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TEST REPORT
VDE-AR-N 4105:2018-11
Generators connected to the low-voltage distribution network – Technical requirements for the connection to and parallel operation with low-voltage distribution networks in junction with
DIN VDE V 0124-100 :2020-06

Report Reference No................:	250929006GZU-001
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Total number of pages................:	196 pages
Testing Laboratory ....:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address ....:	Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
Testing location/ address ....:	Same as above
Tested by (name + signature).........:	Rex Liu Engineer
Approved by (+ signature) ....:	Jason Fu Supervisor
Applicant's name ....:	Zendure USA Inc.
Address ....:	1765 E BAYSHORE RD # 201 EAST PALO ALTO, CA 94303-5501 USA
Test specification:	
Standard....................................:	VDE-AR-N 4105:2018-11 DIN VDE V 0124-100 :2020-06
Test procedure ....:	Type approval
Non-standard test method…………..:	N/A
Test Report Form No. ....:	VDE-AR-N 4105d
Test Report Form(s) Originator.:	Intertek Guangzhou
Master TRF ....:	Dated 2020-06

Test item description ....:	SolarFlow 2400 Pro Power Station SolarFlow 2400 AC+ Power Station
Trade Mark ....:	ZENDURE SuperCharged+-
Manufacturer ....:	ZENDURE TECHNOLOGY CO., LIMITED
Address	RM 77A 2/F BLK F TUEN MUN INDUSTRIAL CENTRE 2 SAN PING CIRCUIT TUEN MUNNT
Model/Type reference ....:	ZDSF2400P, ZDSF2400AC+, ZDSF2400P-800, ZDSF2400AC+-800,

Ratings…...……..:	Model	ZDSF2400P	ZDSF2400AC+
	PV Input		
	Max. input Voltage	55 Vdc	--
	MPPT voltage Range	14 -55 Vdc	--
	Max. input current	4*18 Adc	--
	PV Isc	4*22.5 Adc	--
	AC Side		
	Nominal input/output voltage	230 Vac	
	Nominal input/output Frequency	50 Hz	
	Nominal output current (on-grid)	3.5 A a.c. (default) /10.4A a.c. (*premium)	
	Nominal output power(on-grid)	800 W (default) / 2400W (*premium)	
	Max. input current(on-grid)	13.9 Aac	
	Max. input power(on-grid)	3200 W	
	Max. output current(off-grid)	13.9 Aac	
	Max. output power(off-grid)	3200 VA	
	Max. input current(off-grid)	10.4 Aac	
	Max. input power(off-grid)	2400 VA	
	Power factor range	0.8leading~0.8lagging	
	Battery Side		
	Battery Type	$LiFePO_4$	
	Battery Rated Energy	2400 Wh	
	Battery Rated Voltage	48 V dc	
	Charge/Discharge Voltage Range	37.5~54.75 Vdc	
	Max. Charge/Discharge Power	2400 W	
	Max. Charge/Discharge Current	50 Adc	
	General information		
	Safety level	Class I	
	Ingress Protection	IP 65	
	Operation Ambient Temperature	-20℃ - +55℃	
	Software version	V1	
	*Enabling this function must comply with local regulations and must be performed by professional technicians		
	Model	ZDSF2400P-800	ZDSF2400AC+-800
	PV Input		
	Max. input Voltage	55 Vdc	--
	MPPT voltage Range	14 -55 Vdc	--
	Max. input current	4*18 Adc	--
	PV Isc	4*22.5 Adc	--
	AC Side		
	Nominal input/output voltage	230 Vac	
	Nominal input/output Frequency	50 Hz	

	Max. output current (on-grid)	3.48 Aac
	Max. output power(on-grid)	800 W
	Max. input current (on-grid)	13.9 Aac
	Max. input power(on-grid)	3200 W
	Max. output current (off-grid)	13.9 Aac
	Max. output power(off-grid)	3200 VA
	Max. Input current (off-grid)	10.4 Aac
	Max. input power(off-grid)	2400 VA
	Power factor range	0.8leading~0.8lagging
	Battery Side	
	Battery Type	$LiFePO_4$
	Battery Rated Energy	2400 Wh
	Battery Rated Voltage	48 V dc
	Charge/Discharge Voltage Range	37.5~54.75 Vdc
	Max. Charge/Discharge Power	2400 W
	Max. Charge/Discharge Current	50 Adc
	General information	
	Safety level	Class I
	Ingress Protection	IP 65
	Operation Ambient Temperature	-20℃ - +55℃
	Software version	V1

Summary of testing:

Tests performed (name of test and test clause):

VDE4105 (VDE0124)	Test Description
5.4.4.1 (5.2.2)	Rapid voltage changes
5.4.4.2 (5.2.3)	Flicker
5.4.4.3 (5.2.4)	Harmonics and inter-harmonics
5.4.4.8 (5.2.6)	DC current feeding to network
5.7.2.2.2 (5.4.2)	Measurement of active- and reactive power ranges
5.7.2.3 (5.4.8.1)	Reactive power provision below PEmax
5.7.2.4 (5.4.8.2, 5.4.8.3)	Method of reactive power provision
5.7.3 (5.8)	Dynamic Network support
5.7.4.2 (5.4.3)	Network security management
5.7.4.3 (5.4.4 & 5.4.5 & 5.4.6 & 5.4.7)	Active power adjustment when over- and under frequency
6.4 (5.5.1 & 5.5.2 & 5.5.3 & 5.5.4 & 5.5.5 & 5.5.6)	Interface switch (Functional safety)
6.5.2 (5.5.7 & 5.5.8 & 5.5.9)	Protective function
6.5.3 (5.5.10)	Islanding detection
8.3 (5.6)	Connection conditions and synchronisation

Remark

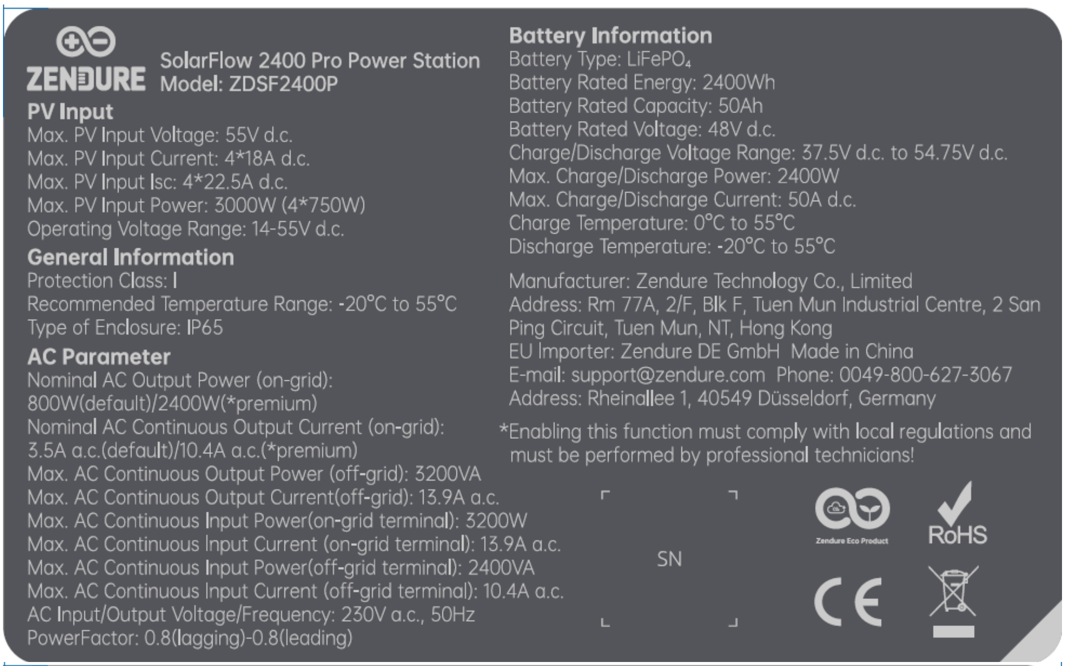
Other than special notice, the model ZDSF2400P is type test and valid for other models

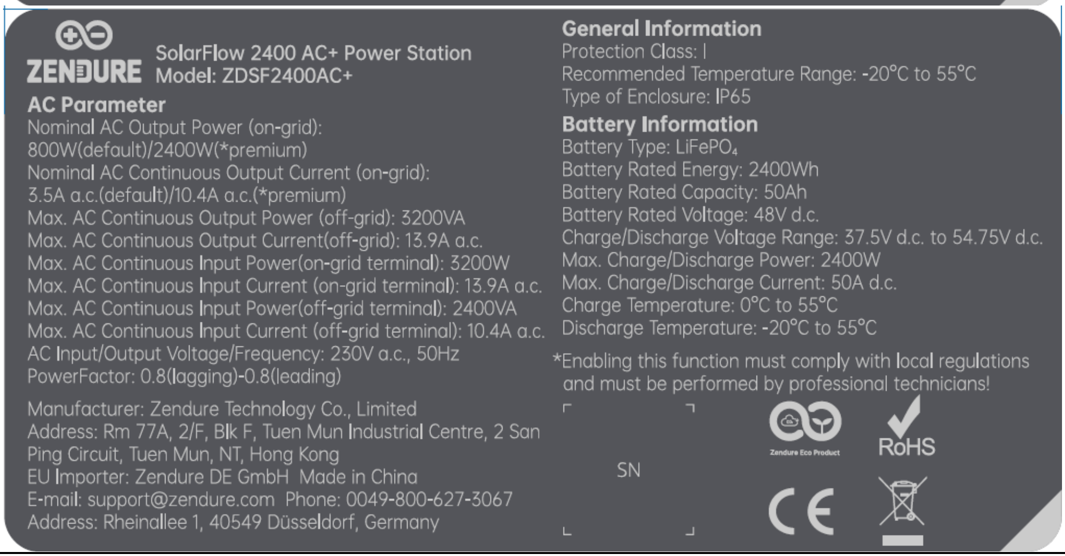
Testing location:

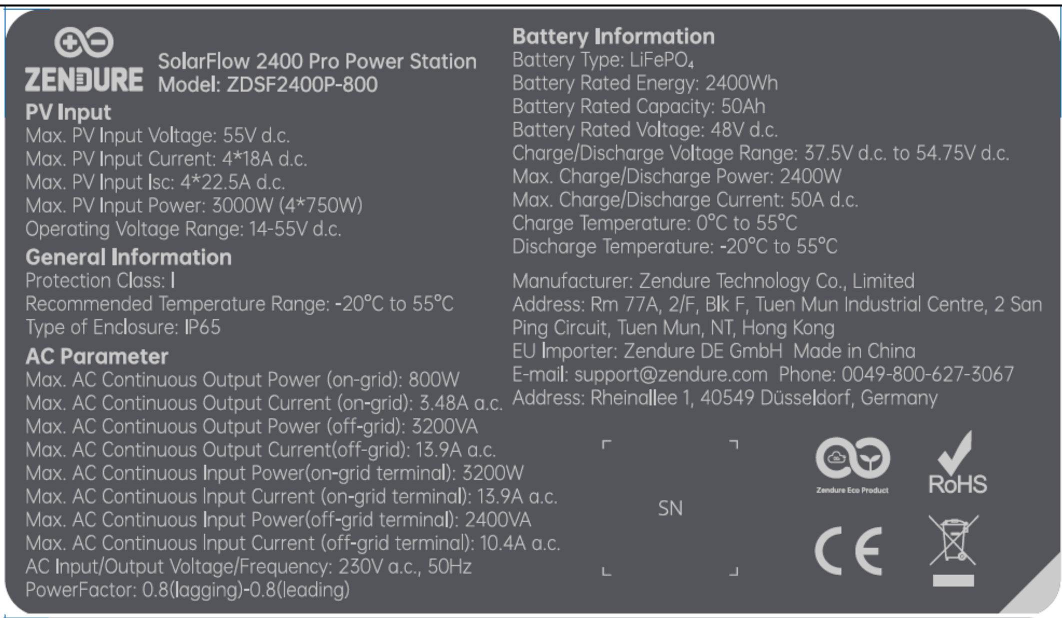
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

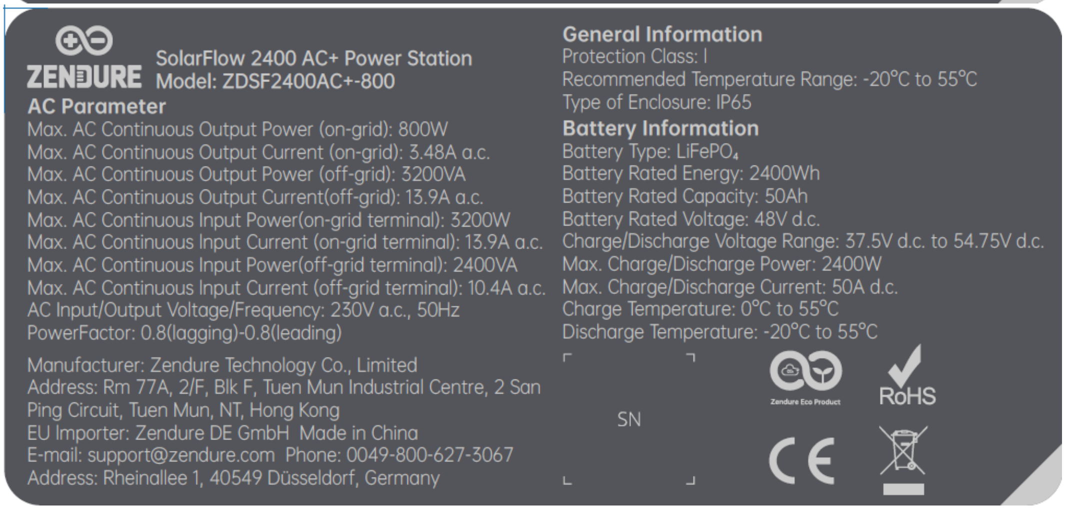
Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China

Copy of marking plate：









Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation.

Test item particulars ....:	
Temperature range...:	-20~+55℃
AC Overvoltage category ....:	☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV
DC Overvoltage category ....:	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
IP protection class ....:	IP65
Possible test case verdicts:	
- test case does not apply to the test object ....:	N/A (Not applicable)
- test object does meet the requirement ....:	P (Pass)
- test object does not meet the requirement ....:	F (Fail)
Testing ....:	
Date of receipt of test item ....:	29 Sep 2025
Date (s) of performance of tests ....:	29 Sep 2025 to 10 Nov 2025

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

When determining for test conclusion, measurement uncertainty of tests has been considered.
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The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

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

General product information:

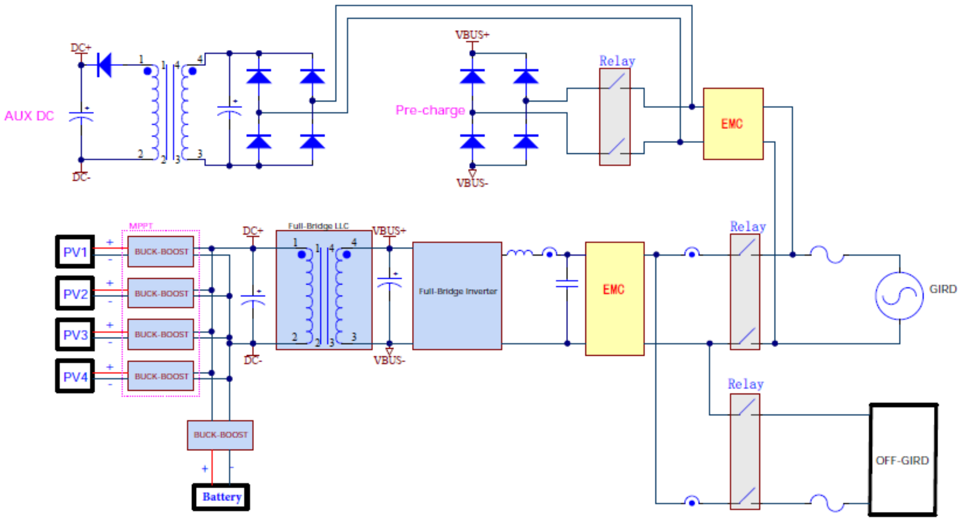
ZDSF2400P is an all-in-one balcony energy storage system, built-in independent 4 MPPT input, each 750W, a total of 3000W; The AC side provides 2400W maximum output power and 3200W maximum input power; The battery side provides 2400W charging power and 2400W discharging power. The product has the characteristics of high-performance MPPT, large-capacity energy storage, powerful output, intelligent control, high reliability, and plug-and-play.

Combining photovoltaic, energy storage, and power management into a single unit, this product supports intelligent control through the Zendure App, offering a comprehensive solution for centralized grid-connected systems.

The topology diagram as following:

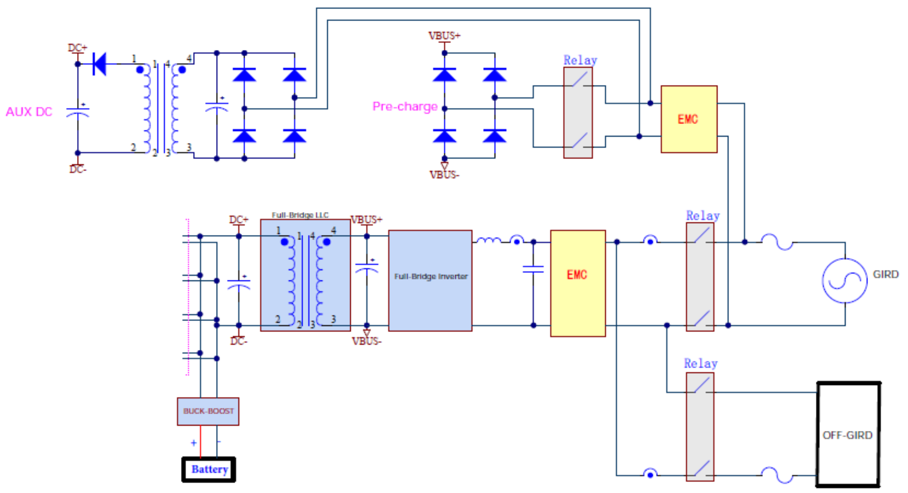
ZDSF2400P

Solar Flow 2400 PRO Schematic block diagram



ZDSF2400AC+

Solar Flow 2400 AC+ Schematic block diagram



Model differences:

Model	Have the PV input terminal and MPPT module	The output power derating by software
ZDSF2400P	Yes	No
ZDSF2400P-800	Yes	Yes*
ZDSF2400AC+	No	No
ZDSF2400AC+-800	No	Yes*

The product was tested on:

The Software version: V1

The Hardware version: V1

Factory information:
Guangdong Huichuang NewPower Co., Ltd.
No.17 Houde Road, Jiaolian Community, Dongguan City, Guangdong Province, the People's Republic of China

Helith Technology (Guangzhou) Co., Ltd.
Add 1: 2F, No. 31 Gangxin Road, Shawan Street, Panyu District, Guangzhou
Add 2: Room 601, 6F, No. 5, Maxing Street, Nansha District, Guangzhou

Shenzhen Hailei New Energy Co., Ltd.
Room 101, Building A, No. 1, Tongfuyu Industrial Zone, Longtian Community, Longtian Street, Pingshan District, Shenzhen

Zhuhai Pengyuan Energy Storage Technology Co., Ltd.
Factory Building(1), Factory Building(2), No.22Chuangxing Middle Road, Hongqi Town, Jinwan District, Zhuhai City, Guangdong Province, China

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict

4	**General framework conditions**		N/A
4.1	**Provisions and regulations**	This report is only evaluated and tested for PGU; The PGS incorporated with the PGU shall further consider this clause and sub-clause.	N/A
4.2	**Application procedure and relevant document for connection**	Shall consider in final PGS	N/A
4.3	**Commissioning of the power generation system and/or the storage unit**	Shall consider in final PGS	N/A

5	**Network connection**		**P**
5.1	**Principles for determination of the network connection point** Power generation systems and storage units shall be connected at a suitable point of the network, i. e. the network connection point. Based on the documents listed in 4.2, the network operator determines the suitable network connection point which will ensure safe network operation while also taking into account the power generation system and the storage unit and at which the requested power can be drawn and transmitted. The essential aspect for a network connection evaluation is always the behaviour of the power generation system and the storage unit at the network connection point or at the PCC. This is intended to ensure that the power generation system or storage unit is operated without adverse interactions and impairment of the supply of other customers. Annex D shows an example of the connection evaluation of power generation systems..	Shall consider in final PGS	N/A
5.2	**Rating of the network equipment** Due to their operating mode, power generation systems and storage units may cause higher loading of lines, transformers and other network equipment. Therefore, the network operator verifies the transmission capacity of the network equipment with regard to the connected power generation systems and storage units in accordance with the relevant rating regulations. For calculation purposes, the maximum apparent power of the sum of all power generation systems and storage units $\sum S_{Amax}$ and usually the load factor m = 1 shall be used. This does not apply to buried cables for the connection of photovoltaic systems where a load factor m = 0,7 shall be used.	Shall consider in final PGS	N/A

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.3	Permissible voltage change For undisturbed operation of the network, the amount of the voltage change caused by all power generation systems with a network connection point in a low-voltage network shall at none of the PCCs in this network may a value of 3 % as compared with the voltage without power generation systems. Deviations from the value of $\Delta u_a \leq 3$ % are permissible as specified by the network operator (e. g. when using a controllable local network transformer). When calculating the voltage change, the displacement factor shall be taken into account which is provided by the network operator for the maximum apparent connection power of the power generation system S_{Amax}.	Shall consider in final PGS	N/A
5.4	**Network interactions** For power generation systems and storage units, the permissible limits for network interactions are also described in VDE-AR-N 4100, 5.4. For the connection evaluation of power generation systems and storage units, the connection owner provides the completed forms E.2 to E.5 to the network operator.		N/A
5.5	**Connection criteria**		P
5.5.1	**General** When connecting a power generation system or a storage unit, the technical connection conditions of the network operator shall be observed.	Shall be considered full feed-in or excess feed-in that in accordance with VDE-AR-N 4100 in the power system	P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.5.2	**$P_{AV, E}$ monitoring (feed-in limitation)** $P_{AV, E}$ monitoring allows a connection power $P_{AV, E}$ deviating from the installed power to be agreed with the network operator and to be set. The feed-in limit described in this sub-clause shall be measured at the central meter panel in accordance with VDE-AR-N 4100, 7.2. $P_{AV, E}$ monitoring can be an independent equipment mounted at the central meter panel in accordance with VDE-AR-N 4100 or in a suitable circuit distributor or may also be part of a power generation unit or a storage unit or a charging unit for electric vehicles. When $P_{AV, E}$ is exceeded, the power of the power generation system and/or the storage unit causing the event shall be reduced. $P_{AV, E}$ monitoring is to be used for monitoring the agreed active connection power $P_{AV, E}$ of power generation systems and/or storage units if thefeed-in power at the network connection point $P_{AV, E}$ agreed with the network operator is smaller than the sum of the installed maximum active connection power of all power generation systems and/or storage units at that network connection point.		N/A
5.5.3	**Power generation systems ready for connection** In addition to the requirements specified in this VDE application guide, DIN VDE V 0100-551-1 (VDE V 0100-551-1) applies to power generation systems ready for connection. Provided a connection-ready power generation system is connected via an existing specific energy socket (e. g. complying with VDE V 0628-1 (VDE V 0628-1)) and a bidirectional meter is mounted at the central meter panel, the signature and the details of the system installer on the commissioning protocol E.8 may be omitted. A site map is not required in this case. This only applies up to a value S_{Amax} ≤ 600 VA per network user installation..		N/A
5.6	**Three-phase inverter systems** For three-phase power generation systems feeding into the network via inverters, the power feed-in into the three line conductors shall be three-phase balanced. The inverter circuit shall preferably be set up as a three phase current unit. The positive sequence system of the terminal voltages, even if they are unbalanced, is to be used as the reference quantity for the currents.		N/A
5.7	**Behaviour of the power generation system at the network**		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.7.1	**General** For frequencies between 47,5 Hz and 51,5 Hz, automatic disconnection from the network due to a frequency deviation is not permitted. The actual operating principle and the associated exceptions are detailed in 5.7.4.3. Frequency-dependent active power control is implemented in the open-loop control of the power generation units.. In the frequency range of 47,5 Hz to 51,5 Hz, power generation systems shall be capable of network parallel operation in compliance with the time-related minimum requirements given in Table 1. Power generation units shall be able to ride through rapid frequency changes without disconnection from the network. This requirement applies provided the following averaged rates of change of frequency (RoCoF) are not exceeded: – ± 2,0 Hz/s for a moving time slot of 0,5 s; or – ± 1,5 Hz/s for a moving time slot of 1 s; or – ± 1,25 Hz/s for a moving time slot of 2 s. In case of rapid frequency changes, frequency measurements shall not take more than 200 ms. The minimum accuracy of frequency measurements is ± 50 mHz.	(See appended table) The unit is verified with ROCOF (2.0Hz/s) without disconnection.	P
5.7.2	**Steady-state voltage stability/reactive power supply**		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.7.2.1	**General boundary conditions** Steady-state voltage stability means the reactive power supply provided by a power generation system and/or a storage unit when energy is supplied for the purpose of voltage stability in the distribution network. The steady-state voltage stability is intended to keep slow (steady-state) voltage changes in the distribution network within acceptable limits. In case of three-phase feed-in, the reactive power supply associated with all three methods described in 5.7.2.4 a) to c) refers to the positive sequence system components of the current and voltage fundamental component. In a passive sign convention system (see A.8), this means the operation of the power generation system in Quadrant II (under-excited) or Quadrant III (over-excited). If a storage unit consumes energy from the network, the reactive power exchange at the network connection point shall comply with the contractual agreements regarding the network connection for customer installations for consumption (see VDE-AR-N 4100). It shall be possible to approach each set-point resulting from the applied control method according to the required reactive power range given in 5.7.2.2 and to operate the power generation unit therein for any duration. Changes of the reactive power supply within the agreed reactive power range shall be possible at any time. Upon agreement with the network operator, the reactive power control range may be extended..		P
5.7.2.2	**Reactive power supply at ΣS_{Emax}**		P
5.7.2.2.1	**General** It is permissible in certain cases described in 5.7.2.2.2 and 5.7.3 to reduce the active power supply to the benefit of the reactive power supply. This is not considered a reduction of the active power supply in thecontext of network security management. Power generation systems shall comply with the reactive power supply irrespective of the number of feed-inphases under normal operating conditions in the voltage tolerance band U_n ± 10 %.		P
5.7.2.2.2	**Type 2 systems – inverters only** At the generator terminals, each power generation unit to be connected shall meet the requirements according to Figure 2 and Figure 3.		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.7.2.2.3	**Type 2 systems – Asynchronous generators (directly connected to the network and principally not able to control any reactive power)** For power generation units with generators that are directly connected to the network and principally not able to control any reactive power and therefore use constant capacities, a constant displacement factor cos ϕ = 0,95under-excited with an accuracy of ± 0,02 at nominal voltage and rated power shall be observed.	Inverter	N/A
5.7.2.2.4	**Type 1 systems and type 2 systems – stirling generators and fuel cells** For power generation systems with a rated apparent power ofΣSEmax ≤ 4,6 kVA , the network operator does not give any specifications. The value of cos ϕ lies within a range of cos ϕ = 0,95under-excited to 0,95over-excited. At its generator terminals, each power generation unit to be connected in systems ΣSEmax > 4,6 kVA shall meet the requirements according to Figure 4.		N/A
5.7.2.3	**Reactive power supply smaller than P_{Emax}** In addition to the requirements for reactive power supply at the operating point P_{Emax} of the power generation unit (P_{mom} = P_{Emax}), requirements also apply to operation with an instantaneous active power P_{mom} smaller than P_{Emax}. The minimum requirement for the reactive power supply in partial load operating mode at the generator terminals is indicated as a red triangle on the *P/Q* diagram. Within the ranges given in Figure 5 or Figure 6, the maximum residual deviation between the set-point and the actual value of the reactive power at the generator terminals shall not exceed ± 4,0 % in relation to P_{Emax}. Within the range of 0 ≤ P_{mom}/P_{Emax} < 0,2 (or 0,1, respectively), the power generation unit shall not exceed the reactive power value at the generator terminals of 10 % of the active power value P_{Emax} (reactive power supply and consumption respectively). Where a minimum technical power for a power generation unit has been agreed, the same conditions apply as for the range 0 ≤ P_{mom}/P_{Emax} < 0,2 (or 0,1, respectively) between 0 and the minimum technical power.	(See appended table)	P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.7.2.4	**Methods for reactive power supply** The reactive power supply for steady-state voltage stability shall not impair the dynamic network stability. The reactive power to be provided by the power generation system is limited to the range given in Figure 5 or Figure 6, respectively. In the context of network connection planning, the network operator prescribes to the connection owner one of the following methods for reactive power supply at the generator terminals of the power generation unit: a) reactive power voltage characteristic curve *Q*(*U*); or b) displacement factor/active power characteristic curve cos ϕ (*P*); or c) fixed displacement factor cos ϕ. The *Q*(*U*) rule applies only to three-phase power generation units connected to the three-phase current system. Here, too, the reactive power requirements are implemented at the generator terminals of the power generation units.	Method a and b are used for reactive power supply PGU S_{Emax}≤4.6 kVA characteristic curve provided by the network operator within cosφ= 0.95 under-excited to 0.95 over-excited.	P
	Re: a) reactive power voltage characteristic curve *Q*(*U*) The objective of this method is the reactive power exchange between power generation unit and network depending on the actual voltage at the generator terminals of the power generation unit (*Q*= *f* (*U*)). The reference voltage U_{Q0} is 400 V / 3. The arithmetic mean of the r.m.s. values (optionally of the positive sequence system) of the three measured line-to-neutral voltages at the generator terminals of the power generation unit is the target value for the reactive power to be fed in on all line conductors. Voltage measurement shall not exceed a maximum measurement error of 1 % in relation to the nominal value.		N/A
	Re: b) Displacement factor/active power characteristic curve cos ϕ (*P*) The objective of this method is the reactive power supply by the power generation unit depending on the actual active power output (*Q* = *f* (P_{mom})).	(See appended table)	P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
	Re: c) Displacement factor cos ϕ The objective of displacement factor control is the power feed-in by the power generation unit at a constant active power/apparent power ratio (cos ϕ = const). Thereby, the use of the reactive power control range given in Figure 5 and Figure 6 is restricted. For this purpose, the target value is defined with a minimum increment of Δ cos ϕ = 0,01. The maximum permissible error tolerance of the reactive power feed-in is calculated using the error tolerance given in 5.7.2.3 of ± 4 % in relation to P_{Emax}. The network operator predefines a displacement factor set-point.	(See appended table)	P
5.7.2.5	**Requirements for reactive power methods of type 2 systems (inverters only) and type 1 systems** In the delivery state, none of the three reactive power methods specified in 5.7.2.4 is set as default. During the commissioning of power generation units, the method specified by the network operator shall be set by the system installer. Without the setting of the method specified by the network operator, power generation units shall not feed in any power.		P
	The control behaviour of the reactive power (methods a), b) and c)) with respect to set-point offsets corresponds to the PT-1 behaviour shown in Figure 10. Method a) deals with a closed control circuit under consideration of the network impedance. Each reactive power value resulting from the control behavior predefined by the network operator shall be adjustable within a range of 6 s to 60 s (from 10 s to 60 s for type 1) when being provided by the power generation unit. The time specified by the network operator corresponds to 3 Tau of a PT-1 behaviour or to the time until reaching 95 % of the set-point. If no actual value is predefined by the network operator for this purpose, the applicable value is 10 s for 3 Tau or 95 % of the set-point, respectively. The envelop delay time includes the determination of the network voltage or the active and reactive powers.		P
5.7.2.6	**Special aspects regarding the extension of power generation systems** The requirements specified in 5.7.2.4 shall also be met by the newly added power generation units at their generator terminals. The reactive power supply by the added power generation units in accordance with 5.7.2.2 shall be determined based on the sum of the rated apparent powers of the existing power generation system and the newly added power generation units.		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.7.3	**Dynamic network stability**		P
5.7.3.1	**General**	(See appended table)	P
5.7.3.2	**Dynamic network stability for type 1 units** **Transient stability – Reaction to network faults** Regarding the power generation unit remaining connected to the network, the following applies to type 1 units: Throughout the operating range of the power generation unit, voltage drops caused by single-phase, two phase or three-phase network faults and the subsequent voltage transient phenomena shall not cause the power generation unit to become unstable or to disconnect from the network if the voltage assumes values within the limit curves shown in Figure 11 (red for the under-voltage limit curve, blue for the over-voltage limit curve).		N/A
5.7.3.3	**Dynamic network stability for type 2 units and storage units** The following conditions apply to all type 2 power generation units and storage units: As long as the line-neutral-voltages at the generator terminals of the power generation unit or storage unit do not exceed the limit curves shown in Figure 12 (red for the under-voltage limit curve, blue for the over-voltage limit curve), both the power generation unit and the storage unit shall neither become unstable nor disconnect from the network throughout the operating range.		P
	For evaluating the curves, the smallest respective value of the line-neutral-voltages at the power generation unit or the storage unit shall be used in case of a voltage drop, and the highest respective value of the line-neutral- voltages at the power generation unit or the storage unit shall be used in case of a voltage rise. As far as the set values for the NS protection given in Table 2 (column “Inverter(s)”) anticipate the requirements given in Figure 12 in certain working points, merely the checking of the set values for NS protection is required for the verification procedure.		P
	If the voltage at the generator terminals falls below < 0,8 U_n or exceeds > 1,15 U_n (onset of fault), type 2 power generation units and storage units shall ride through voltage drops without feeding current into the network of the network operator (limited dynamic network stability).		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
	This requirement is deemed to be met, if the current fed in by the power generation unit(s) and/or the storage unit in any line conductor does not exceed 20 % of the rated current I_r within 60 ms and 10 % of I_r within 100 ms upon a voltage drop below 0,8 U_n or a voltage rise above 1,15 U_n.		P
	Behaviour after the end of a fault If, after the end of a fault, the network voltage resumes a value within the voltage band from –15 % U_n to +10 % U_n and the active current of the power generation unit and/or the storage unit has been reduced during the network fault, it shall, immediately after the end of the fault, be increased to its pre-fault value as quickly as possible. The transient period shall not exceed a maximum of 1 s. The reactive power supply follows 5.7.2.5 in its time-related behaviour. In case of rotating machinery, the transient period shall not exceed a maximum of 6 s. At voltages of 1,15 U_n, the power generation units and storage units shall not disconnect from the network for a period of up to 60 s after the onset of the fault. If the tripping of the self-protection of the power generation units and/or the storage unit is imminent, these units can adjust their reactive power behaviour such as to prevent self-protection tripping.		P
5.7.4	**Active power output**		P
5.7.4.1	**General** In cases where set-points are specified by a third party (e. g. direct marketing) and of network security management in accordance with 5.7.4.2, the new set-point shall be approached with the customer installation's power gradients listed below in relation to the network connection point. Implementation of those power gradients directly at the power generation units or storage units is sufficient for meeting the requirement. The following power gradients shall be observed for increasing/reducing the active power output of power generation systems (minimum technical power or 5 % P_{Amax} ↔ 100 % P_{Amax}) as well as the energy supply and consumption by storage units (5 % P_{Amax} ↔ 100 % P_{Amax}): – at a maximum rate of 0,66 % P_{Amax} per s; – at a minimum rate of 0,33 % P_{Amax} per s. Power generation systems may react more slowly in case of set-points specified by third parties and of power increases. For this purpose, a minimum rate of 4 % P_{Amax} per minute should be observed.	The active power can be remote-controlled on the Phone and Server through WiFi module.	P

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Clause	Requirement - Test	Result - Remark	Verdict
	Other technically induced power gradients (e. g. for hydro power generation systems with level control depending on network demands) are permissible upon approval by the network operator. The power increase or reduction of the customer installation shall be realised in a uniform process, i. e. with a behaviour as linear as possible. The specification of set-points by third parties shall be realised on the level of the individual customer installation or by the sum of all systems accessed by a third party (e. g. by uniform distribution of the active powers to be connected or disconnected over a total period of ≥ 2,5 min).		N/A
	The power generation system or storage unit shall be provided with a logical interface (inlet port) which, irrespective of the power gradients listed above, allows to terminate the active power output within 5 s upon reception of a corresponding signal from the network operator. Additionally, the interface may be used for network security management.		P
5.7.4.2	**Network security management**		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
5.7.4.2.1	**Types of power generation systems and storage units** If not specified otherwise by legislation, the requirements described below apply. **Photovoltaic systems** PV systems shall contribute to the avoidance of network overload. For this purpose, PV system power is divided into three power groups: – For PV systems up to and including 30 kWp, the system operator may chose between two options: a) by means of a corresponding inverter design or a certified technical control, the active power feed-in of the PV system shall be permanently limited to a maximum value of 70 % of the installed module power at the network connection point with the power gradients given in 5.7.4.1; or b) the PV system shall be provided with a technical means for remote-controlled reduction of the feedin power by the network operator. – PV systems > 30 kWp up to and including 100 kWp shall be provided with a technical means enabling the remote-controlled reduction of the feed-in power by the network operator. – PV systems > 100 kWp shall be provided with a technical means enabling the remote-controlled reduction of the feed-in power by the network operator and for the provision of the actual feed-in power. If the installed total power increases to > 100 kWp due to the installation of a further PV system on the same plot or building within a period of 12 months, legal provisions require implementation of the feed-in management for systems > 100 kWp while providing the actual feed-in power for the total power..	The active power can be remote-controlled on the Phone and Server through WiFi module.	P
	Cogeneration of power and heat (CHP) systems, wind, biogas, hydroelectric power as well as landfill and sewage gas systems Those PV systems with P_{Amax} > 100 kW shall be provided with a technical means enabling the remote-controlled reduction of the feed-in power by the network operator and for the provision of the actual feed-in power.		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Storage units buffering EEG or KWKG systems Those storage units with P_{Amax} > 100 kW shall be provided with a technical means enabling the remote controlled reduction of the feed-in power by the network operator and for the provision of the actual feed-in power. These requirements do not apply if the feeding into the network of the network operator by a storage unit is prevented by technical control means. This shall be demonstrated by means of a manufacturer's declaration.		N/A
	Any EEG and KWKG systems with an intelligent measurement system If an intelligent measurement system is present, the network operator may demand the metering point operator to transmit network state data (i. e. also the actual feed-in power).		N/A
	Any power generation systems and storage units other than those indicated above All power generation systems and storage units shall be provided with technical means enabling the remote-controlled reduction of the feed-in power by the network operator and for the provision of the actual feed-in power.		P
5.7.4.2.2	**Implementation of network security management** Power generation systems and storage units shall be able to reduce their active power to a power value predetermined by the network operator at the network connection point without disconnecting from the network. The following values have proved effective: 100 %/60 %/30 %/0 % in relation to the installed active feed-in power P_{Amax}. Instead of reducing the generated active power, the consumed power of the customer installation can be increased, too. The sum of the reduced generated active power and/or the increased consumed active power at the network connection point shall not deviate by more than ± 5 % from the setpoint of active power limitation. Power reduction shall be possible for any operating state and from any operating point. In case of a redispatch, the power generation systems shall be technically capable of increasing the power to a maximum of P_{Amax} upon the network operator's request.	(See appended table)	P

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Clause	Requirement - Test	Result - Remark	Verdict
5.7.4.2.3	**Active power adjustment at over-frequency and under-frequency** A network frequency outside the tolerance band of ± 200 mHz around the nominal network frequency of 50,0 Hz indicates the presence of a critical system state in the integrated network where any power generation units and storage units shall contribute to the network frequency support. The accuracy of the frequency measurement in the steady state shall be ≤ ± 10 mHz. The requirements given in 5.7.4.3 do not apply to storage units in standby mode. Additionally, DC coupled storage units shall behave as type 2 units. In case of **over-frequency**, an excess of generated power is opposed by a deficit of consumed power. Therefore, all power generation units and storage units shall be able to adjust the active power working point at an over-frequency up to a maximum of 51,5 Hz (see Figure 14 and Figure 15). Power generation units shall enable the frequency for starting this frequency-dependent active power feed-in to be set to a value between 50,2 Hz and 50,5 Hz. Unless specified otherwise by the network operator, this start frequency shall be set to 50,2 Hz. The static value of the frequency-dependent active power feed-in shall be adjustable within a range of 2 % to 12 %. This corresponds to a power gradient within a range of 16,67 % of P_{ref} per Hertz (s = 12 %) to 100 % of P_{ref} per Hertz (s = 2 %). Unless specified otherwise by the network operator, a gradient of 40 % of P_{ref} per Hertz (s = 5 %) shall be set (see Figure 14). For storage units, the generated active power with a gradient of 40 % of P_{Emax} per Hertz (s = 5 %) shall be reduced or increased (see Figure 15). Consequently, the power generation unit or the storage unit will constantly move up and down along the frequency characteristic within the frequency range of 50,2 Hz (unless specified otherwise for power generation units by the network operator) to 51,5 Hz with regard to its maximum possible active power feed-in ("operation along the characteristic").	(See appended table) The starting frequency can be set from 50.2 to 50.5Hz, And, power gradient 2%-12% adjustable Default 50.2 and power gradient 5% setting.	P

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Clause	Requirement - Test	Result - Remark	Verdict
	At frequencies below 49,8 Hz, all power generation units shall increase the instantaneous generated active power P_{mom} with a gradient of 40 % P_{Emax} per Hertz (s = 5 %) to its technically possible maximum value. For storage units, a gradient of 100 % P_{Emax} per Hertz (s = 2 %) applies. The maximum value is determined by the actual primary energy supply as well as the actually usable storage power. Power reductions for the protection of operating equipment are permitted even at under-frequency. For CHP systems, power reductions resulting from a heat-lead operating mode or a power drop due to the rotational speed are also permitted. Storage units dedicated to other purposes (e. g. gas storage units in biogas systems, DC buffer storage elements for self-consumption etc.) should be activated for this purpose. System-integrated storage units with an energy level below P_n × 30 s (e. g. smoothing chokes, indirect capacitors etc.) may be neglected for this application. Consequently, power generation units and storage units will constantly move up and down along the frequency characteristic also within the frequency range of 49,8 Hz to 47,5 Hz or 47,8 Hz with regard to their maximum possible active power feed-in (“operation along the characteristic”). At an under-frequency within the range of 49,8 Hz to 47,5 Hz, all storage units in charging mode shall reduce their instantaneous charging power according to the characteristic curve shown in Figure 15 to its technically possible minimum value (“operation along the characteristic”). In addition, storage units, as far as their charging state permits, shall change into the operating mode “energy supply” and increase their power according to the characteristic curve shown in Figure 15. In this case, system stability is of higher priority than a potential restraint for feeding storage energy into the network of the network operator based on technical/financial requirements. At network frequencies f < 47,5 Hz, power generation units and storage units shall disconnect from the network (see Figure 14 and Figure 15).	PV inverter units, a gradient of 40 % P_{Emax} per Hertz (s = 5 %) applies (See appended table)	P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
	Requirements for the control times for power generation units and storage units The initial time delay T_V of the frequency-dependent adjustment of the active power output at over-frequency and under-frequency is part of the transient period and shall preferably be ≤ 2 s. In case of a time delay > 2 s, the operator of the power generation system shall justify that delay by submitting technical proof to the transmission network operator. For type 2 power generation units and storage units, the necessary initial time delays T_V for reaching the required transient periods are significantly shorter than 2 s. For the time curve of the frequency-dependent active power adjustment, the following conditions regarding the initial time delay T_V and the transient period $T_{an\_90\ \%}$ shall be observed: – After $T_V + 0,1 \times (T_{an\_90\ \%} - T_V)$ has elapsed, a value of at least 9 % of the required power adjustment ΔP has been reached. – After the transient period $T_{an\_90\ \%}$ has elapsed, a value of 90 % of the power adjustment ΔP has been reached.		P
	During the control process (“operation along the characteristic”), the power generation unit and the storage unit shall respond as quickly as possible to sudden network frequency changes within a frequency range of 50,2 Hz to 51,5 Hz (subject to capability as declared by the manufacturer) with a transient period of 8 s for $\Delta P \leq 45$ % of P_{Emax} and ΔP for power changes beyond that in case of type 1 units and type 2 units with rotating machinery and 2 s in case of all other type 2 power generation units and 1 s in case of storage units. The settling period shall not exceed 30 s for type 1 units and type 2 units with rotating machinery or 20 s for all other type 2 power generation units and for storage units. After settling, the supplied active power should deviate by ≤ ± 10 % P_{Emax} from the set-point. The same requirements shall be applied to the active power increase at an under-frequency between 49,8 Hz and 47,5 Hz.		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
	Conditional requirements based on technical restrictions As an alternative to active power reduction at over-frequency, non-controllable power generation units may disconnect from the network within the frequency range of 50,2 Hz to 51,5 Hz; in that case, uniform distribution of the disconnection frequency in maximum increments of 0,1 Hz shall be ensured for each system type by the manufacturer. Power generation units of limited variability, e. g. only within the range of 70 % to 100 % P_{Emax}, can be curtailed within that range in accordance with the characteristic curve. Outside the controllable range, disconnection is then carried out according to the uniformly distributed shut-down limit curve. For power generation units with combustion engines or gas turbines, active power reduction occurs with a power gradient of at least 66 % P_{Emax} per minute (equals 1,11 % P_{Emax} per second). Thus, the transient period of 8 s can be observed up to a power reduction of 8,88 % P_{Emax}. In case of a greater change of frequency, the transient period is accordingly higher. Linear generators, such as stirling machines up to a maximum apparent power of $S_{Amax} \leq 4{,}6$ kVA, are exempt from the active power feed-in at over/under-frequency. They may remain connected to the network within a frequency range between 50,2 Hz and their maximum upper frequency limit and may disconnect from the network if this value is exceeded or, at the latest, when a frequency of 51,5 Hz is reached or exceeded. At an under-frequency between 49,8 Hz and their maximum lower frequency limit, linear generators should remain connected to the network but shall disconnect from it at the latest when a frequency of 47,5 Hz is reached or exceeded.		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	End of critical network state and return to normal operation Even if the network frequency has resumed a value within the tolerance band of 50,0 Hz ± 200 mHz after a frequency deviation, a critical network state has still to be assumed initially. The time for transition from the critical network state to normal operation is limited by a maximum change of the active power set-point based on P_{mom}. This change of the active power set-point (except for providing the operating reserve) shall be limited to a maximum gradient of 10 % of the active power P_{Emax} per minute (under consideration of 5.7.1). Only after the network frequency has been within the tolerance band of 50,0 Hz ± 200 mHz for 10 min continuously, the normal operation of the network is deemed to be restored whereupon this requirement does no longer apply.		P
5.7.4.4	**Voltage-dependent active power reduction** In order to avoid disconnection of the power generation system due to over-voltage protection U >, it is permissible to reduce the active power feed-in as a function of the voltage of (a) power generation unit(s). Implementation is then chosen by the system manufacturer. This is not considered an active power reduction in the context of feed-in management in compliance with EEG. Surges or oscillations of the active power feed-in are not permitted for that purpose.		N/A
5.7.5	**Short-circuit contribution** Due to the operation of a power generation system, the short-circuit current of the low-voltage network is increased by the short-circuit current of the power generation system. Therefore, the short-circuit current of the power generation system to be expected at the network connection point shall be indicated in accordance with 4.2. For the determination of the initial short-circuit AC current contribution I_{kA} of a power generation system, the following roughly estimated values can be assumed: – for synchronous generators: 8 times the rated current; – for asynchronous generators: 6 times the rated current; – for generators and storage units with inverters: the rated current. If the power generation system causes a short-circuit current increase in the network operator's network in excess of the rated value, then connection owner and network operator shall agree upon appropriate measures limiting the short-circuit current from the power generation system accordingly.		P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
6	**Construction of the power generation system/network and system protection (NS protection)**		P
6.1	**General requirements** The network and system protection (NS protection) is a type-tested protective device with a NS protection certificate (see Form E.6) wherein all protective functions specified in 6.5 are installed. The NS protection acts on the interface switch in accordance with 6.4. Depending on the sum of the maximum apparent powers of all power generation systems and storage units connected to the same network connection point $\sum S_{Amax}$, the following conditions apply to the NS protection:		P
6.2	**Central NS protection** The central NS protection shall be accommodated, installed and connected as an independent equipment at the central meter panel in a suitable circuit distributor in accordance with VDE-AR-N 4100, Clause 8, Paragraph 1, and not in the upper connection compartment according to VDE-AR-N 4100, 7.2, Paragraph 11. Examples of the arrangement of the central NS protection and hence the connection of power generation systems to meter panels are shown in Annex C. For central NS protection, it is additionally required to carry out a trigger test for checking the tripping circuit "NS protection – interface switch". For this purpose, the central NS protection is provided with a means for tripping the interface switch (e. g. by means of a test button) for testing purposes. Activation shall be visualised at the interface switch.	Integrated NS protection	N/A
6.3	**Integrated NS protection** In the case of integrated NS protection, the NS protection can be integrated in the programmable system control of the power generation units (e. g. in the inverter control). In this case, the means for testing the tripping circuit "NS protection – interface switch" by the system installer is not required. The integrated NS protection acts on an integrated interface switch (see 6.4.3).		P
6.4	**Interface switch**	The PSU include integrated interface switch and is type tested in the report	P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
6.4.1	**General** For the connection of the power generation system to the network operator’s low-voltage network or to the remaining customer installation, an interface switch shall be used. The interface switch is controlled by the NS protection and automatically triggers if at least one protective function responds. As interface switches, the switching devices of the individual power generation units (integrated interface switch) can be used. The integrated interface switches can also be used in combination with the central NS protection. In any case, central NS protection from ΣS_{Amax}>30 kVA (sum of the maximum apparent powers of all power generation systems and storage units connected to the same network connection point; for exceptions, see 6.1) shall be directly connected to the central meter panel. Where a signal is routed to a spatially separate switching device, it shall be ensured that the required disconnection periods given in Table 2 are observed and lead to the disconnection of the power generation system. During commissioning of the power generation system, a tripping test of the interface switch shall be conducted. The interface switch shall be designed for the rated conditional short-circuit current and under consideration of the protective devices required according to 6.5 and it shall enable instantaneous tripping. The switching capacity of the interface switch shall be rated according to the rated current of the upstream fuse or the maximum initial short-circuit AC current contribution of the power generation system, whichever is the higher. The functional check of the interface switch shall be carried out according to a) or b) or c): a) by using an interface switch which, in its active state, requires a control voltage to be applied continuously and which disconnects automatically when this voltage is no longer applied. The operational connection and disconnection processes shall be monitored; b) by connection and disconnection of the interface switch via the NS protection and monitoring its proper functioning (e. g. break contact of a monitoring contact) at least once daily; c) by using the integrated interface switch and the integrated NS protection for PV and battery inverters in compliance with DIN EN 62109 (VDE 0126-14). When a defect of the interface switch is detected, the power generation system shall neither feed in nor reconnect.	Integrated interface switch has been type tested in compliance with DIN EN 62109	P

