POWER-AC [A]	181.7465	10.41650	-171.3300
I2_tRMS_rc@POWER-AC [A]	181.1801	14.67811	-166.5019
I3_tRMS_rc@POWER-AC [A]	186.2887	20.38960	-165.8991
P_t_rc@POWER-AC [W]	124918.3	-5113.442	-130031.8
S_t_rc@POWER-AC [VA]	125607.3	9565.498	-116041.8



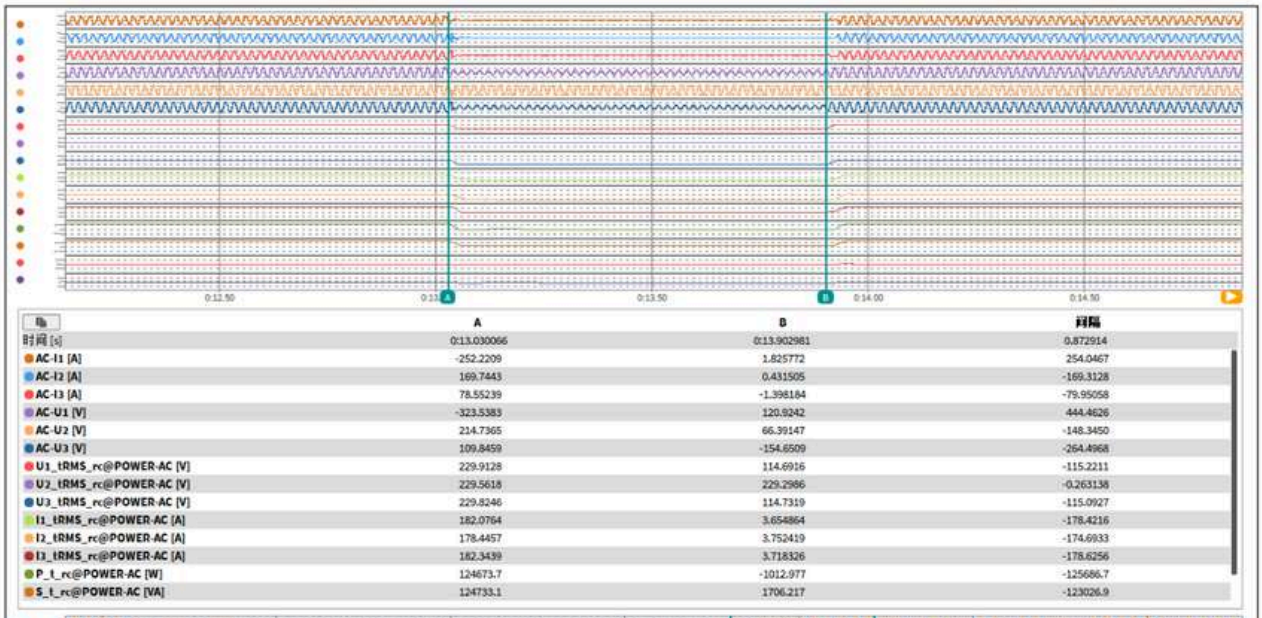
	A	B	间隔
时间 [s]	0:13.401677	0:13.646808	0.245132
AC-I1 [A]	0.058017	-257.6933	-257.7514
AC-I2 [A]	-12.45204	115.8720	128.3240
AC-I3 [A]	12.26427	134.8777	122.6134
AC-U1 [V]	-0.904083	-325.6519	-324.7478
AC-U2 [V]	279.9783	146.1845	-133.7938
AC-U3 [V]	-281.0376	181.4644	462.5020
U1_tRMS_rc@POWER-AC [V]	222.3008	231.4947	9.193939
U2_tRMS_rc@POWER-AC [V]	220.3696	230.8947	10.52505
U3_tRMS_rc@POWER-AC [V]	196.9283	231.4123	34.48393
I1_tRMS_rc@POWER-AC [A]	10.41650	180.4366	170.0201
I2_tRMS_rc@POWER-AC [A]	14.67811	176.8705	162.1924
I3_tRMS_rc@POWER-AC [A]	20.38960	181.0528	160.6632
P_t_rc@POWER-AC [W]	-5113.442	124449.1	129562.5
S_t_rc@POWER-AC [VA]	9565.498	124506.4	114940.9

5 guasto asimmetrico bifase in BT
/ two phases asymmetric failure

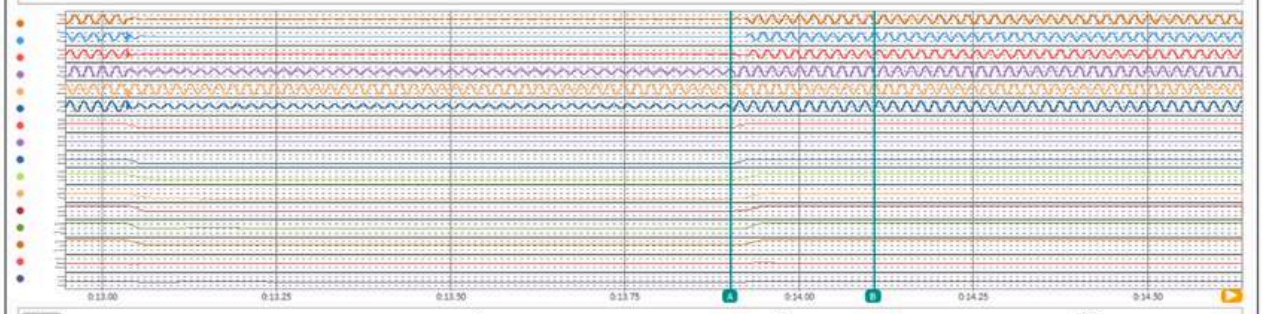
	A	B	
时间 [s]	0:14.4416022	0:14.6604804	0.2188782
AC-I1 [A]	31.07222	-1.030244	-32.10247
AC-I2 [A]	-248.6581	3.604737	252.2628
AC-I3 [A]	243.9821	-4.661181	-248.6433
AC-U1 [V]	30.14350	-8.497239	-38.64074
AC-U2 [V]	-310.8914	-239.1036	71.78784
AC-U3 [V]	193.2325	29.78778	-163.4448
U1_tRMS_rc@POWER-AC [V]	229.8704	23.25299	-206.6174
U2_tRMS_rc@POWER-AC [V]	229.5332	228.4335	-1.099716
U3_tRMS_rc@POWER-AC [V]	229.7947	23.21810	-206.5766
I1_tRMS_rc@POWER-AC [A]	181.8357	3.189762	-178.6460
I2_tRMS_rc@POWER-AC [A]	178.4405	3.609442	-174.8310
I3_tRMS_rc@POWER-AC [A]	182.2660	2.806150	-179.4598
P_t_rc@POWER-AC [W]	124579.6	-585.4673	-125165.1
S_t_rc@POWER-AC [VA]	124640.4	963.8425	-123676.6

	A	B	
时间 [s]	0:14.6602444	0:14.8337741	0.1735296
AC-I1 [A]	-0.397243	-181.7314	-181.3341
AC-I2 [A]	5.715815	239.7067	233.9909
AC-I3 [A]	-4.137971	-56.33054	-52.19257
AC-U1 [V]	-9.663582	-240.3042	-230.6407
AC-U2 [V]	-221.5305	304.0152	525.5456
AC-U3 [V]	30.79748	-70.84775	-101.6452
U1_tRMS_rc@POWER-AC [V]	23.25299	229.6095	206.3565
U2_tRMS_rc@POWER-AC [V]	228.4335	230.5398	2.106232
U3_tRMS_rc@POWER-AC [V]	23.21810	229.5401	206.3220
I1_tRMS_rc@POWER-AC [A]	3.189762	181.6816	178.4918
I2_tRMS_rc@POWER-AC [A]	3.609442	177.9642	174.3548
I3_tRMS_rc@POWER-AC [A]	2.806150	181.8121	179.0060
P_t_rc@POWER-AC [W]	-585.4673	124423.0	125008.5
S_t_rc@POWER-AC [VA]	963.8425	124476.8	123513.0

6 guasto asimmetrico bifase in BT
/ three phases symmetric failure

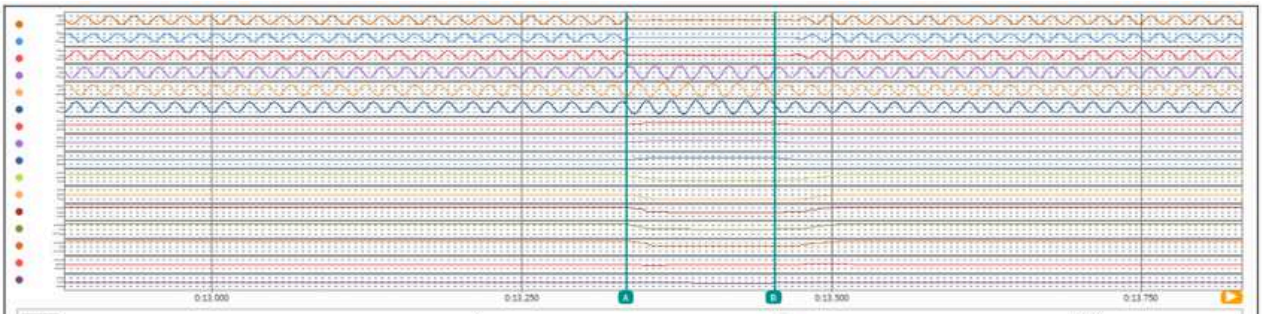


时间 [s]	A	B	间隔
AC-I1 [A]	0:13.030066	0:13.902981	0.872914
AC-I2 [A]	-252.2209	1.825772	254.0467
AC-I3 [A]	169.7443	0.431505	-169.3128
AC-U1 [V]	78.55239	-1.398184	-79.95058
AC-U2 [V]	-323.5383	120.9242	444.4626
AC-U3 [V]	214.7365	66.39147	-148.3450
U1_tRMS_rc@POWER-AC [V]	109.8459	-154.6509	-264.4968
U2_tRMS_rc@POWER-AC [V]	229.9128	114.6916	-115.2211
U3_tRMS_rc@POWER-AC [V]	229.5618	229.2986	-0.263138
I1_tRMS_rc@POWER-AC [A]	229.8246	114.7319	-115.0927
I2_tRMS_rc@POWER-AC [A]	182.0764	3.654864	-178.4216
I3_tRMS_rc@POWER-AC [A]	178.4457	3.752419	-174.6933
P_t_rc@POWER-AC [W]	182.3439	3.718326	-178.6256
S_t_rc@POWER-AC [VA]	124673.7	-1012.977	-125686.7
	124733.1	1706.217	-123026.9