VDE-AR-N 4105:2018-11			
Clause	Requirement - Test	Result - Remark	Verdict
6.4.2	**Central interface switch** The central interface switch shall be a galvanic break device (e. g. mechanical contactor, protective motor switch, mechanical circuit breaker). For a power generation system required to contribute to the dynamic network stability, an interface switch enabling compliance with the requirements specified in 5.7.3 (no malfunction at under-voltage in the context of the FRT requirements) shall be used. The interface switch shall be installed in the distribution field of or directly at the central meter panel in a circuit distributor. Examples of the arrangement of interface switches and hence the connection of power generation systems to meter panels are shown in Annex C.		N/A
6.4.3	**Integrated interface switch** For the construction of the interface switch, the requirements specified in 6.1 shall be considered. The interface switch (e. g. power relay, mechanical contactor, mechanical circuit-breaker, etc.) ensures galvanic breaking. For power generation systems with inverters, the interface switch shall be provided on the inverter's network side.	Integrated power relay in the PGU. Each live conductor is constructed with two relays	P
6.5	**Protective devices and protection settings**		P
6.5.1	**General** The purpose of NS protection is to disconnect the power generation system from the network in the event of inadmissible voltage and frequency values (also refer to DIN VDE 0100-551 (VDE 0100-551)). This is meant to prevent inadvertent feed-in from the power generation system into a partial network separated from the main distribution network.		P
6.5.2	**Protective functions** The NS protection shall be provided with a means for preventing unauthorised access (z. B. sealable, password protection). The rise-in-voltage protection U > shall be designed such as to be adjustable in the NS protection (see Table 2, Footnote b). Additionally, the time delay of the voltage drop protection U < and U << for directly coupled synchronous and asynchronous generators with P_n > 50 kW shall also be designed such as to be adjustable in the NS protection (see Table 2, Footnote d). Any other protective functions listed in 6.5.1 are either to be installed permanently, i. e. not adjustable, in the NS protection or to be provided with an additional separate protection against unauthorised access (e. g. password protection) for preventing modifications.	(See appended table)	P

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Clause	Requirement - Test	Result - Remark	Verdict
6.5.3	**Islanding detection**	(See appended table)	P
6.6	**Further requirements for power generation systems**	Shall be considered in PGS	N/A
7	**Metering for billing purposes**		N/A
8	**Operation of the system**		P
8.1	**General**		P
8.2	**Special aspects of the management of the network operator's network**		N/A
8.3	**Connection conditions and synchronisation**		P
8.3.1	**General** Power generation systems and storage units shall be connected to the network operator's network only if a suitable device determines that both the mains voltage and the mains frequency are within the tolerance range of 85 % U_n to 110 % U_n or 47,5 Hz to 50,1 Hz, respectively, for a period of at least 60 seconds. Additionally, the delay times for the reconnection of a generator and the staggered times applicable when connecting several generators shall be sufficient for safely finishing any control and adjustment processes within the power generation system and/or the storage unit caused by the connection. In case of power generation systems and storage units being reconnected to the network operator's network at the tripping of the NS protective device or the $P_{AV,E}$ monitoring, the active power of controllable power generation systems and storage units supplied to the network operator's network shall not exceed the gradient of 10 % of the active power P_{Amax} per minute. Non-controllable power generation systems and storage units can connect after 1 min to 10 min (random generator) or later.	(See appended table)	P
8.3.2	**Connection of synchronous generators**		N/A
8.3.3	**Connection of asynchronous generators**		N/A
8.3.4	**Connection of power generation units and storage units with inverters** Power generation units with inverters (such as photovoltaic systems) and storage units with inverters shall only be connected with $k_{imax} \leq 1,2$.		P
8.4	**Special aspects regarding the planning, installation and operation of power generation systems and storage units each with PAmax ≥ 135 kW**		N/A
9	**Verification of electrical properties**		P

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Clause	Requirement - Test	Result - Remark	Verdict

	Annex A: Explanations (informative)	

	Annex B: Connection examples and measurement strategies (informative)	

	Annex C: Examples of meter panel configurations (informative)	

	Annex D: Examples for the connection evaluation of power generation systems - Connection of a 20 kW PV system (informative)	

	Annex E: Forms (mandatory)	**P**
E.1	Application procedure	N/A
E.2	Data sheet for power generation systems	N/A
E.3	Data sheet for storage units	N/A
E.4	Unit certificate	P
E.5	Test report “Network interactions” for power generation units with an input current > 75 A	N/A
E.6	Certificate of the network and system protection	P
E.7	Requirements for the test report for the NS protection	P
E.8	Commissioning protocol for power generation systems and/or storage units	N/A
E.9	Type approval procedure	N/A

Appended Table - Testing Result

5.2.2	TABLE: Rapid voltage change		P
Operation type: Switching on at any power level (without default to primary energy source)			
Condition	Test 1: cosφ=1	Test 2: cosφ=0.9 over-excited	Test 3: cosφ=0.9 under-excited
Ki	0.042	0.043	0.046
Kimax Limit	<1.2		
Operation type: start-up at Pn (reference condition) with circuit breaker reclosing			
Condition	Test 1: cosφ=1	Test 2: cosφ=0.9 over-excited	Test 3: cosφ=0.9 under-excited
Ki	0.046	0.045	0.046
Kimax Limit	<1.2		
Operation type: shut-down (breaking operation at nominal power)			
Condition	Test 1: cosφ=1	Test 2: cosφ=0.9 over-excited	Test 3: cosφ=0.9 under-excited
Ki	0.484	0.560	0.441
Kimax Limit	<1.2		
Note: 1) Sk,fic/Sn = 20 2) ki is the ratio of the highest current occurring during a switching operation to the normal generator current, the current is to be considered as an r.m.s. value over a period 3) d_c and d_{Max} for voltage change refer to result of section 5.2.3 based on DIN EN 61000-3-3			

Switching actions	Ki
Marking operation without default (to primary energy carrier)	0.046
Worst case at switch over of generator sections	0.046
Marking operation at reference conditions (of primary energy carrier)	0.046
Breaking operation at nominal power	0.560
Worst case value of all switching operations Ki max	0.560

5.2.3	TABLE: Flicker （according to DIN EN 61000-3-3）					P
Test impedance	0.24Ω+0.15j					
	Pst			cψk		
	L1	L2	L3	L1	L2	L3
1	0.07	--	--	1.40	--	--
2	0.05	--	--	1.00	--	--
3	0.42	--	--	8.40	--	--
4	0.05	--	--	1.00	--	--
5	0.05	--	--	1.00	--	--
6	0.05	--	--	1.00	--	--
7	0.05	--	--	1.00	--	--
8	0.05	--	--	1.00	--	--
9	0.05	--	--	1.00	--	--
10	0.05	--	--	1.00	--	--
11	0.05	--	--	1.00	--	--
12	0.05	--	--	1.00	--	--
Calculation						
Plt L1	0.183					
Plt L2	--					
Plt L3	--					
greatest ascertained cψk	8.40					

Note:
1) Sk,fic/Sn = 20

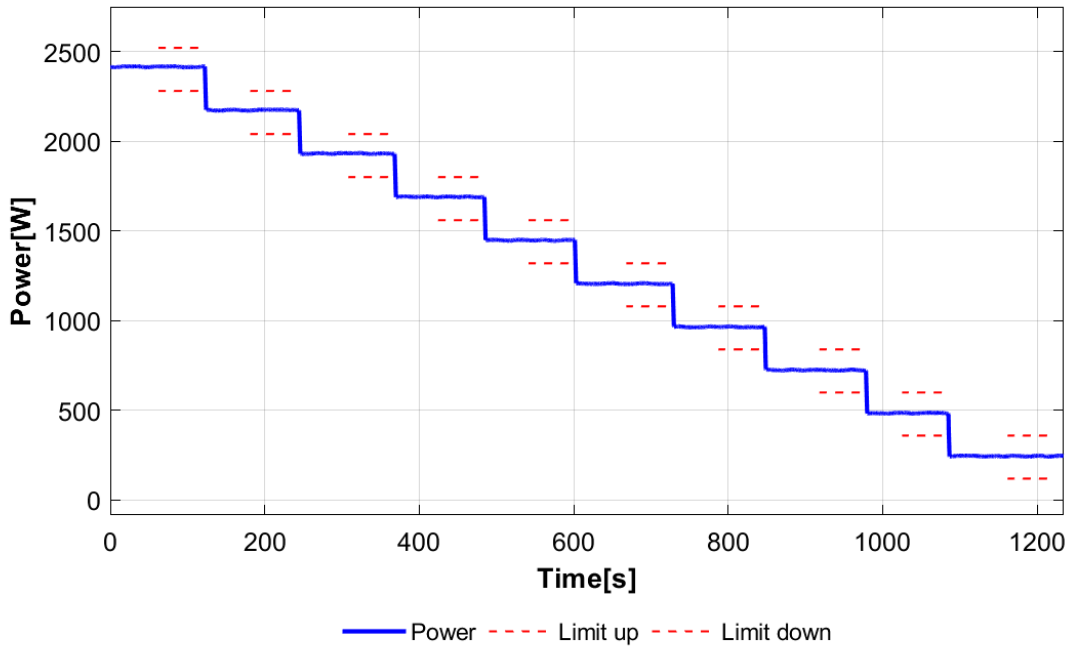
5.2.4	TABLE: Harmonics and inter-harmonics (according to DIN EN 61000-3-2)										P
Active power P/Pₙ [%]	10	20	30	40	50	60	70	80	90	100	Limit [A]
Harmonic number	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	
2	0.0068	0.0102	0.0142	0.0176	0.0217	0.0255	0.0300	0.0345	0.0387	0.0430	1.080
3	0.0279	0.0387	0.0467	0.0547	0.0604	0.0726	0.0808	0.0905	0.1011	0.1118	2.3
4	0.0037	0.0044	0.0041	0.0039	0.0036	0.0037	0.0036	0.0035	0.0039	0.0045	0.43
5	0.0162	0.0185	0.0218	0.0221	0.0259	0.0312	0.0338	0.0366	0.0401	0.0455	1.14
6	0.0033	0.0038	0.0035	0.0038	0.0035	0.0035	0.0036	0.0037	0.0038	0.0044	0.3
7	0.0217	0.0248	0.0272	0.0300	0.0300	0.0322	0.0333	0.0355	0.0396	0.0463	0.77
8	0.0037	0.0044	0.0042	0.0040	0.0042	0.0040	0.0040	0.0040	0.0043	0.0048	0.23
9	0.0284	0.0300	0.0310	0.0331	0.0354	0.0396	0.0432	0.0462	0.0491	0.0531	0.4
10	0.0039	0.0040	0.0044	0.0043	0.0042	0.0043	0.0043	0.0044	0.0047	0.0050	0.184
11	0.0375	0.0389	0.0405	0.0409	0.0429	0.0420	0.0443	0.0468	0.0499	0.0526	0.33
12	0.0045	0.0046	0.0049	0.0049	0.0047	0.0047	0.0047	0.0048	0.0049	0.0054	0.153
13	0.0422	0.0437	0.0461	0.0460	0.0468	0.0493	0.0496	0.0517	0.0531	0.0548	0.21
14	0.0047	0.0048	0.0052	0.0050	0.0055	0.0049	0.0053	0.0053	0.0057	0.0057	0.131
15	0.0465	0.0480	0.0503	0.0507	0.0511	0.0535	0.0536	0.0547	0.0564	0.0591	0.15
16	0.0050	0.0052	0.0052	0.0053	0.0056	0.0052	0.0054	0.0057	0.0059	0.0062	0.115
17	0.0488	0.0495	0.0511	0.0525	0.0525	0.0549	0.0569	0.0575	0.0586	0.0598	0.132
18	0.0050	0.0051	0.0051	0.0052	0.0053	0.0057	0.0054	0.0057	0.0059	0.0063	0.102
19	0.0482	0.0482	0.0486	0.0500	0.0503	0.0511	0.0529	0.0546	0.0556	0.0564	0.118
20	0.0048	0.0050	0.0050	0.0051	0.0052	0.0059	0.0054	0.0056	0.0062	0.0061	0.092
21	0.0462	0.0461	0.0455	0.0469	0.0477	0.0494	0.0505	0.0522	0.0531	0.0528	0.107
22	0.0044	0.0045	0.0045	0.0048	0.0049	0.0057	0.0053	0.0053	0.0059	0.0062	0.084
23	0.0425	0.0420	0.0408	0.0411	0.0417	0.0429	0.0426	0.0437	0.0444	0.0447	0.098
24	0.0040	0.0040	0.0042	0.0045	0.0047	0.0053	0.0056	0.0053	0.0056	0.0060	0.077
25	0.0396	0.0391	0.0379	0.0376	0.0380	0.0392	0.0388	0.0394	0.0400	0.0400	0.09
26	0.0038	0.0037	0.0039	0.0042	0.0045	0.0050	0.0061	0.0054	0.0055	0.0057	0.071
27	0.0351	0.0348	0.0338	0.0332	0.0333	0.0341	0.0340	0.0336	0.0334	0.0324	0.083
28	0.0034	0.0035	0.0036	0.0039	0.0043	0.0048	0.0064	0.0054	0.0054	0.0057	0.066
29	0.0329	0.0330	0.0318	0.0307	0.0306	0.0314	0.0313	0.0301	0.0295	0.0289	0.078
30	0.0031	0.0031	0.0033	0.0036	0.0041	0.0046	0.0058	0.0055	0.0056	0.0060	0.061
31	0.0292	0.0291	0.0280	0.0270	0.0268	0.0275	0.0273	0.0266	0.0252	0.0248	0.073
32	0.0030	0.0031	0.0032	0.0033	0.0038	0.0043	0.0054	0.0061	0.0058	0.0061	0.058
33	0.0272	0.0271	0.0263	0.0253	0.0250	0.0253	0.0249	0.0252	0.0241	0.0232	0.068
34	0.0028	0.0029	0.0030	0.0032	0.0036	0.0043	0.0050	0.0069	0.0059	0.0065	0.054
35	0.0252	0.0251	0.0242	0.0230	0.0225	0.0225	0.0221	0.0223	0.0210	0.0200	0.064
36	0.0029	0.0026	0.0029	0.0032	0.0036	0.0042	0.0050	0.0076	0.0066	0.0077	0.051
37	0.0241	0.0234	0.0227	0.0217	0.0212	0.0216	0.0214	0.0218	0.0206	0.0200	0.061
38	0.0027	0.0028	0.0030	0.0032	0.0036	0.0044	0.0055	0.0079	0.0087	0.0108	0.048
39	0.0213	0.0208	0.0203	0.0196	0.0191	0.0192	0.0191	0.0191	0.0194	0.0190	0.058
40	0.0040	0.0041	0.0043	0.0047	0.0054	0.0064	0.0077	0.0097	0.0119	0.0142	0.046

5.2.6	TABLE: DC Injection					P
Rated output current: 10.4A						
Power P/Pn		100%				
Measurement						Limitation
Phase L1		Phase L2		Phase L3		
0.0480A	0.461%	--	--	--	--	0.5%
Power P/Pn [%]		60%				
Measurement						Limitation
Phase L1		Phase L2		Phase L3		
0.0088A	0.085%	--	--	--	--	0.5%
Power P/Pn [%]		30%				
Measurement						Limitation
Phase L1		Phase L2		Phase L3		
0.0109A	0.105%	--	--	--	--	0.5%

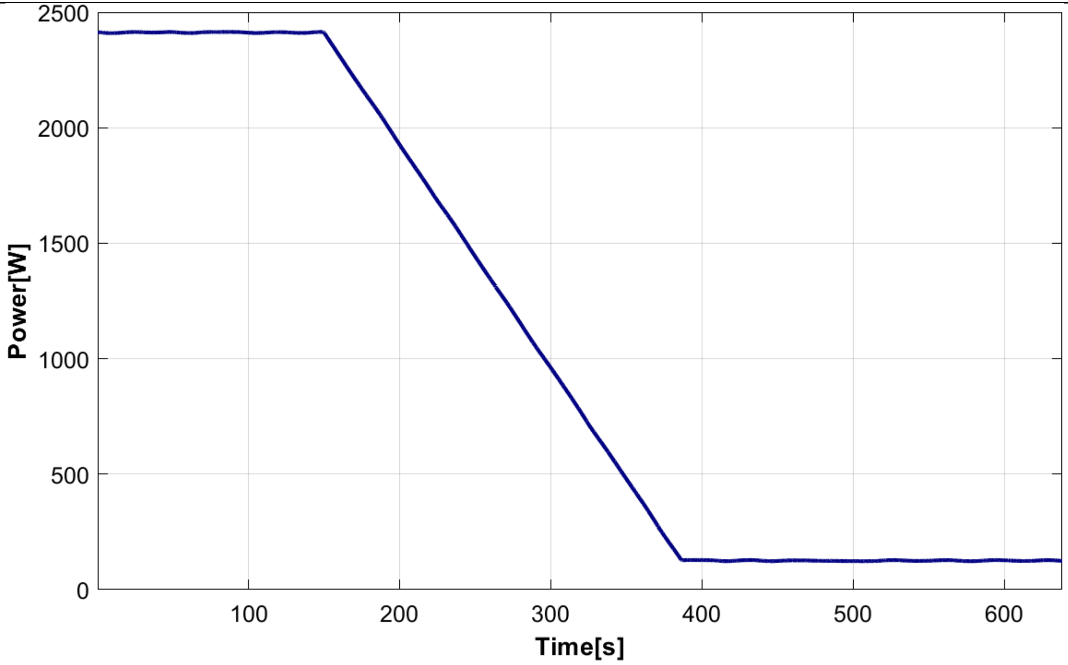
5.4.2	TABLE: Measurement of active- and reactive power ranges								P
No.	Test condition		Measurement						
	Cosφ	U / Un	U [V]	I [A]	$P_{Emax600}$ *) [W]	$S_{emax600}$ *) [VA]	Q [Var]	Cosφ	
Model: ZDSF2400P									
a1	1.00	90%	207.54	11.65	2414.65	2414.65	3.94	1.0000	
a3		100%	230.48	10.48	2412.73	2412.73	5.92	1.0000	
a5		109%	250.94	9.60	2406.64	2406.65	7.82	1.0000	
b1	max. under-excited	95%	218.50	11.69	2419.72	2546.53	-793.59	0.9502	
b3		100%	230.47	11.09	2422.22	2548.95	-793.69	0.9503	
B5		109%	250.74	10.17	2416.53	2542.81	-791.31	0.9503	
c1	max. over-excited	90%	208.06	12.19	2408.37	2533.10	785.10	0.9508	
c3		100%	208.06	12.19	2408.37	2533.10	785.10	0.9504	
c4		105%	241.56	10.46	2400.38	2526.18	787.24	0.9502	
$P_{Emax600}$ [W]			2422.22						
$S_{Emax600}$ [VA]			2548.95						

5.4.2	TABLE: Measurement of active- and reactive power ranges								P
No.	Test condition		Measurement						
	Cosφ	U / Un	U [V]	I [A]	$P_{Emax600}$ *) [W]	$S_{emax600}$ *) [VA]	Q [Var]	Cosφ	
Model: ZDSF2400P-800									
a1	1.00	90%	207.07	3.88	804.03	804.04	-3.01	1.0000	
a3		100%	230.06	3.49	802.00	802.00	1.05	1.0000	
a5		109%	250.75	3.19	798.71	798.71	2.08	1.0000	
b1	max. under-excited	95%	218.57	3.88	804.94	847.45	-265.03	0.9498	
b3		100%	230.06	3.68	803.73	846.21	-264.77	0.9498	
B5		109%	250.76	3.36	800.92	842.94	-262.82	0.9502	
c1	max. over-excited	90%	207.08	4.07	800.90	841.99	259.81	0.9512	
c3		100%	230.06	3.66	798.82	841.30	263.95	0.9495	
c4		105%	241.55	3.48	797.39	839.73	263.28	0.9496	
$P_{Emax600}$ [W]			804.94						
$S_{Emax600}$ [VA]			847.45						

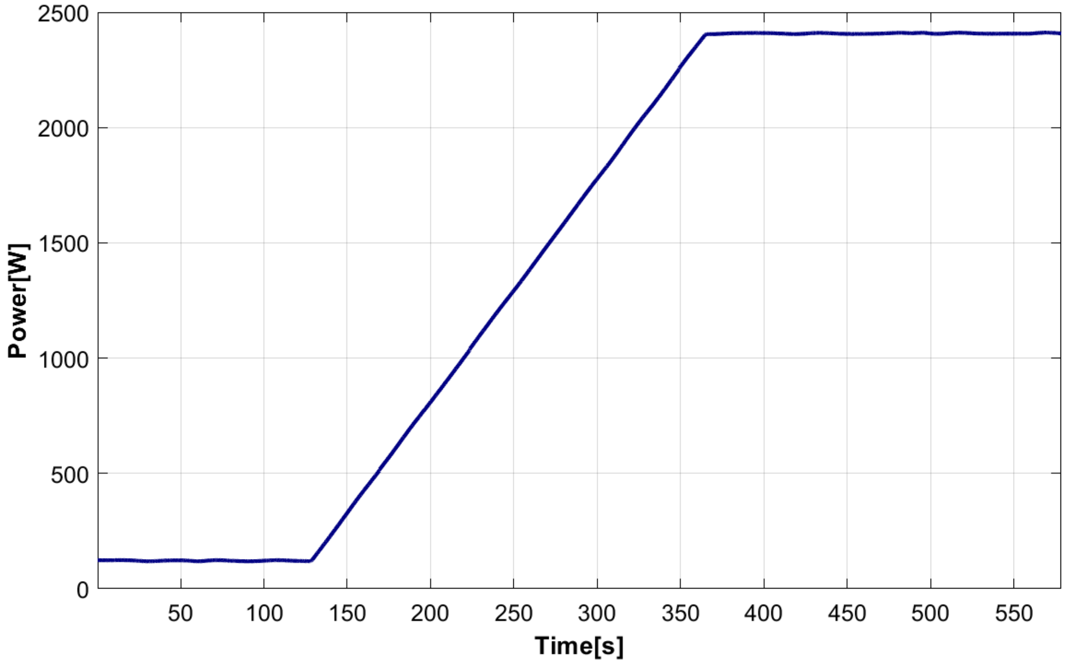
5.4.3	Active power reduction through setpoint specification			P
Measurement Item	Power Setting [W]	Actual Power [W]	Deviation of power [W]	Δ P/ Pn [%]
100%	2400	2414.56	14.56	0.61
90%	2160	2174.50	14.50	0.60
80%	1920	1931.49	11.49	0.48
70%	1680	1689.70	9.70	0.40
60%	1440	1448.19	8.19	0.34
50%	1200	1205.75	5.75	0.24
40%	960	964.78	4.78	0.20
30%	720	724.25	4.25	0.18
20%	480	485.48	5.48	0.23
10%	240	245.36	5.36	0.22
Limitation of Δ P/ Pn	± 5%			



Power gradient (100%Pn ->5%Pn) [W/s]:	9.64W/s
Power gradient (5%Pn ->100%Pn) [W/s]:	9.57W/s
Limitation of gradient [W/s]	7.92W/s – 15.84W/s



Power gradient from 100% to 5%



Power gradient from 5% to 100%

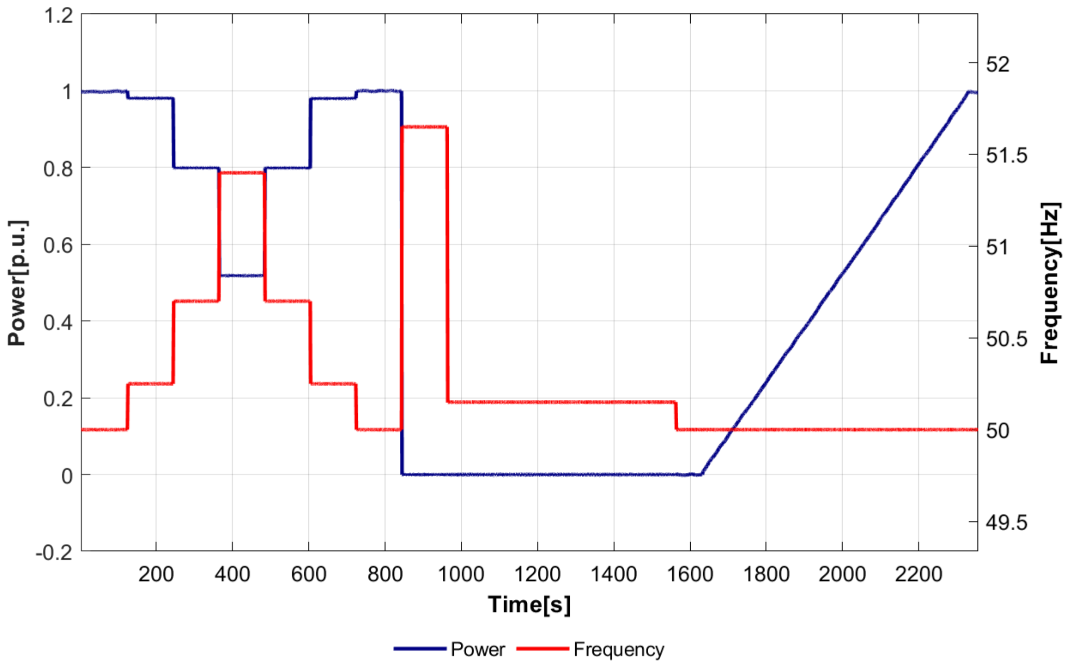
The exact name of interface: Logic interface
Information: if receiving the signal is low, the interface will change the state of power, which specified in the manual
Response time of Activation of interface: Response time (5s limitation): Primary power:100% to 0%

Response time: 0.059s

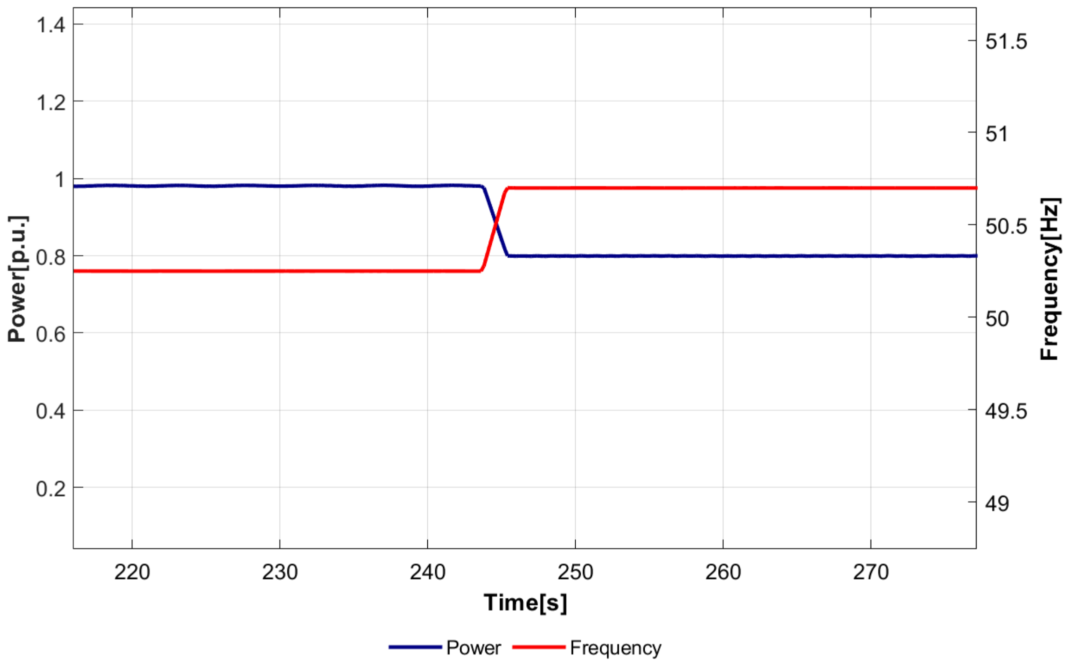
Noted: CH1 represents signal for activating logic interface, CH3: Current of EUT

5.4.4	Active power supply at overfrequency							P
Test 1 Setting parameters of the EZE: P = 100% PEmax Start of power reduction at 50.2 Hz s = 5% (40% Pref / Hz)	40%P_{Emax} (W)		960		10%P_{Emax} (W)		240	
	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time		
						The initial time delay TV <2s	The response times $T_{an\_90\ \%}$ <2s	The settling times <20s
a) 50Hz ± 0.01Hz	50.00	100	2395.98	-0.17	< ± 5%	--	--	--
b)50.25Hz ± 0.01Hz	50.25	98	2354.02	0.08	< ± 10%	0.2	0.2	0.4
c)50.70Hz ± 0.01Hz	50.70	80	1918.05	-0.08	< ± 10%	--	0.2	0.4
d)51.40Hz ± 0.01Hz	51.40	52	1244.12	-0.16	< ± 10%	--	0.2	0.4
e)50.70Hz ± 0.01Hz	50.70	80	1917.68	-0.10	< ± 10%	--	0.2	0.4
f)50.25Hz ± 0.01Hz	50.25	98	2352.08	0.00	< ± 10%	--	0.2	0.4
g)50Hz ± 0.01Hz	50.00	100	2399.40	-0.02	< ± 10%	--	0.2	0.4
h)51.65Hz± 0.01Hz	51.65	0	-0.21	Disconnection Time[ms]:162.75, Limitation[ms]: 200				
i)50.15Hz± 0.01Hz	50.15	0	-0.26	Reconnection: ☐ Yes/ ☒ No, Limitation: No reconnection is allowed.				
j)50.00Hz± 0.01Hz	50.00	100	2325.14	Reconnection time: 67.8s Maximal Rising Gradient [%/min]:8.57 %, Limitation [%/min]: 10%				

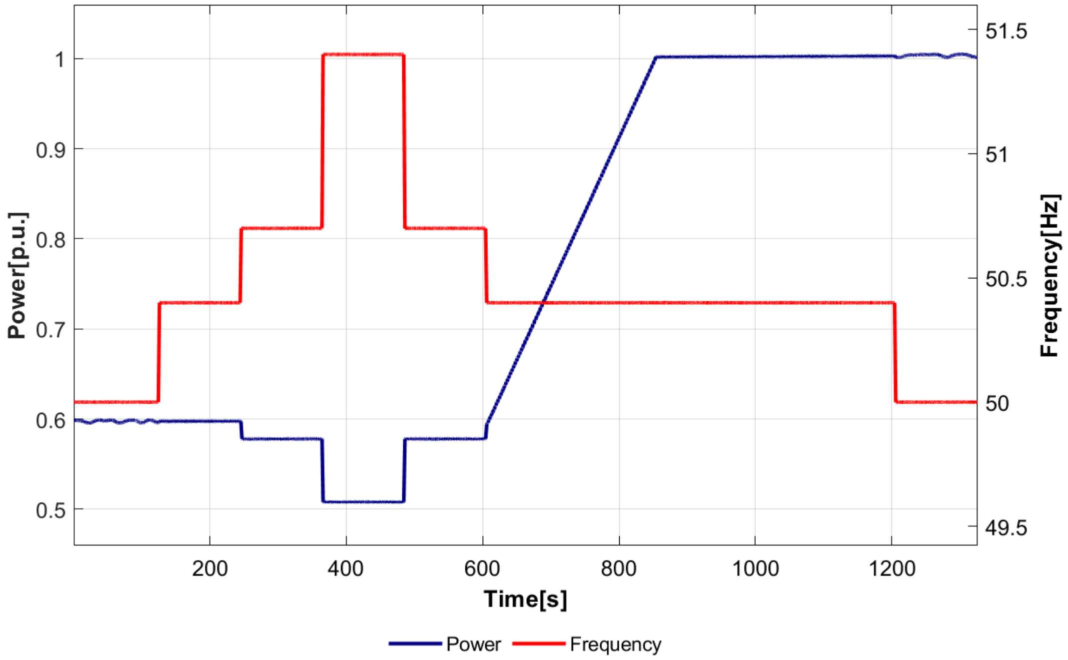
Test 2	16.67%P_{Emax} (W)		400.08		10%P_{Emax} (W)		240	
Setting parameters of the EZE: P = 60% PEmax (The reduction of the primary energy supply to limit the active power output, or the limiting setting of the active power output must be removed from measuring point c) Start of power reduction at 50.5 Hz s= 12% (16.67% P / Hz)	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time		
						The initial time delay TV <2s	The response times $T_{an\_90\ \%}$ <2s	The settling times <20s
a)50Hz ± 0.01Hz	50.00	60	1433.93	-0.25	< ± 5%	--	--	--
b)50.40Hz ± 0.01Hz	50,40	60	1434.10	-0.25	< ± 10%	--	--	--
c)50.70Hz ± 0.01Hz	50.70	58	1386.90	-0.21	< ± 10%	0.2	0.2	0.4
d)51.40Hz ± 0.01Hz	51.40	51	1219.04	-0.21	< ± 10%	--	0.2	0.4
e)50.70Hz ± 0.01Hz	50.70	58	1386.97	-0.21	< ± 10%	--	0.2	0.4
f)50.40Hz ± 0.01Hz	50.40	60-100	Maximal Rising Gradient [%/min]: 9.85, Limitation [%/min]: 10%					
g)50Hz ± 0.01Hz	50.00	100	--					



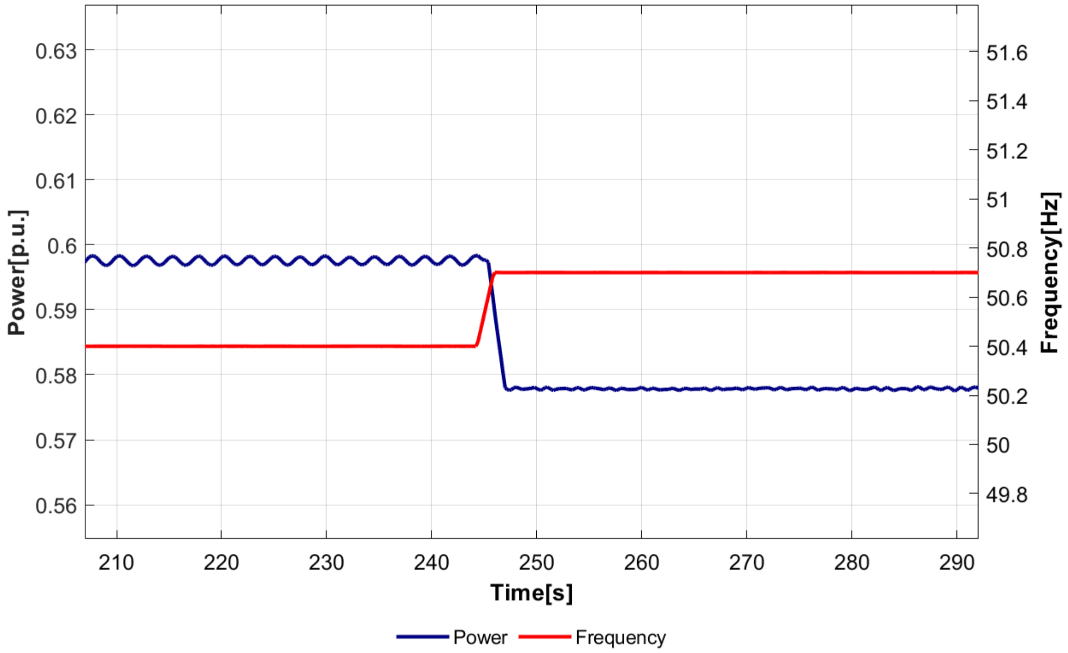
Test 1 P&F curve



Response time



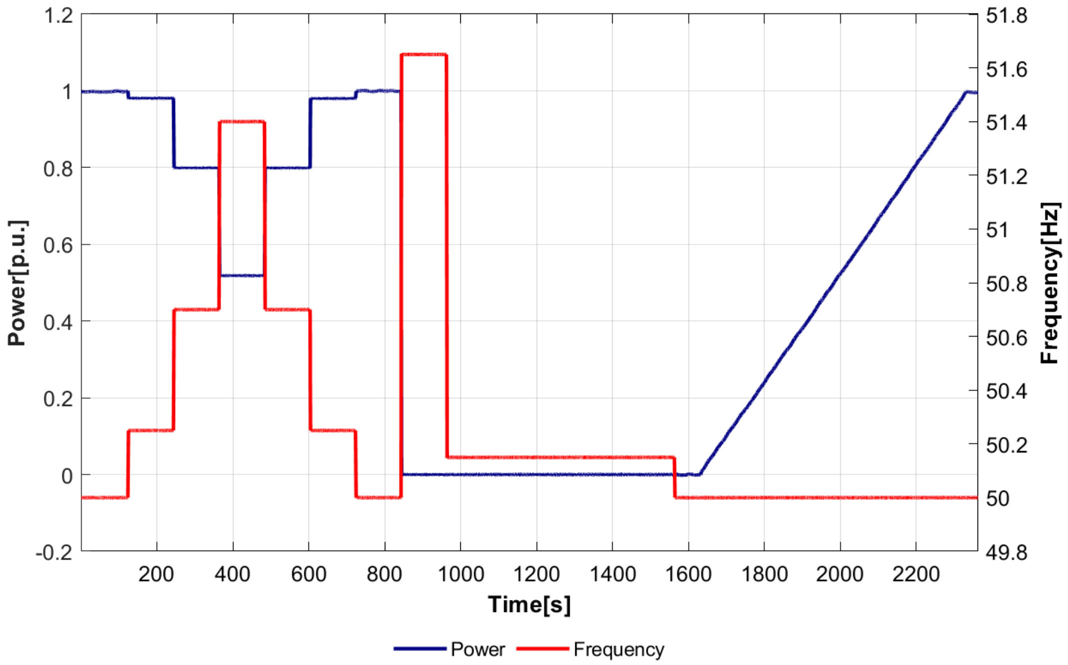
Test 2 P&F curve



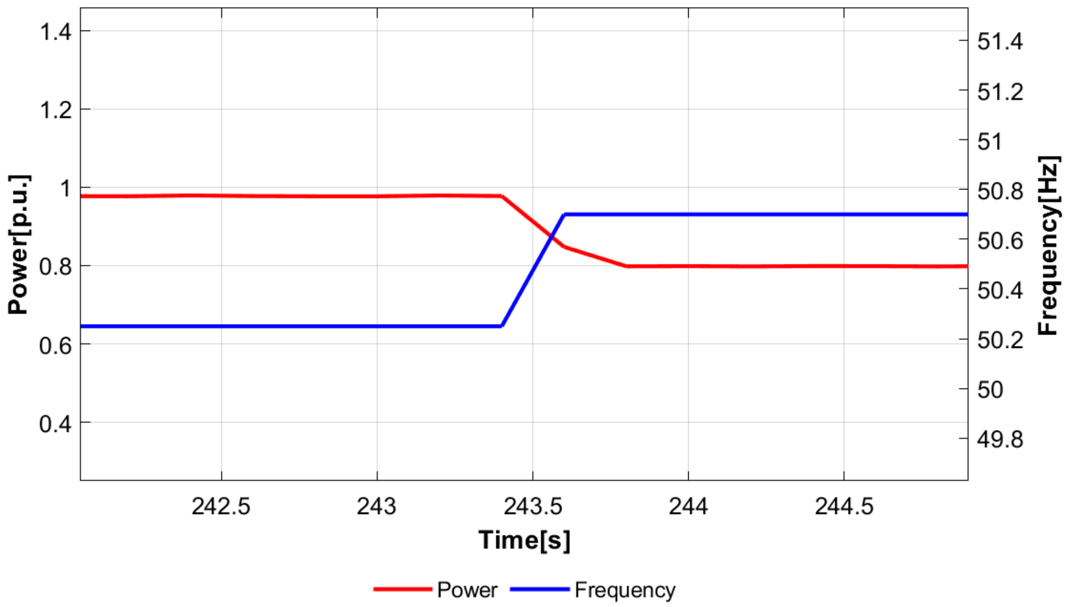
Response time

5.4.4	Active power supply at overfrequency							P
Test 1 Setting parameters of the memory: P=100%PEmax Start of power reduction at 50.2 Hz	40%P_{Emax} (W)		960		10%P_{Emax} (W)		240	
	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time: The initial time delay TV <2s	Time: The response times $T_{an\_90\ \%}$ <1s	Time: The settling times <20s
a) 50Hz ± 0.01Hz	50.00	100	2395.98	-0.17	< ± 5%	--	--	--
b)50.25Hz ± 0.01Hz	50.25	98	2354.02	0.08	< ± 10%	0.2	0.2	0.4
c)50.70Hz ± 0.01Hz	50.70	80	1918.05	-0.08	< ± 10%	--	0.2	0.4
d)51.40Hz ± 0.01Hz	51.40	52	1254.58	0.27	< ± 10%	--	0.2	0.4
e)50.70Hz ± 0.01Hz	50.70	80	1917.68	-0.10	< ± 10%	--	0.2	0.4
f)50.25Hz ± 0.01Hz	50.25	98	2352.08	0.00	< ± 10%	--	0.2	0.4
g)50Hz ± 0.01Hz	50.00	100	2399.40	-0.02	< ± 10%	--	0.2	0.4
h)51.65Hz± 0.01Hz	51.65	0	-0.21	Disconnection Time[ms]:161.25, Limitation[ms]: 200				
i)50.15Hz± 0.01Hz	50.15	0	-0.12	Reconnection: ☐ Yes/ ☒ No, Limitation: No reconnection is allowed.				
j)50.00Hz± 0.01Hz	50.00	100	2365.35	Reconnection time: 69.4s Maximal Rising Gradient [%/min]:9.81 %, Limitation [%/min]: 10%				