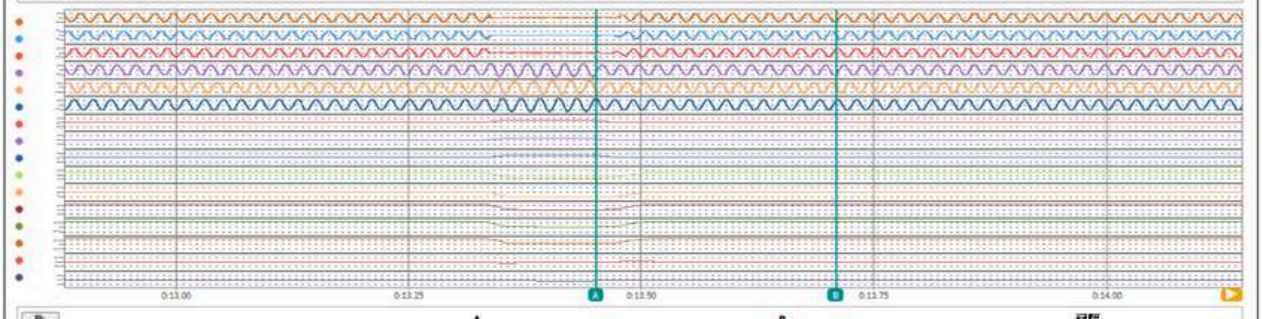


时间 [s]	A	B	间隔
AC-I1 [A]	0:13.901945	0:14.107267	0.205322
AC-I2 [A]	-0.088610	-117.2246	-117.1360
AC-I3 [A]	-0.403199	254.9342	255.3374
AC-U1 [V]	-0.051715	-129.2573	-129.2056
AC-U2 [V]	149.4727	-163.3139	-312.7866
AC-U3 [V]	-41.31127	326.8738	368.1851
U1_tRMS_rc@POWER-AC [V]	-130.1615	-169.3680	-39.20651
U2_tRMS_rc@POWER-AC [V]	114.6932	232.1236	117.4304
U3_tRMS_rc@POWER-AC [V]	229.2988	230.5635	1.264725
I1_tRMS_rc@POWER-AC [A]	114.7295	232.0971	117.3676
I2_tRMS_rc@POWER-AC [A]	3.654676	180.1301	176.4754
I3_tRMS_rc@POWER-AC [A]	3.753975	176.5384	172.7844
P_t_rc@POWER-AC [W]	3.719122	180.6652	176.9461
S_t_rc@POWER-AC [VA]	-1013.845	124392.6	125406.4
	1706.641	124447.6	122741.0

7 OV1 - three-phase symmetrical overvoltage

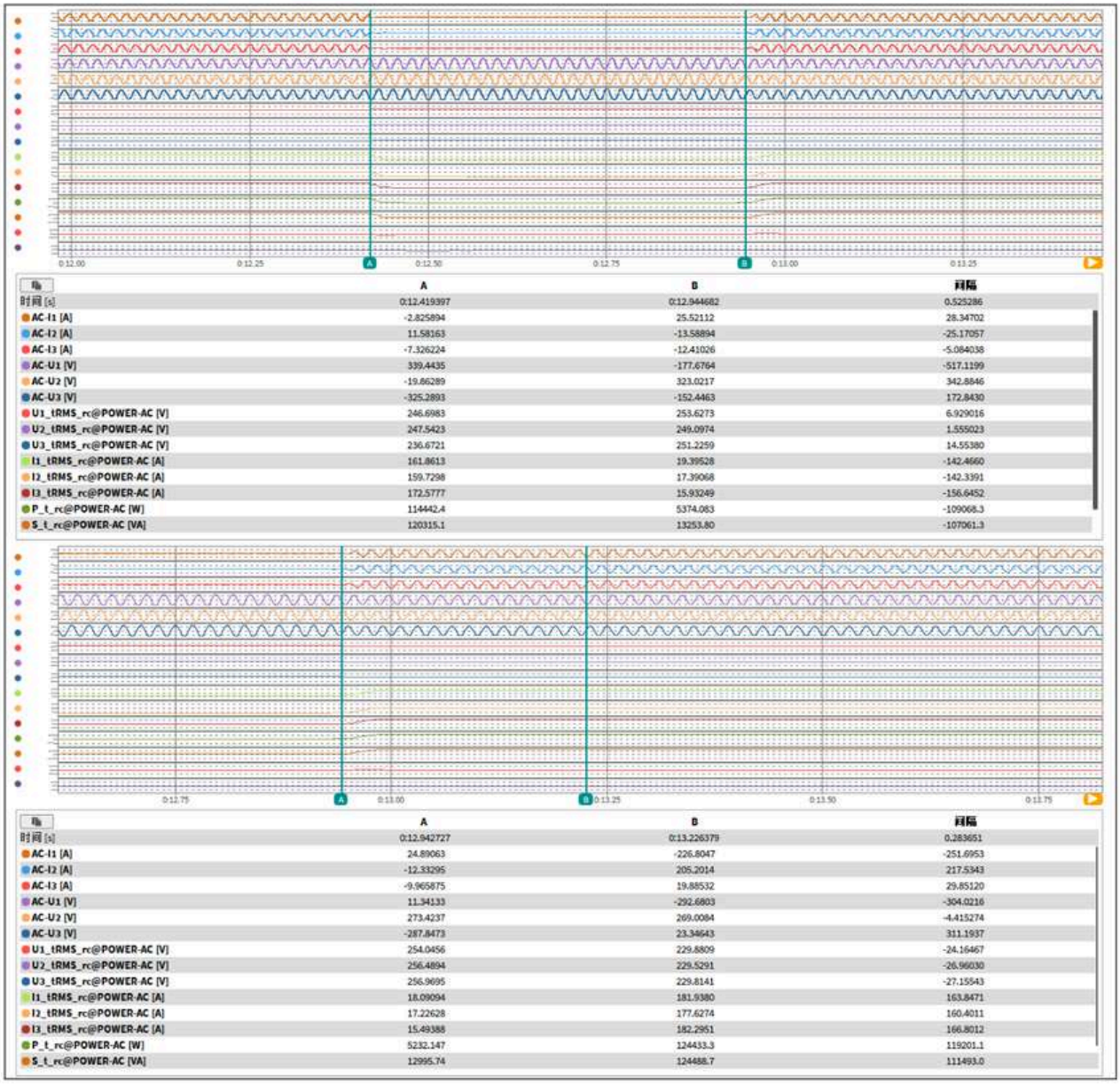


	A	B	Δ
时间 [s]	0:13.3347556	0:13.4539497	0.1191941
AC-I1 [A]	100.2146	26.68520	-73.52937
AC-I2 [A]	-167.3882	-68.46694	98.92130
AC-I3 [A]	78.86210	32.84540	-46.01670
AC-U1 [V]	251.6210	132.6549	-118.9661
AC-U2 [V]	-402.5610	-322.5038	80.05715
AC-U3 [V]	151.0108	191.9983	40.98749
U1_tRMS_rc@POWER-AC [V]	230.2044	286.2844	56.08003
U2_tRMS_rc@POWER-AC [V]	234.3884	282.3681	47.97971
U3_tRMS_rc@POWER-AC [V]	232.6898	284.1329	51.44308
I1_tRMS_rc@POWER-AC [A]	181.6574	7.178456	-174.4789
I2_tRMS_rc@POWER-AC [A]	169.5810	15.82798	-153.7530
I3_tRMS_rc@POWER-AC [A]	179.5501	12.35015	-167.2000
P_t_rc@POWER-AC [W]	122094.4	-1719.853	-123814.3
S_t_rc@POWER-AC [VA]	123345.6	10033.48	-113312.2



	A	B	Δ
时间 [s]	0:13.4521221	0:13.7092802	0.2571581
AC-I1 [A]	-3.434219	-220.5852	-217.1509
AC-I2 [A]	9.197680	6.727901	-2.469778
AC-I3 [A]	-4.612543	216.8446	221.4571
AC-U1 [V]	-70.78052	-279.5212	-208.7407
AC-U2 [V]	-312.0620	-3.177405	308.8846
AC-U3 [V]	376.0789	281.3633	-94.71560
U1_tRMS_rc@POWER-AC [V]	286.5415	229.9190	-56.62248
U2_tRMS_rc@POWER-AC [V]	286.4631	229.5527	-56.91048
U3_tRMS_rc@POWER-AC [V]	286.6360	229.8367	-56.79930
I1_tRMS_rc@POWER-AC [A]	5.682081	181.9556	176.2735
I2_tRMS_rc@POWER-AC [A]	7.401610	174.5705	167.1689
I3_tRMS_rc@POWER-AC [A]	6.121248	182.4147	176.2934
P_t_rc@POWER-AC [W]	-3371.035	123775.9	127146.9
S_t_rc@POWER-AC [VA]	5503.011	123833.8	118330.8