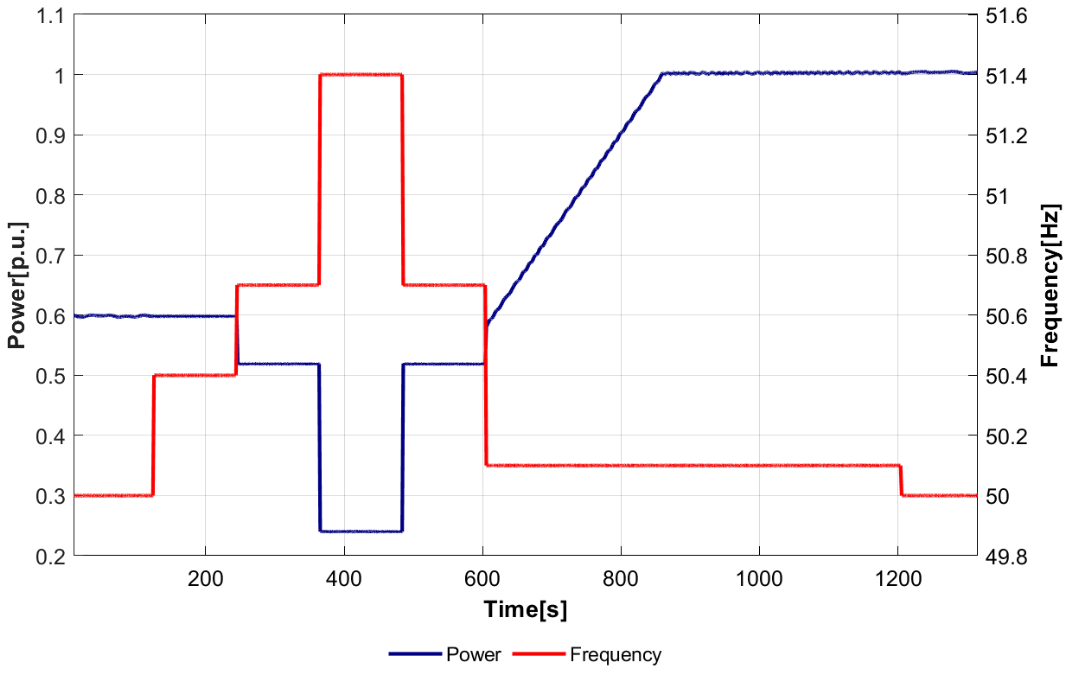
Test 2 Setting parameters of the memory: P = 60% PEmax (The limiting setting of the active power output is to be removed from measuring point c) Start of power reduction at 50.5Hz	40%P_{Emax} (W)		960		10%P_{Emax} (W)		240	
	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time: The initial time delay TV <2s	Time: The response times $T_{an\_90\ \%}$ <1s	Time: The settling times <20s
a)50Hz ± 0.01Hz	50.00	60	1435.43	-0.19	< ± 5%	--	--	--
b)50.40Hz ± 0.01Hz	50,40	60	1435.48	-0.19	< ± 10%	--	--	--
c)50.70Hz ± 0.01Hz	50.70	52	1245.25	-0.11	< ± 10%	0.2	0.2	0.4
d)51.40Hz ± 0.01Hz	51.40	24	576.28	0.01	< ± 10%	--	0.2	0.4
e)50.70Hz ± 0.01Hz	50.70	52	1244.94	-0.13	< ± 10%	--	0.2	0.4
f)50.10Hz ± 0.01Hz	50.10	60-100	Maximal Rising Gradient [%/min]: 9.76, Limitation [%/min]: 10%					
g)50Hz ± 0.01Hz	50.00	100	--					



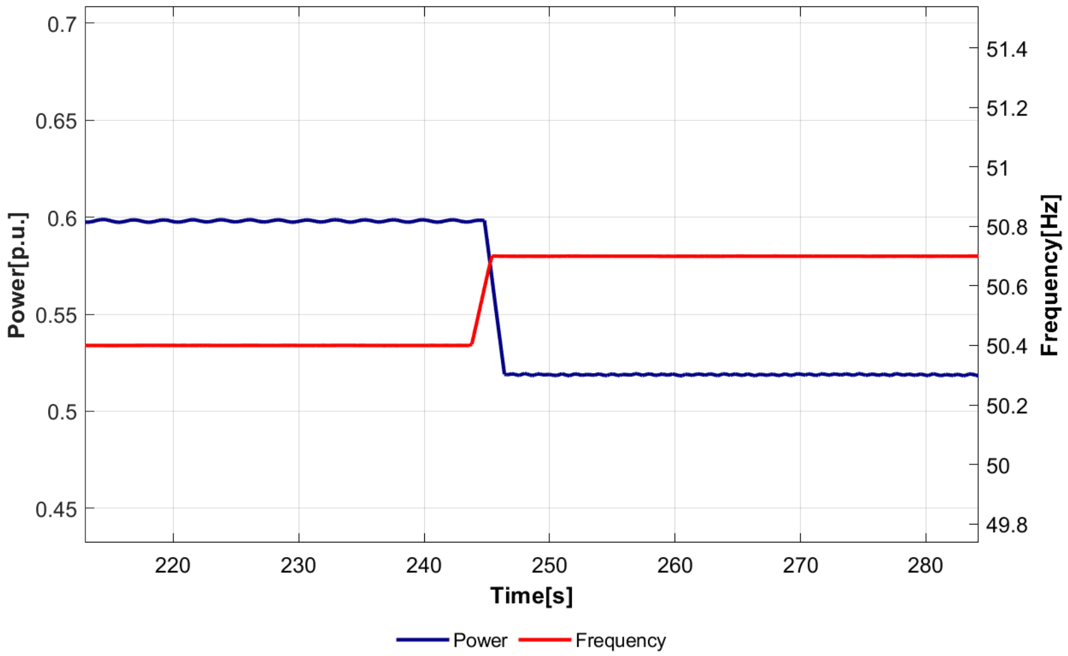
Test 1 P&F curve



Response time



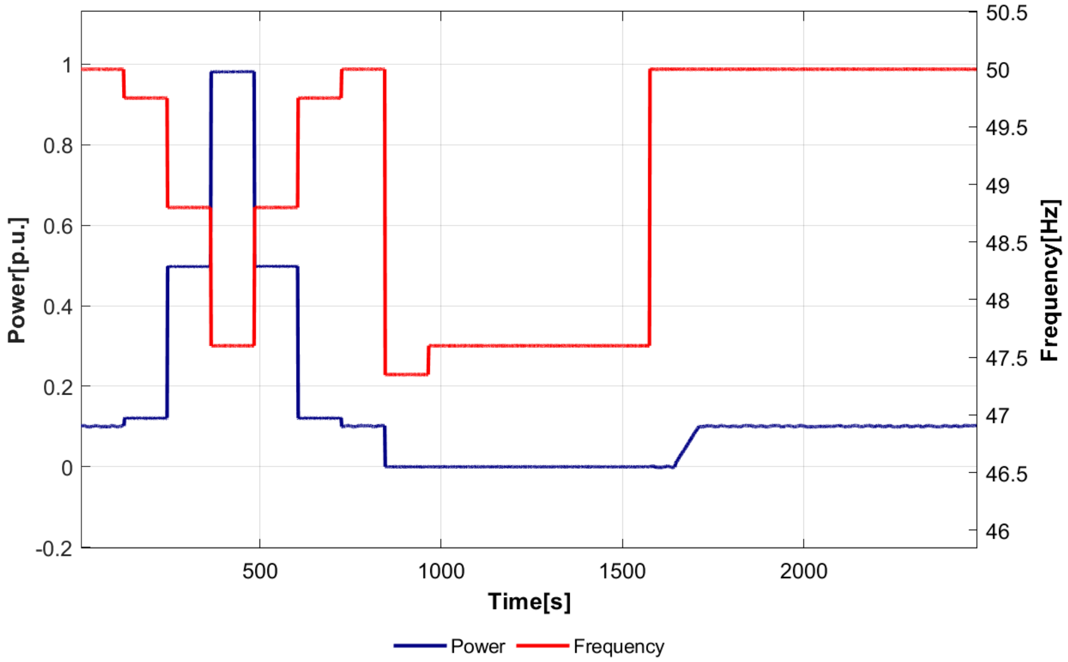
Test 2 P&F curve



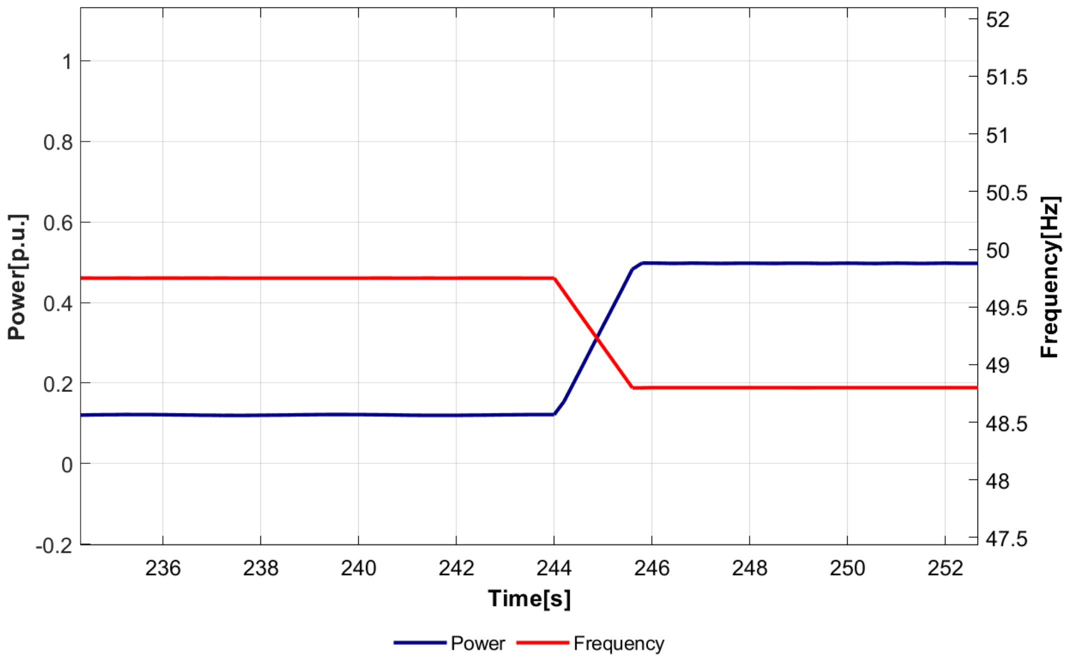
Response time

5.4.6	Active power supply at underfrequency							P
Test 1 Setting parameters of the EZE:P=10% Start of power reduction at 49.8 Hz	40%P_{Emax} (W)		960		10%P_{Emax} (W)		240	
	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time		
						The initial time delay TV <2s	The response times $T_{an\_90\ \%}$ <2s	The settling times <20s
a) 50Hz ± 0.01Hz	50.00	10.00	241.03	0.04	< ± 5%	--	--	--
b)49.75Hz ± 0.01Hz	49.75	12.00	289.85	0.08	< ± 10%	0.2	0.2	0.4
c)48.80Hz ± 0.01Hz	48.80	50.00	1193.45	-0.27	< ± 10%	--	0.2	0.4
d)47.60Hz ± 0.01Hz	47.60	98.00	2354.47	0.10	< ± 10%	--	0.2	0.4
e)48.80Hz ± 0.01Hz	48.80	50.00	1194.85	-0.21	< ± 10%	--	0.2	0.4
f)49.75Hz ± 0.01Hz	49.75	12.00	290.08	0.09	< ± 10%	--	0.2	0.4
g)50Hz ± 0.01Hz	50.00	10.00	243.28	0.14	< ± 10%	--	0.2	0.4
h)47.35Hz± 0.01Hz	47.35	0	-0.21	Disconnection Time[ms]:132.50ms, Limitation[ms]: _200_				
i)47.60Hz± 0.01Hz	47.60	0	-0.21	Reconnection: ☐ Yes/ ☒ No, Limitation: No reconnection is allowed.				
j)50.00Hz± 0.01Hz	50.00	10	242.19	Reconnection time: 68.0s Maximal Rising Gradient [%/min]: 9.15%, Limitation [%/min]: 10%				

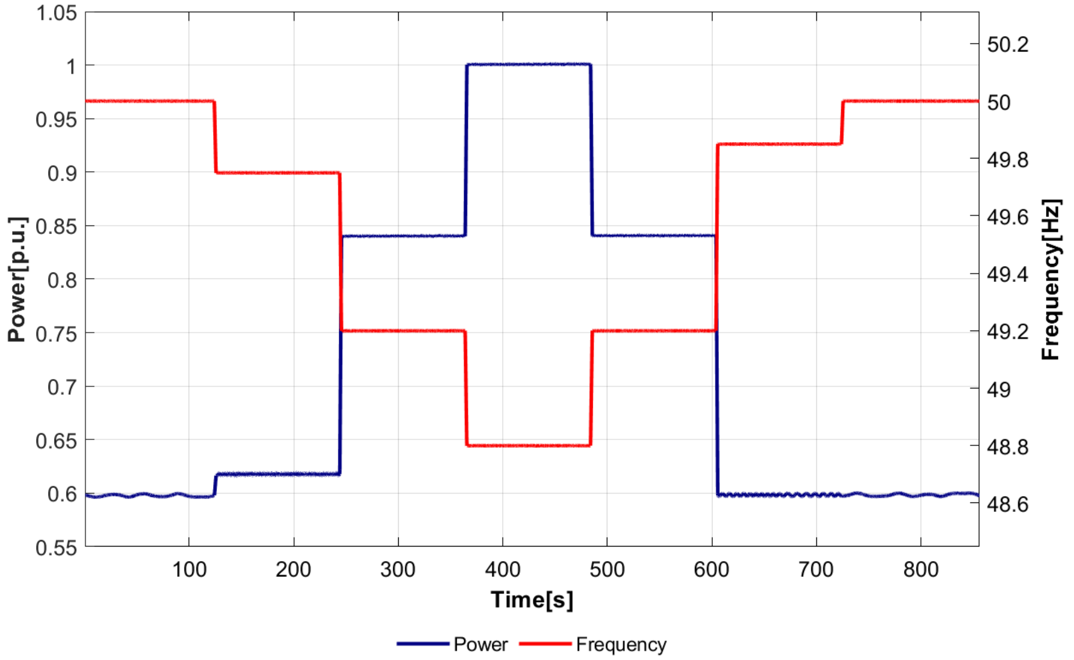
Test 2	40%P_{Emax} (W)		960		10%P_{Emax} (W)		240	
Setting parameters of the EZE: P = 60% PEmax (The reduction of the primary energy supply to limit the active power output, or the limiting setting of the active power output must be removed from measuring point c) Start of power reduction at 49.8 Hz	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time		
						The initial time delay TV <2s	The response times $T_{an\_90\ \%}$ <2s	The settling times <20s
a)50Hz ± 0.01Hz	50.00	60.00	1433.88	-0.25	< ± 5%	--	--	--
b)49.75Hz ± 0.01Hz	49.75	62.00	1482.64	-0.22	< ± 10%	0.2	0.2	0.2
c)49.20Hz ± 0.01Hz	49.20	84.00	2016.79	0.03	< ± 10%	--	0.2	0.2
d)48.80Hz ± 0.01Hz	48.80	100.00	2401.87	0.08	< ± 10%	--	0.2	0.2
e)49.20Hz ± 0.01Hz	49.20	84.00	2017.67	0.07	< ± 10%	--	0.2	0.2
f)49.85Hz ± 0.01Hz	49.85	60.00	1436.19	-0.16	< ± 10%	--	0.2	0.2
g)50Hz ± 0.01Hz	50.00	60.00	1436.68	-0.14	< ± 10%	---	--	--



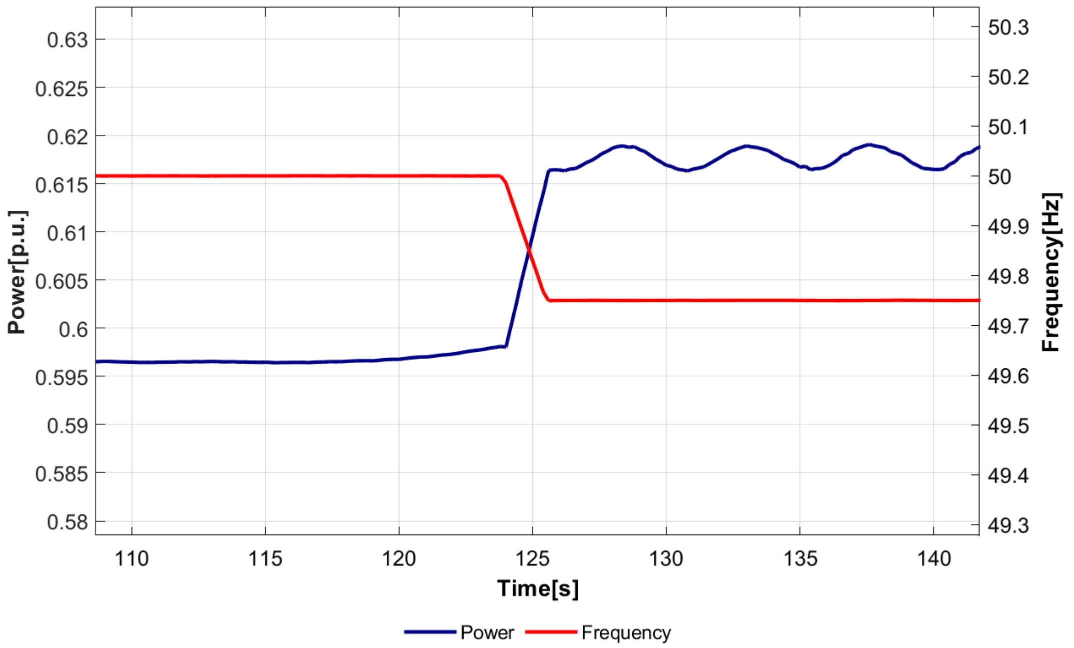
Test 1 P&F curve



Response time



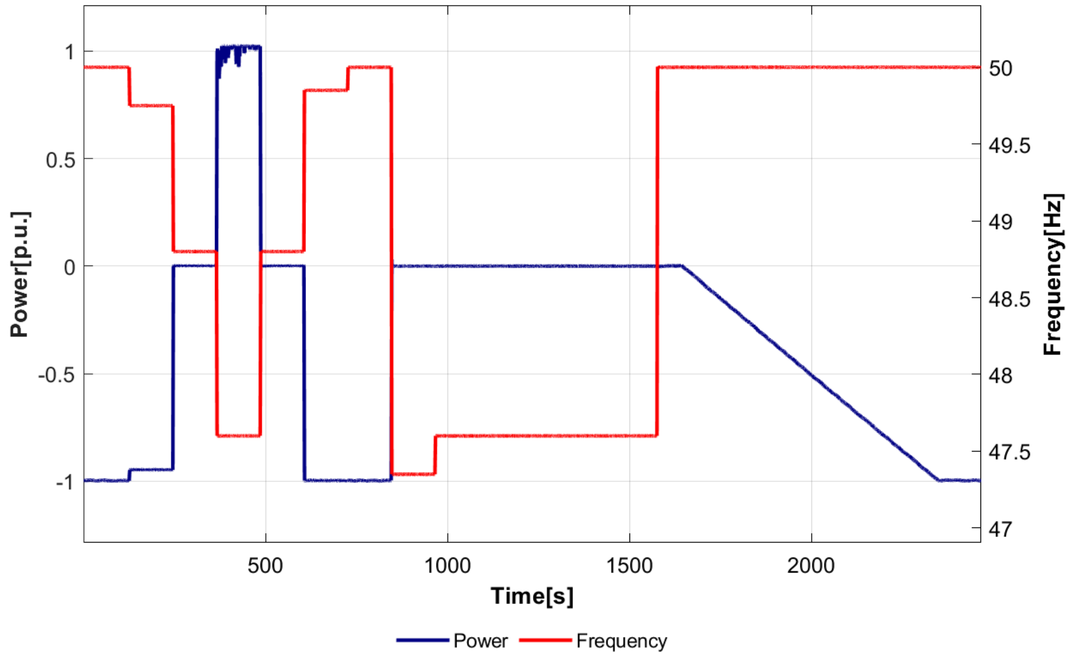
Test 2 P&F curve



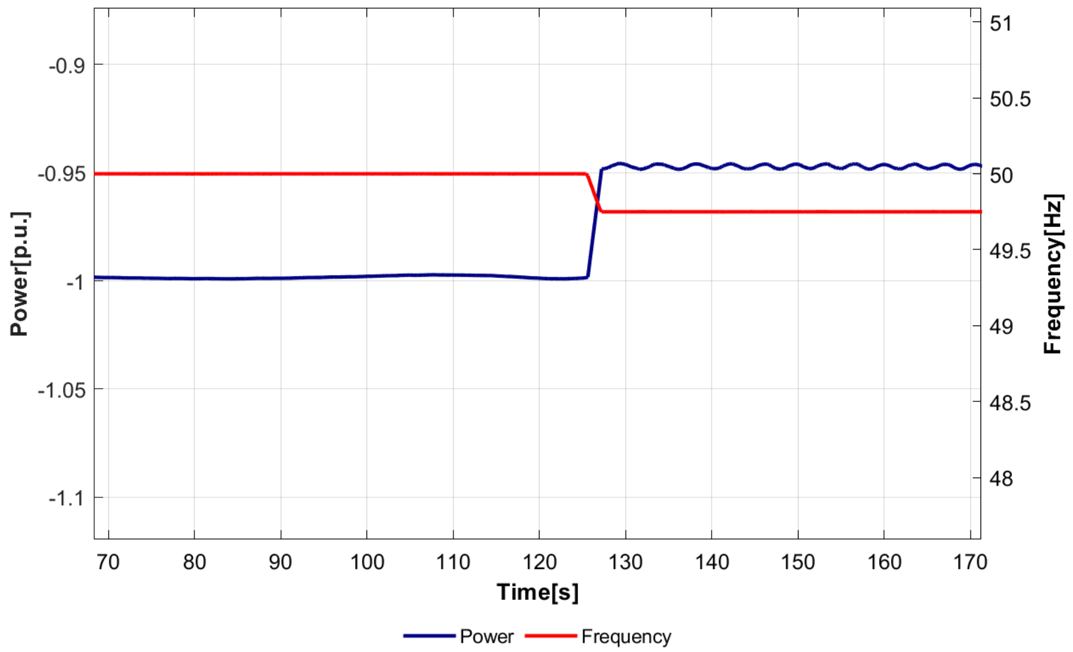
Response time

5.4.6	Active power supply at underfrequency							P
Test 1 Setting parameters of the memory: P=-100% PEmax Start of power reduction at 49.8 Hz	100%P_{Emax} (W)		2400		10%P_{Emax} (W)		240	
	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time		
						The initial time delay TV <2s	The response times $T_{an\_90\ \%}$ <1s	The settling times <20s
a) 50Hz ± 0.01Hz	50.00	-100	-2395.94	0.17	< ± 5%	--	--	--
b)49.75Hz ± 0.01Hz	49.75	-95	-2273.33	0.28	< ± 10%	0.2	0.4	0.6
c)48.80Hz ± 0.01Hz	48.80	0	3.02	0.13	< ± 10%	--	0.4	0.6
d)47.60Hz ± 0.01Hz	47.60	100	2440.76	1.70	< ± 10%	--	0.4	0.6
e)48.80Hz ± 0.01Hz	48.80	0	3.12	0.13	< ± 10%	--	0.4	0.6
f)49.75Hz ± 0.01Hz	49.75	-100	-2393.68	0.26	< ± 10%	--	0.4	0.6
g)50Hz ± 0.01Hz	50.00	-100	-2393.82	0.26	< ± 10%	--	0.4	0.6
h)47.35Hz± 0.01Hz	47.35	0	-0.21	Disconnection Time[ms]:119.50ms, Limitation[ms]: _200_				
i)47.60Hz± 0.01Hz	47.60	0	-0.21	Reconnection: ☐ Yes/ ☒ No, Limitation: No reconnection is allowed.				
j)50.00Hz± 0.01Hz	50.00	-100	-2392.52	Reconnection time: 69.8s Maximal Rising Gradient [%/min]:8.45%, Limitation [%/min]: 10%				

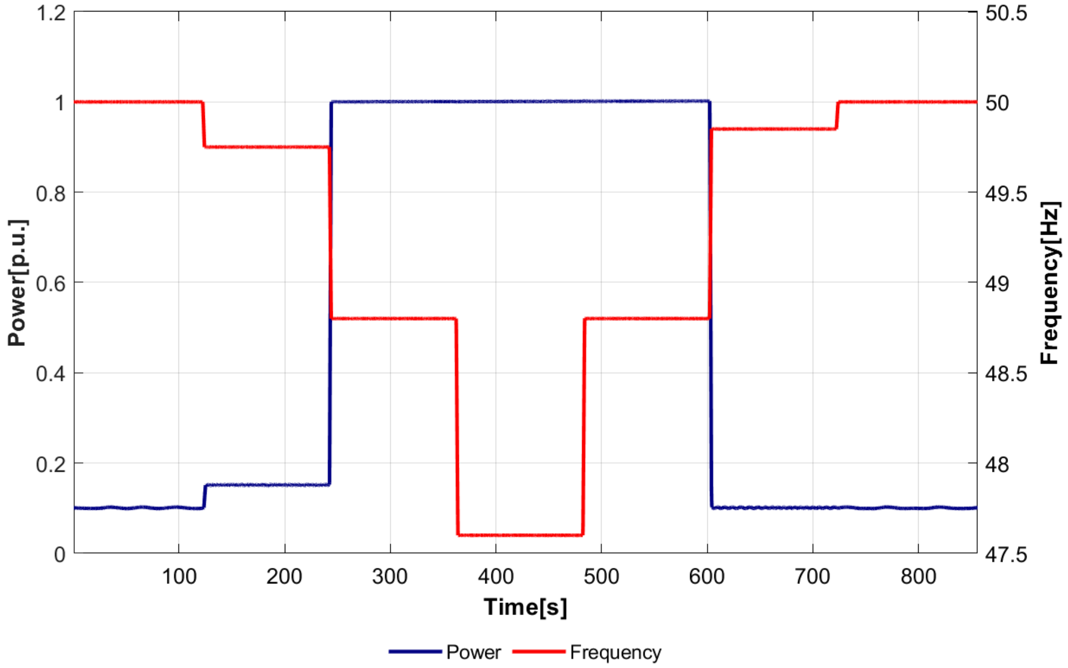
Test 2 Setting parameters of the memory: P = 10% PEmax Start of power reduction at 49.8 Hz	100%P_{Emax} (W)		2400			10%P_{Emax} (W)		240
	f (Hz)	Expected Active power output [P/ PEmax] [%]	Measured output Power (W)	Tolerance between measured P and Expected [△P/ PEmax] [%]	Tolerance Limit [%]	Time		
						The initial time delay TV <2s	The response times $T_{an\_90\ \%}$ <1s	The settling times <20s
a)50Hz ± 0.01Hz	50.00	10	241.85	0.08	< ± 5%	--	--	--
b)49.75Hz ± 0.01Hz	49.75	15	363.54	0.15	< ± 10%	0.2	0.4	0.4
c)48.80Hz ± 0.01Hz	48.80	100	2401.63	0.07	< ± 10%	--	0.4	0.4
d)47.60Hz ± 0.01Hz	47.60	100	2402.57	0.11	< ± 10%	--	0.4	0.4
e)48.80Hz ± 0.01Hz	48.80	100	2404.27	0.18	< ± 10%	--	0.4	0.4
f)49.85Hz ± 0.01Hz	49.85	10	242.42	0.10	< ± 10%	--	0.4	0.4
g)50Hz ± 0.01Hz	50.00	10	240.64	0.03	< ± 10%	---	--	--



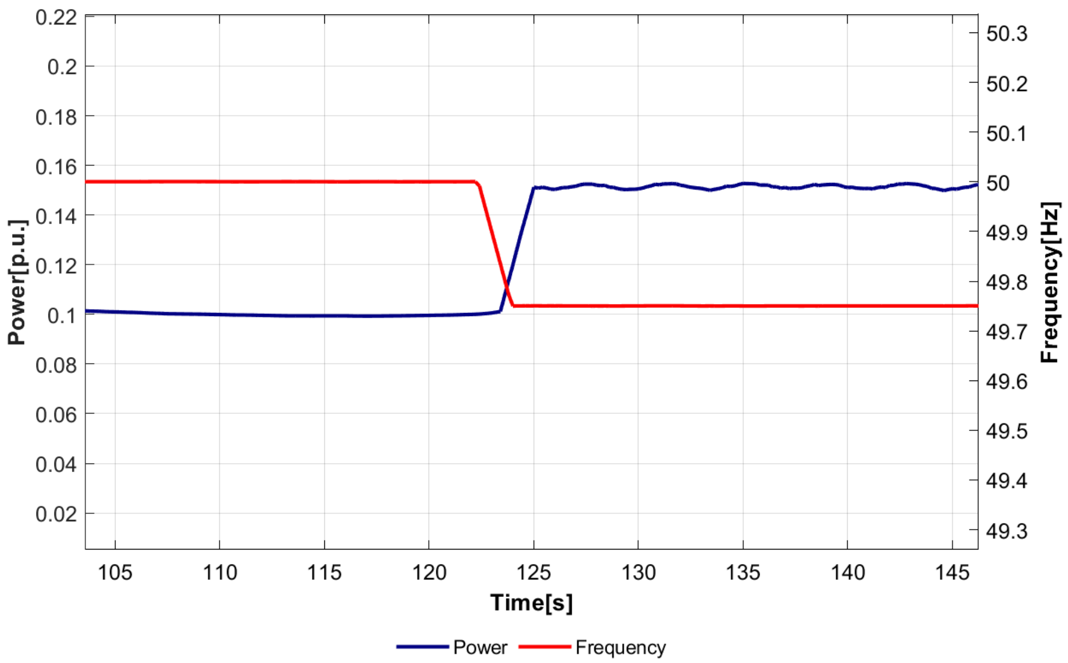
Test 1 P&F curve



Response time

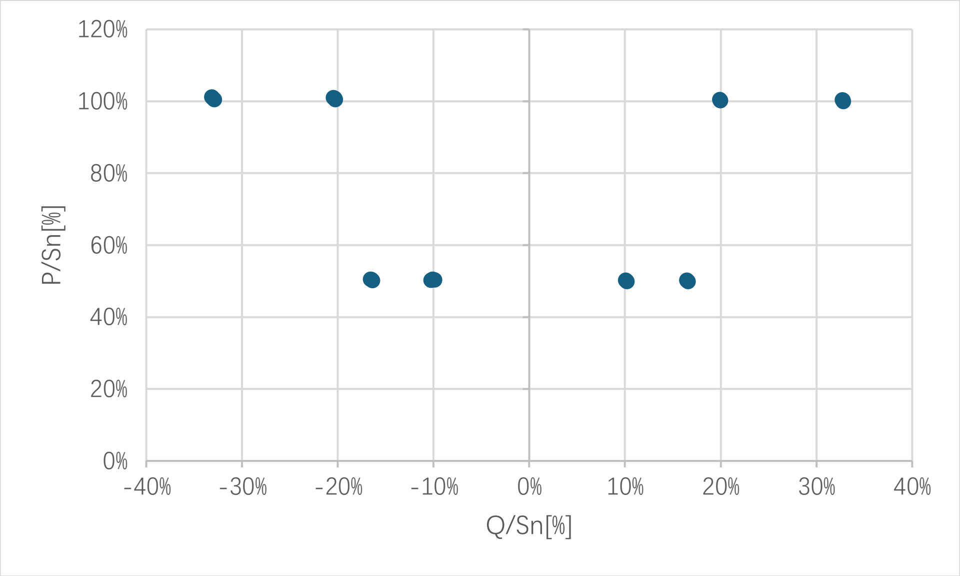


Test 2 P&F curve



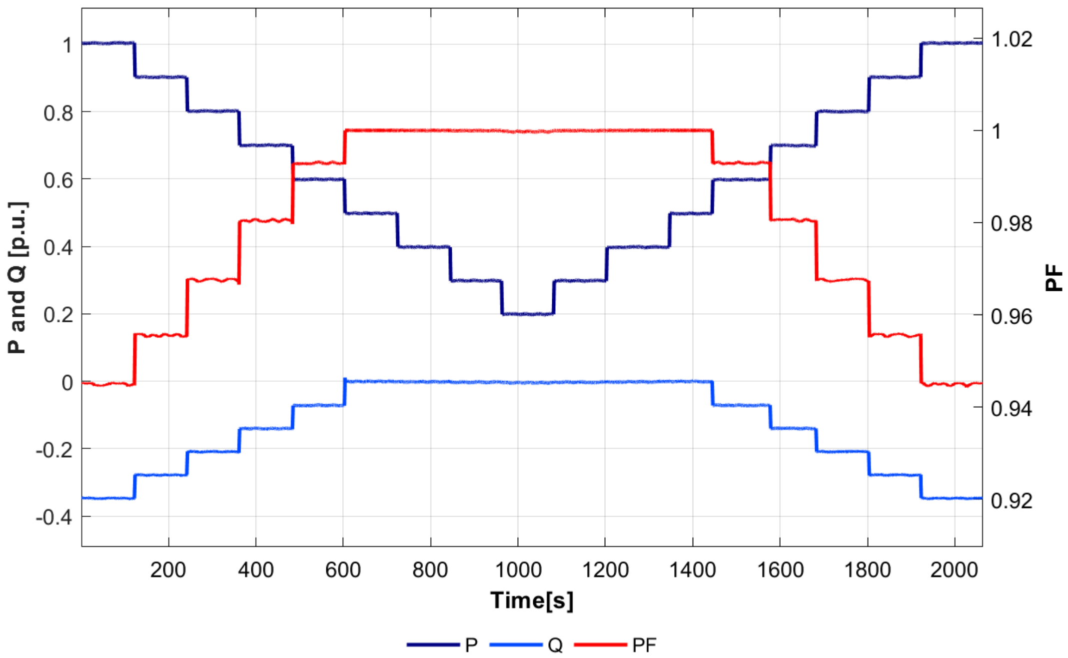
Response time

5.4.8.2	TABLE: Reactive power / displacement factor setting accuracy								P
No.	Test condition		Measurement						
	Cos_{φ}	Power	U [V]	P [W]	Q [Var]	S [VA]	cos ϕ	∆ Q / P_{Emax}	Limit ∆ Q / P_{Emax}
☒ ∑SEmax < 4.6kVA									
a)	0.95 under-excited	50%P_{Emax}	207.26	1212.40	-397.63	1275.94	0.9501	-0.13	≤ ±4%
			230.23	1208.88	-395.16	1271.83	0.9505	-0.03	≤ ±4%
			253.01	1203.54	-393.08	1266.11	0.9506	0.06	≤ ±4%
		S_{Emax}	207.54	2427.15	-795.63	2554.23	0.9502	-0.28	≤ ±4%
			230.48	2420.92	-793.46	2547.64	0.9503	-0.19	≤ ±4%
			253.24	2410.91	-789.37	2536.85	0.9504	-0.02	≤ ±4%
	0.98 under-excited	50%P_{Emax}	207.27	1212.21	-241.72	1236.07	0.9807	0.08	≤ ±4%
			230.22	1205.28	-246.16	1230.16	0.9798	-0.10	≤ ±4%
			253.02	1206.46	-237.29	1229.58	0.9812	0.27	≤ ±4%
		S_{Emax}	207.55	2423.54	-490.41	2472.66	0.9801	-0.13	≤ ±4%
			230.49	2418.39	-487.55	2467.04	0.9803	-0.01	≤ ±4%
			253.24	2411.24	-485.40	2459.61	0.9803	0.08	≤ ±4%
b)	0.95 over-excited	50% P_{Emax}	207.28	1205.20	395.01	1268.28	0.9503	0.02	≤ ±4%
			230.25	1201.89	396.35	1265.55	0.9497	0.08	≤ ±4%
			253.23	1197.52	398.36	1262.03	0.9489	0.16	≤ ±4%
		S_{Emax}	207.56	2408.08	785.65	2533.00	0.9507	-0.13	≤ ±4%
			230.51	2406.09	787.06	2531.54	0.9504	-0.07	≤ ±4%
			253.46	2397.29	787.75	2523.40	0.9500	-0.05	≤ ±4%
	0.98 over-excited	50% P_{Emax}	207.27	1203.97	242.13	1228.07	0.9804	-0.06	≤ ±4%
			230.23	1200.65	243.99	1225.19	0.9800	0.01	≤ ±4%
			253.22	1196.88	245.37	1221.77	0.9796	0.07	≤ ±4%
		S_{Emax}	207.54	2410.88	478.25	2457.86	0.9809	-0.38	≤ ±4%
			230.49	2403.05	479.29	2450.39	0.9807	-0.34	≤ ±4%
			230.49	2403.05	479.29	2450.39	0.9805	-0.34	≤ ±4%

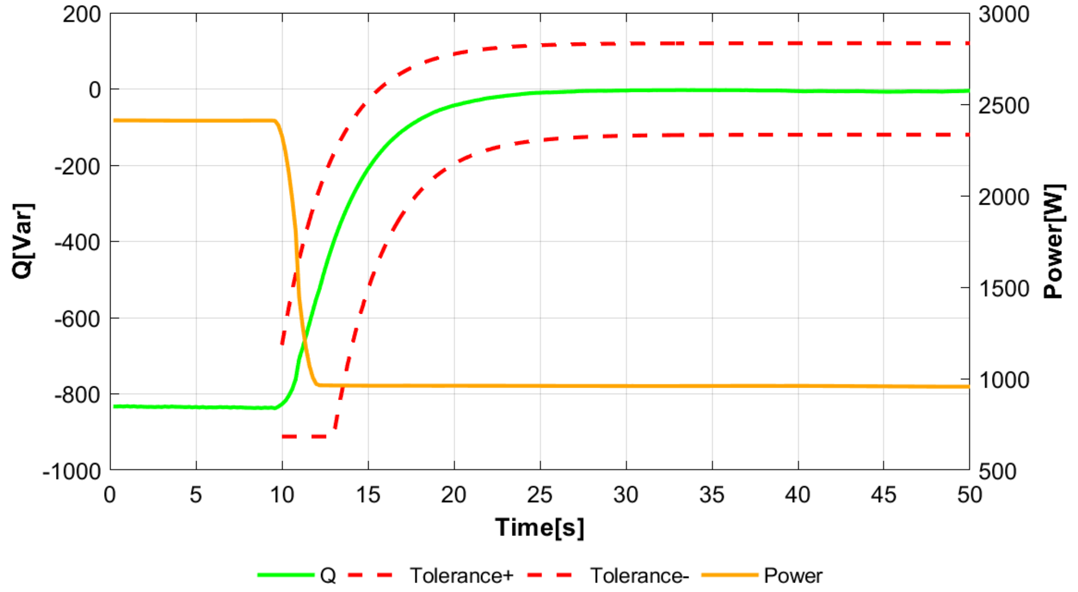

120%
100%
80%
60%
40%
20%
0%
P/Sn[%]
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%
Q/Sn[%]

5.4.8.3	TABLE: Testing the displacement factor / active power characteristic curve $Cos_{\varphi}(P)$						P
3) Test steps for supply-dependent EZE accuracy (characteristic curve)							
Step	Pdc[W]	P[W]	Q[Var]	Cosϕ	Qdesired	Δ Q / P_{Emax}	Limitation
100%	2576.54	2408.15	-833.19	0.95	-788.84	-1.85	± 4%
90%	2311.59	2165.59	-668.03	0.96	-630.00	-1.58	± 4%
80%	2047.36	1923.70	-502.09	0.97	-481.20	-0.87	± 4%
70%	1784.02	1680.25	-336.80	0.98	-341.14	0.18	± 4%
60%	1523.47	1437.19	-171.83	0.99	-205.19	1.39	± 4%
50%	1263.27	1195.46	-1.93	1.00	0.00	-0.08	± 4%
40%	1012.97	955.69	-4.45	1.00	0.00	-0.19	± 4%
30%	763.63	716.24	-6.20	1.00	0.00	-0.26	± 4%
20%	518.27	477.06	-10.50	1.00	0.00	-0.44	± 4%
30%	763.31	715.94	-7.20	1.00	0.00	-0.30	± 4%
40%	1010.00	954.72	-3.61	1.00	0.00	-0.15	± 4%
50%	1261.86	1194.11	-2.69	1.00	0.00	-0.11	± 4%
60%	1523.41	1436.31	-172.11	0.99	-205.19	1.38	± 4%
70%	1783.25	1677.49	-336.23	0.98	-341.14	0.20	± 4%
80%	2046.55	1920.89	-500.54	0.97	-481.20	-0.81	± 4%
90%	2311.59	2165.23	-667.68	0.96	-630.00	-1.57	± 4%
100%	2577.53	2408.08	-833.64	0.95	-788.84	-1.87	± 4%

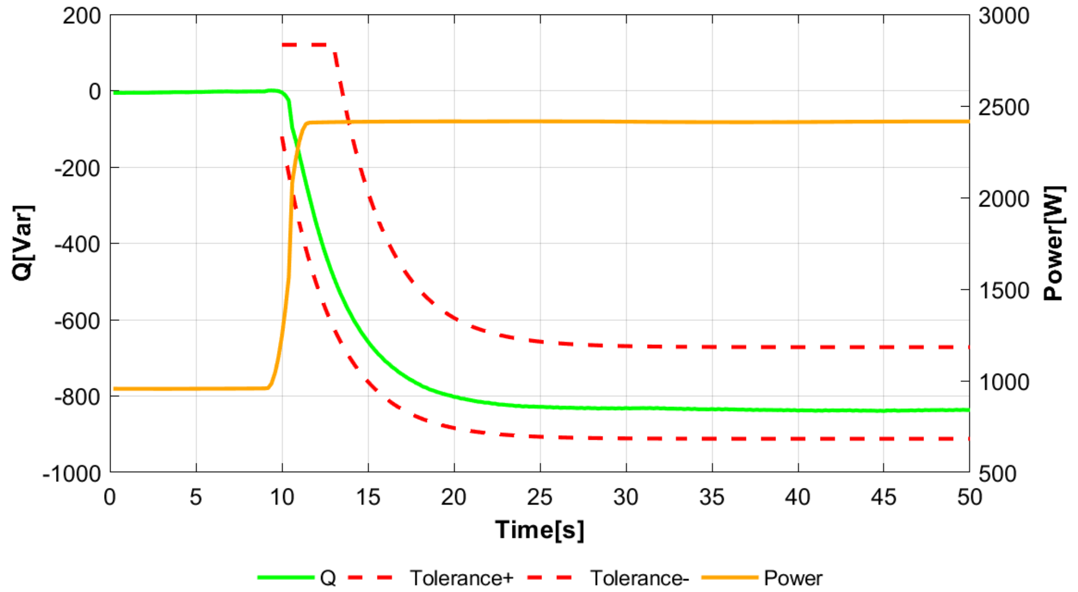
P(t), Q(t), $Cos_{\varphi}(t)$, Diagram



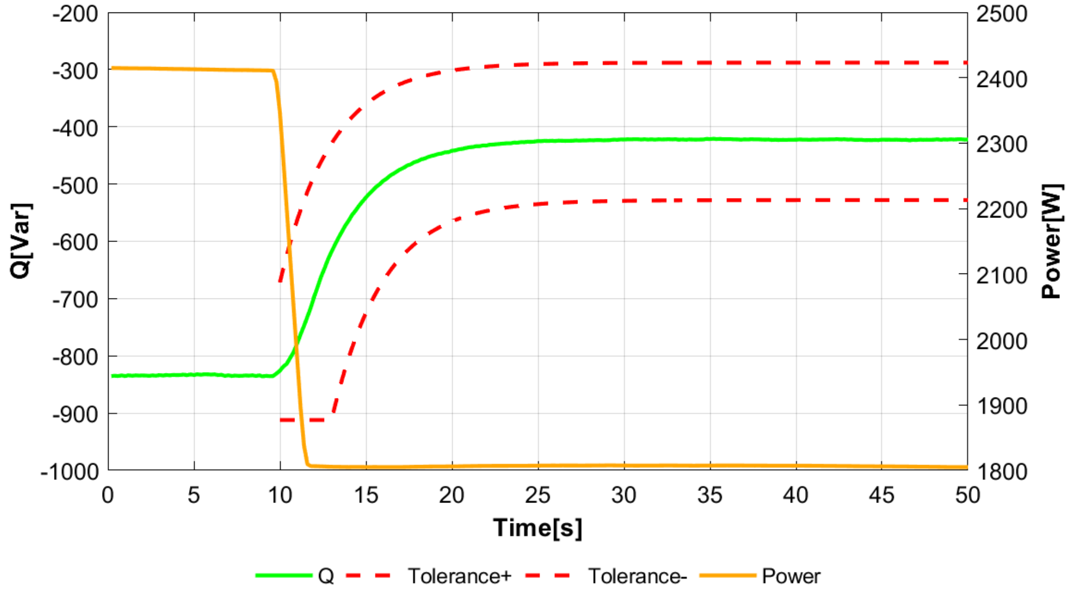
4) Test steps for supply-dependent EZE-dynamics		
Step	Duration [s]	Dynamic as PT1 character ?
100%	60s	--
40%	60s	☒ Pass ☐ Failed
100%	60s	☒ Pass ☐ Failed
75%	60s	☒ Pass ☐ Failed



Power from 100% to 40% with PT1 character



Power from 40% to 100% with PT1 character



Power from 100% to 75% with PT1 character

5.5.2, 5.5.3, 5.5.4	TABLE: Interface switch (Functional safety)	P
☒ Integrated interface switch		
☒ Complied with DIN EN 62109-2		
Switch manufacturer and type: XIAMEN HONGFA ELECTROACOUSTIC CO LTD, HF140FF-G		
Response time of interface switch for integrated NS protection:20ms		
The max. initial short-circuited current of PGU Ik”: 16A		

No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
1.	PV Input	Reverse before start up S-C	48Vdc	10min	--	--	Cannot be connected to the grid normally, can be connected to the grid normally after recovery
2.	AC Output	S-C	48Vdc	10min	--	--	Unit shutdown immediately, No damage, no hazards, recoverable.
3.	F1	S-C	48Vdc	10min	--	--.	The unit works normally.No damage, no hazards. recoverable
4.	C4	S-C	48Vdc	10min	--	--	Unit shutdown immediately. K1, F1, C4 damage Cannot be restored
5.	C7	S-C	48Vdc	10min	--	--	Unit shutdown immediately. F1 damage Cannot be restored
6.	Q1pin1to2	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
7.	Q1pin1to3	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
8.	Q1pin2to3	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
9.	D1	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
10.	D2	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
11.	Q2pin1to2	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
12.	Q2pin1to3	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
13.	Q2pin2to3	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
14.	Q6 pin1to2	S-C	48Vdc	10min	--	--	The unit works normally. No damage, no hazards. recoverable
15.	T2 pin6to9	S-C	48Vdc	10min	--	--	Unit shutdown immediately. T2 damage

16.	C22	S-C	48Vdc	10min	--	--	Unit shutdown immediately. C22 damage Cannot be restored
17.	Q14pin1to2	S-C	48Vdc	10min	--	--	The unit works normally. No damage, no hazards. recoverable
18.	Q18	S-C	48Vdc	10min	--	--	Unit shutdown immediately. Q18 damage Cannot be restored
19.	C114	S-C	48Vdc	10min	--	--	Unit shutdown immediately. C114 damage Cannot be restored
20.	Q52Pin S to D	S-C	48Vdc	10min	--	--	Unit shutdown immediately. Q52 damage Cannot be restored
21.	F4	S-C	48Vdc	10min	--	--	The unit works normally. No damage, no hazards. recoverable
22.	T5 pin6to9	S-C	48Vdc	10min	--	--	Unit shutdown immediately. T5 damage
23.	Q27 pin2to3	S-C	48Vdc	10min	--	--	Unit shutdown immediately. No damage, no hazards. recoverable
24.	T9 pin6to5	S-C	48Vdc	10min	--	--	Unit shutdown immediately. T9 damage
25.	C474	S-C	48Vdc	10min	--	--	The unit works normally. No damage, no hazards. recoverable
26.	C482	S-C	48Vdc	10min	--	--	The unit works normally. No damage, no hazards. recoverable
Supplement: s-c: short-circuited, o-c: open-circuited, o-l: overload							

5.5.7.2 &5.5.7.4	TABLE: Protection device and settings			P
OV Stage 2 No.	Set value	Measured L1-N	Limitation	Test condition
1	1.25Un	287.39	+/-1%Un	1.2, UL1-N applying ramp test, start of <282.9 V, and ramp to >292.1 V, step voltage length is <1.15 V, and step time is >400ms 2.2, UL1-N applying Leap test, start of <282.9 V, and jump to >292.1 V, step voltage length is >9.2 V, and step time is >400ms
	100ms	113.4	⩽200ms	
2	1.25Un	287.39	+/-1%Un	
	100ms	119.4	⩽200ms	
3	1.25Un	287.39	+/-1%Un	
	100ms	120.4	⩽200ms	
4	1.25Un	287.40	+/-1%Un	
	100ms	128.4	⩽200ms	
5	1.25Un	287.39	+/-1%Un	
	100ms	119.4	⩽200ms	

OV Stage 1 No.		Trip time [s]	Limitation [s]	Test condition
1	Set value 1.10Un 100ms	506.6	450-550	3.1 Operation under nominal voltage for 10min, then jumped from Un to 1.12Un.
2		No disconnect	No disconnect	3.2 Operation under nominal voltage for 10min, then jumped from Un to 1.08Un.
3		312.8	225 - 375	3.3 Operation under 1.06 voltage for 10min, then jumped from 1.06Un to 1.14Un.