8 OV2 - three-phase symmetrical overvoltage



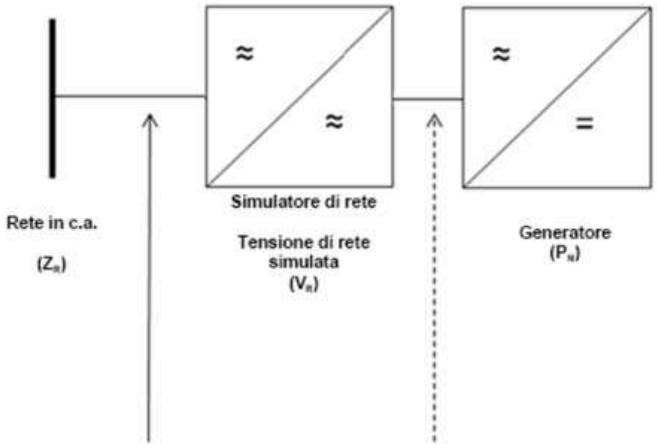
时间 [s]	A	B	间隔
AC-I1 [A]	-2.825894	25.52112	28.34702
AC-I2 [A]	11.58163	-13.58894	-25.17057
AC-I3 [A]	-7.326224	-12.41026	-5.084038
AC-U1 [V]	339.4435	-177.6764	-517.1199
AC-U2 [V]	-19.86289	323.0217	342.8846
AC-U3 [V]	-325.2893	-152.4463	172.8430
U1_tRMS_rc@POWER-AC [V]	246.6983	253.6273	6.929016
U2_tRMS_rc@POWER-AC [V]	247.5423	249.0974	1.555023
U3_tRMS_rc@POWER-AC [V]	236.6721	251.2259	14.55380
I1_tRMS_rc@POWER-AC [A]	161.8613	19.39528	-142.4660
I2_tRMS_rc@POWER-AC [A]	159.7298	17.39068	-142.3391
I3_tRMS_rc@POWER-AC [A]	172.5777	15.93249	-156.6452
P_t_rc@POWER-AC [W]	114442.4	5374.083	-109068.3
S_t_rc@POWER-AC [VA]	120315.1	13253.80	-107061.3

时间 [s]	A	B	间隔
AC-I1 [A]	24.89063	-226.8047	-251.6953
AC-I2 [A]	-12.33295	205.2014	217.5343
AC-I3 [A]	-9.965875	19.88532	29.85120
AC-U1 [V]	11.34133	-292.6803	-304.0216
AC-U2 [V]	273.4237	269.0084	-4.415274
AC-U3 [V]	-287.8473	23.34643	311.1937
U1_tRMS_rc@POWER-AC [V]	254.0456	229.8809	-24.16467
U2_tRMS_rc@POWER-AC [V]	256.4894	229.5291	-26.96030
U3_tRMS_rc@POWER-AC [V]	256.9695	229.8141	-27.15543
I1_tRMS_rc@POWER-AC [A]	18.09094	181.9380	163.8471
I2_tRMS_rc@POWER-AC [A]	17.22628	177.6274	160.4011
I3_tRMS_rc@POWER-AC [A]	15.49388	182.2951	166.8012
P_t_rc@POWER-AC [W]	5232.147	124433.3	119201.1
S_t_rc@POWER-AC [VA]	12995.74	124488.7	111493.0

Bbis.10	**TABLE:** Verifica della insensibilità alle richiusure automatiche in discordanza di fase ***/ Check of the insensibility to the re-closures when phases are in discordance***		
☒ **Bbis.10.1 Test su rete simulata** ***/ Test on simulated grid*** ☐ **Bbis.10.2 Test su rete di distribuzione tramite trasformatore di accoppiamento** ***/ Test on distribution grid through coupler transformer*** ☐ **Bbis.10.3 Test su rete di distribuzione, simulazione della deriva di frequenza** ***/ Test on distribution grid, simulation of frequency deviation***			
	Ambient temperature (°C) .....:	25 °C ± 2 °C	
	Humidity (RH %) .....:	35 %	
	Instrumentation list.....:	See table "Measurement equipment and instrumentation"	
	Uncertainty .....:	See table	

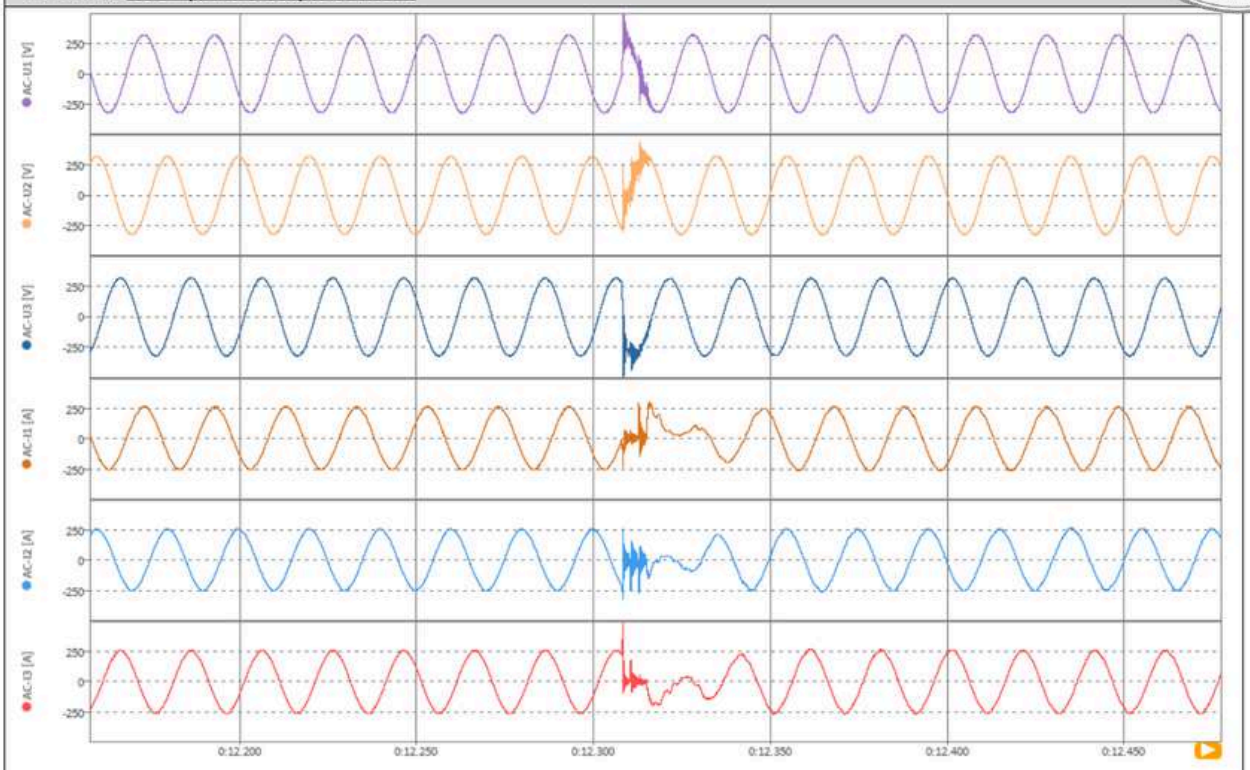
Supplementary information:

Test made with grid simulator as follow:

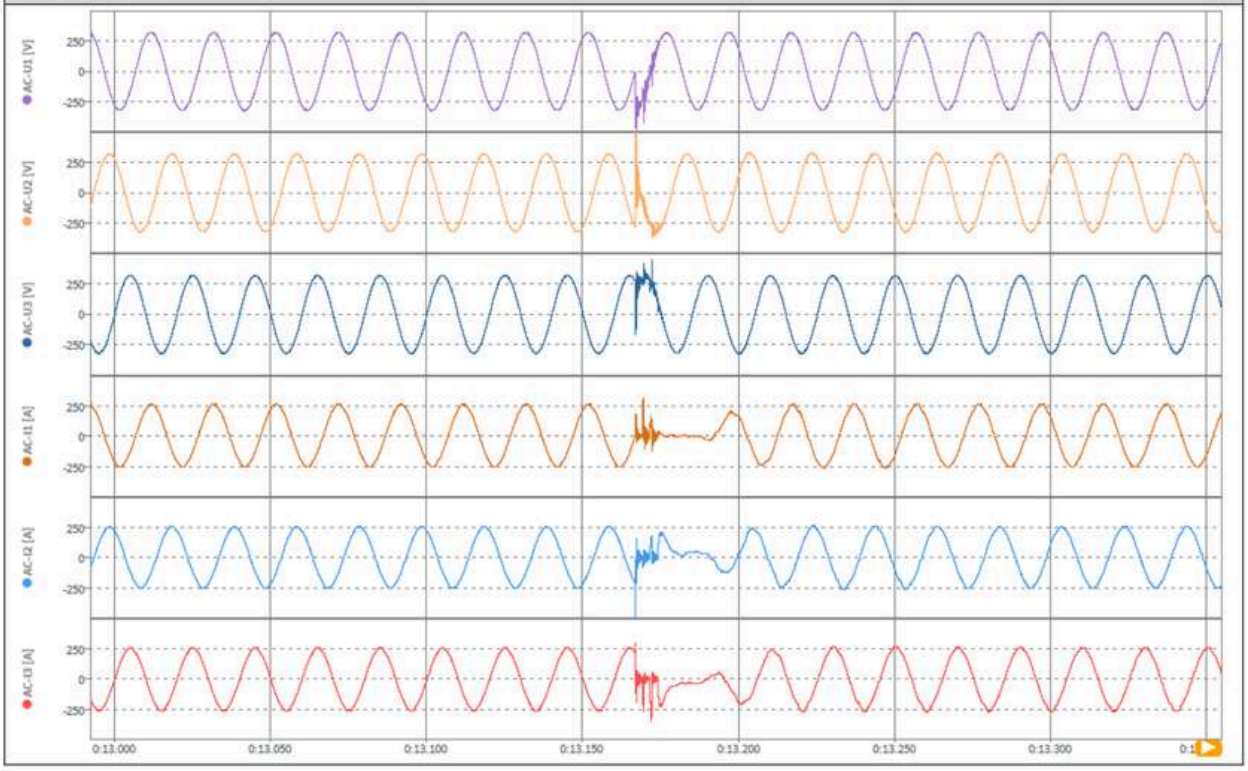


Test	Output Power [W]	Output Current [A]	Phase displacement [°]	Phase displacement [°]	Result
1	124508	180.9	**+90°**	+90°	No damage inverter connected
2	125230	181.4	**-90°**	-90°	No damage Inverter connected
3	124303	180.6	**+180°**	+180°	No damage Inverter connected
4	124490	180.7	**180°**	180°	No damage inverter connected