<table>
<tr><th>UV Stage 2</th><th rowspan="2">Set value</th><th>Measured</th><th rowspan="2">Limitation [ms]</th><th rowspan="2">Test condition</th></tr>
<tr><th>No.</th><th>L1-N</th></tr>
<tr><td rowspan="2">1</td><td>0.45Un</td><td>103.71</td><td>+/-1%Un</td><td rowspan="10">6.2, UL1-N applying ramp test, start of >108.1 V, and ramp to <98.9V, step voltage length is <1.15 V, and step time is >500ms

7.2, UL1-N applying Jump test, start of >108.1 V, and jump to <98.9V, step voltage length is >9.2 V, and step time is >500ms</td></tr>
<tr><td>300ms</td><td>325.0</td><td>300-400ms</td></tr>
<tr><td rowspan="2">2</td><td>0.45Un</td><td>103.71</td><td>+/-1%Un</td></tr>
<tr><td>300ms</td><td>315.5</td><td>300-400ms</td></tr>
<tr><td rowspan="2">3</td><td>0.45Un</td><td>103.71</td><td>+/-1%Un</td></tr>
<tr><td>300ms</td><td>314.5</td><td>300-400ms</td></tr>
<tr><td rowspan="2">4</td><td>0.45Un</td><td>103.71</td><td>+/-1%Un</td></tr>
<tr><td>300ms</td><td>327.0</td><td>300-400ms</td></tr>
<tr><td rowspan="2">5</td><td>0.45Un</td><td>103.71</td><td>+/-1%Un</td></tr>
<tr><td>300ms</td><td>327.0</td><td>300-400ms</td></tr>
</table>

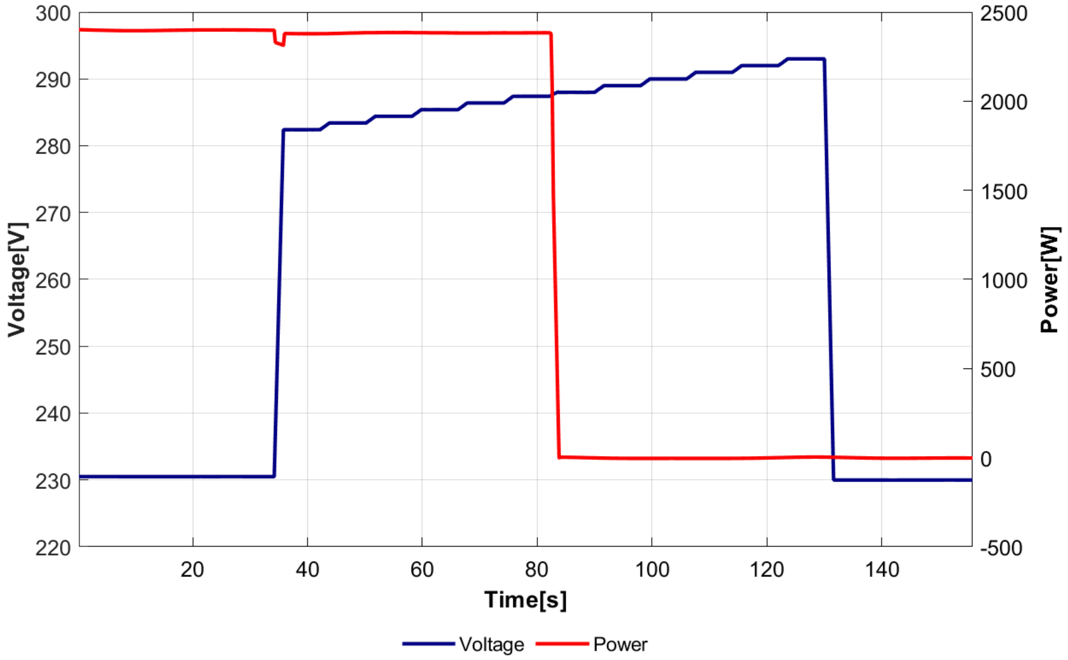
<table>
<tr><th>UV Stage 1</th><th rowspan="2">Set value</th><th>Measured</th><th rowspan="2">Limitation [ms]</th><th rowspan="2">Test condition</th></tr>
<tr><th>No.</th><th>L1-N</th></tr>
<tr><td rowspan="2">1</td><td>0.8Un</td><td>183.63</td><td>+/-1%Un</td><td rowspan="10">4.2, UL1-N applying ramp test, start of >188.6 V, and ramp to <179.4V, step voltage length is <1.15 V, and step time is >3.2s

5.2, UL1-N applying Jump test, start of >200.1 V, and jump to <179.4V, step voltage length is >9.2 V, and step time is >3.2s</td></tr>
<tr><td>3s</td><td>3.020</td><td>3-3.1s</td></tr>
<tr><td rowspan="2">2</td><td>0.8Un</td><td>183.63</td><td>+/-1%Un</td></tr>
<tr><td>3s</td><td>3.015</td><td>3-3.1s</td></tr>
<tr><td rowspan="2">3</td><td>0.8Un</td><td>183.63</td><td>+/-1%Un</td></tr>
<tr><td>3s</td><td>3.031</td><td>3-3.1s</td></tr>
<tr><td rowspan="2">4</td><td>0.8Un</td><td>183.84</td><td>+/-1%Un</td></tr>
<tr><td>3s</td><td>3.034</td><td>3-3.1s</td></tr>
<tr><td rowspan="2">5</td><td>0.8Un</td><td>183.84</td><td>+/-1%Un</td></tr>
<tr><td>3s</td><td>3.033</td><td>3-3.1s</td></tr>
</table>

OF No.	Set value	Measured Trip value					Limitation	Remark
1	51.5Hz	51.48	51.48	51.48	51.48	51.48	+/-0.05Hz	8.1, applying ramp test, start of <51.4Hz, and ramp to >51.6Hz, step frequency length is <0.025 Hz, and step time is >400ms
2	100ms	149.5	150.0	171.5	163.5	173.5	≤200	9.1, applying Jump test, start of <51.4Hz, and jump to >51.6Hz, step frequency length is >0.2Hz, and step time is >400ms

UF No.	Set value	Measured Trip value					Limitation [ms]	Remark
1	47.5Hz	47.52	47.52	47.52	47.52	47.52	+/-0.05Hz	10.1, applying ramp test, start of >47.6Hz, and ramp to <47.4Hz, step frequency length is <0.025 Hz, and step time is >400ms
2	100ms	162.5	162.5	161.5	173.5	170.5	≤200	10.2, applying Jump test, start of >47.6Hz, and jump to <47.4Hz, step frequency length is >0.2Hz, and step time is >400ms

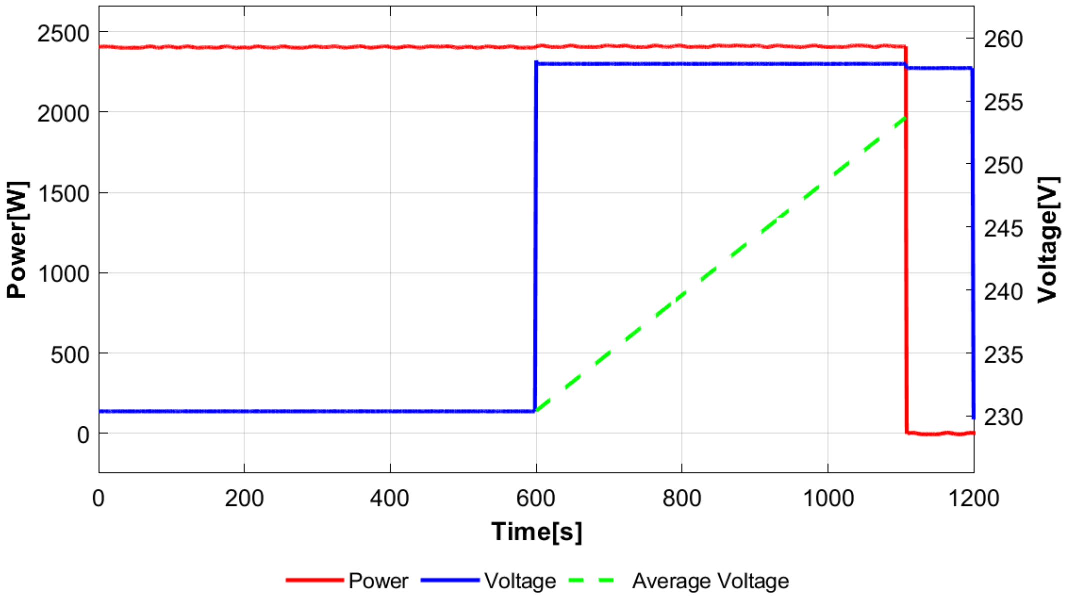
OV Stage 2:



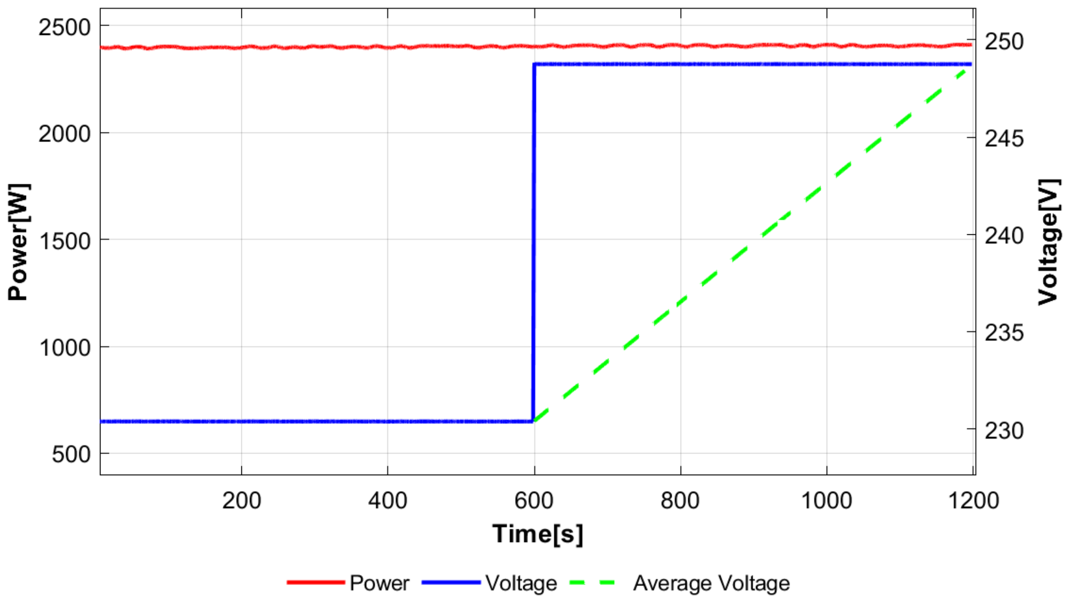
Ramp test

Leap test

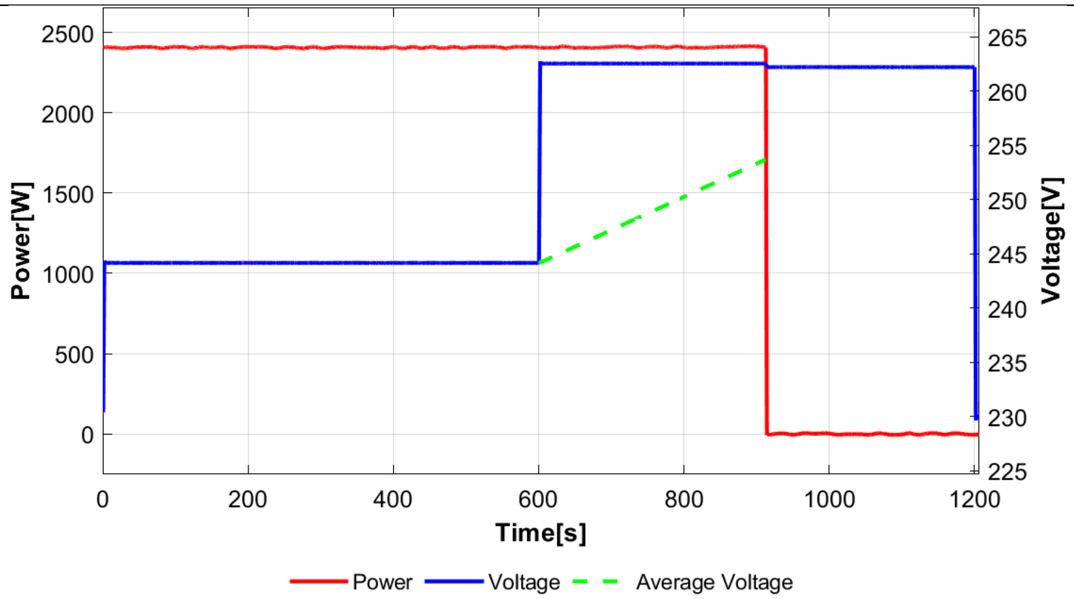
OV Stage 1:



112% Un

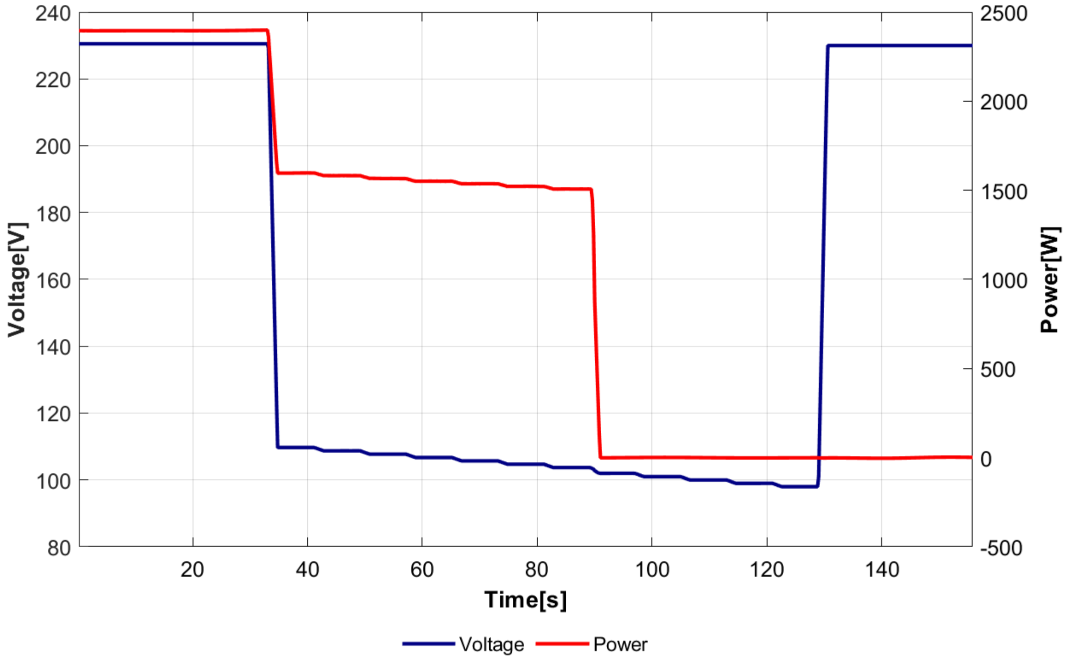


Un to 1.08Un

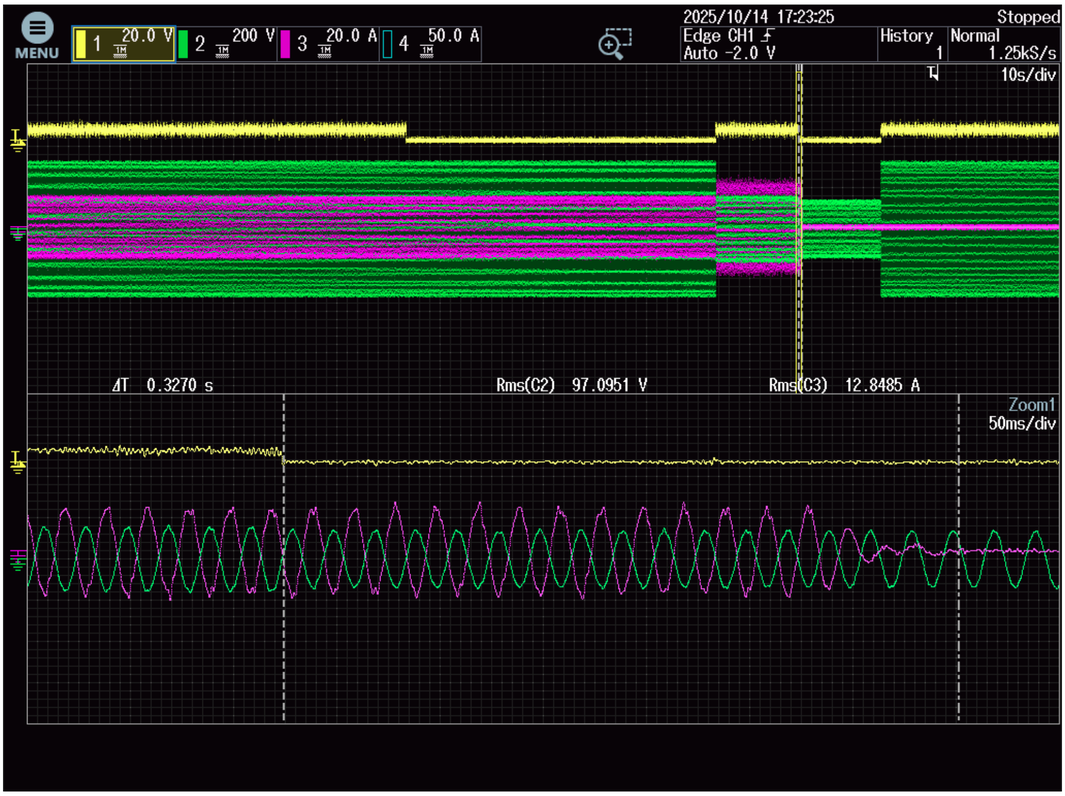


1.06 Un to 1.14Un

UV Stage 2

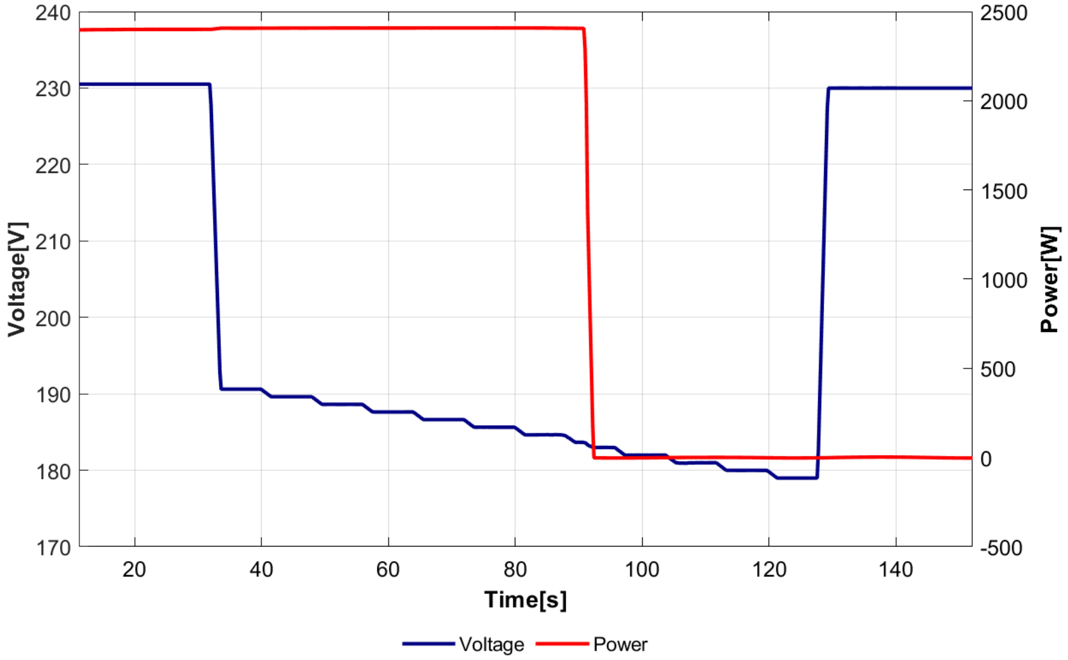


Ramp test



Leap Test

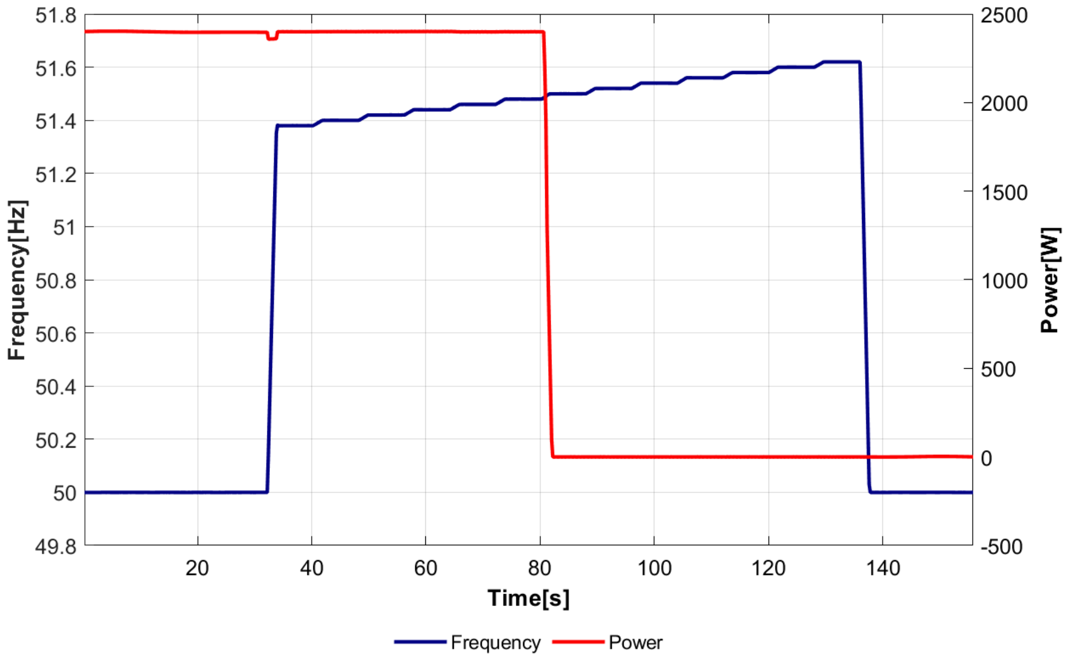
UV Stage 1



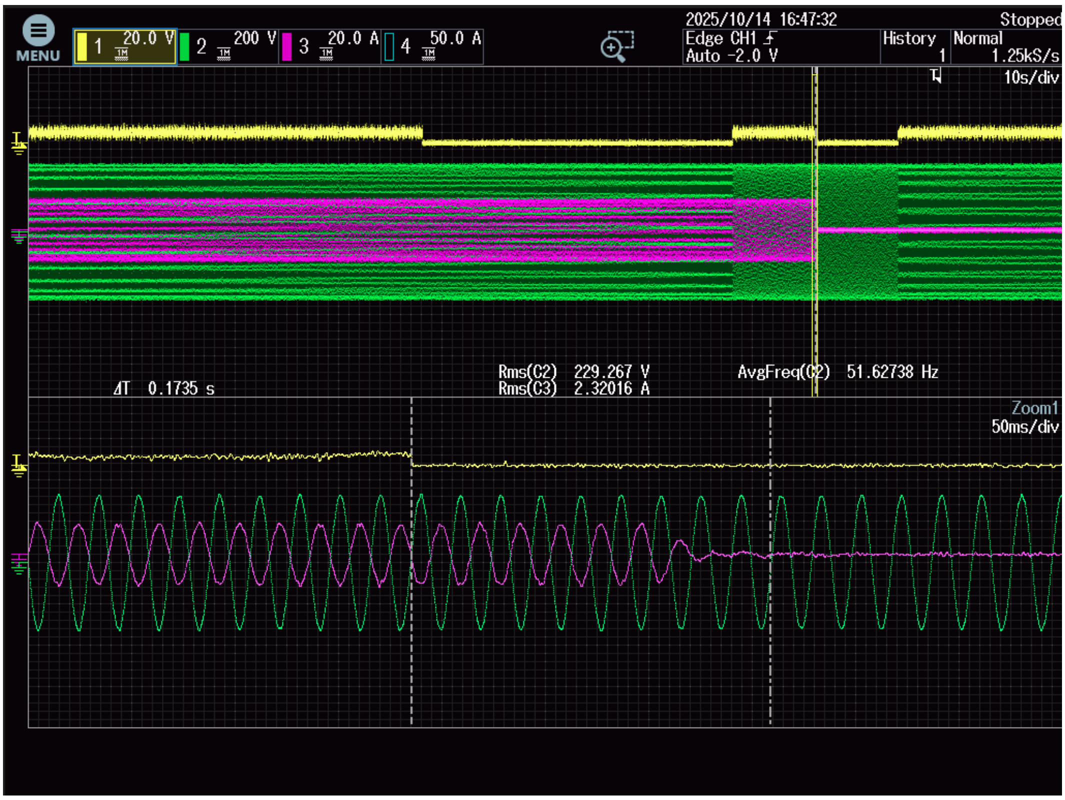
Ramp test

Leap test

OF:

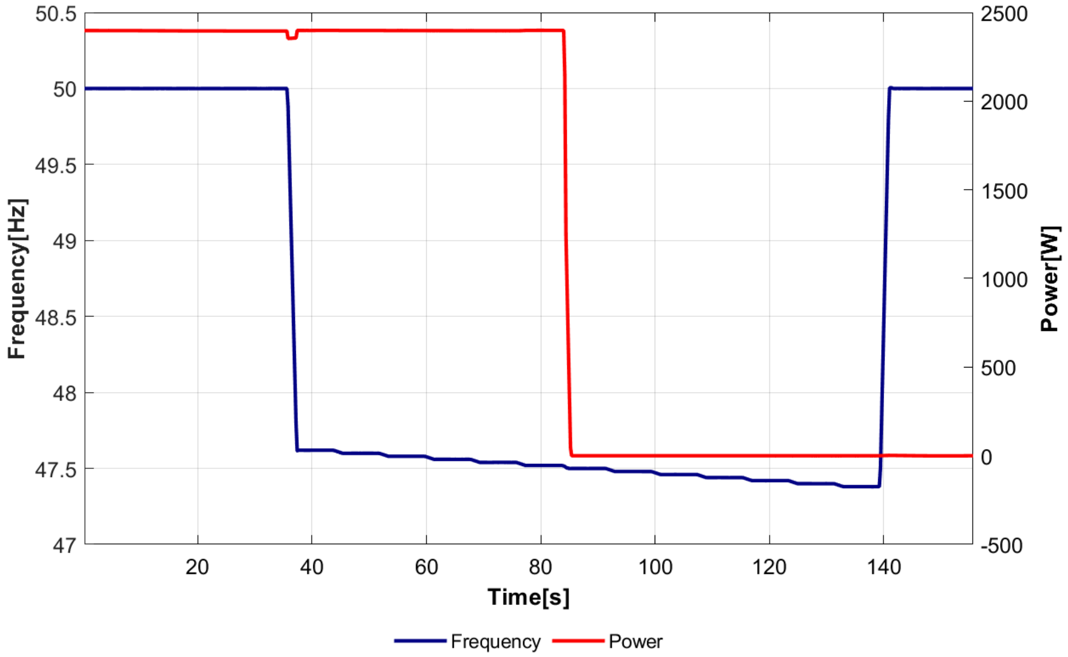


Ramp test

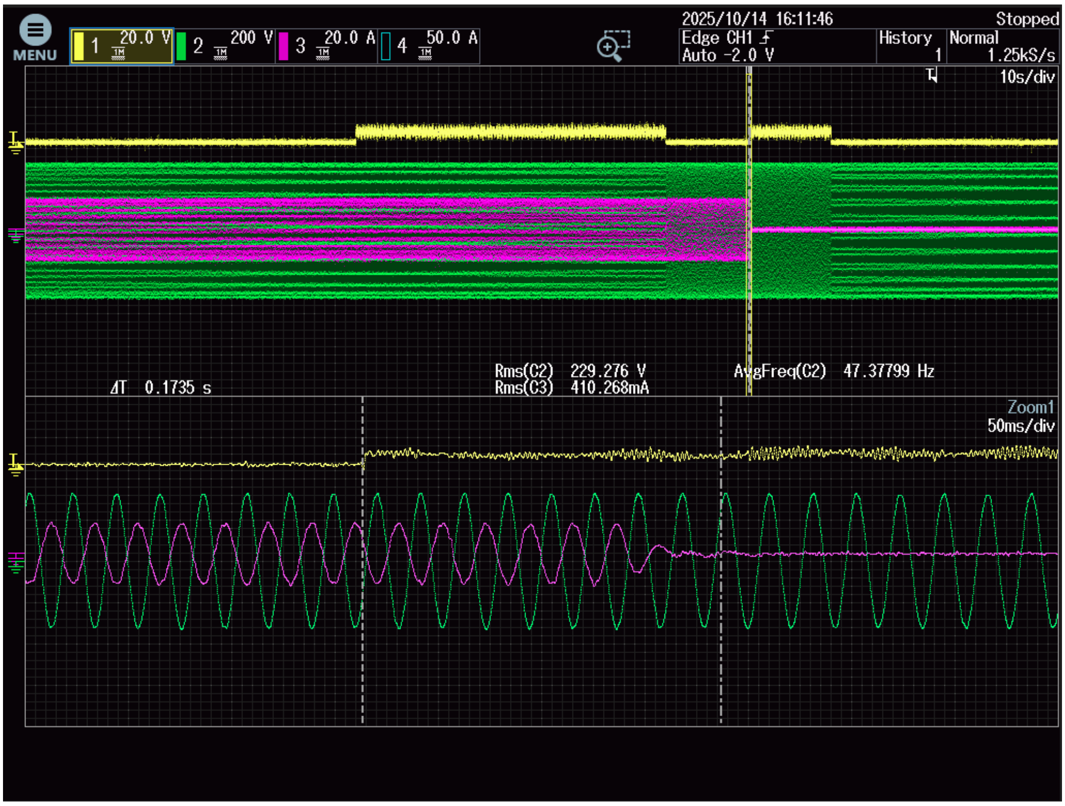


Leap test

UF:



Ramp test



Leap test

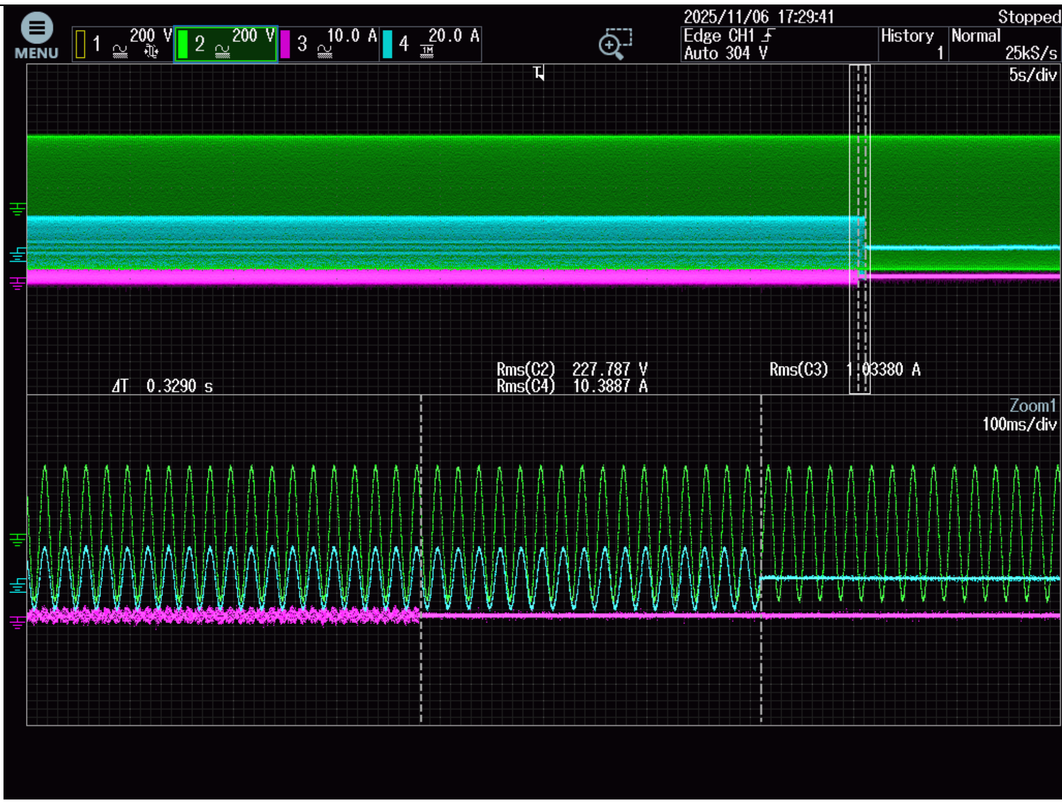
5.5.8, 5.5.9	TABLE: Indication / protection of NS protection		P
1.	The last 5 fault indication can be read	☒ Pass ☐ Failed	
	Fault 1:	Error message display	
	Fault 2:	Error message display	
	Fault 3:	Error message display	
	Fault 4:	Error message display	
	Fault 5:	Error message display	
2.	Fault indication can be read after a supply interruption ≤ 3s	☒ Pass ☐ Failed	
	Fault 1:	Error message display	
	Fault 2:	Error message display	
	Fault 3:	Error message display	
	Fault 4:	Error message display	
	Fault 5:	Error message display	
3.	The protection settings can be read on PGU or data interface equipment	☒ Pass ☐ Failed	
		Interface equipment: remote monitor	
4.	The NS protection settings shall be protected.	☒ Pass ☐ Failed	
		Protection type: Integrated NS protection	
5.	If all protection settings are fixed	☒ Pass ☐ Failed	

5.5.10	Island detection	P

No.	PEUT[1] (% of EUT rating)	Reactive load (% of QL in 6.1.d)1)	PAC[2] (% of nominal)	QAC[3] (% of nominal)	Run on time (ms)	PEUT (KW)	Actual Qf	VDC	Remarks[4]
1	100	100	0	0	329.0	2.4	1.00	47	Test A at BL
2	66	66	0	0	341.0	1.6	1.00	32	Test B at BL
3	33	33	0	0	174.0	0.8	1.00	20	Test C at BL
4	100	100	-5	-5	191.0	2.3	1.03	47	Test A at IB
5	100	100	-5	0	274.0	2.3	1.06	47	Test A at IB
6	100	100	-5	5	74.0	2.3	1.08	47	Test A at IB
7	100	100	0	-5	181.0	2.4	0.98	47	Test A at IB
8	100	100	0	5	84.0	2.4	1.03	47	Test A at IB
9	100	100	5	-5	186.0	2.5	0.94	47	Test A at IB
10	100	100	5	0	323.0	2.5	0.97	47	Test A at IB
11	100	100	5	5	183.0	2.5	0.99	47	Test A at IB
12	66	66	0	-5	182.5	1.6	0.98	32	Test B at IB
13	66	66	0	-4	188.0	1.6	0.98	32	Test B at IB
14	66	66	0	-3	192.5	1.6	0.99	32	Test B at IB
15	66	66	0	-2	197.5	1.6	0.99	32	Test B at IB
16	66	66	0	-1	284.0	1.6	1.00	32	Test B at IB
17	66	66	0	1	222.0	1.6	1.01	32	Test B at IB
18	66	66	0	2	195.0	1.6	1.01	32	Test B at IB
19	66	66	0	3	180.0	1.6	1.02	32	Test B at IB
20	66	66	0	4	147.0	1.6	1.03	32	Test B at IB
21	66	66	0	5	59.0	1.6	1.03	32	Test B at IB
22	33	33	0	-5	64.5	0.8	0.97	20	Test C at IB
23	33	33	0	-4	156.0	0.8	0.98	20	Test C at IB
24	33	33	0	-3	162.0	0.8	0.98	20	Test C at IB
25	33	33	0	-2	128.0	0.8	0.99	20	Test C at IB
26	33	33	0	-1	159.0	0.8	0.99	20	Test C at IB
27	33	33	0	1	314.0	0.8	1.01	20	Test C at IB
28	33	33	0	2	318.0	0.8	1.01	20	Test C at IB
29	33	33	0	3	345.0	0.8	1.02	20	Test C at IB
30	33	33	0	4	216.0	0.8	1.02	20	Test C at IB
31	33	33	0	5	150.0	0.8	1.03	20	Test C at IB

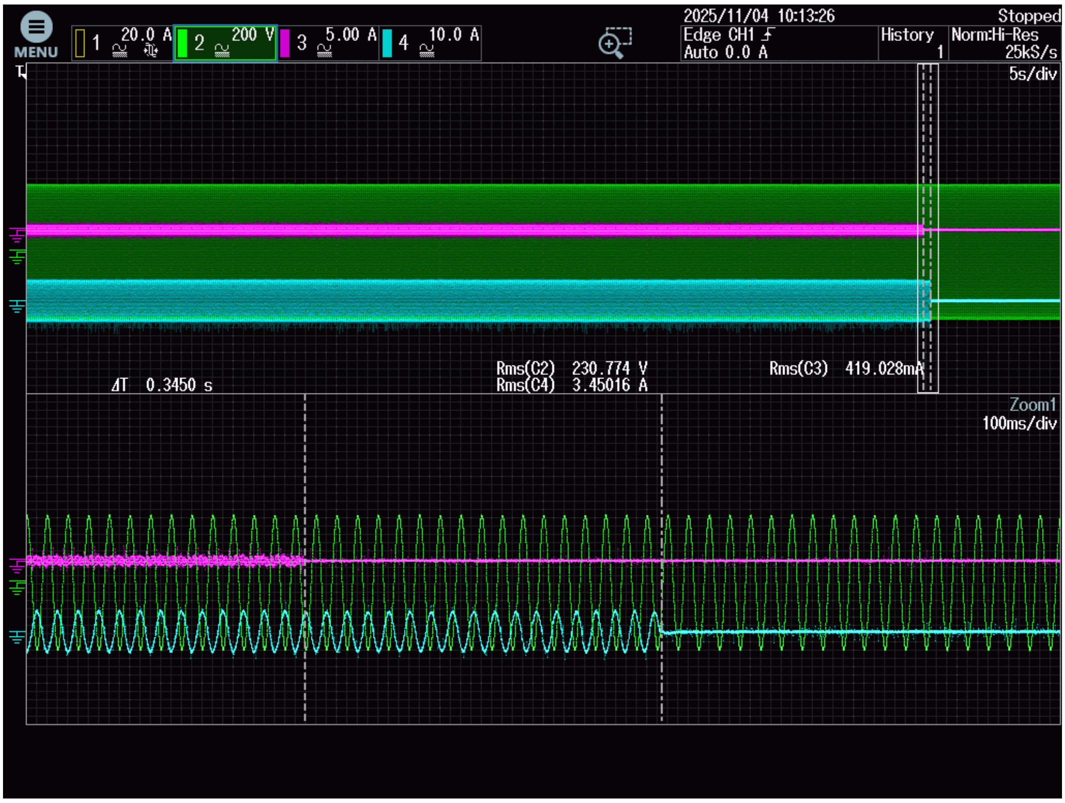
Remark:

1) PEUT: EUT output power
2) PAC: Real power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0% test condition value.
3) QAC: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0% test condition value.
4) BL: Balance condition, IB: Imbalance condition.
5) *Note: test condition A (100%): If any of the recorded run-on times are longer than the one recorded for the rated balance condition, i.e. test procedure 6.1 f), then the non-shaded parameter combinations (no.33~48) also require testing.