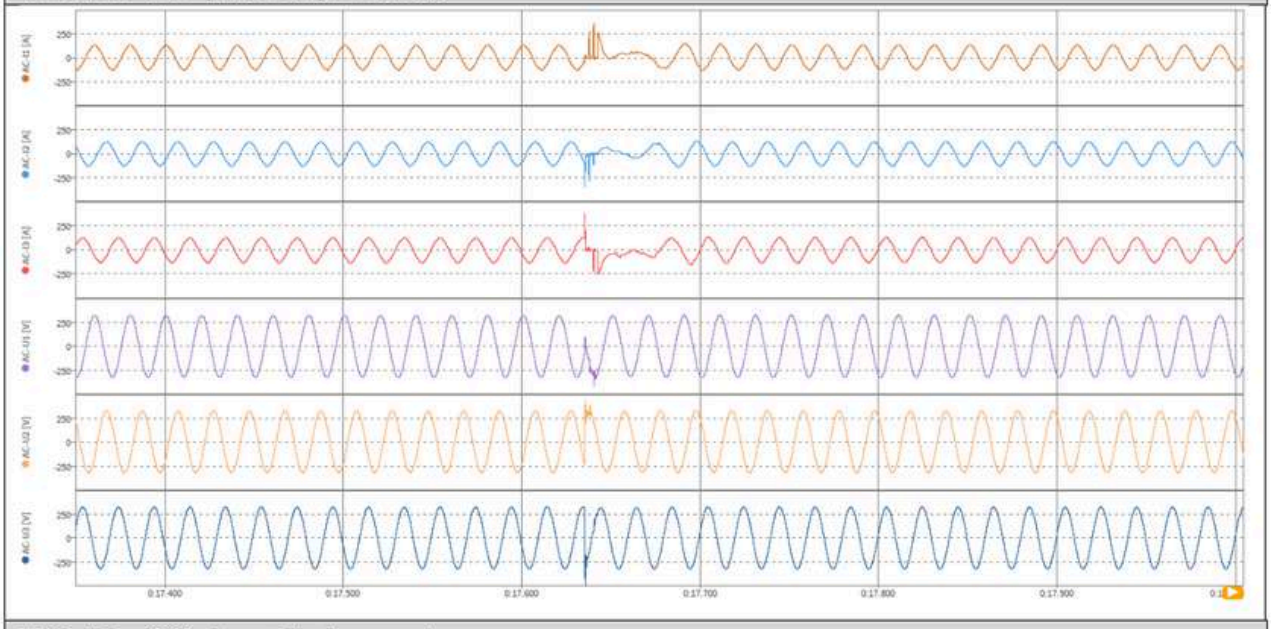
TEST#1: +90° phase displacement



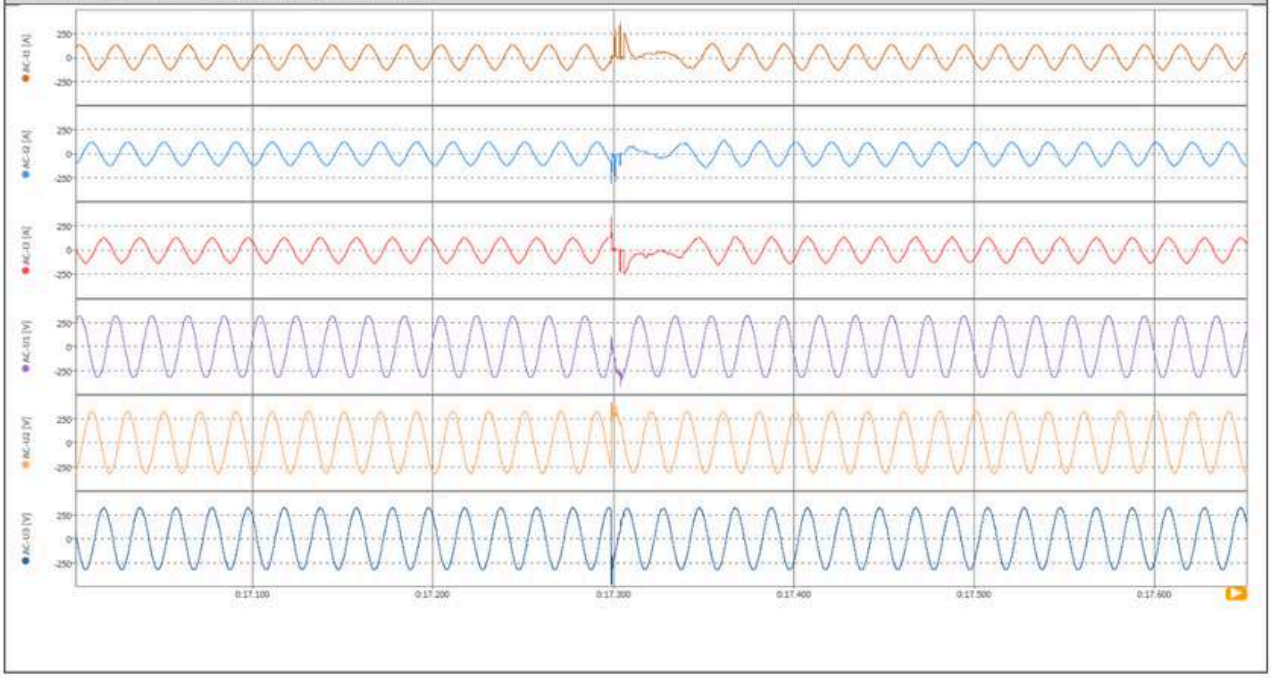
TEST#2: -90° phase displacement.



TEST#3: +180° phase displacement



TEST#4: -180° phase displacement



-TEST REPORT END-

P H O T O D O C U M E N T A T I O N

Energy Storage System
(Integrated Battery Energy Storage System)

SOLID POWER HV 261

Model: SOLID POWER HV 261

Energy Storage System (Front view)

Energy Storage System (Back view)

Model: SOLID POWER HV 261

Energy Storage System (Left view)

Energy Storage System (Right view)

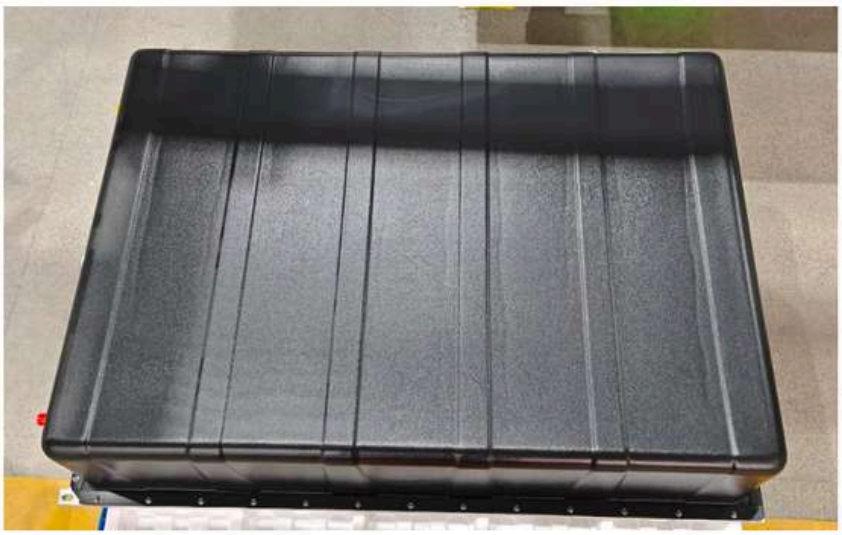
Model: SOLID POWER HV 261

Energy Storage System (Open view)

Battery Pack

Model: SOLID POWER HV 261

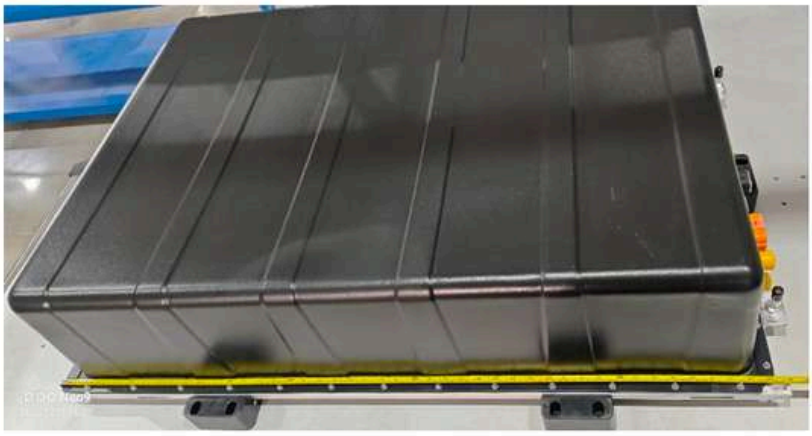
Battery control box



Battery Pack (Top view)

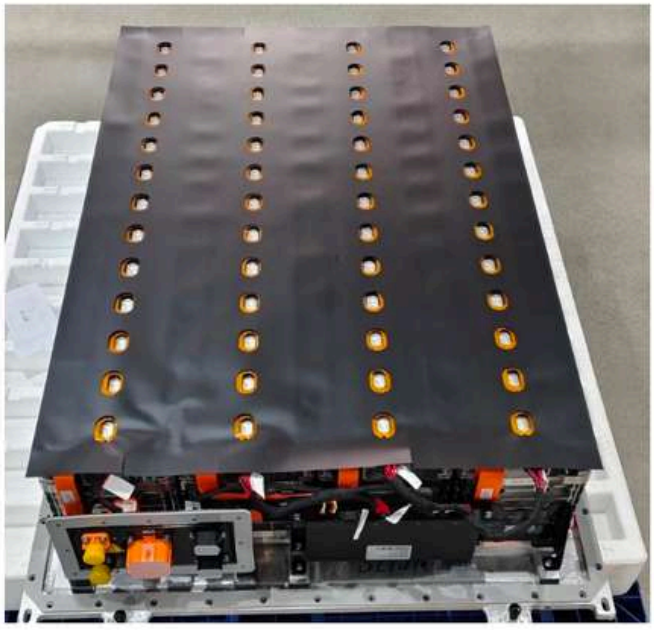
Model: SOLID POWER HV 261

Battery Pack (Right view)



Battery Pack (Left view)

Model: SOLID POWER HV 261



Battery pack (inside view)