PEUT 100%, PAC 0%, QAC 0%, =329.0ms

PEUT 66%, PAC 0%, QAC 0%, = 341.0ms

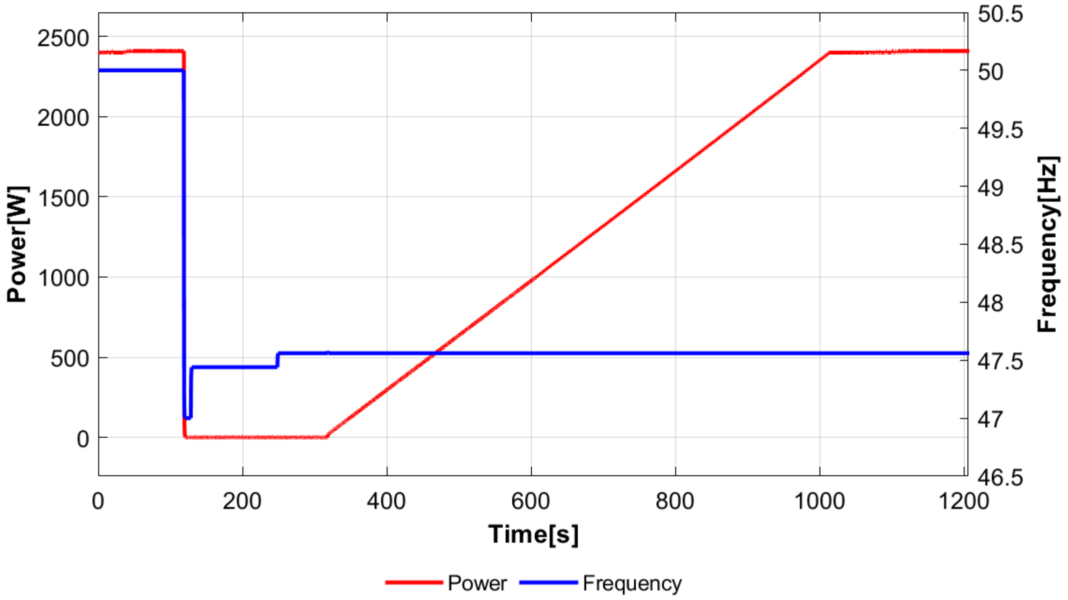


PEUT 33%, PAC 0%, QAC 3%, = 345.0ms

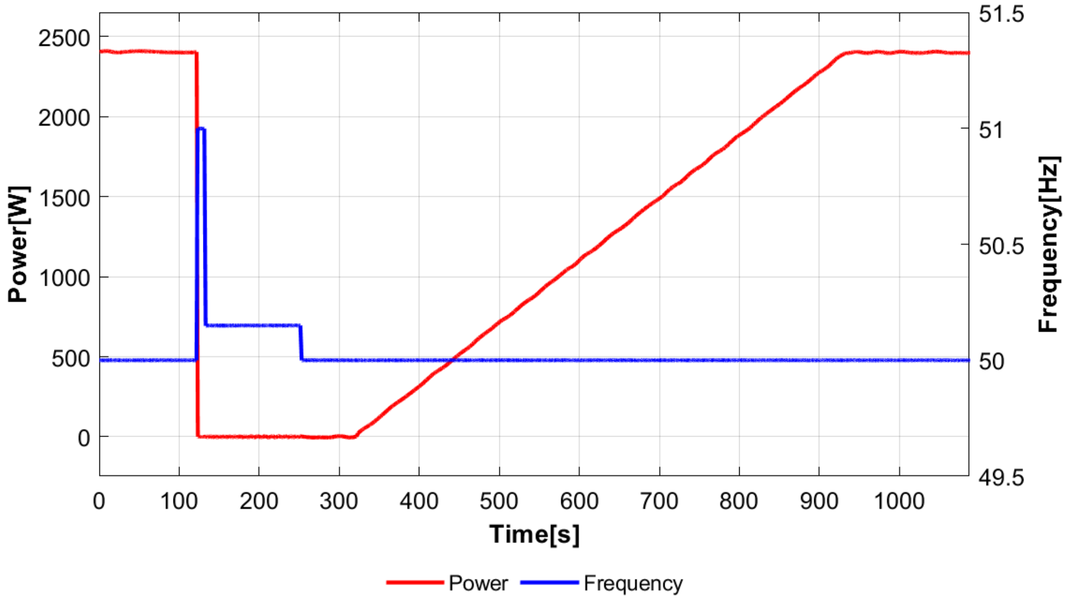
5.6	Connection conditions and synchronization	P

DC input:	AC output:	Rated Output Power		
50Vdc	230Vac; 50Hz	2.4kW		
Measure Item	Reconnection?	Measurement		
		Voltage [%Un]	Frequency [Hz]	Reconnection Time (>60s)
f_{ist} <47.45Hz	☐ Yes ☒ No	100	47.40	Cannot reconnection
f_{ist} ≥ 47.55Hz	☒ Yes ☐ No	100	47.55	63.8
f_{ist} > 50.15Hz	☐ Yes ☒ No	100	50.20	Cannot reconnection
f_{ist} ≤ 50.05Hz	☒ Yes ☐ No	100	50.00	65.2
U_{ist} < 84% U_n	☐ Yes ☒ No	83.92	50.00	Cannot reconnection
U_{ist} ≥ 86% U_n	☒ Yes ☐ No	86.00	50.00	66.6
U_{ist} > 111% U_n	☐ Yes ☒ No	111.36	50.00	Cannot reconnection
U_{ist} ≤ 109% U_n	☒ Yes ☐ No	108.99	50.00	69.4

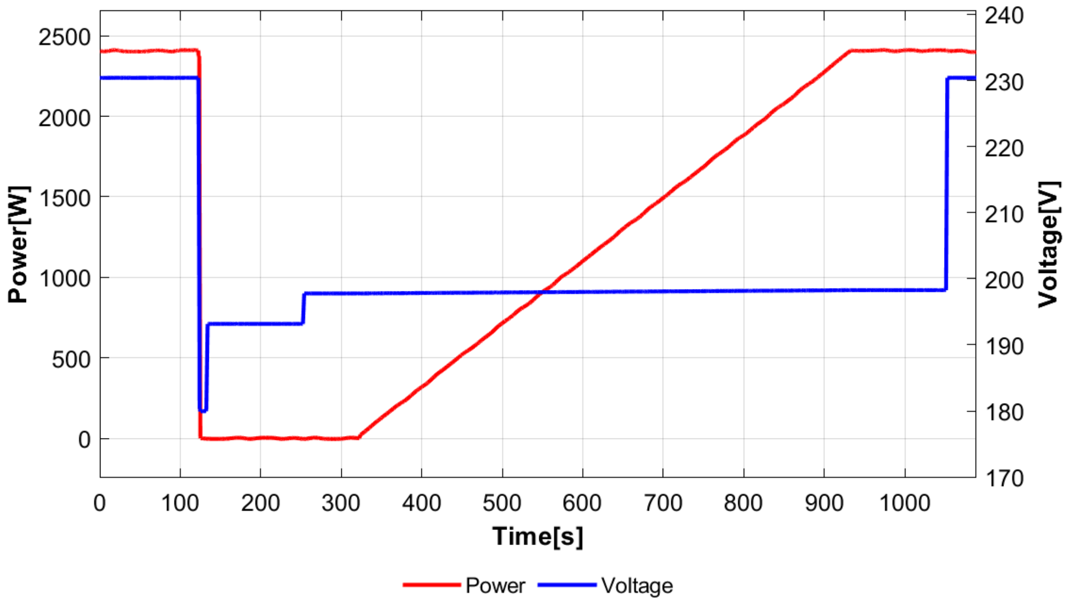
Graph of the gradual power supply and reconnection: for 47.55Hz



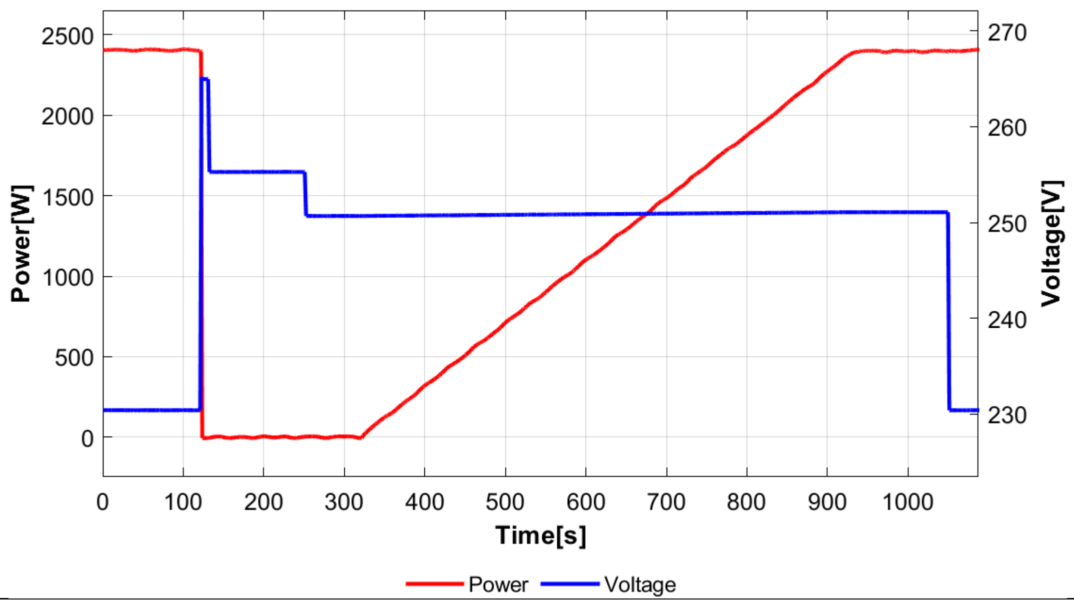
Graph of the gradual power supply and reconnection: for 50.05Hz



Graph of the gradual power supply and reconnection: for 86%Un

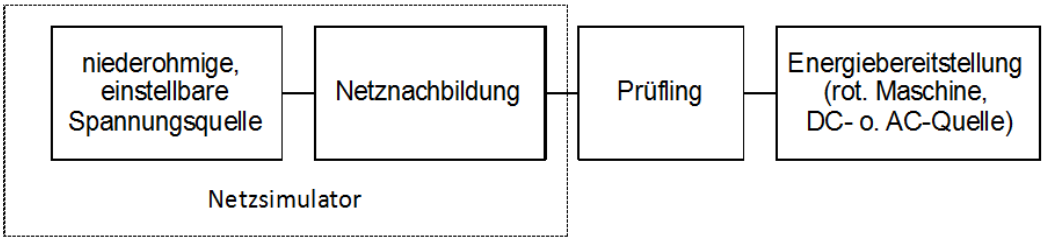


Graph of the gradual power supply and reconnection: for 109%Un



5.8	Dynamic Network support	P

Test equipment:

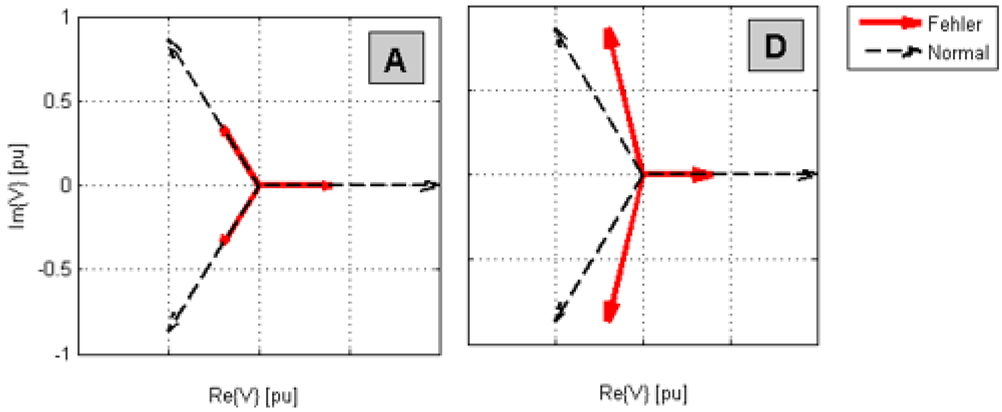


The effective network impedance from view of PGU must fulfill following criterion:
- short-circuited power at PGU before and after fault must be between 10xSn and 30xSn
- R/X 0.3-3 (for applied impedance in test equipment)

The test equipment and network simulator must be able to take the max. occurring PGU current, both in generating and motoring area. The energy absorb shall be designed for sudden short circuited current Ip (per IEC 60909). Ip is obvious different by the type of test sample, the correct value shall be:

- for inverter coupled system about 2.2In,
- for direct coupled Asynchronous or Synchronous machines about 7In.

Grid simulator settings for asymmetry grid fault:



D1	Test Equipment	Test Sample
Connection terminal	U	L1
	V	L2
	W	L3 (L for single phase)
D2	Test Equipment	Test Sample
Connection terminal	U	L3
	V	L1 (L for single phase)
	W	L2

VDE No.	U	V	W	Type	Remark
--	1.00, -150°	1.00, 90°	1.00, -30°	A	Initial status
1.3, 1.4	0.62, -173.3°	0.15, 90°	0.62, -6.9°	D	UVRT

2.3, 2.4, 3.3, 3.4	0.76, -161.1°	0.50, 90°	0.76, -19.1°	D	
4.3, 4.4	0.93, -152.8°	0.85, 89.9°	0.93, -27.4°	D	
5.3, 5.4	1.08, -144.5°	1.25, 89.1°	1.06, -36.3°	D	OVRT
6.3, 6.4	1.06, -145.5°	1.20, 89.3°	1.05, -35.1°	D	
7.3, 7.4	1.04, -146.6°	1.15, 89.4°	1.04, -33.9°	D	

Diagram:

For each test the following diagrams shall be figured since t1-1s (one second before fault entry) till t2+6s (six seconds after fault clear), zoomed if needed:

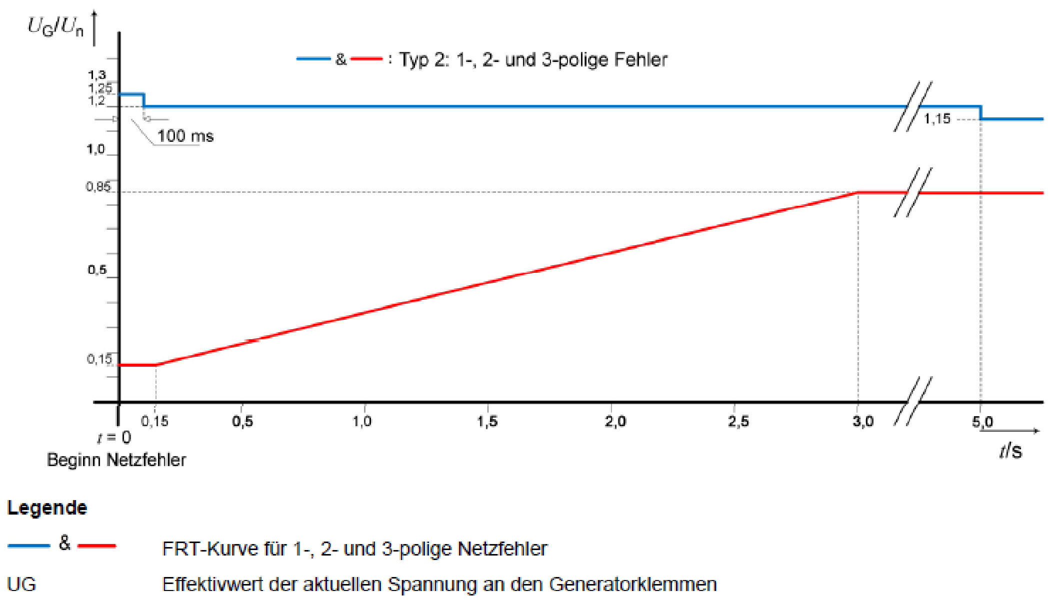
Empty load tests:

- line to line voltages and line to neutral voltages (signal)
- full period-RMS value of line to neutral voltages with updated rate of 1/ms.

Tests with sample:

- line to line voltage and line to neutral voltage (signal)
- line currents (signal)
- full period-RMS value of line to neutral voltage with updated rate of 1/ms
- full period-RMS value of line currents with updated rate of 1/ms (active and reactive part additionally)
- active power and reactive power in pos. sequence with updated rate of 1/ms
- voltage and current in pos. sequence with updated rate of 1/ms

Test condition:



Method of calculations:

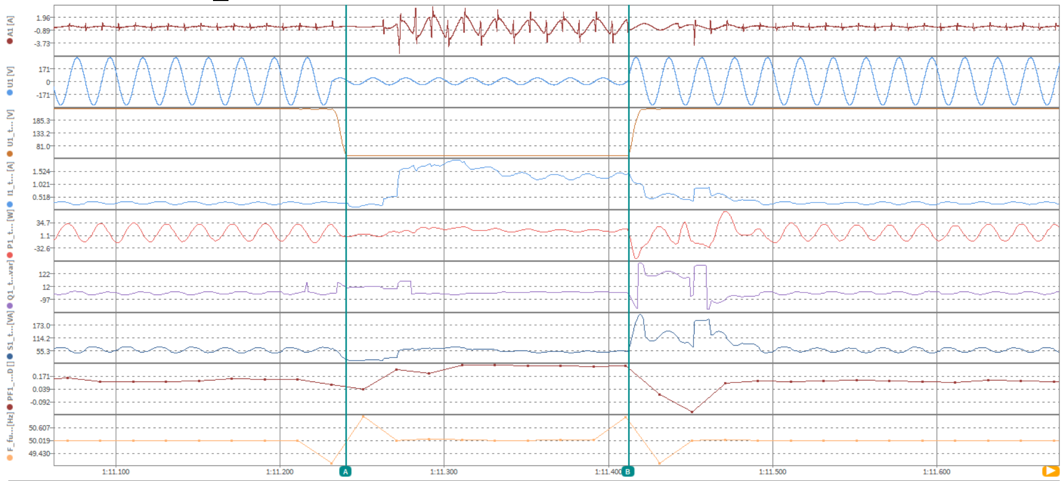
Notes on calculations:	Used formula	Remarks
General remarks: The average grid frequency over the measured interval is calculated from zero-crossings of the sine function. Only 10 cycles before the dip are used for this calculation. RMS-Calculations are performed with a moving window, which is determined by T = 1/f and must remain constant. The number of samples N per calculation window is determined by the sampling rate f_S. N has to be even and an integer number nearest to the product $T*f_S$.	$\underline{U}_1 = \frac{\sqrt{2}}{N} \cdot \sum_{n=0}^{N} u(n) \cdot e^{-j(\frac{2\cdot\pi\cdot n}{N})}$ $\underline{I}_1 = \frac{\sqrt{2}}{N} \cdot \sum_{n=0}^{N} i(n) \cdot e^{-j(\frac{2\cdot\pi\cdot n}{N})}$	- Calculated for each phase A,B,C - N: Amount of samples per window - n: number of sample
Performed Calculation	$\underline{U}^+ = \frac{1}{3} \cdot (\underline{U}_{1A} + \underline{U}_{1B} \cdot e^{+j\frac{2\pi}{3}} + \underline{U}_{1C} \cdot e^{-j\frac{2\pi}{3}})$ $\underline{I}^+ = \frac{1}{3} \cdot (\underline{I}_{1A} + \underline{I}_{1B} \cdot e^{+j\frac{2\pi}{3}} + \underline{I}_{1C} \cdot e^{-j\frac{2\pi}{3}})$	
Complex values for the fundamental harmonic	$P = 3 \cdot U^+ \cdot I^+ \cdot \cos(\varphi)$ $Q = 3 \cdot U^+ \cdot I^+ \cdot \sin(\varphi)$	Phase-angle : Angular difference between current and voltage $\varphi = (\varphi_U - \varphi_I)$
Positive sequence component of the voltage and current	$I_r = I^+ \cdot \sin(\varphi)$ $I_{tot} = I^+$	
Power:	$U_{rms} = \sqrt{\frac{1}{N} \cdot \sum_{n=0}^{N} (u(n) - \overline{u})^2}$ $\overline{u} = \frac{1}{N} \cdot \sum_{n=0}^{N} u(n)$	- Calculated for each phase A,B,C or L1, L2, L3

Verification of dynamic network support	P
Short-circuited power at generator terminal [VA]	6K
NS protection settings	See table 5.5 for detail.

	No.	Parameter	Phase ref.	Time ref.	unit	Result		
General Info.	0	Test number	--	--	--	1.1	2.1	3.1
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025		
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph		
	3	Fault type (phase)	--	--		A	A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.15	0.5	0.5
	5	Setting dip duration		--	ms	150	1500	1500
	6	Point of fault entry	Total	--	ms	20ms		
	7	Point of fault clearance	Total	--	ms	20ms		
	8	Fault duration in empty load test	Total	--	ms	171.9	1521.5	1521.5
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.15	0.5	0.5
	10		Positive sequence		p.u.	--	--	--
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--
	13	Active power	Total	t1-10s to t1	p.u.	1.010	1.008	1.005
	14		Positive sequence			--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.025	0.326	-0.333
	16		Positive sequence			--	--	--
	17	Cos_{φ}	--	t1-10s to t1	--	0.9997	0.9502	0.9498
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.15	0.5	0.5
	19	Line current	Phase 1	t1+60ms	p.u.	0.007	0.025	0.025

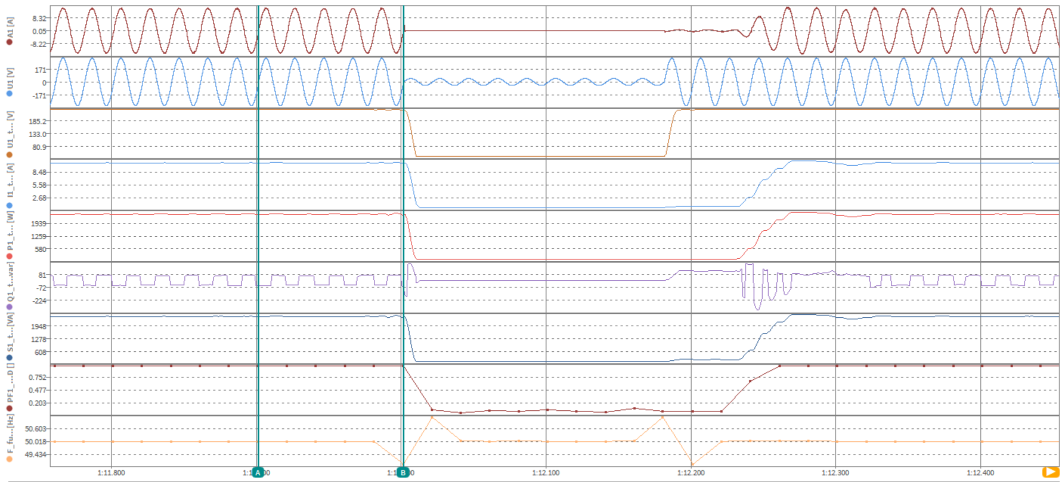
	20		Phase 2			--	--	--
	21		Phase 3			--	--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.008	0.024	0.025
	23		Phase 2			--	--	--
	24		Phase 3			--	--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.001	0.002	0.001
	26		Positive sequence			--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--
	29		Total			1.010	1.001	0.996
	39	Active power rising time	Positive sequence	--	s	0.141	0.144	0.136
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--
	32		Total			-0.022	0.314	-0.314
	33	Reactive power rising time	Positive sequence	--	s	0.141	9.950	9.322
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes		

Graph of Test number 1.1_0.15Un



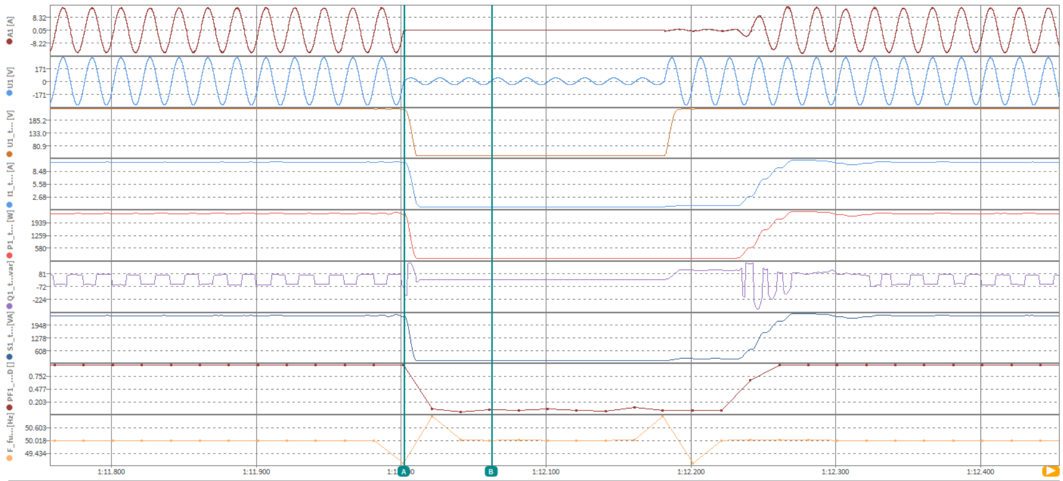
	A	B	间隔	有效值
时间 [s]	1:11.2404000	1:11.4123000	0.1719000	
A1 [A]	-0.010872	-3.700733	-3.689862	1.392553
U1 [V]	20.01524	54.07882	34.06358	34.28700
U1_tRMS_rc@GIRD [V]	53.11282	34.45995	-18.65286	34.55493
I1_tRMS_rc@GIRD [A]	0.243380	1.372971	1.129591	1.367380
P1_t_rc@GIRD [W]	-3.448892	16.47162	19.92051	13.29114
Q1_t_rc@GIRD [var]	12.45800	-44.35269	-56.81069	45.15639
S1_t_rc@GIRD [VA]	12.92659	47.31253	34.38594	47.07180
PF1_t@GIRD []	0.082372	0.281321	0.198949	0.240194
F_fund@GIRD [Hz]	48.89782	51.10238	2.204559	50.12060

Empty load



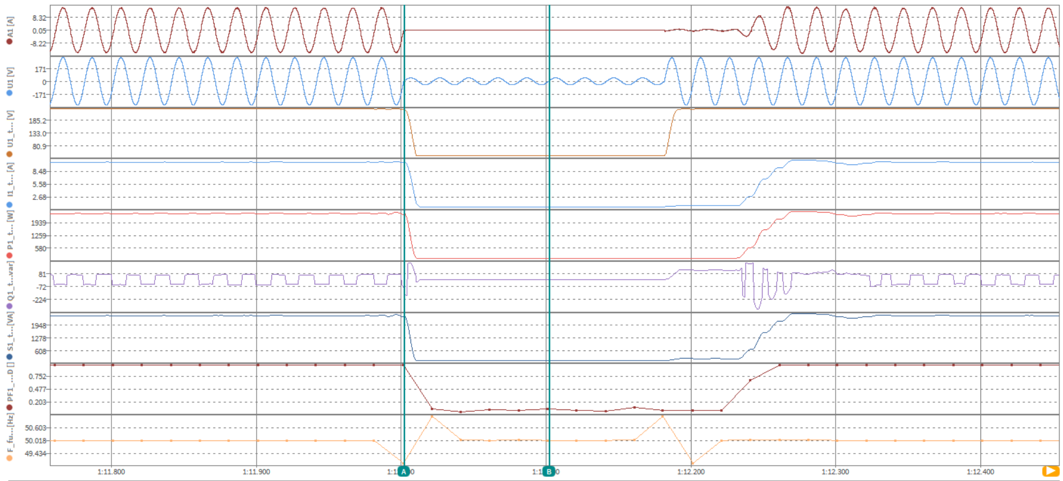
	A	B	间隔	有效值
时间 [s]	1:11.901800	1:12.001800	0.100000	
A1 [A]	-1.003021	-1.059288	-0.056267	10.55401
U1 [V]	-23.39959	-23.44275	-0.043154	230.0660
U1_tRMS_rc@GIRD [V]	230.1110	228.0453	-2.065689	230.1902
I1_tRMS_rc@GIRD [A]	10.54344	10.45975	-0.083680	10.55883
P1_t_rc@GIRD [W]	2425.391	2384.491	-40.89966	2429.890
Q1_t_rc@GIRD [var]	-61.08679	-62.01344	-0.926647	57.95289
S1_t_rc@GIRD [VA]	2426.160	2385.298	-40.86255	2430.581
PF1_t@GIRD []	0.999715	0.999708	-7.212e-6	0.999710
F_fund@GIRD [Hz]	49.99983	49.99952	-3.090e-4	49.99988

Before dip (t1-100ms)



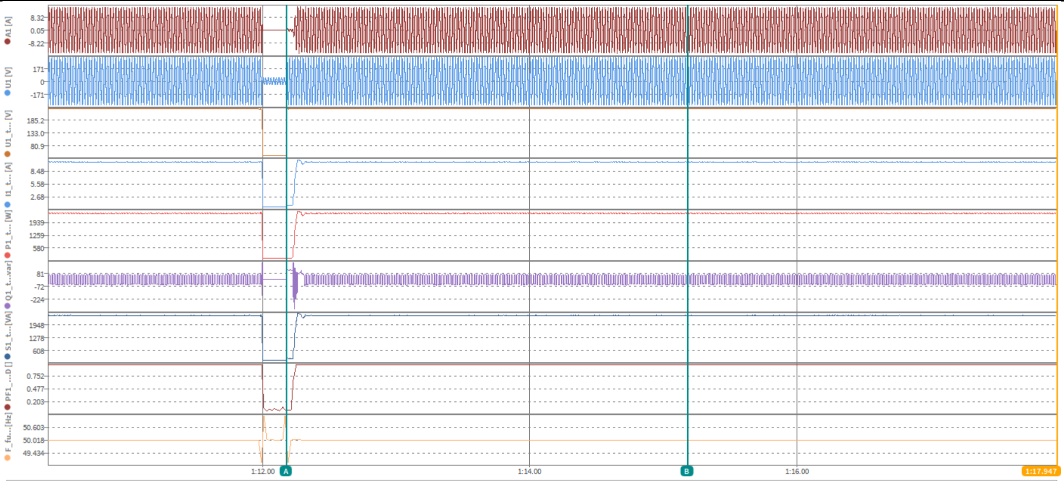
	A	B	间隔	有效值
时间 [s]	1:12.002200	1:12.062700	0.060500	
A1 [A]	0.612026	-0.081772	-0.693798	0.337430
U1 [V]	2.418041	10.14972	7.731677	34.10525
U1_tRMS_rc@GIRD [V]	228.0453	34.32355	-193.7217	78.23588
I1_tRMS_rc@GIRD [A]	10.45975	0.076950	-10.38280	3.273091
P1_t_rc@GIRD [W]	2384.491	-0.538914	-2385.030	681.3977
Q1_t_rc@GIRD [var]	-62.01344	2.585646	64.59908	64.27733
S1_t_rc@GIRD [VA]	2385.298	2.641210	-2382.656	684.4227
PF1_t@GIRD []	0.999708	0.011215	-0.988493	0.632745
F_fund@GIRD [Hz]	49.99952	50.00049	9.689e-4	50.01210

During dip (t1+60ms)



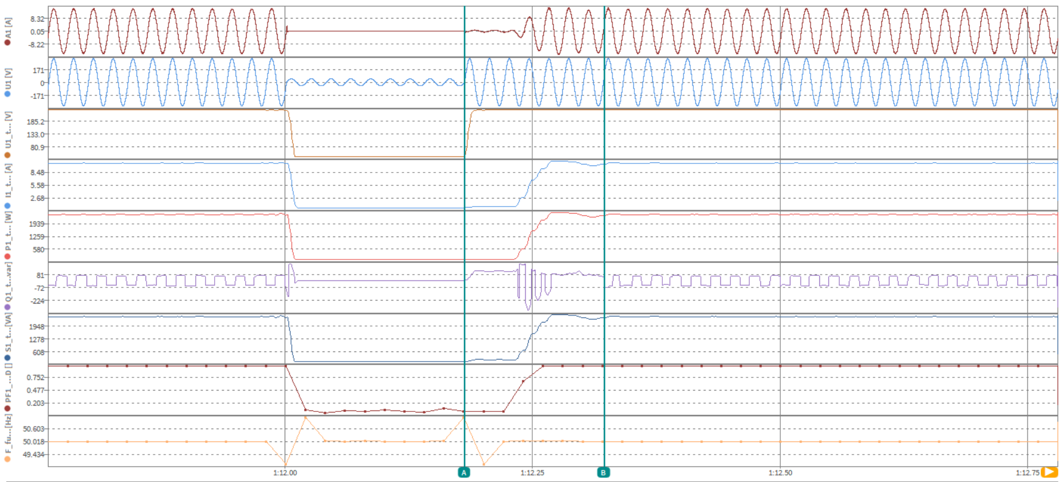
	A	B	间隔	有效值
时间 [s]	1:12.002200	1:12.102400	0.100200	
A1 [A]	0.612026	-0.110859	-0.722885	0.267253
U1 [V]	2.418041	5.290270	2.872229	34.27525
U1_tRMS_rc@GIRD [V]	228.0453	34.34615	-193.6991	64.91987
I1_tRMS_rc@GIRD [A]	10.45975	0.083858	-10.37590	2.564942
P1_t_rc@GIRD [W]	2384.491	-0.608894	-2385.100	533.8705
Q1_t_rc@GIRD [var]	-62.01344	2.815104	64.82854	50.38992
S1_t_rc@GIRD [VA]	2385.298	2.880201	-2382.417	536.2432
PF1_t@GIRD []	0.999708	0.035836	-0.963872	0.534949
F_fund@GIRD [Hz]	49.99952	50.00018	6.599e-4	50.00879

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:12.181600	1:15.183100	3.001500	
A1 [A]	-0.094647	4.943615	5.038262	10.43492
U1 [V]	-6.390572	106.7262	113.1167	230.1176
U1_tRMS_rc@GIRD [V]	34.70844	230.1058	195.3973	229.9434
I1_tRMS_rc@GIRD [A]	0.085153	10.54189	10.45674	10.42681
P1_t_rc@GIRD [W]	-0.691971	2425.190	2425.882	2399.178
Q1_t_rc@GIRD [var]	2.873398	-52.14628	-55.01968	64.22849
S1_t_rc@GIRD [VA]	2.955544	2425.750	2422.795	2400.037
PF1_t@GIRD []	-6.024e-3	0.999719	1.005743	0.987726
F_fund@GIRD [Hz]	51.13170	49.99995	-1.131748	50.00046

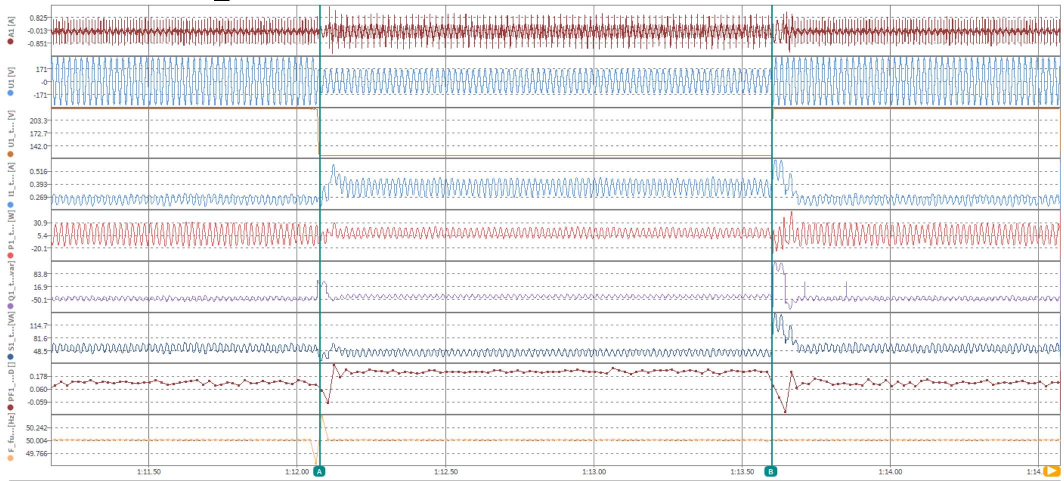
After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:12.181600	1:12.322600	0.141000	
A1 [A]	-0.094647	3.278976	3.373623	7.579899
U1 [V]	-6.390572	58.21514	64.60572	229.2078
U1_tRMS_rc@GIRD [V]	34.70844	230.1088	195.4004	225.1382
I1_tRMS_rc@GIRD [A]	0.085153	10.24519	10.16004	7.351429
P1_t_rc@GIRD [W]	-0.691971	2357.025	2357.717	1687.112
Q1_t_rc@GIRD [var]	2.873398	47.73838	44.86498	130.4773
S1_t_rc@GIRD [VA]	2.955544	2357.509	2354.553	1692.150
PF1_t@GIRD []	-6.024e-3	0.999540	1.005564	0.741674
F_fund@GIRD [Hz]	51.13170	50.00059	-1.131107	50.01029

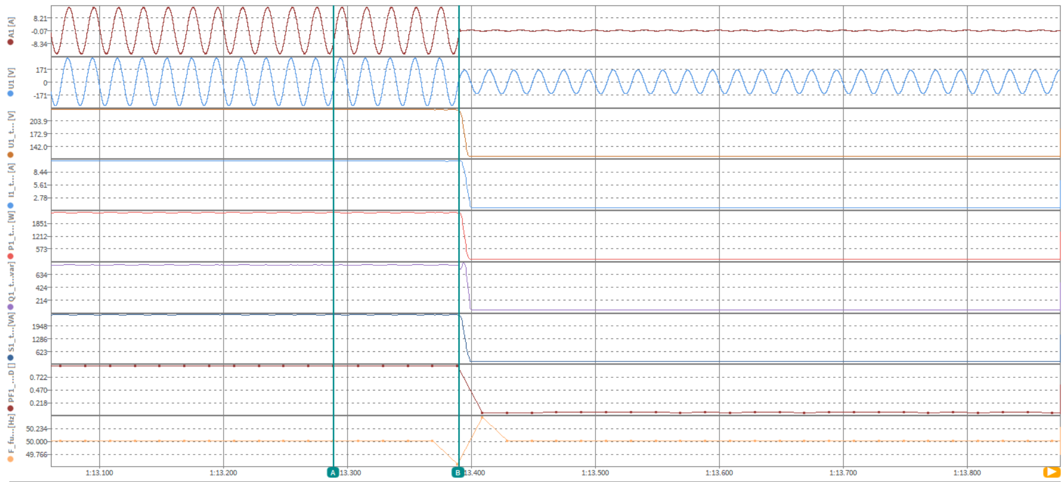
Recovery time

Graph of Test number 2.1_0.5Un



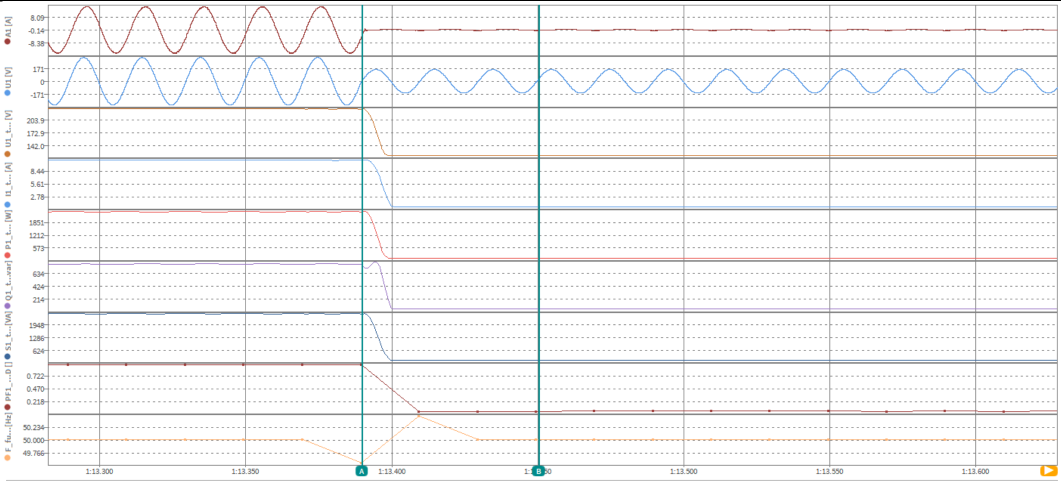
	A	B	间隔	有效值
时间 [s]	1:12.077600	1:13.599100	1.521500	
A1 [A]	0.224876	-0.352764	-0.577641	0.365052
U1 [V]	77.04068	3.683090	-73.35759	114.9133
U1_tRMS_rc@GIRD [V]	119.6140	114.9581	-4.655930	114.9670
I1_tRMS_rc@GIRD [A]	0.252608	0.315524	0.062916	0.364720
P1_t_rc@GIRD [W]	-11.35293	-2.676441	8.676486	12.07052
Q1_t_rc@GIRD [var]	28.00158	-36.17319	-64.17477	40.15552
S1_t_rc@GIRD [VA]	30.21551	36.27208	6.056564	41.93045
PF1_t@GIRD []	0.092393	0.216005	0.123612	0.216647
F_fund@GIRD [Hz]	49.55076	49.98962	0.438862	50.00011

Empty load



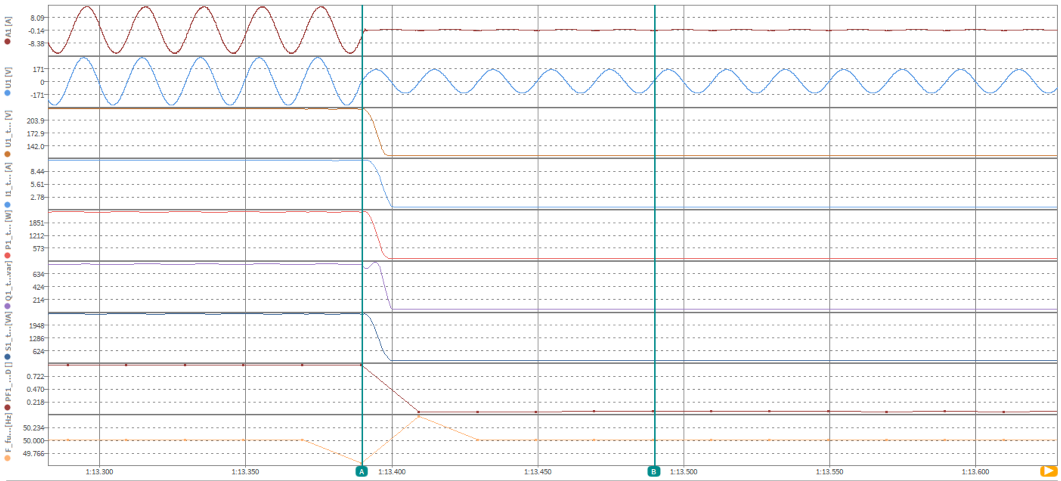
	A	B	间隔	有效值
时间 [s]	1:13.289000	1:13.389800	0.100800	
A1 [A]	-8.087282	-4.615908	3.471375	10.88097
U1 [V]	-76.42678	1.602141	78.02892	229.7252
U1_tRMS_rc@GIRD [V]	230.6997	229.6742	-1.025558	230.7288
I1_tRMS_rc@GIRD [A]	10.96438	10.93654	-0.027840	10.91350
P1_t_rc@GIRD [W]	2405.146	2386.522	-18.62427	2392.655
Q1_t_rc@GIRD [var]	783.2891	783.4930	0.203918	784.7727
S1_t_rc@GIRD [VA]	2529.480	2511.841	-17.63867	2518.068
PF1_t@GIRD []	0.950214	0.950168	-4.524e-5	0.950182
F_fund@GIRD [Hz]	49.99986	49.99979	-6.866e-5	49.99983

Before dip (t1-100ms)



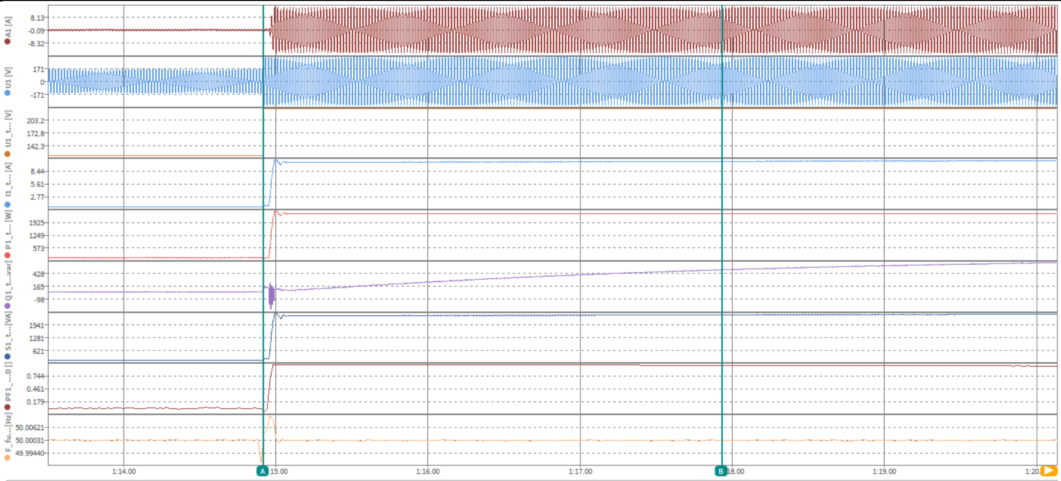
	A	B	间隔	有效值
时间 [s]	1:13.390000	1:13.450500	0.060500	
A1 [A]	-3.089075	-0.403528	2.685547	0.343452
U1 [V]	13.01214	37.76881	24.75667	114.1456
U1_tRMS_rc@GIRD [V]	229.6742	114.7373	-114.9369	130.7879
I1_tRMS_rc@GIRD [A]	10.93654	0.261878	-10.67466	3.726859
P1_t_rc@GIRD [W]	2386.522	4.074587	-2382.447	724.2195
Q1_t_rc@GIRD [var]	783.4930	29.76963	-753.7234	293.9520
S1_t_rc@GIRD [VA]	2511.841	30.04718	-2481.794	781.6019
PF1_t@GIRD []	0.949294	3.710e-3	-0.945585	0.474687
F_fund@GIRD [Hz]	49.55452	49.99977	0.445251	50.00101

During dip (t1+60ms)



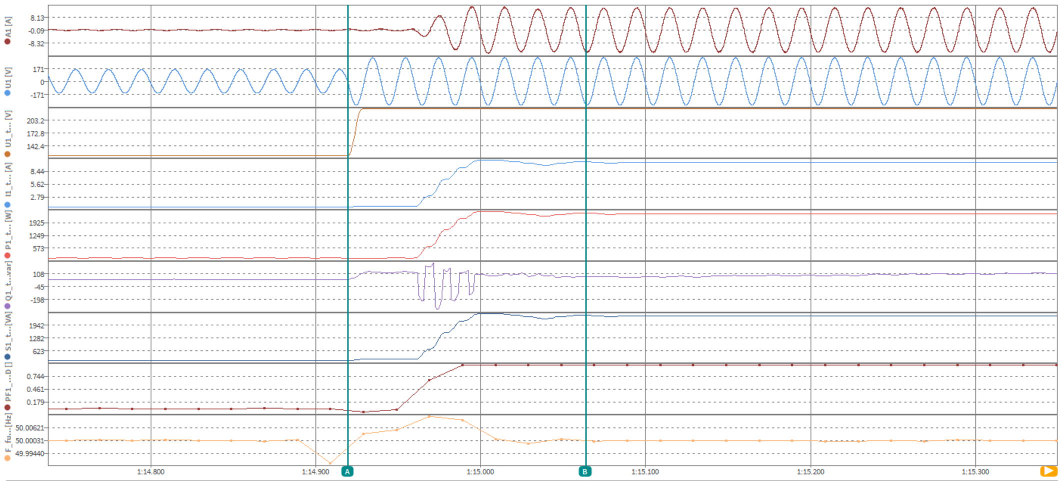
	A	B	间隔	有效值
时间 [s]	1:13.390000	1:13.490000	0.100000	
A1 [A]	-3.089075	-0.492220	2.596855	0.313219
U1 [V]	13.01214	11.97073	-1.041412	114.6686
U1_tRMS_rc@GIRD [V]	229.6742	114.7893	-114.8849	124.8505
I1_tRMS_rc@GIRD [A]	10.93654	0.252845	-10.68370	2.924483
P1_t_rc@GIRD [W]	2386.522	5.406023	-2381.116	567.4245
Q1_t_rc@GIRD [var]	783.4930	28.51605	-754.9770	231.0541
S1_t_rc@GIRD [VA]	2511.841	29.02395	-2482.817	612.6635
PF1_t@GIRD []	0.949294	0.015629	-0.933666	0.387682
F_fund@GIRD [Hz]	49.55452	49.99999	0.445469	50.00060

During dip (t1+100ms)



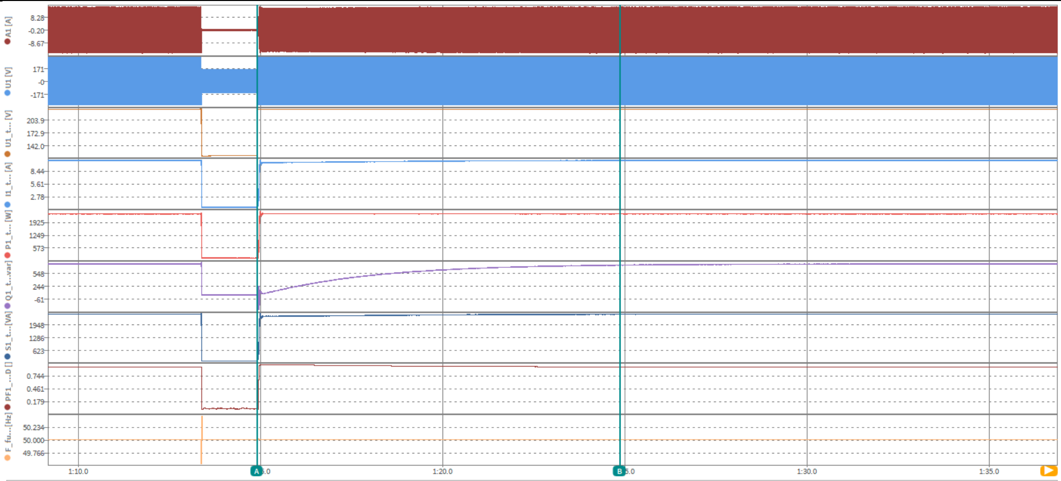
	A	B	间隔	有效值
时间 [s]	1:14.9197000	1:17.9316000	3.0119000	
A1 [A]	0.357981	5.707141	5.349160	10.39470
U1 [V]	2.651183	178.6465	175.9954	230.5927
U1_tRMS_rc@GIRD [V]	114.9544	230.6616	115.7072	230.4747
I1_tRMS_rc@GIRD [A]	0.267730	10.65353	10.38581	10.38577
P1_t_rc@GIRD [W]	-2.946175	2407.684	2410.630	2373.838
Q1_t_rc@GIRD [var]	30.63539	491.6122	460.9768	322.3814
S1_t_rc@GIRD [VA]	30.77673	2457.361	2426.585	2395.628
PF1_t@GIRD []	3.574e-3	0.979408	0.975834	0.979264
F_fund@GIRD [Hz]	49.98905	49.99991	0.010857	50.00002

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:14.9197000	1:15.0638000	0.1441000	
A1 [A]	0.357981	-13.94523	-14.30321	8.095539
U1 [V]	2.651183	-311.6327	-314.2839	229.6179
U1_tRMS_rc@GIRD [V]	114.9544	230.6211	115.6667	226.6474
I1_tRMS_rc@GIRD [A]	0.267730	10.55045	10.28272	7.857622
P1_t_rc@GIRD [W]	-2.946175	2432.233	2435.179	1807.480
Q1_t_rc@GIRD [var]	30.63539	67.03066	36.39528	126.5238
S1_t_rc@GIRD [VA]	30.77673	2433.157	2402.380	1811.903
PF1_t@GIRD []	3.574e-3	0.999230	0.995656	0.741666
F_fund@GIRD [Hz]	49.98905	50.00071	0.011658	50.00229

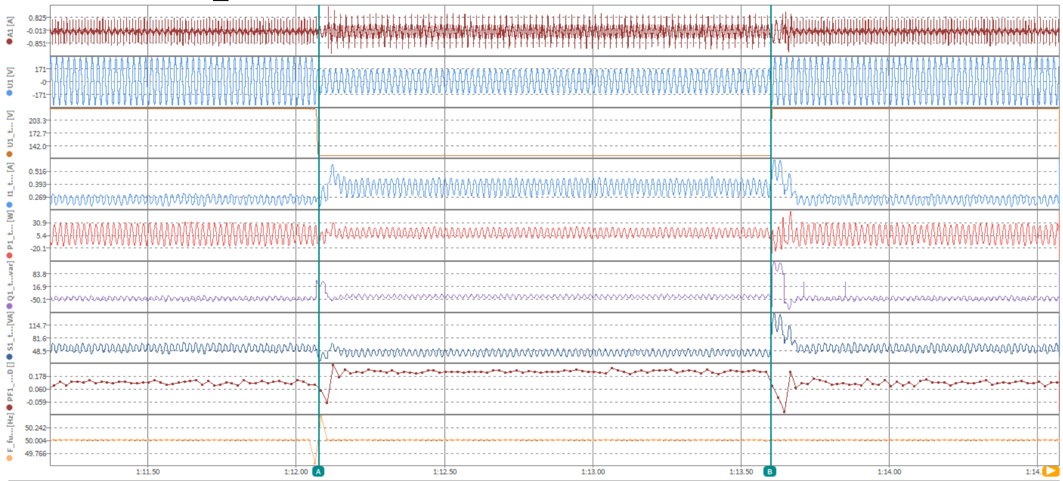
Recovery time-P



	A	B	间隔	有效值
时间 [s]	1:14.9197000	1:24.8697000	9.9500000	
A1 [A]	0.357981	-4.990225	-5.348206	10.66750
U1 [V]	2.651183	-6.784471	-9.435654	230.6874
U1_tRMS_rc@GIRD [V]	114.9544	230.6817	115.7273	230.6344
I1_tRMS_rc@GIRD [A]	0.267730	10.91621	10.64848	10.66358
P1_t_rc@GIRD [W]	-2.946175	2402.493	2405.439	2387.813
Q1_t_rc@GIRD [var]	30.63539	754.4556	723.8202	591.5931
S1_t_rc@GIRD [VA]	30.77673	2518.169	2487.392	2460.007
PF1_t@GIRD []	3.574e-3	0.953547	0.949973	0.967611
F_fund@GIRD [Hz]	49.98905	49.99955	0.010498	49.99995

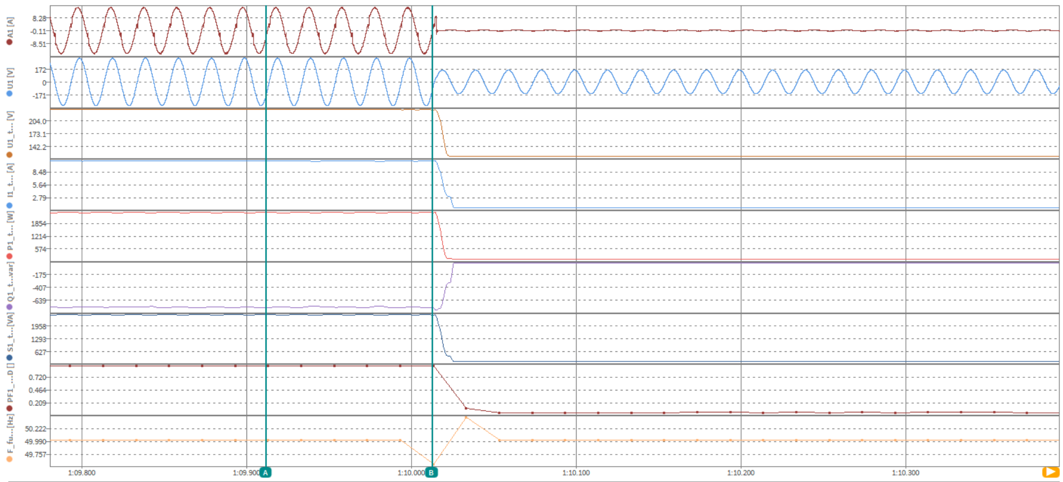
Recovery time-Q

Graph of Test number 3.1_0.5Un



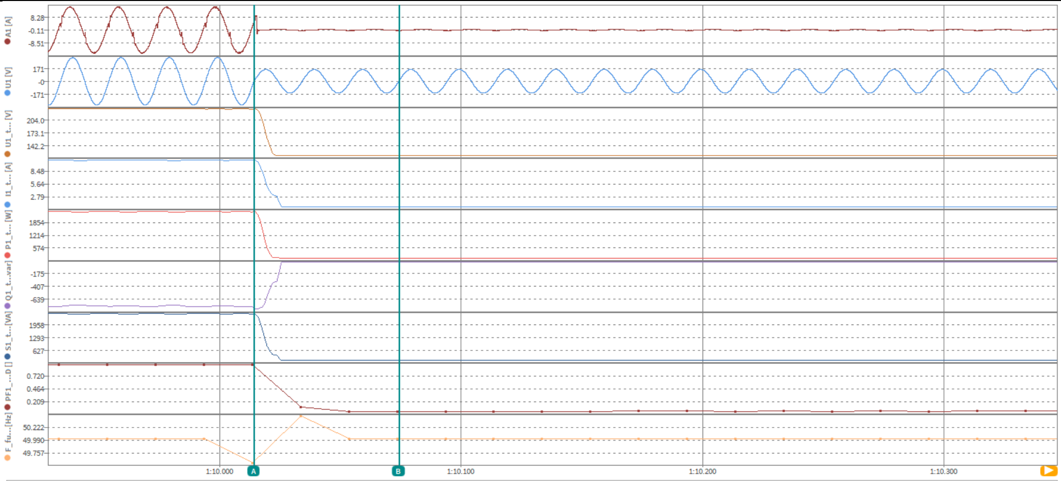
	A	B	间隔	有效值
时间 [s]	1:12.077600	1:13.599100	1.521500	
A1 [A]	0.224876	-0.352764	-0.577641	0.365052
U1 [V]	77.04068	3.683090	-73.35759	114.9133
U1_tRMS_rc@GIRD [V]	119.6140	114.9581	-4.655930	114.9670
I1_tRMS_rc@GIRD [A]	0.252608	0.315524	0.062916	0.364720
P1_t_rc@GIRD [W]	-11.35293	-2.676441	8.676486	12.07052
Q1_t_rc@GIRD [var]	28.00158	-36.17319	-64.17477	40.15552
S1_t_rc@GIRD [VA]	30.21551	36.27208	6.056564	41.93045
PF1_t@GIRD []	0.092393	0.216005	0.123612	0.216647
F_fund@GIRD [Hz]	49.55076	49.98962	0.438862	50.00011

Empty load



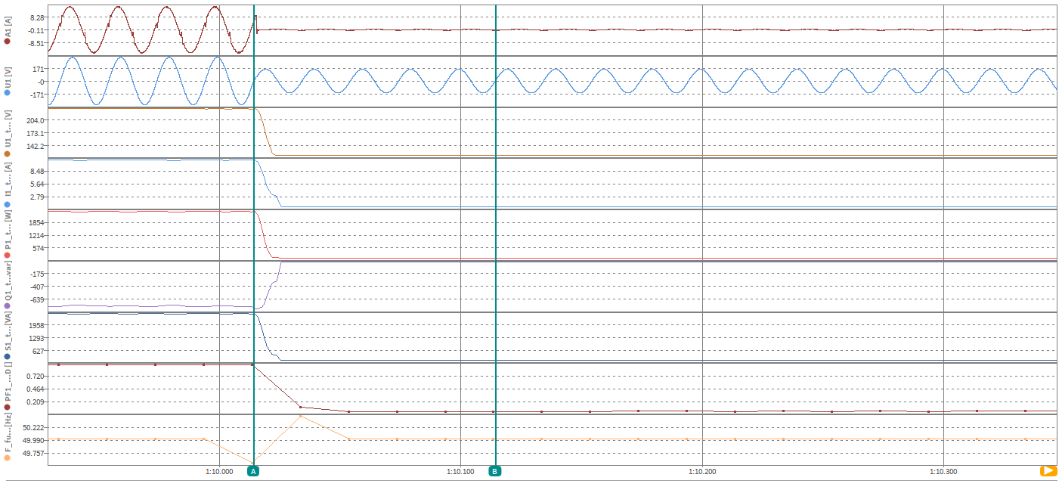
	A	B	间隔	有效值
时间 [s]	1:09.9120000	1:10.0126000	0.1006000	
A1 [A]	-5.112772	-2.167826	2.944946	10.92385
U1 [V]	-197.5034	-145.4082	52.09518	230.4025
U1_tRMS_rc@GIRD [V]	230.7385	230.4312	-0.307266	230.7748
I1_tRMS_rc@GIRD [A]	11.01240	10.97817	-0.034229	10.95876
P1_t_rc@GIRD [W]	2411.918	2400.920	-10.99756	2402.647
Q1_t_rc@GIRD [var]	-799.5339	-796.8889	2.645020	789.4281
S1_t_rc@GIRD [VA]	2540.984	2529.713	-11.27124	2529.013
PF1_t@GIRD []	0.949808	0.949780	-2.807e-5	0.949954
F_fund@GIRD [Hz]	50.00002	49.99998	-3.815e-5	49.99984

Before dip (t1-100ms)



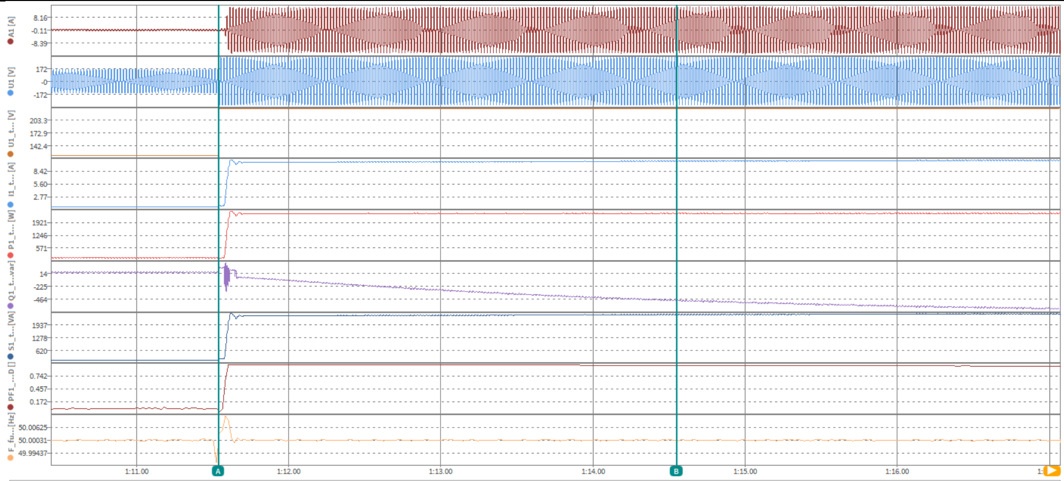
	A	B	间隔	有效值
时间 [s]	1:10.0143000	1:10.0743000	0.0600000	
A1 [A]	2.859946	-0.434522	-3.294468	1.140054
U1 [V]	11.02707	10.59148	-0.435591	114.8860
U1_tRMS_rc@GIRD [V]	229.5921	115.0406	-114.5514	129.5891
I1_tRMS_rc@GIRD [A]	10.97406	0.255848	-10.71821	3.197805
P1_t_rc@GIRD [W]	2389.724	2.305433	-2387.419	619.3247
Q1_t_rc@GIRD [var]	-798.3652	29.34254	827.7077	283.2226
S1_t_rc@GIRD [VA]	2519.557	29.43296	-2490.124	681.0125
PF1_t@GIRD []	0.949470	-0.016296	-0.965765	0.476494
F_fund@GIRD [Hz]	49.54663	49.99971	0.453079	49.99589

During dip (t1+60ms)



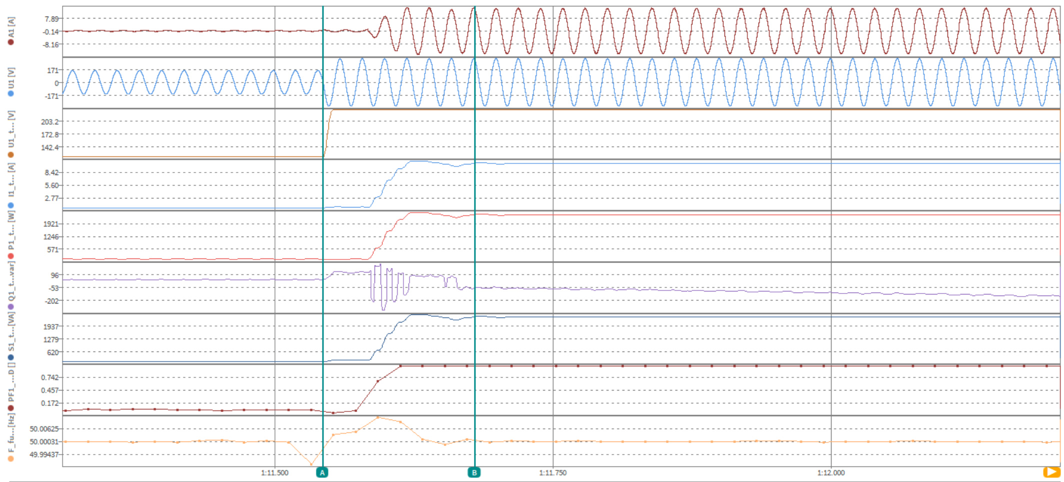
	A	B	间隔	有效值
时间 [s]	1:10.0143000	1:10.1144000	0.1001000	
A1 [A]	2.859946	-0.426893	-3.286839	0.898020
U1 [V]	11.02707	16.31734	5.290270	114.8844
U1_tRMS_rc@GIRD [V]	229.5921	115.0071	-114.5849	124.0262
I1_tRMS_rc@GIRD [A]	10.97406	0.258462	-10.71560	2.490467
P1_t_rc@GIRD [W]	2389.724	2.886903	-2386.837	481.3094
Q1_t_rc@GIRD [var]	-798.3652	29.58444	827.9496	220.8926
S1_t_rc@GIRD [VA]	2519.557	29.72496	-2489.832	529.5775
PF1_t@GIRD []	0.949470	-0.011907	-0.961376	0.389113
F_fund@GIRD [Hz]	49.54663	49.99973	0.453098	49.99720

During dip (t1+100ms)



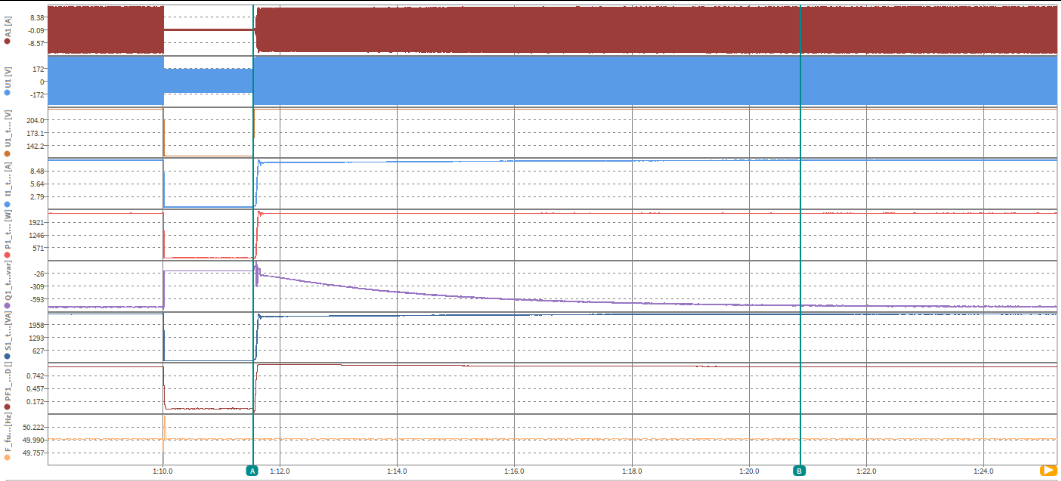
	A	B	间隔	有效值
时间 [s]	1:11.5434000	1:14.5520000	3.0086000	
A1 [A]	0.321265	-6.409769	-6.731034	10.39851
U1 [V]	34.43524	-198.1354	-232.5707	230.7029
U1_tRMS_rc@GIRD [V]	114.9417	230.7130	115.7713	230.4841
I1_tRMS_rc@GIRD [A]	0.274890	10.68462	10.40973	10.38580
P1_t_rc@GIRD [W]	-3.756964	2411.181	2414.938	2372.618
Q1_t_rc@GIRD [var]	31.37218	-512.6656	-544.0378	332.7716
S1_t_rc@GIRD [VA]	31.59633	2465.080	2433.484	2395.841
PF1_t@GIRD []	-0.012896	0.978559	0.991455	0.978685
F_fund@GIRD [Hz]	49.98899	50.00006	0.011070	50.00009

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:11.5434000	1:11.6798000	0.1364000	
A1 [A]	0.321265	14.35077	14.02950	7.957045
U1 [V]	34.43524	317.6982	283.2630	230.3906
U1_tRMS_rc@GIRD [V]	114.9417	230.6029	115.6613	226.2042
I1_tRMS_rc@GIRD [A]	0.274890	10.38418	10.10929	7.631666
P1_t_rc@GIRD [W]	-3.756964	2393.528	2397.285	1755.291
Q1_t_rc@GIRD [var]	31.37218	-72.43702	-103.8092	125.6637
S1_t_rc@GIRD [VA]	31.59633	2394.624	2363.027	1759.783
PF1_t@GIRD []	-0.012896	0.999390	1.012286	0.741854
F_fund@GIRD [Hz]	49.98899	50.00099	0.012001	50.00235

Recovery time-P



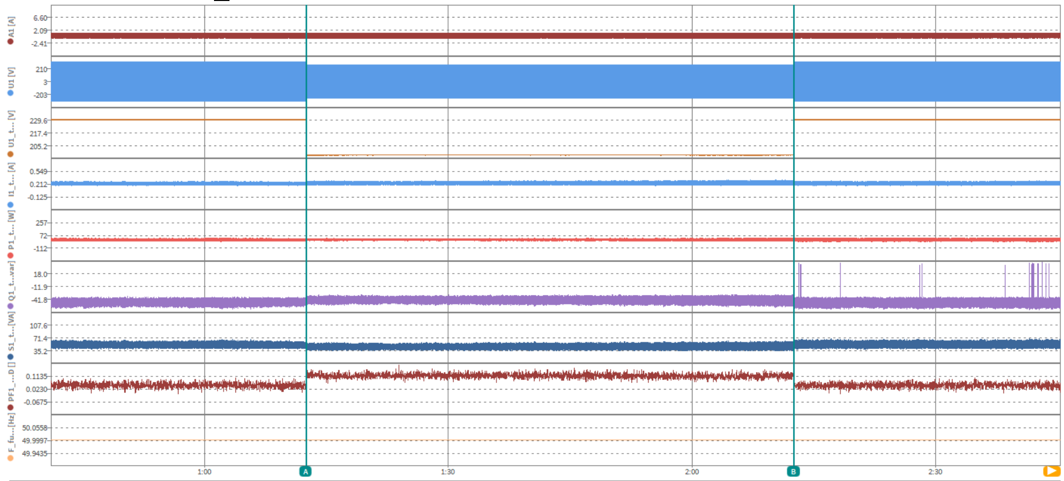
	A	B	间隔	有效值
时间 [s]	1:11.5434000	1:20.8655000	9.3221000	
A1 [A]	0.321265	-10.84006	-11.16133	10.67835
U1 [V]	34.43524	-140.0235	-174.4588	230.6987
U1_tRMS_rc@GIRD [V]	114.9417	230.7771	115.8355	230.6626
I1_tRMS_rc@GIRD [A]	0.274890	10.86277	10.58788	10.67588
P1_t_rc@GIRD [W]	-3.756964	2390.651	2394.408	2392.186
Q1_t_rc@GIRD [var]	31.37218	-754.4726	-785.8448	587.3088
S1_t_rc@GIRD [VA]	31.59633	2506.879	2475.283	2463.227
PF1_t@GIRD []	-0.012896	0.954244	0.967140	0.967934
F_fund@GIRD [Hz]	49.98899	49.99980	0.010811	49.99999

Recovery time-Q

Verification of dynamic network support									P
Short-circuited power at generator terminal [VA]			6K						
NS protection settings			See table 5.5 for detail.						
	No.	Parameter	Phase ref.	Time ref.	unit	Result			
General Info.	0	Test number	--	--	--	4.1	5.1	6.1	7.1
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025			
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph			
	3	Fault type (phase)	--	--		A	A	A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.85	1.25	1.20	1.15
	5	Setting dip duration		--	ms	60000	100	5000	60000
	6	Point of fault entry	Total	--	ms	20ms			
	7	Point of fault clearance	Total	--	ms	20ms			
	8	Fault duration in empty load test	Total	--	ms	60013	123.2	5021.1	60000
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.85	1.25	1.20	1.15
	10		Positive sequence		p.u.	--	--	--	--
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00	1.00
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--	--
	13	Active power	Total	t1-10s to t1	p.u.	0.994	1.016	1.010	1.011
	14		Positive sequence			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	0.022	-0.025	-0.023	-0.022
	16		Positive sequence			--	--	--	--
	17	Cos φ	--	t1-10s to t1	--	0.9997	0.9997	0.9996	0.9997
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.85	1.25	1.20	1.15
	19	Line current	Phase 1	t1+60ms	p.u.	1.181	0.037	0.040	0.876

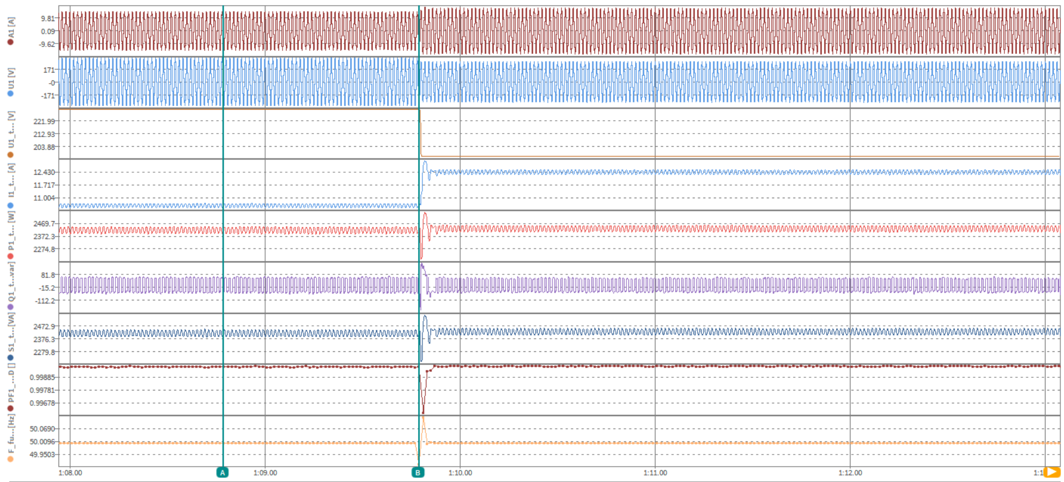
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	--	--
	22	Line current	Phase 1	t1+100ms	p.u.	1.190	0.018	0.020	0.875
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.009	-0.005	-0.003	1.003
	26		Positive sequence			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--	--
	29		Total			0.996	1.001	0.993	1.011
	39	Active power rising time	Positive sequence	--	s	0.094	0.081	0.163	0.071
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--	--
	32		Total			0.020	-0.027	-0.023	-0.025
	33	Reactive power rising time	Positive sequence	--	s	0.094	0.081	0.163	0.071
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 4.1_0.85Un



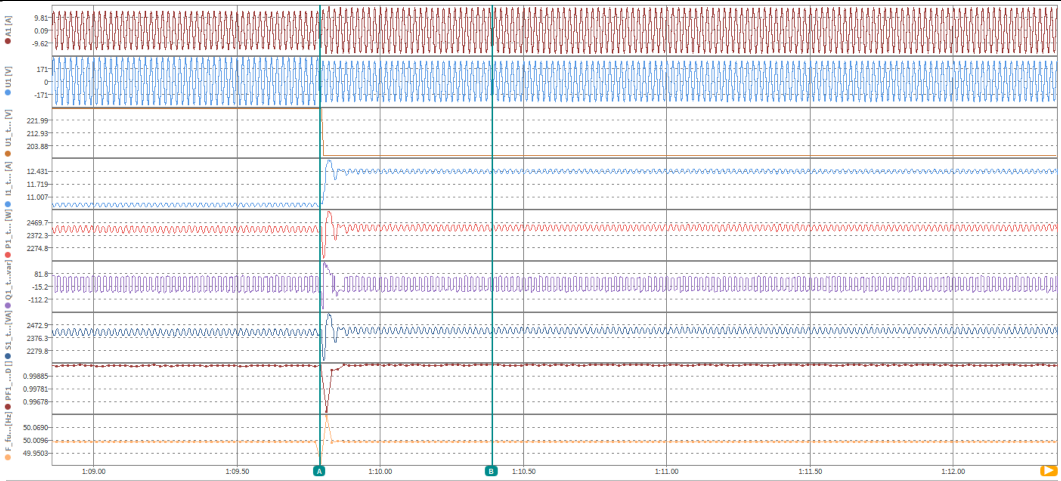
	A	B	间隔	有效值
时间 [s]	1:12.51570	2:12.52910	1:00.01340	
A1 [A]	-0.072479	0.195980	0.268459	0.237718
U1 [V]	-96.10582	271.9364	368.0423	195.4130
U1_tRMS_rc@GIRD [V]	195.1543	195.4653	0.311005	195.4122
I1_tRMS_rc@GIRD [A]	0.229329	0.288011	0.058682	0.237713
P1_t_rc@GIRD [W]	18.67114	-0.740268	-19.41141	12.23372
Q1_t_rc@GIRD [var]	-40.67381	-56.29136	-15.61756	44.81057
S1_t_rc@GIRD [VA]	44.75455	56.29623	11.54168	46.45052
PF1_t@GIRD []	0.054326	0.116716	0.062390	0.119078
F_fund@GIRD [Hz]	49.89269	49.99822	0.105530	49.99992

Empty Load



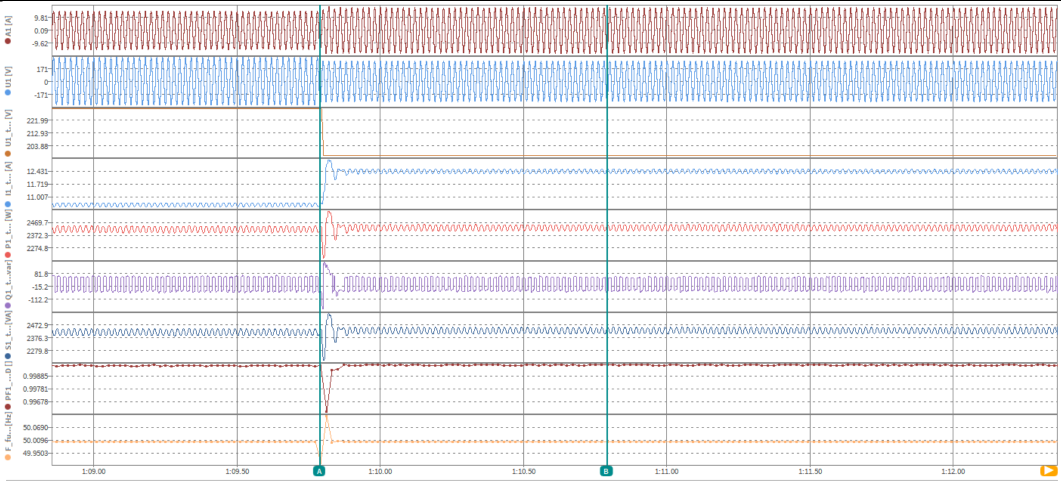
	A	B	间隔	有效值
时间 [s]	1:08.7870	1:09.7893	1.0023	
A1 [A]	2.218437	-8.347321	-10.56576	10.47914
U1 [V]	50.14062	-174.8831	-225.0238	229.9352
U1_tRMS_rc@GIRD [V]	230.1556	230.1618	6.149e-3	230.1645
I1_tRMS_rc@GIRD [A]	10.37025	10.38049	0.010240	10.48900
P1_t_rc@GIRD [W]	2386.205	2388.521	2.315186	2413.519
Q1_t_rc@GIRD [var]	51.99209	-56.63839	-108.6305	57.21400
S1_t_rc@GIRD [VA]	2386.771	2389.192	2.420410	2414.197
PF1_t@GIRD []	0.999698	0.999641	-5.668e-5	0.999687
F_fund@GIRD [Hz]	49.99987	49.99985	-1.907e-5	49.99999

Before dip (t1-100ms)



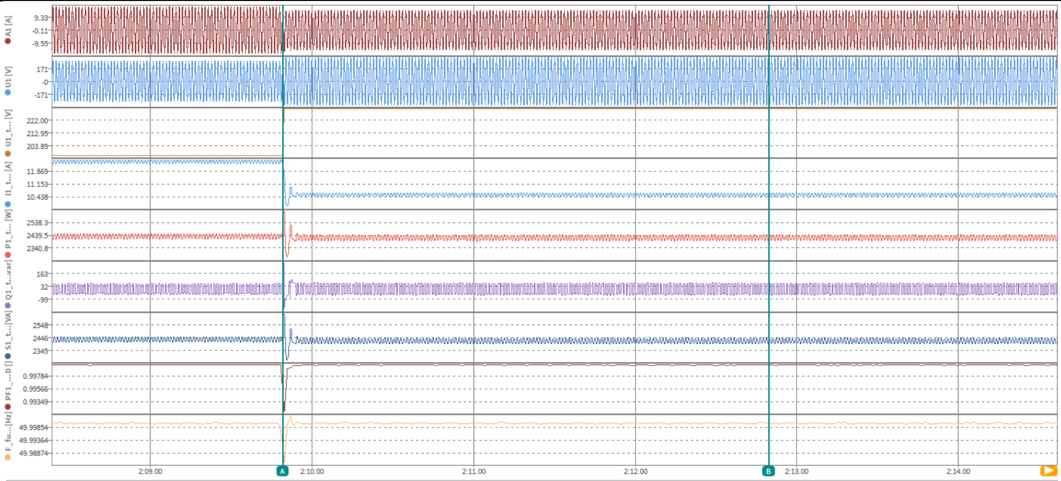
	A	B	间隔	有效值
时间 [s]	1:09.7899	1:10.3904	0.6005	
A1 [A]	-10.60467	-14.11972	-3.515053	12.36704
U1 [V]	-223.3822	-218.9078	4.474402	196.3132
U1_tRMS_rc@GIRD [V]	230.1648	195.7223	-34.44255	196.5713
I1_tRMS_rc@GIRD [A]	10.39585	12.28528	1.889422	12.35337
P1_t_rc@GIRD [W]	2391.981	2403.788	11.80713	2424.715
Q1_t_rc@GIRD [var]	-61.02538	-58.58912	2.436268	61.46932
S1_t_rc@GIRD [VA]	2392.760	2404.502	11.74268	2425.494
PF1_t@GIRD []	0.999641	0.999762	1.213e-4	0.999577
F_fund@GIRD [Hz]	49.99985	50.00017	3.204e-4	50.00054

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:09.7899	1:10.7919	1.0020	
A1 [A]	-10.60467	-17.51118	-6.906510	12.38629
U1 [V]	-223.3822	-272.0766	-48.69438	196.1731
U1_tRMS_rc@GIRD [V]	230.1648	195.7335	-34.43135	196.2310
I1_tRMS_rc@GIRD [A]	10.39585	12.38053	1.984679	12.37149
P1_t_rc@GIRD [W]	2391.981	2422.386	30.40527	2425.260
Q1_t_rc@GIRD [var]	-61.02538	-65.97083	-4.945442	58.23959
S1_t_rc@GIRD [VA]	2392.760	2423.285	30.52515	2425.959
PF1_t@GIRD []	0.999641	0.999779	1.382e-4	0.999638
F_fund@GIRD [Hz]	49.99985	50.00032	4.692e-4	50.00033

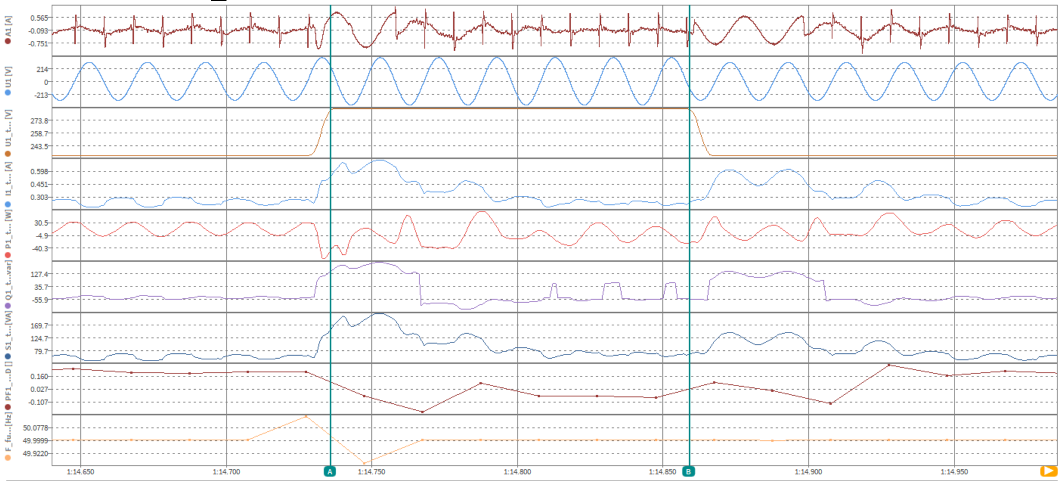
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	2:09.8255	2:12.8284	3.0029	
A1 [A]	10.34231	-4.385376	-14.72769	10.48800
U1 [V]	161.8991	-90.88326	-252.7824	230.0702
U1_tRMS_rc@GIRD [V]	195.7289	230.1699	34.44098	230.0885
I1_tRMS_rc@GIRD [A]	12.31313	10.38989	-1.923237	10.49693
P1_t_rc@GIRD [W]	2409.463	2390.938	-18.52515	2414.217
Q1_t_rc@GIRD [var]	52.50175	48.99228	-3.509464	58.06907
S1_t_rc@GIRD [VA]	2410.035	2391.439	-18.59546	2414.915
PF1_t@GIRD []	0.999719	0.999730	1.091e-5	0.999642
F_fund@GIRD [Hz]	49.99810	50.00006	1.961e-3	49.99990

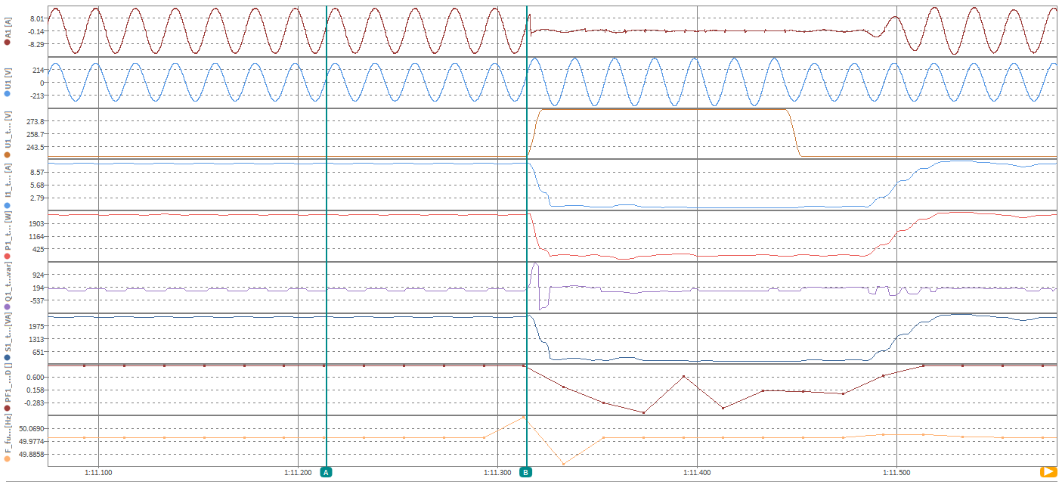
After dip(t2+3s)

Graph of Test number 5.1_1.25Un



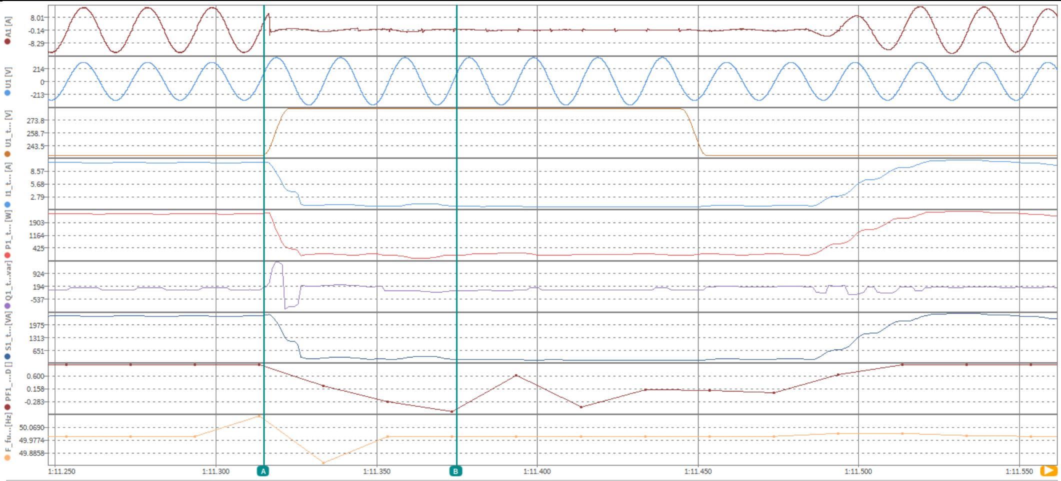
	A	B	间隔	有效值
时间 [s]	1:14.7358000	1:14.8590000	0.1232000	
A1 [A]	0.626850	-0.146770	-0.773621	0.384957
U1 [V]	257.0727	-102.2720	-359.3447	284.3667
U1_tRMS_rc@GIRD [V]	282.0824	287.3679	5.285492	287.3545
I1_tRMS_rc@GIRD [A]	0.503611	0.203975	-0.299636	0.398498
P1_t_rc@GIRD [W]	-60.74826	-28.66552	32.08275	28.41491
Q1_t_rc@GIRD [var]	128.4160	-51.12848	-179.5444	110.9264
S1_t_rc@GIRD [VA]	142.0599	58.61597	-83.44392	114.5080
PF1_t@GIRD []	0.206491	-0.072520	-0.279011	0.129095
F_fund@GIRD [Hz]	50.14833	50.00222	-0.146111	50.00049

Empty Load



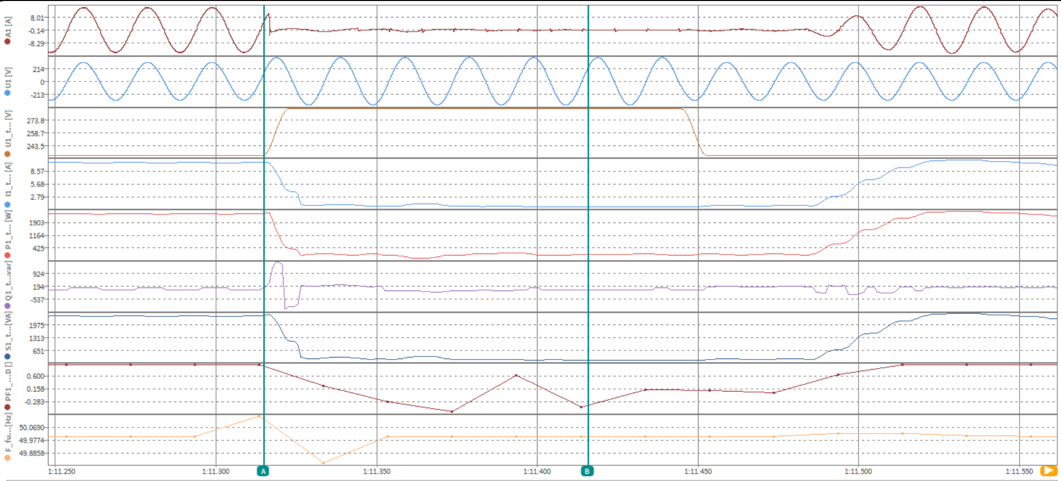
	A	B	间隔	有效值
时间 [s]	1:11.2146000	1:11.3146000	0.1000000	
A1 [A]	3.611183	3.686714	0.075531	10.48338
U1 [V]	69.72242	86.74455	17.02213	230.0956
U1_tRMS_rc@GIRD [V]	230.1934	230.1979	4.501e-3	230.1833
I1_tRMS_rc@GIRD [A]	10.59658	10.59527	-1.307e-3	10.48868
P1_t_rc@GIRD [W]	2438.523	2438.463	-0.060059	2413.633
Q1_t_rc@GIRD [var]	-60.08229	-51.63668	8.445610	57.52958
S1_t_rc@GIRD [VA]	2439.263	2439.010	-0.253418	2414.319
PF1_t@GIRD []	0.999688	0.999715	2.688e-5	0.999687
F_fund@GIRD [Hz]	50.00015	50.15189	0.151741	50.02534

Before dip (t1-100ms)



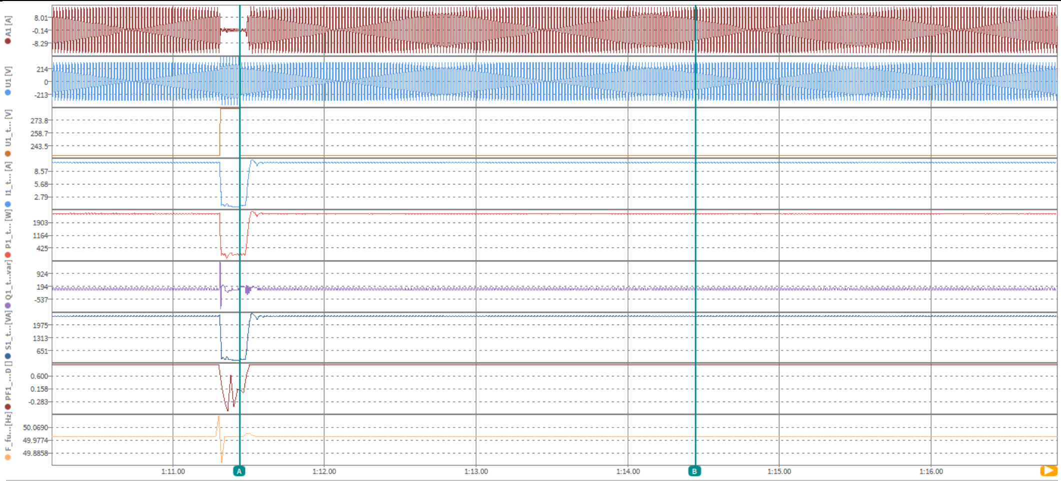
	A	B	间隔	有效值
时间 [s]	1:11.3149000	1:11.3749000	0.0600000	
A1 [A]	4.559326	0.389385	-4.169941	1.615349
U1 [V]	123.1098	120.7638	-2.346039	287.1037
U1_tRMS_rc@GIRD [V]	230.5302	287.2705	56.74034	283.3941
I1_tRMS_rc@GIRD [A]	10.59172	0.382979	-10.20874	3.324195
P1_t_rc@GIRD [W]	2440.819	-50.11898	-2490.938	670.4353
Q1_t_rc@GIRD [var]	66.03335	-97.93960	-163.9729	499.3588
S1_t_rc@GIRD [VA]	2441.712	110.0185	-2331.693	835.9682
PF1_t@GIRD []	0.999715	-0.683052	-1.682766	0.637206
F_fund@GIRD [Hz]	50.15189	50.00155	-0.150341	49.98917

During dip (t1+60ms)



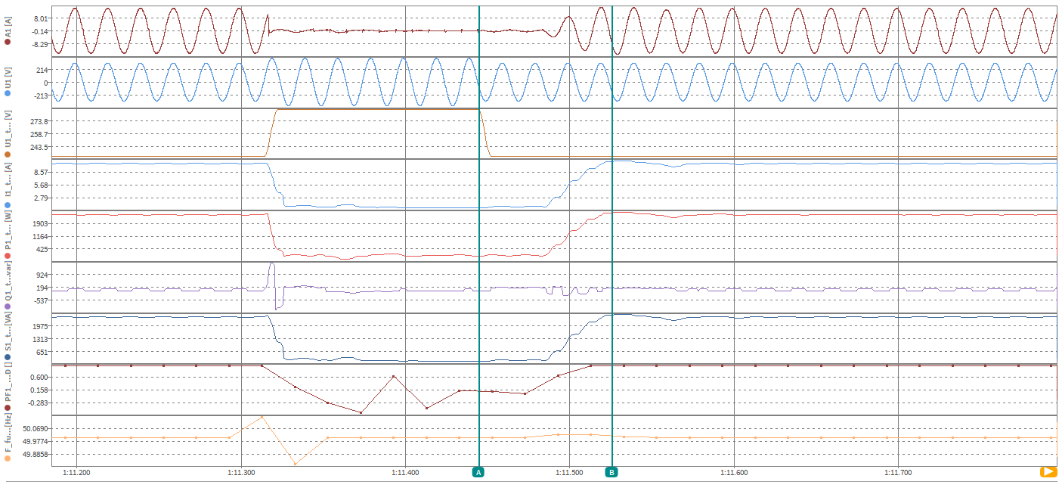
	A	B	间隔	有效值
时间 [s]	1:11.3149000	1:11.4158000	0.1009000	
A1 [A]	4.559326	-1.144e-3	-4.560471	1.262142
U1 [V]	123.1098	224.9270	101.8171	286.4203
U1_tRMS_rc@GIRD [V]	230.5302	287.3276	56.79741	284.9485
I1_tRMS_rc@GIRD [A]	10.59172	0.190894	-10.40083	2.592364
P1_t_rc@GIRD [W]	2440.819	-11.46141	-2452.280	522.0591
Q1_t_rc@GIRD [var]	66.03335	-53.63816	-119.6715	391.6115
S1_t_rc@GIRD [VA]	2441.712	54.84903	-2386.863	652.6142
PF1_t@GIRD []	0.999715	-0.500076	-1.499791	0.610831
F_fund@GIRD [Hz]	50.15189	49.99962	-0.152271	49.99269

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:11.4448000	1:14.4470000	3.0022000	
A1 [A]	-0.282669	-12.27980	-11.99713	10.39129
U1 [V]	-86.73287	-267.8170	-181.0842	230.1581
U1_tRMS_rc@GIRD [V]	287.3353	230.1753	-57.15999	230.3038
I1_tRMS_rc@GIRD [A]	0.235267	10.44233	10.20706	10.38255
P1_t_rc@GIRD [W]	-40.39471	2402.675	2443.070	2389.165
Q1_t_rc@GIRD [var]	-54.20415	-65.46178	-11.25764	61.04684
S1_t_rc@GIRD [VA]	67.60046	2403.567	2335.966	2389.945
PF1_t@GIRD []	0.112903	0.999689	0.886786	0.987679
F_fund@GIRD [Hz]	50.00236	49.99995	-2.411e-3	50.00032

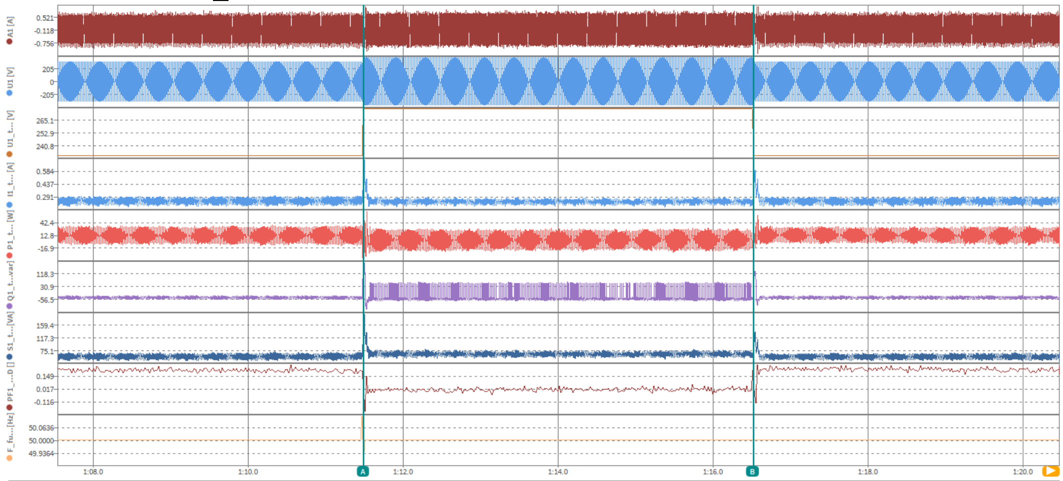
After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:11.4448000	1:11.5259000	0.0811000	
A1 [A]	-0.282669	-9.021950	-8.739281	5.695470
U1 [V]	-86.73287	-189.6837	-102.9508	228.9959
U1_tRMS_rc@GIRD [V]	287.3353	230.2798	-57.05553	234.3327
I1_tRMS_rc@GIRD [A]	0.235267	10.92772	10.69245	5.211644
P1_t_rc@GIRD [W]	-40.39471	2514.532	2554.927	1190.152
Q1_t_rc@GIRD [var]	-54.20415	97.77053	151.9747	152.9864
S1_t_rc@GIRD [VA]	67.60046	2516.433	2448.832	1199.944
PF1_t@GIRD []	0.112903	0.982821	0.869918	0.526992
F_fund@GIRD [Hz]	50.00236	50.02246	0.020100	50.00893

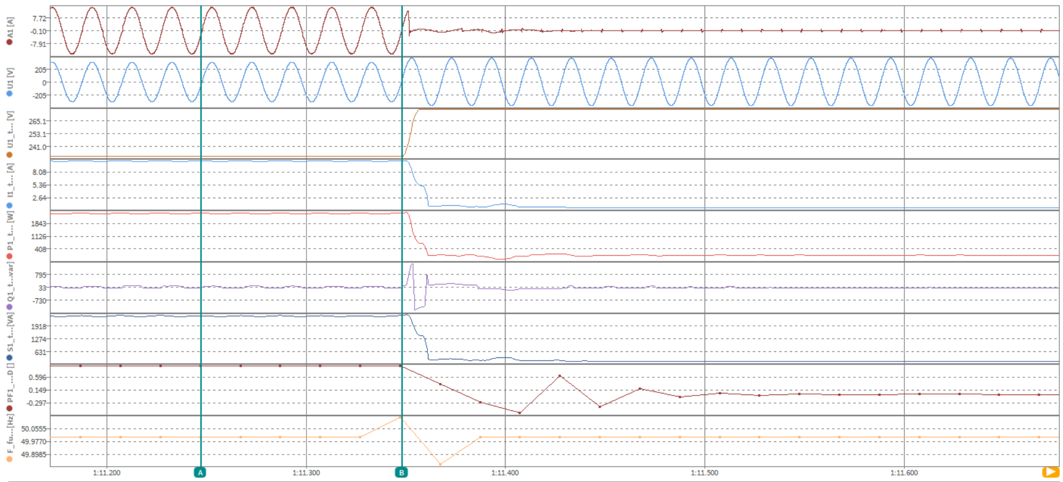
Recovery time

Graph of Test number 6.1_1.20Un



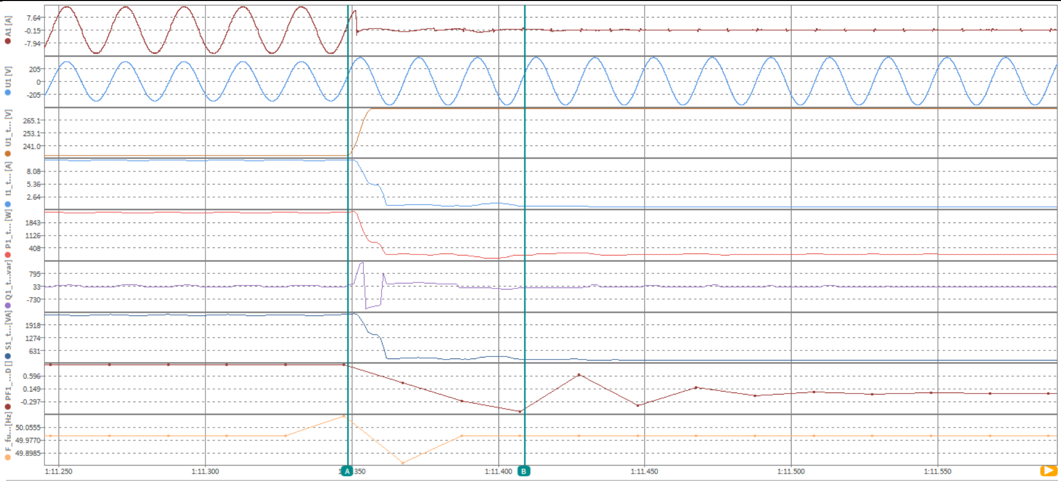
	A	B	间隔	有效值
时间 [s]	1:11.493600	1:16.514700	5.021100	
A1 [A]	0.611115	-0.154781	-0.765896	0.228822
U1 [V]	228.3683	107.6012	-120.7671	275.8768
U1_tRMS_rc@GIRD [V]	272.8153	275.8922	3.076874	275.8961
I1_tRMS_rc@GIRD [A]	0.387868	0.195073	-0.192796	0.229239
P1_t_rc@GIRD [W]	-26.68609	-18.02419	8.661903	17.36984
Q1_t_rc@GIRD [var]	102.3961	-50.71110	-153.1072	60.81426
S1_t_rc@GIRD [VA]	105.8164	53.81902	-51.99737	63.24623
PF1_t@GIRD []	0.203689	-5.456e-3	-0.209145	0.027957
F_fund@GIRD [Hz]	50.12123	50.00171	-0.119522	50.00001

Empty Load



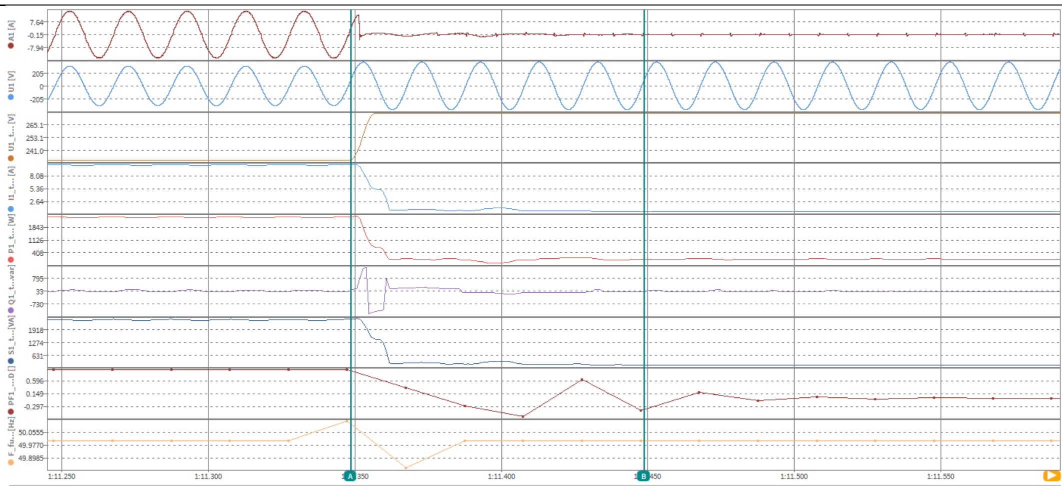
	A	B	间隔	有效值
时间 [s]	1:11.247300	1:11.348200	0.100900	
A1 [A]	-2.991486	0.272083	3.263569	10.38330
U1 [V]	-64.40187	32.88460	97.28647	229.0506
U1_tRMS_rc@GIRD [V]	230.1740	230.1774	3.464e-3	230.1666
I1_tRMS_rc@GIRD [A]	10.53112	10.53883	7.710e-3	10.43544
P1_t_rc@GIRD [W]	2423.335	2425.037	1.701416	2401.240
Q1_t_rc@GIRD [var]	-56.29781	-60.86959	-4.571777	55.88553
S1_t_rc@GIRD [VA]	2423.989	2425.801	1.811523	2401.890
PF1_t@GIRD []	0.999635	0.999702	6.729e-5	0.999689
F_fund@GIRD [Hz]	49.99982	50.12649	0.126671	50.01810

Before dip (t1-100ms)



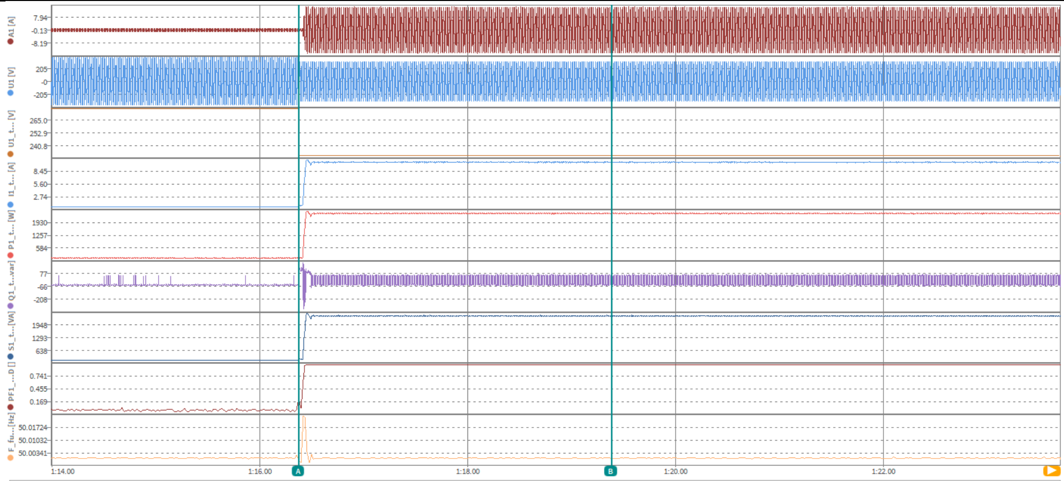
	A	B	间隔	有效值
时间 [s]	1:11.348700	1:11.409000	0.060300	
A1 [A]	3.994274	0.331879	-3.662396	2.149946
U1 [V]	93.08172	125.7277	32.64594	275.0020
U1_tRMS_rc@GIRD [V]	230.1774	275.7584	45.58099	272.0245
I1_tRMS_rc@GIRD [A]	10.53883	0.420008	-10.11882	3.791675
P1_t_rc@GIRD [W]	2425.037	-53.24244	-2478.279	790.0394
Q1_t_rc@GIRD [var]	-60.86959	-102.8577	-41.98809	511.2476
S1_t_rc@GIRD [VA]	2425.801	115.8208	-2309.980	941.0294
PF1_t@GIRD []	0.999702	-0.701234	-1.700935	0.655247
F_fund@GIRD [Hz]	50.12649	50.00192	-0.124573	49.98893

During dip (t1+60ms)



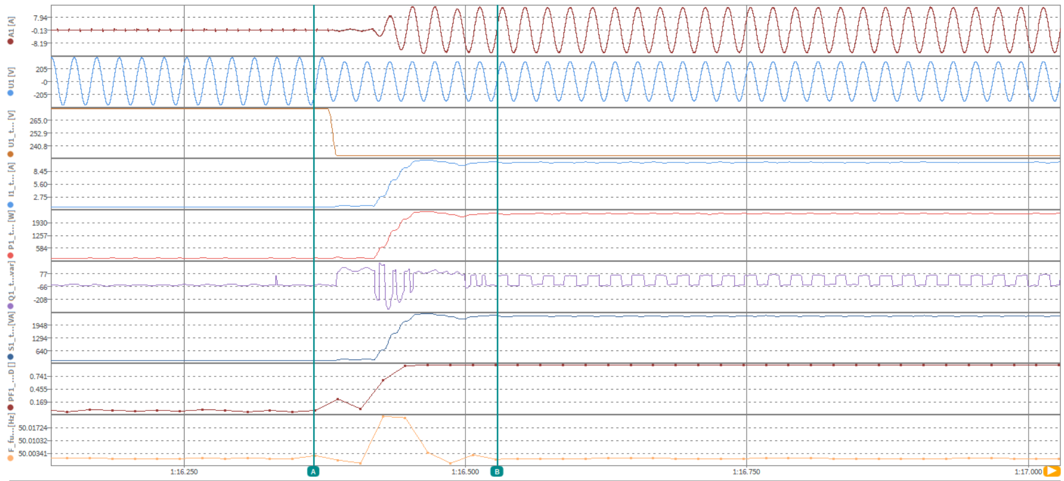
	A	B	间隔	有效值
时间 [s]	1:11.348700	1:11.448700	0.100000	
A1 [A]	3.994274	0.394535	-3.599739	1.682717
U1 [V]	93.08172	90.77907	-2.302647	275.6631
U1_tRMS_rc@GIRD [V]	230.1774	275.8401	45.66263	273.5244
I1_tRMS_rc@GIRD [A]	10.53883	0.214232	-10.32460	2.955218
P1_t_rc@GIRD [W]	2425.037	-7.118073	-2432.155	614.9110
Q1_t_rc@GIRD [var]	-60.86959	-58.66364	2.205952	400.6728
S1_t_rc@GIRD [VA]	2425.801	59.09390	-2366.707	733.9307
PF1_t@GIRD []	0.999702	-0.461824	-1.461526	0.623529
F_fund@GIRD [Hz]	50.12649	49.99981	-0.126682	49.99257

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:16.374500	1:19.380900	3.006400	
A1 [A]	-0.071526	-12.03232	-11.96079	10.32691
U1 [V]	344.8339	-261.0424	-605.8762	230.0952
U1_tRMS_rc@GIRD [V]	275.8921	230.1528	-45.73927	230.3224
I1_tRMS_rc@GIRD [A]	0.194683	10.35944	10.16476	10.31915
P1_t_rc@GIRD [W]	-9.112444	2383.597	2392.709	2374.356
Q1_t_rc@GIRD [var]	-52.93275	-56.04541	-3.112652	61.06562
S1_t_rc@GIRD [VA]	53.71139	2384.255	2330.544	2375.141
PF1_t@GIRD []	-0.044209	0.999715	1.043924	0.987802
F_fund@GIRD [Hz]	50.00169	50.00028	-1.411e-3	50.00030

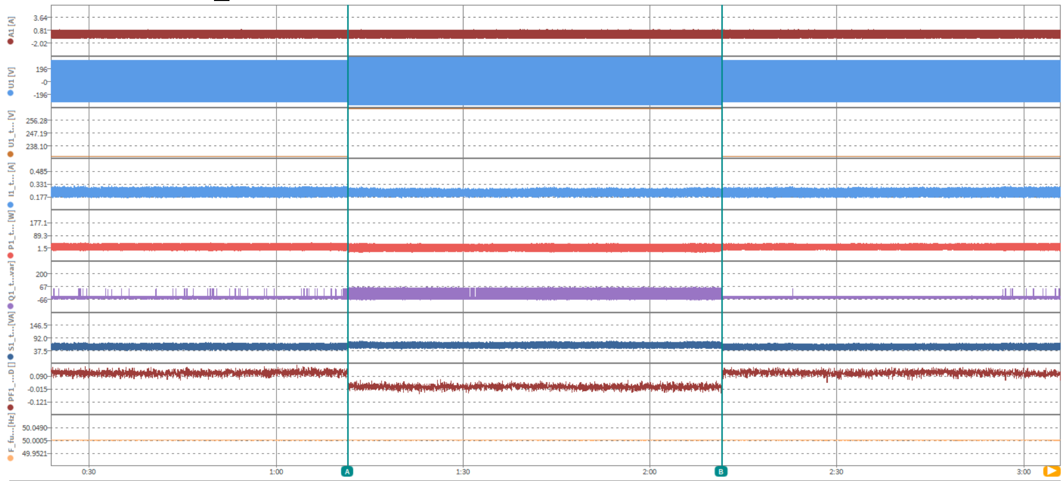
After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:16.365719	1:16.528600	0.162881	
A1 [A]	-0.038338	3.551674	3.590012	7.891688
U1 [V]	-253.3960	68.11881	321.5149	231.8690
U1_tRMS_rc@GIRD [V]	275.9016	230.2329	-45.66869	235.7433
I1_tRMS_rc@GIRD [A]	0.225651	10.53754	10.31189	7.677185
P1_t_rc@GIRD [W]	8.494518	2425.303	2416.808	1763.778
Q1_t_rc@GIRD [var]	-61.67513	-61.76747	-0.092342	119.9651
S1_t_rc@GIRD [VA]	62.25735	2426.089	2363.832	1767.853
PF1_t@GIRD []	-0.077899	0.999704	1.077603	0.736711
F_fund@GIRD [Hz]	49.99998	49.99922	-7.591e-4	50.00452

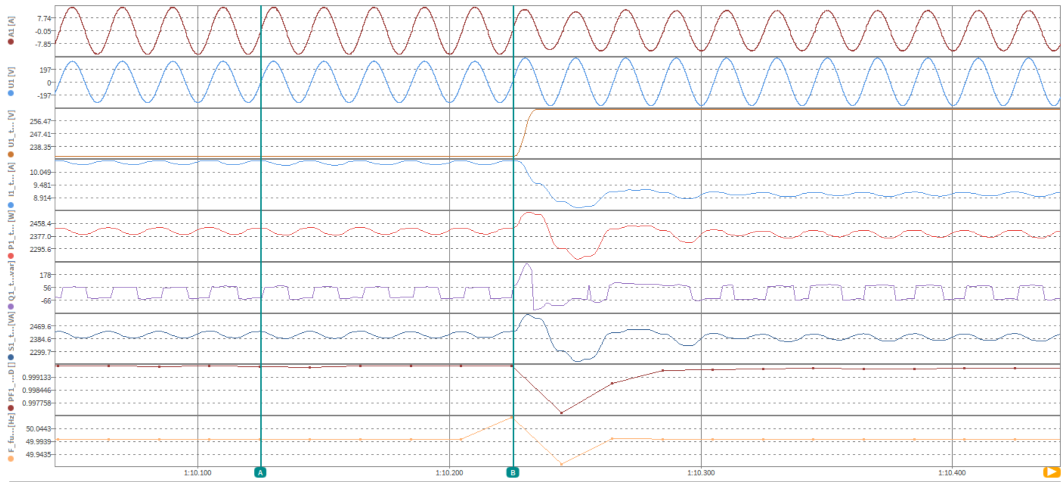
Recovery time

Graph of Test number 7.1_1.15Un



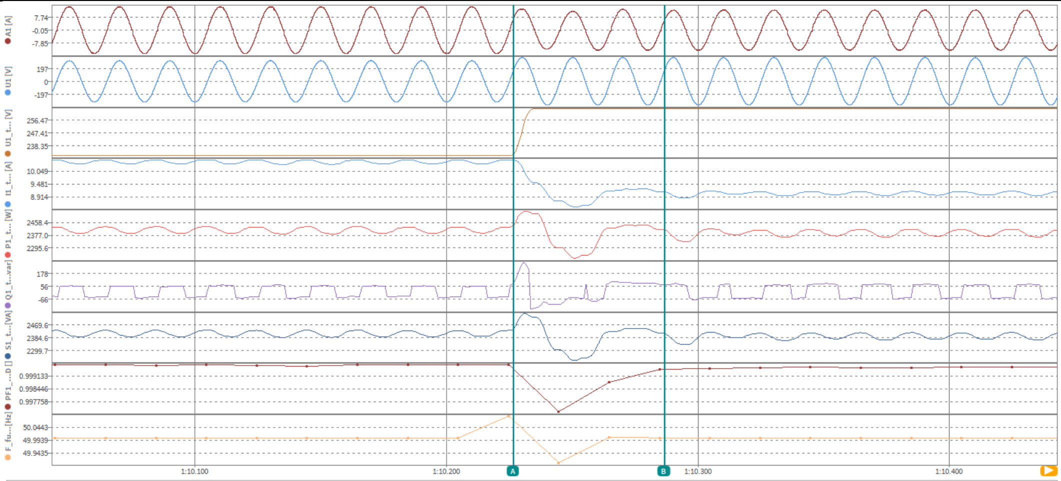
	A	B	间隔	有效值
时间 [s]	1:11.51540	2:11.51630	1:00.00090	
A1 [A]	-0.491238	-0.216293	0.274944	0.228889
U1 [V]	-83.21620	-186.1715	-102.9553	264.4241
U1_tRMS_rc@GIRD [V]	264.4782	264.4186	-0.059631	264.4257
I1_tRMS_rc@GIRD [A]	0.310998	0.231953	-0.079045	0.228897
P1_t_rc@GIRD [W]	-53.06784	-17.01218	36.05567	17.73256
Q1_t_rc@GIRD [var]	-62.84288	-58.92597	3.916916	57.87024
S1_t_rc@GIRD [VA]	82.25220	61.33257	-20.91963	60.52610
PF1_t@GIRD []	0.142110	-3.287e-3	-0.145397	0.018119
F_fund@GIRD [Hz]	50.09276	49.99984	-0.092918	50.00003

Empty Load



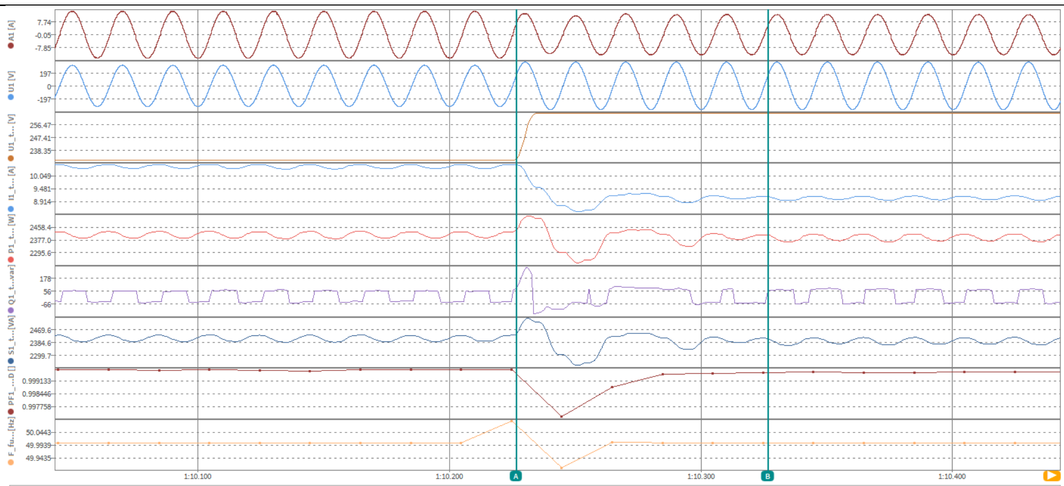
	A	B	间隔	有效值
时间 [s]	1:10.1252000	1:10.2255000	0.1003000	
A1 [A]	-0.688648	-0.052357	0.636292	10.43564
U1 [V]	-7.143736	26.56245	33.70619	229.7192
U1_tRMS_rc@GIRD [V]	230.1738	230.1885	0.014648	230.1755
I1_tRMS_rc@GIRD [A]	10.55071	10.55301	2.291e-3	10.45719
P1_t_rc@GIRD [W]	2427.905	2428.551	0.645996	2406.370
Q1_t_rc@GIRD [var]	-53.71029	-55.31857	-1.608288	54.58311
S1_t_rc@GIRD [VA]	2428.499	2429.180	0.681885	2406.989
PF1_t@GIRD []	0.999698	0.999732	3.392e-5	0.999715
F_fund@GIRD [Hz]	50.00030	50.08995	0.089649	50.01509

Before dip (t1-100ms)



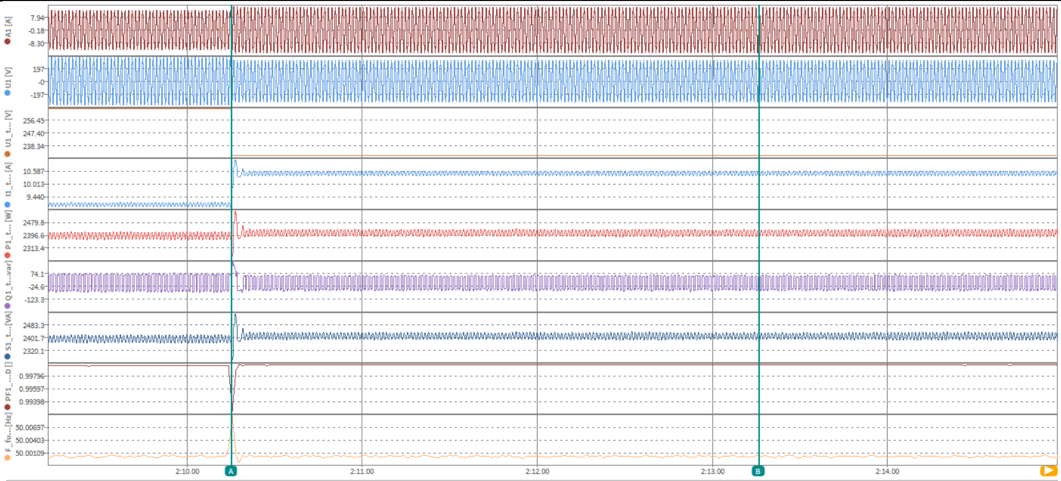
	A	B	间隔	有效值
时间 [s]	1:10.2267000	1:10.2867000	0.0600000	
A1 [A]	6.533146	5.453110	-1.080036	9.022334
U1 [V]	162.4007	162.3018	-0.098944	264.4955
U1_tRMS_rc@GIRD [V]	230.2325	264.6389	34.40639	262.0178
I1_tRMS_rc@GIRD [A]	10.55155	9.115611	-1.435940	9.157724
P1_t_rc@GIRD [W]	2428.428	2411.472	-16.95630	2389.579
Q1_t_rc@GIRD [var]	65.44016	64.89140	-0.548752	115.7317
S1_t_rc@GIRD [VA]	2429.310	2412.345	-16.96484	2392.380
PF1_t@GIRD []	0.999732	0.999482	-2.504e-4	0.998782
F_fund@GIRD [Hz]	50.08995	49.99917	-0.090782	49.99747

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:10.2267000	1:10.3267000	0.1000000	
A1 [A]	6.533146	5.520630	-1.012516	9.017146
U1 [V]	162.4007	162.2555	-0.145197	264.5546
U1_tRMS_rc@GIRD [V]	230.2325	264.6556	34.42311	263.0599
I1_tRMS_rc@GIRD [A]	10.55155	9.102868	-1.448683	9.099704
P1_t_rc@GIRD [W]	2428.428	2408.211	-20.21753	2387.215
Q1_t_rc@GIRD [var]	65.44016	-66.36272	-131.8029	99.39482
S1_t_rc@GIRD [VA]	2429.310	2409.125	-20.18506	2389.283
PF1_t@GIRD []	0.999732	0.999586	-1.465e-4	0.999038
F_fund@GIRD [Hz]	50.08995	49.99980	-0.090149	49.99842

During dip (t1+100ms)



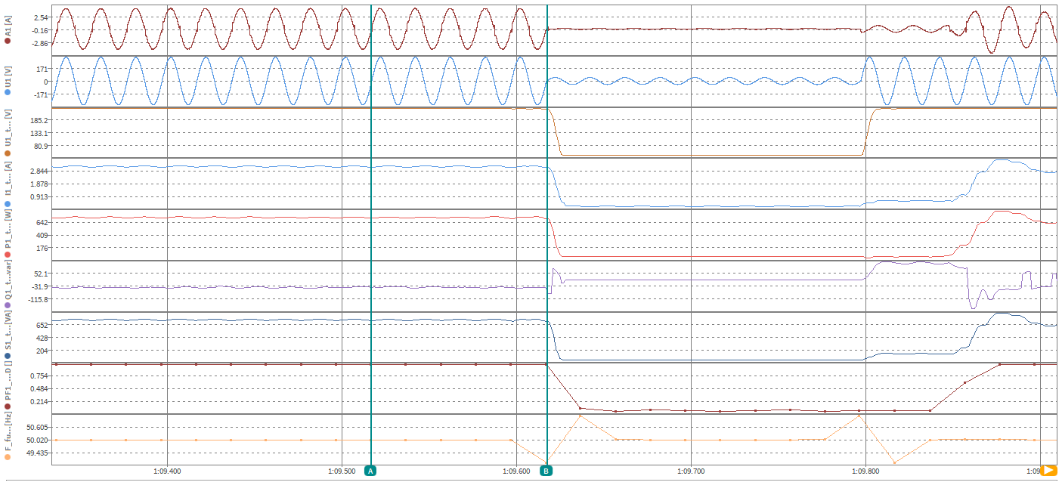
	A	B	间隔	有效值
时间 [s]	2:10.2559000	2:13.2657000	3.0098000	
A1 [A]	-3.171158	2.352619	5.523777	10.46349
U1 [V]	-65.74154	45.86220	111.6037	230.1792
U1_tRMS_rc@GIRD [V]	264.5783	230.1900	-34.38828	230.2362
I1_tRMS_rc@GIRD [A]	8.942683	10.55016	1.607472	10.46092
P1_t_rc@GIRD [W]	2365.232	2427.819	62.58618	2407.660
Q1_t_rc@GIRD [var]	-61.79931	-59.20743	2.591877	56.51416
S1_t_rc@GIRD [VA]	2366.040	2428.541	62.50098	2408.324
PF1_t@GIRD []	0.999576	0.999719	1.423e-4	0.999659
F_fund@GIRD [Hz]	50.00146	50.00033	-1.129e-3	50.00008

After dip(t2+3s)

Verification of dynamic network support								P
Short-circuited power at generator terminal [VA]		6K						
NS protection settings		See table 5.5 for detail.						
	No.	Parameter	Phase ref.	Time ref.	unit	Result		
General Info.	0	Test number	--	--	--	1.2	2.2	3.2
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025		
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph		
	3	Fault type (phase)	--	--		A	A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.15	0.5	0.5
	5	Setting dip duration		--	ms	150	1500	1500
	6	Point of fault entry	Total	--	ms	20ms		
	7	Point of fault clearance	Total	--	ms	20ms		
	8	Fault duration in empty load test	Total	--	ms	171.9	1521.5	1521.5
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.15	0.5	0.5
	10		Positive sequence		p.u.	--	--	--
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--
	13	Active power	Total	t1-10s to t1	p.u.	0.299	0.303	0.305
	14		Positive sequence			--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.019	0.329	-0.331
	16		Positive sequence			--	--	--
	17	Cosφ	--	t1-10s to t1	--	0.9977	0.6742	0.6747
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.15	0.50	0.50
	19	Line current	Phase 1	t1+60ms	p.u.	0.009	0.025	0.026

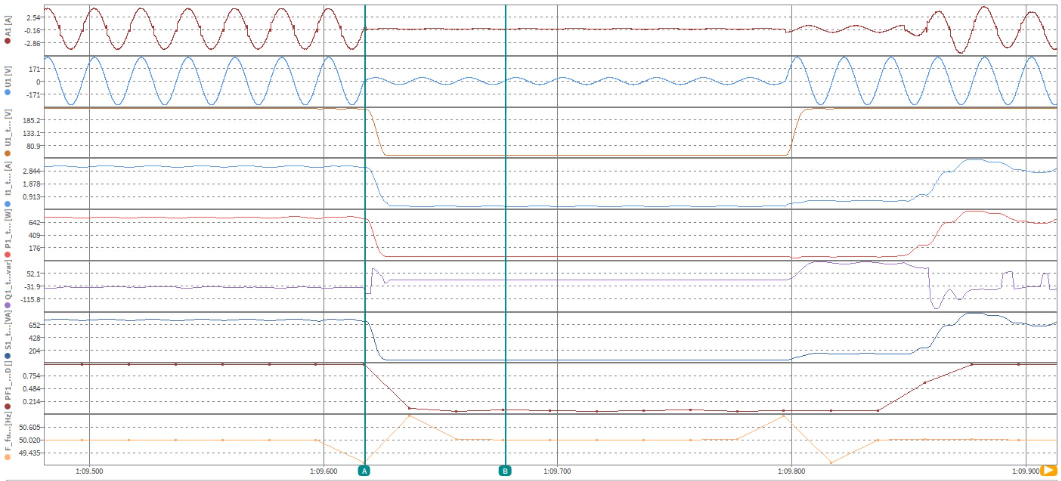
	20		Phase 2			--	--	--
	21		Phase 3			--	--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.008	0.025	0.026
	23		Phase 2			--	--	--
	24		Phase 3			--	--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.001	0.001	0.002
	26		Positive sequence			--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--
	29		Total			0.501	0.306	0.302
	39	Active power rising time	Positive sequence	--	s	0.139	0.148	0.148
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--
	32		Total			-0.008	0.317	-0.316
	33	Reactive power rising time	Positive sequence	--	s	0.139	9.894	9.879
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes		

Graph of Test number 1.2_0.15Un



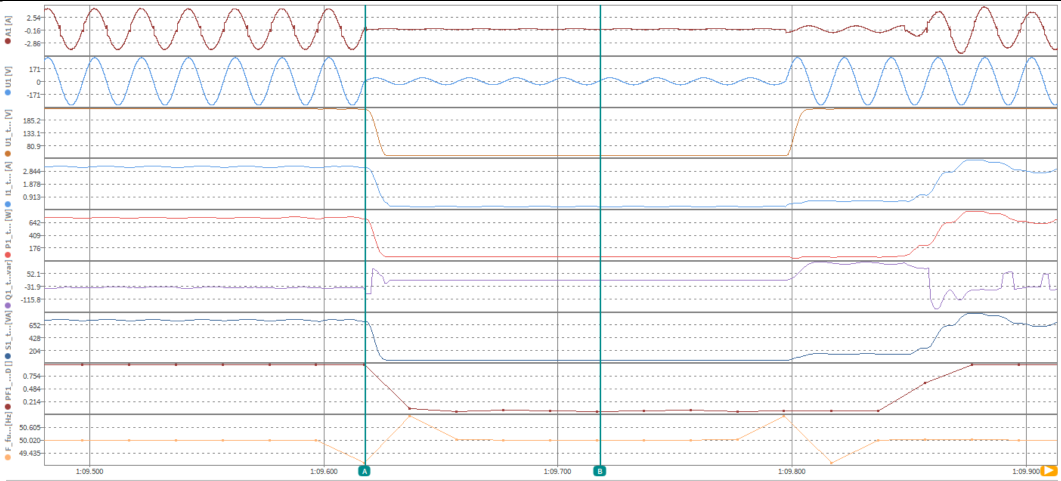
	A	B	间隔	有效值
时间 [s]	1:09.51680	1:09.61750	0.10070	
A1 [A]	-0.796551	0.070816	0.867367	3.156095
U1 [V]	-66.22076	0.540018	66.76078	229.1088
U1_tRMS_rc@GIRD [V]	229.9309	227.6714	-2.259445	229.9960
I1_tRMS_rc@GIRD [A]	3.123256	3.088113	-0.035143	3.167775
P1_t_rc@GIRD [W]	716.7480	701.4259	-15.32208	727.1432
Q1_t_rc@GIRD [var]	-44.57801	-48.12788	-3.549873	45.92531
S1_t_rc@GIRD [VA]	718.1329	703.0751	-15.05786	728.5920
PF1_t@GIRD []	0.997753	0.997826	7.325e-5	0.997934
F_fund@GIRD [Hz]	49.99986	49.99939	-4.692e-4	49.99980

Before dip (t1-100ms)



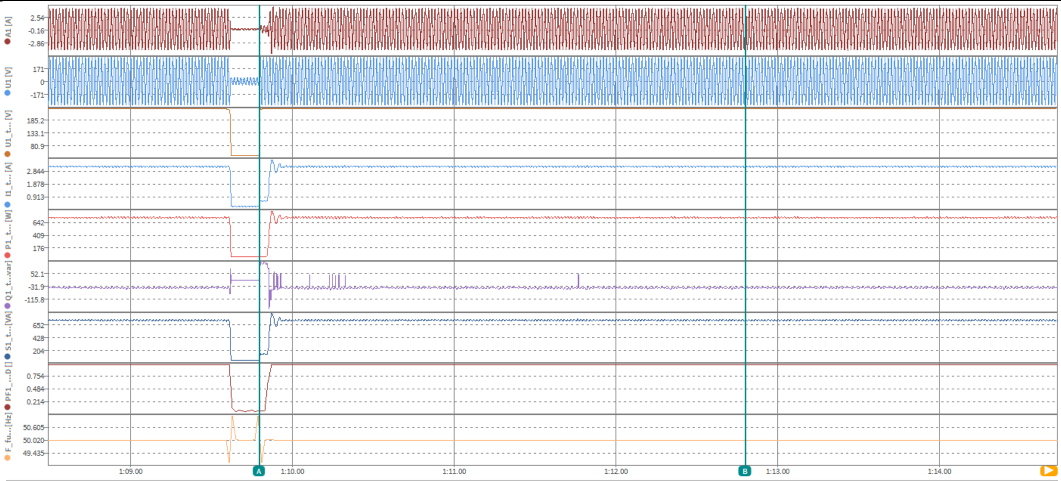
	A	B	间隔	有效值
时间 [s]	1:09.61760	1:09.67780	0.06020	
A1 [A]	0.263935	-0.104660	-0.368595	0.175903
U1 [V]	1.721859	4.956961	3.235102	34.23058
U1_tRMS_rc@GIRD [V]	227.6714	34.37354	-193.2979	75.59697
I1_tRMS_rc@GIRD [A]	3.088113	0.090245	-2.997869	0.929989
P1_t_rc@GIRD [W]	701.4259	-1.345147	-702.7710	189.4790
Q1_t_rc@GIRD [var]	-48.12788	2.795197	50.92308	26.98662
S1_t_rc@GIRD [VA]	703.0751	3.102023	-699.9731	191.3911
PF1_t@GIRD []	0.997826	0.016774	-0.981052	0.631302
F_fund@GIRD [Hz]	49.99939	49.99908	-3.090e-4	50.01447

During dip (t1+60ms)



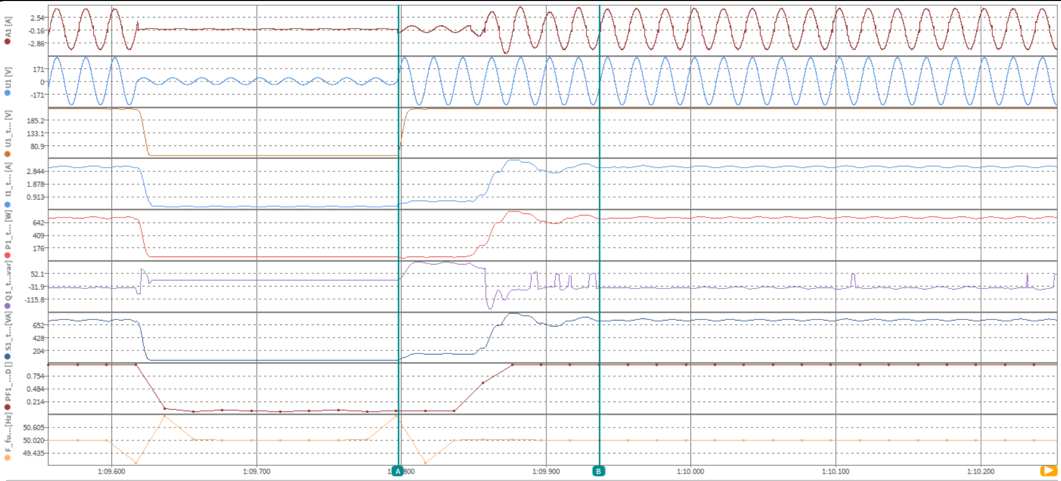
	A	B	间隔	有效值
时间 [s]	1:09.61760	1:09.71810	0.10050	
A1 [A]	0.263935	-0.065560	-0.329494	0.147311
U1 [V]	1.721859	9.829522	8.107663	34.26849
U1_tRMS_rc@GIRD [V]	227.6714	34.38002	-193.2914	62.62159
I1_tRMS_rc@GIRD [A]	3.088113	0.088440	-2.999674	0.724905
P1_t_rc@GIRD [W]	701.4259	-1.540975	-702.9669	147.2546
Q1_t_rc@GIRD [var]	-48.12788	2.621137	50.74902	21.05253
S1_t_rc@GIRD [VA]	703.0751	3.040553	-700.0345	148.7519
PF1_t@GIRD []	0.997826	-0.029941	-1.027768	0.533674
F_fund@GIRD [Hz]	49.99939	50.00047	1.080e-3	50.01043

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:09.79790	1:12.80030	3.00240	
A1 [A]	-0.676388	3.736740	4.413128	3.142146
U1 [V]	45.30335	253.3345	208.0312	229.9529
U1_tRMS_rc@GIRD [V]	34.39143	229.9419	195.5505	229.7869
I1_tRMS_rc@GIRD [A]	0.091573	3.121541	3.029967	3.139803
P1_t_rc@GIRD [W]	-1.419884	716.0955	717.5153	720.4050
Q1_t_rc@GIRD [var]	2.811096	-49.04510	-51.85620	50.09296
S1_t_rc@GIRD [VA]	3.149339	717.7730	714.6237	722.1445
PF1_t@GIRD []	-2.468e-4	0.997906	0.998152	0.985618
F_fund@GIRD [Hz]	51.13268	50.00006	-1.132618	50.00037

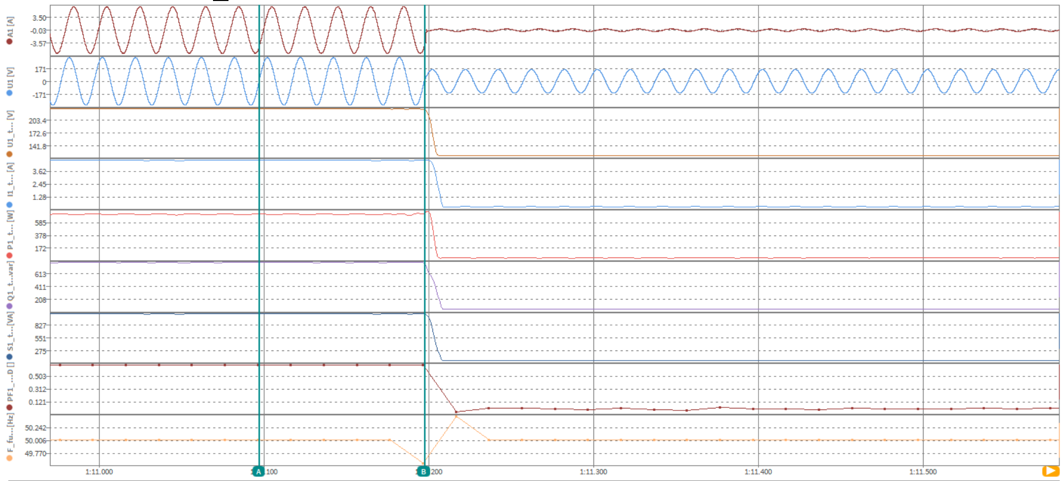
After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:09.79790	1:09.93680	0.13890	
A1 [A]	-0.676388	-0.731224	-0.054836	2.436895
U1 [V]	45.30335	-66.31685	-111.6202	230.7903
U1_tRMS_rc@GIRD [V]	34.39143	229.9162	195.5248	225.4315
I1_tRMS_rc@GIRD [A]	0.091573	3.093654	3.002081	2.352102
P1_t_rc@GIRD [W]	-1.419884	709.6100	711.0299	533.1626
Q1_t_rc@GIRD [var]	2.811096	-48.73172	-51.54282	90.49214
S1_t_rc@GIRD [VA]	3.149339	711.2813	708.1320	540.7876
PF1_t@GIRD []	-2.468e-4	0.995712	0.995959	0.687915
F_fund@GIRD [Hz]	51.13268	50.00130	-1.131378	50.00996

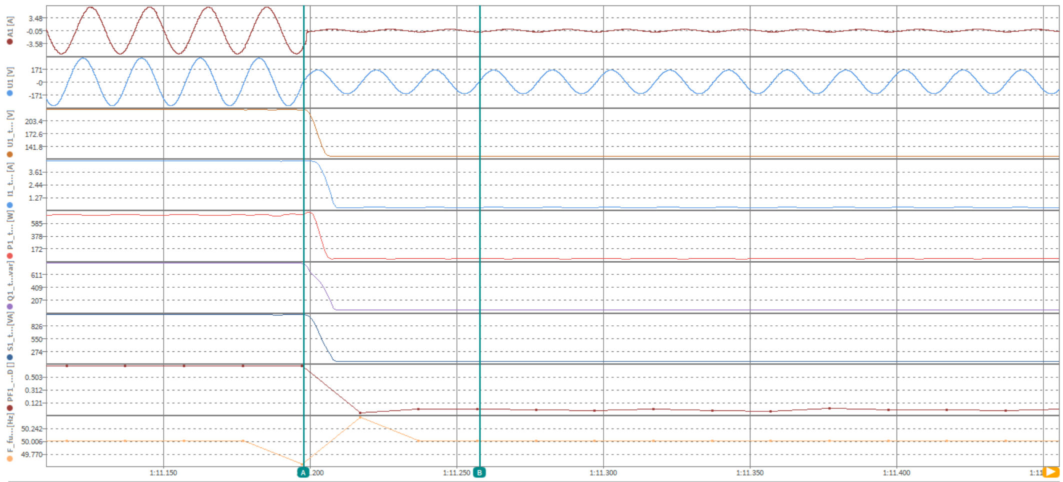
Recovery time

Graph of Test number 2.2_0.5Un



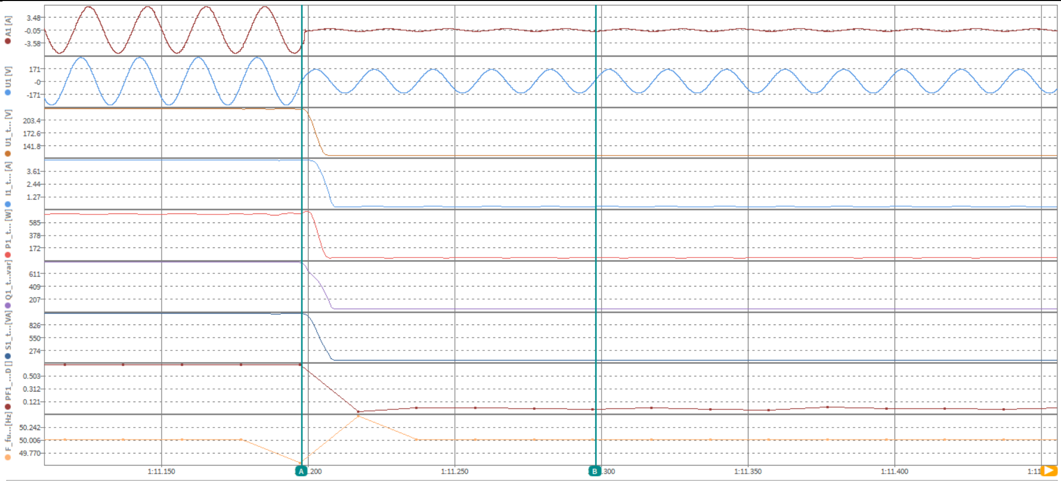
	A	B	间隔	有效值
时间 [s]	1:11.097400	1:11.197400	0.100000	
A1 [A]	-4.828577	-4.732733	0.095844	4.643835
U1 [V]	-5.452188	-5.864652	-0.412464	229.9832
U1_tRMS_rc@GIRD [V]	230.0898	228.9627	-1.127182	230.0980
I1_tRMS_rc@GIRD [A]	4.660346	4.661631	1.285e-3	4.644123
P1_t_rc@GIRD [W]	726.4258	720.1713	-6.254517	720.9744
Q1_t_rc@GIRD [var]	788.7517	787.7606	-0.991089	788.7378
S1_t_rc@GIRD [VA]	1072.298	1067.339	-4.958984	1068.603
PF1_t@GIRD []	0.674201	0.673809	-3.923e-4	0.674558
F_fund@GIRD [Hz]	49.99981	49.99985	4.196e-5	49.99989

Before dip (t1-100ms)



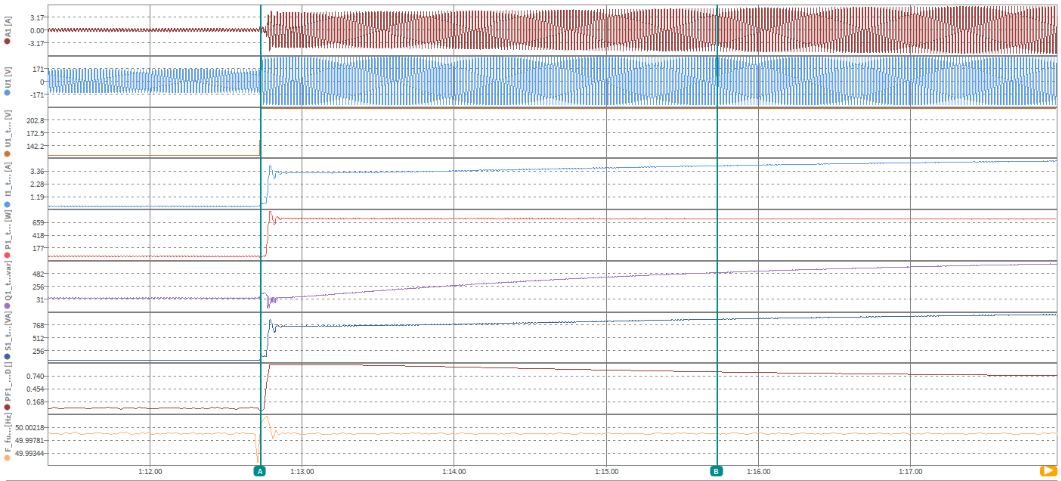
	A	B	间隔	有效值
时间 [s]	1:11.197900	1:11.257900	0.060000	
A1 [A]	-3.985529	-0.382070	3.603459	0.498689
U1 [V]	22.42419	22.69480	0.270605	114.6009
U1_tRMS_rc@GIRD [V]	228.9627	114.7568	-114.2059	129.7032
I1_tRMS_rc@GIRD [A]	4.661631	0.260847	-4.400783	1.714247
P1_t_rc@GIRD [W]	720.1713	4.810923	-715.3603	236.9357
Q1_t_rc@GIRD [var]	787.7606	29.54487	-758.2157	242.1562
S1_t_rc@GIRD [VA]	1067.339	29.93400	-1037.405	338.7893
PF1_t@GIRD []	0.671715	9.790e-3	-0.661925	0.336976
F_fund@GIRD [Hz]	49.55655	49.99978	0.443230	50.00404

During dip (t1+60ms)



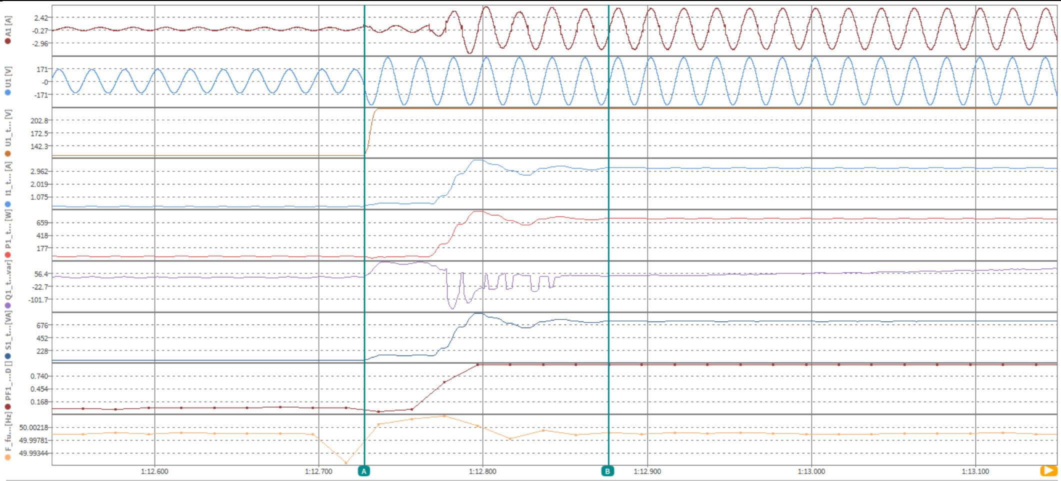
	A	B	间隔	有效值
时间 [s]	1:11.197900	1:11.298000	0.100100	
A1 [A]	-3.985529	-0.402097	3.583431	0.420074
U1 [V]	22.42419	27.52253	5.098343	114.6263
U1_tRMS_rc@GIRD [V]	228.9627	114.8157	-114.1470	124.0126
I1_tRMS_rc@GIRD [A]	4.661631	0.261784	-4.399847	1.342289
P1_t_rc@GIRD [W]	720.1713	4.340682	-715.8306	184.1455
Q1_t_rc@GIRD [var]	787.7606	29.74183	-758.0188	189.1206
S1_t_rc@GIRD [VA]	1067.339	30.05692	-1037.282	263.9624
PF1_t@GIRD []	0.671715	-6.894e-3	-0.678609	0.275156
F_fund@GIRD [Hz]	49.55655	49.99991	0.443359	50.00265

During dip (t1+100ms)



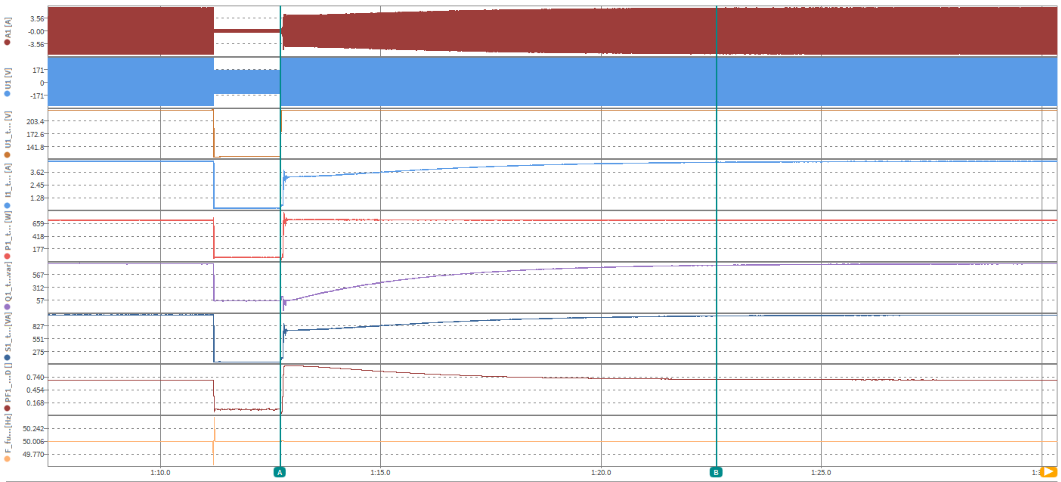
	A	B	间隔	有效值
时间 [s]	1:12.7281000	1:15.7282000	3.0001000	
A1 [A]	0.637884	1.815672	1.177788	3.416016
U1 [V]	-65.23327	-74.41453	-9.181262	230.0915
U1_tRMS_rc@GIRD [V]	114.9469	230.1062	115.1593	229.9341
I1_tRMS_rc@GIRD [A]	0.260821	3.777800	3.516978	3.411031
P1_t_rc@GIRD [W]	-2.630988	718.8871	721.5181	720.5260
Q1_t_rc@GIRD [var]	29.86494	488.7487	458.8838	311.2365
S1_t_rc@GIRD [VA]	29.98061	869.2951	839.3145	784.8732
PF1_t@GIRD []	-4.621e-4	0.829223	0.829686	0.913482
F_fund@GIRD [Hz]	49.98948	49.99998	0.010502	49.99993

After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:12.7281000	1:12.8764000	0.1483000	
A1 [A]	0.637884	-1.724367	-2.362251	2.635592
U1 [V]	-65.23327	-105.9595	-40.72619	231.2294
U1_tRMS_rc@GIRD [V]	114.9469	230.0884	115.1416	226.7471
I1_tRMS_rc@GIRD [A]	0.260821	3.200684	2.939863	2.547458
P1_t_rc@GIRD [W]	-2.630988	735.5548	738.1858	580.4335
Q1_t_rc@GIRD [var]	29.86494	36.10476	6.239822	80.51233
S1_t_rc@GIRD [VA]	29.98061	736.4404	706.4598	585.9908
PF1_t@GIRD []	-4.621e-4	0.998641	0.999103	0.733458
F_fund@GIRD [Hz]	49.98948	49.99940	9.922e-3	50.00059

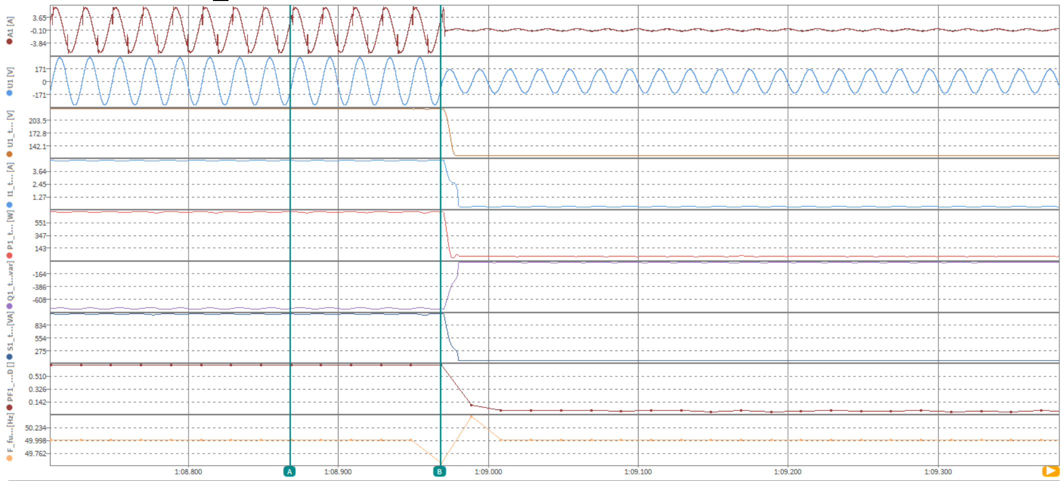
Recovery time-P



	A	B	间隔	有效值
时间 [s]	1:12.7281000	1:22.6217000	9.8936000	
A1 [A]	0.637884	3.122683	2.484799	4.048616
U1 [V]	-65.23327	316.0181	381.2514	230.0965
U1_tRMS_rc@GIRD [V]	114.9469	230.0999	115.1530	230.0481
I1_tRMS_rc@GIRD [A]	0.260821	4.562946	4.302124	4.047426
P1_t_rc@GIRD [W]	-2.630988	724.5876	727.2186	721.3463
Q1_t_rc@GIRD [var]	29.86494	759.8241	729.9592	589.0556
S1_t_rc@GIRD [VA]	29.98061	1049.933	1019.953	931.3039
PF1_t@GIRD []	-4.621e-4	0.690321	0.690783	0.793055
F_fund@GIRD [Hz]	49.98948	49.99994	0.010460	49.99992

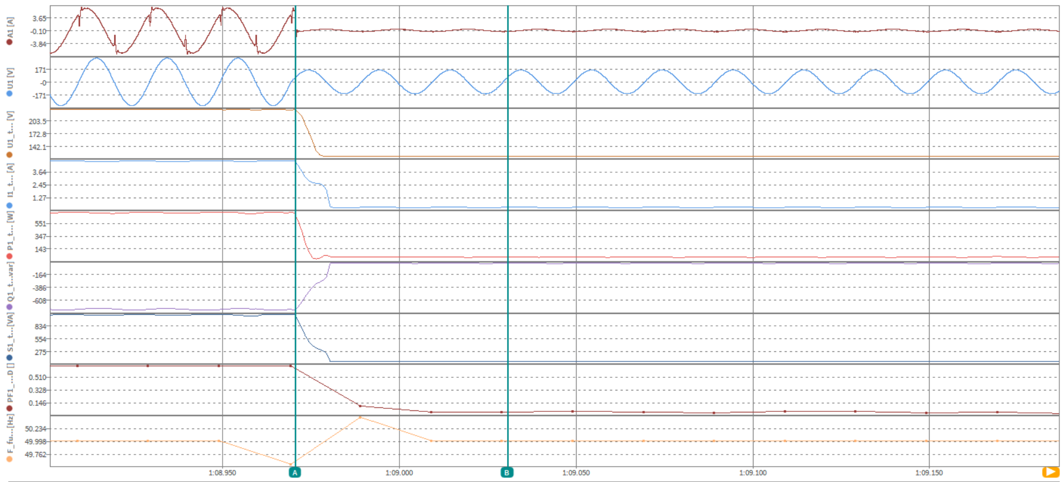
Recovery time-Q

Graph of Test number 3.2_0.5Un



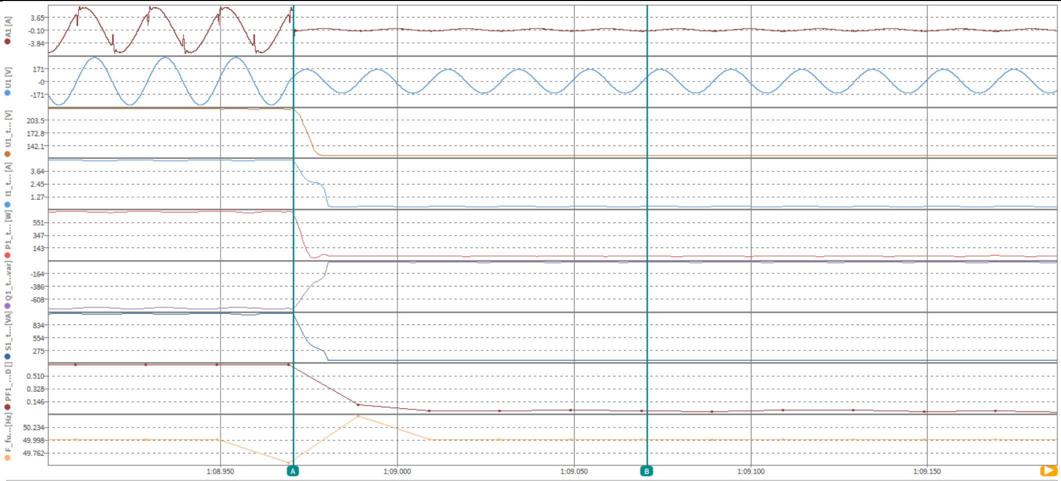
	A	B	间隔	有效值
时间 [s]	1:08.867900	1:08.968000	0.100100	
A1 [A]	2.317305	2.461310	0.144005	4.642831
U1 [V]	-149.5026	-140.6527	8.849860	229.9598
U1_tRMS_rc@GIRD [V]	230.0992	229.5601	-0.539139	230.1193
I1_tRMS_rc@GIRD [A]	4.696395	4.688873	-7.522e-3	4.646289
P1_t_rc@GIRD [W]	731.8923	721.7015	-10.19073	721.5858
Q1_t_rc@GIRD [var]	-795.0534	-798.5845	-3.531067	788.9918
S1_t_rc@GIRD [VA]	1080.637	1076.378	-4.258667	1069.203
PF1_t@GIRD []	0.674733	0.673529	-1.204e-3	0.674814
F_fund@GIRD [Hz]	50.00002	49.99944	-5.798e-4	49.99986

Before dip (t1-100ms)



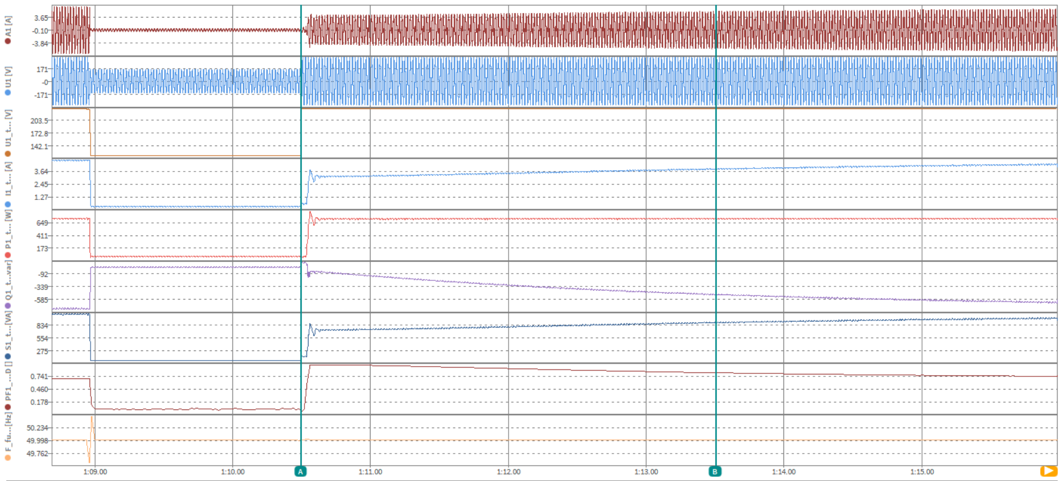
	A	B	间隔	有效值
时间 [s]	1:08.970700	1:09.030700	0.060000	
A1 [A]	4.984732	-0.401144	-5.385876	0.341557
U1 [V]	62.12709	62.98992	0.862837	114.9794
U1_tRMS_rc@GIRD [V]	228.9541	115.1048	-113.8493	128.6591
I1_tRMS_rc@GIRD [A]	4.689914	0.267433	-4.422481	1.416397
P1_t_rc@GIRD [W]	726.6744	6.048641	-720.6257	160.4479
Q1_t_rc@GIRD [var]	-790.5295	30.18267	820.7121	231.1236
S1_t_rc@GIRD [VA]	1073.775	30.78278	-1042.992	281.3568
PF1_t@GIRD []	0.673576	5.984e-4	-0.672978	0.339478
F_fund@GIRD [Hz]	49.54872	49.99990	0.451180	50.00014

During dip (t1+60ms)



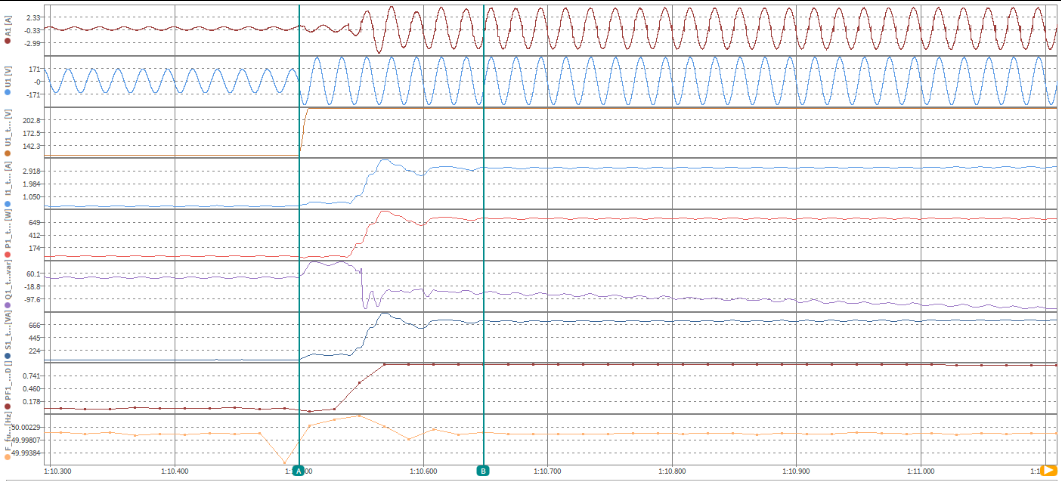
	A	B	间隔	有效值
时间 [s]	1:08.970700	1:09.070700	0.100000	
A1 [A]	4.984732	-0.401144	-5.385876	0.312293
U1 [V]	62.12709	62.96203	0.834942	115.0179
U1_tRMS_rc@GIRD [V]	228.9541	115.0517	-113.9024	123.4605
I1_tRMS_rc@GIRD [A]	4.689914	0.268785	-4.421128	1.113001
P1_t_rc@GIRD [W]	726.6744	5.623927	-721.0505	124.7177
Q1_t_rc@GIRD [var]	-790.5295	30.40851	820.9380	180.5967
S1_t_rc@GIRD [VA]	1073.775	30.92420	-1042.851	219.4759
PF1_t@GIRD []	0.673576	-8.912e-4	-0.674467	0.277188
F_fund@GIRD [Hz]	49.54872	49.99987	0.451149	50.00010

During dip (t1+100ms)



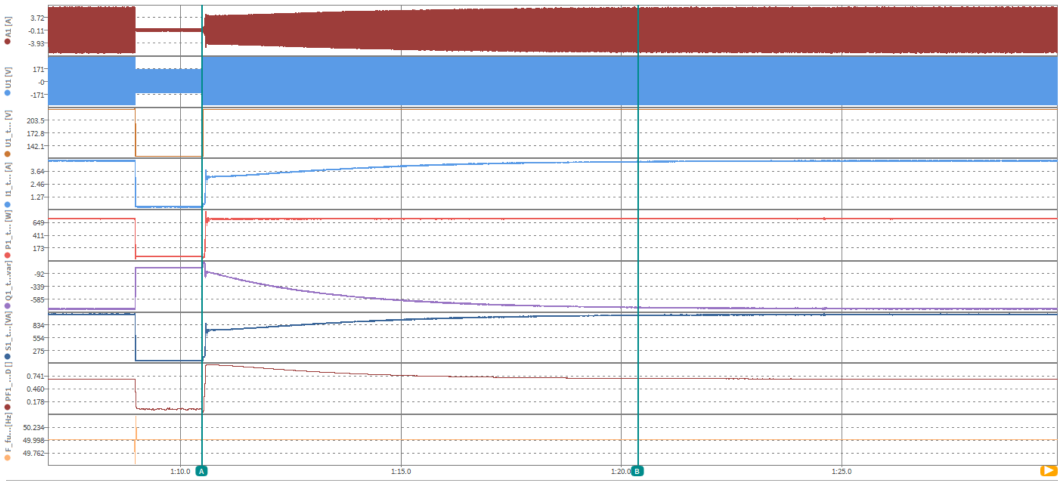
	A	B	间隔	有效值
时间 [s]	1:10.500000	1:13.505600	3.005600	
A1 [A]	0.705595	-2.883558	-3.589154	3.421135
U1 [V]	-58.11790	-303.4661	-245.3482	230.1513
U1_tRMS_rc@GIRD [V]	114.9852	230.0957	115.1105	229.9406
I1_tRMS_rc@GIRD [A]	0.275055	3.844896	3.569841	3.416043
P1_t_rc@GIRD [W]	-5.242370	718.7449	723.9872	710.0633
Q1_t_rc@GIRD [var]	31.18973	-515.8384	-547.0282	337.0474
S1_t_rc@GIRD [VA]	31.62723	884.6940	853.0668	785.9967
PF1_t@GIRD []	3.799e-3	0.818112	0.814313	0.900218
F_fund@GIRD [Hz]	49.99002	50.00012	0.010098	50.00000

After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:10.500000	1:10.648400	0.148400	
A1 [A]	0.705595	-1.217012	-1.922608	2.576975
U1 [V]	-58.11790	-103.2026	-45.08472	231.1545
U1_tRMS_rc@GIRD [V]	114.9852	230.0832	115.0980	227.0303
I1_tRMS_rc@GIRD [A]	0.275055	3.160210	2.885155	2.495076
P1_t_rc@GIRD [W]	-5.242370	723.9417	729.1840	567.2498
Q1_t_rc@GIRD [var]	31.18973	-67.81522	-99.00495	87.34850
S1_t_rc@GIRD [VA]	31.62723	727.1110	695.4837	573.9357
PF1_t@GIRD []	3.799e-3	0.996414	0.992616	0.730090
F_fund@GIRD [Hz]	49.99002	49.99969	9.670e-3	50.00065

Recovery time-P



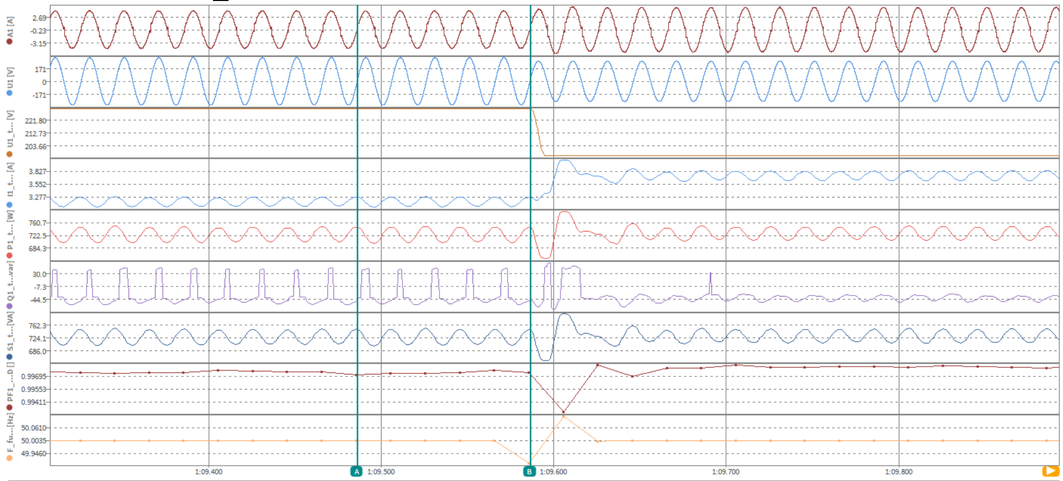
	A	B	间隔	有效值
时间 [s]	1:10.500000	1:20.379900	9.879900	
A1 [A]	0.705595	-5.568152	-6.273747	4.062708
U1 [V]	-58.11790	-48.29243	9.825469	230.0943
U1_tRMS_rc@GIRD [V]	114.9852	230.0948	115.1096	230.0490
I1_tRMS_rc@GIRD [A]	0.275055	4.526266	4.251211	4.061742
P1_t_rc@GIRD [W]	-5.242370	714.3799	719.6223	717.3397
Q1_t_rc@GIRD [var]	31.18973	-757.8399	-789.0296	599.0627
S1_t_rc@GIRD [VA]	31.62723	1041.470	1009.843	934.5867
PF1_t@GIRD []	3.799e-3	0.688188	0.684389	0.785409
F_fund@GIRD [Hz]	49.99002	49.99969	9.670e-3	49.99995

Recovery time-Q

Verification of dynamic network support										P
Short-circuited power at generator terminal [VA]			6K							
NS protection settings			See table 5.5 for detail.							
	No.	Parameter	Phase ref.	Time ref.	unit	Result				
General Info.	0	Test number	--	--	--	4.2	5.2	6.2	7.2	
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025				
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph				
	3	Fault type (phase)	--	--		A	A	A	A	
	4	Setting voltage depth	Line to line	--	p.u.	0.85	1.25	1.20	1.15	
	5	Setting dip duration		--	ms	60000	100	5000	60000	
	6	Point of fault entry	Total	--	ms	20ms				
	7	Point of fault clearance	Total	--	ms	20ms				
	8	Fault duration in empty load test	Total	--	ms	60013	123.2	5021.1	60000	
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.85	1.25	1.20	1.15	
	10		Positive sequence		p.u.	--	--	--	--	
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00	1.00	
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--	--	
	13	Active power	Total	t1-10s to t1	p.u.	0.311	0.311	0.308	0.310	
	14		Positive sequence			--	--	--	--	
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.023	-0.023	-0.021	-0.020	
	16		Positive sequence			--	--	--	--	
	17	Cosφ	--	t1-10s to t1	--	0.9974	0.9975	0.9973	0.9977	
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.85	1.25	1.20	1.15	
	19	Line current	Phase 1	t1+60ms	p.u.	0.373	0.040	0.040	0.264	

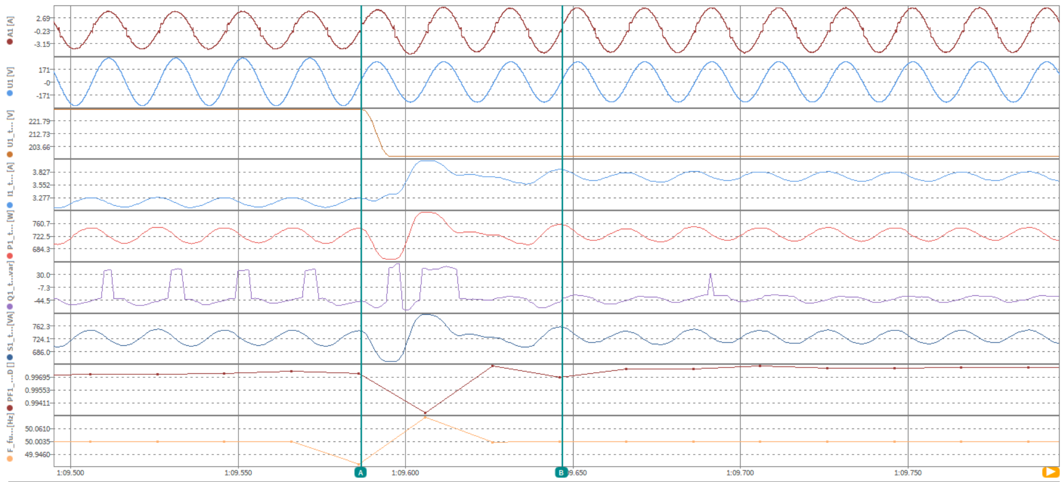
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.369	0.021	0.021	0.269
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.312	0.011	0.010	0.307
	26		Positive sequence			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--	--
	29		Total			0.299	0.298	0.293	0.300
	39	Active power rising time	Positive sequence	--	s	0.067	0.109	0.144	0.089
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--	--
	32		Total			-0.024	-0.027	-0.020	-0.010
	33	Reactive power rising time	Positive sequence	--	s	0.067	0.109	0.144	0.089
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 4.2_0.85Un



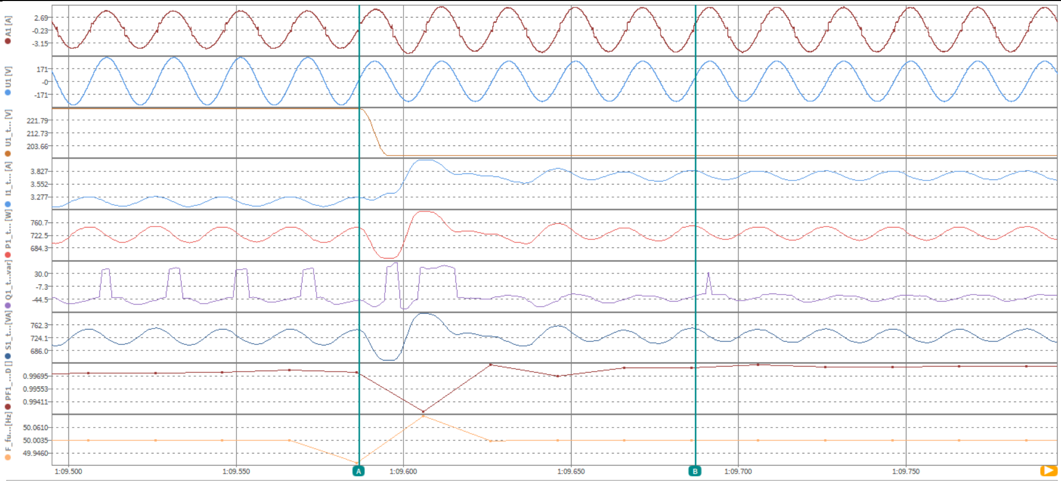
	A	B	间隔	有效值
时间 [s]	1:09.4860	1:09.5864	0.1004	
A1 [A]	-0.670910	-0.235462	0.435448	3.141318
U1 [V]	-40.73525	-0.396967	40.33828	229.4216
U1_tRMS_rc@GIRD [V]	229.9915	229.9900	-1.526e-3	229.9880
I1_tRMS_rc@GIRD [A]	3.250643	3.247193	-3.451e-3	3.151296
P1_t_rc@GIRD [W]	745.6346	745.0145	-0.620117	723.0561
Q1_t_rc@GIRD [var]	-54.45568	-51.92576	2.529919	49.67441
S1_t_rc@GIRD [VA]	747.6205	746.8219	-0.798584	724.7604
PF1_t@GIRD []	0.997390	0.997334	-5.585e-5	0.997324
F_fund@GIRD [Hz]	50.00015	49.89399	-0.106159	49.98484

Before dip (t1-100ms)



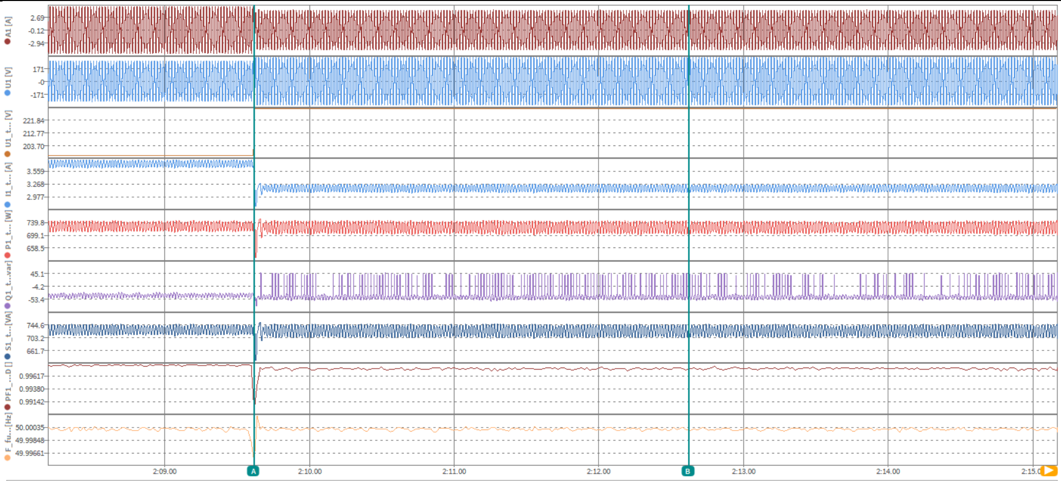
	A	B	间隔	有效值
时间 [s]	1:09.5868	1:09.6468	0.0600	
A1 [A]	1.375580	1.363564	-0.012016	3.721697
U1 [V]	36.40223	35.73251	-0.669718	195.3483
U1_tRMS_rc@GIRD [V]	229.9900	195.5121	-34.47791	198.8910
I1_tRMS_rc@GIRD [A]	3.247193	3.877566	0.630373	3.674761
P1_t_rc@GIRD [W]	745.0145	756.3704	11.35583	726.1037
Q1_t_rc@GIRD [var]	-51.92576	-51.34407	0.581684	52.97587
S1_t_rc@GIRD [VA]	746.8219	758.1110	11.28912	728.0337
PF1_t@GIRD []	0.997334	0.996934	-3.999e-4	0.996315
F_fund@GIRD [Hz]	49.89399	50.00052	0.106529	50.00147

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:09.5868	1:09.6872	0.1004	
A1 [A]	1.375580	1.567841	0.192261	3.715521
U1 [V]	36.40223	68.18152	31.77929	195.0588
U1_tRMS_rc@GIRD [V]	229.9900	195.5218	-34.46823	197.5600
I1_tRMS_rc@GIRD [A]	3.247193	3.840973	0.593780	3.693996
P1_t_rc@GIRD [W]	745.0145	749.8570	4.842468	726.2642
Q1_t_rc@GIRD [var]	-51.92576	-41.30788	10.61787	50.08608
S1_t_rc@GIRD [VA]	746.8219	750.9939	4.171997	727.9892
PF1_t@GIRD []	0.997334	0.997879	5.450e-4	0.996834
F_fund@GIRD [Hz]	49.89399	50.00007	0.106079	50.00091

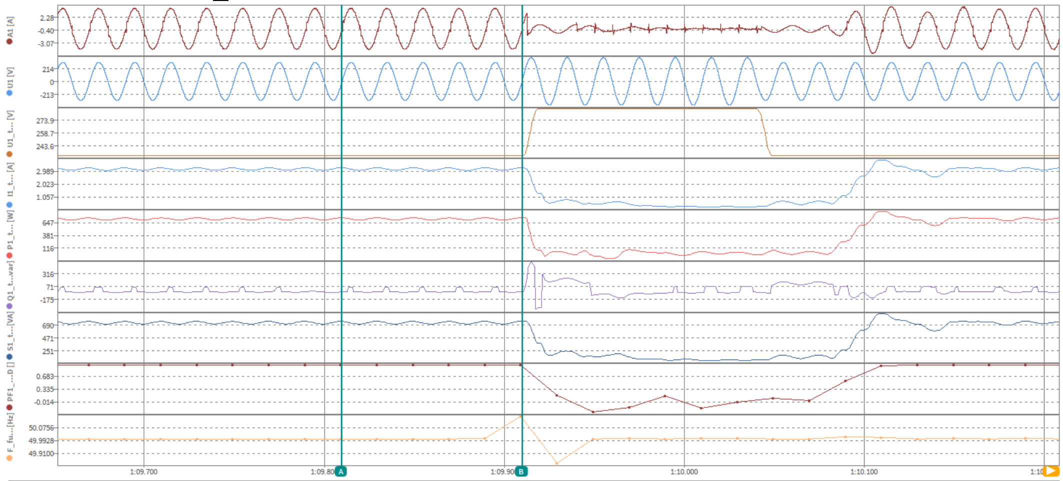
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	2:09.616900	2:12.621000	3.004100	
A1 [A]	-1.681709	-4.490090	-2.808380	3.148476
U1 [V]	-52.70434	-322.7811	-270.0768	229.9965
U1_tRMS_rc@GIRD [V]	195.5114	229.9929	34.48149	229.9333
I1_tRMS_rc@GIRD [A]	3.627650	3.129651	-0.497999	3.149139
P1_t_rc@GIRD [W]	708.3996	717.4530	9.053406	722.3561
Q1_t_rc@GIRD [var]	-34.65659	-58.04763	-23.39104	49.22055
S1_t_rc@GIRD [VA]	709.2468	719.7974	10.55060	724.0311
PF1_t@GIRD []	0.998088	0.997294	-7.946e-4	0.997423
F_fund@GIRD [Hz]	49.99815	50.00000	1.850e-3	49.99997

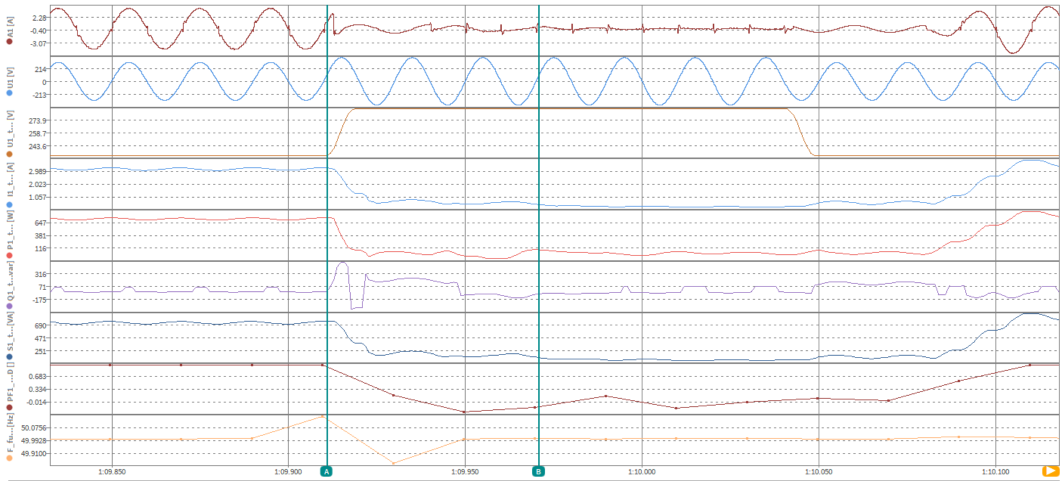
After dip(t2+3s)

Graph of Test number 5.2_1.25Un



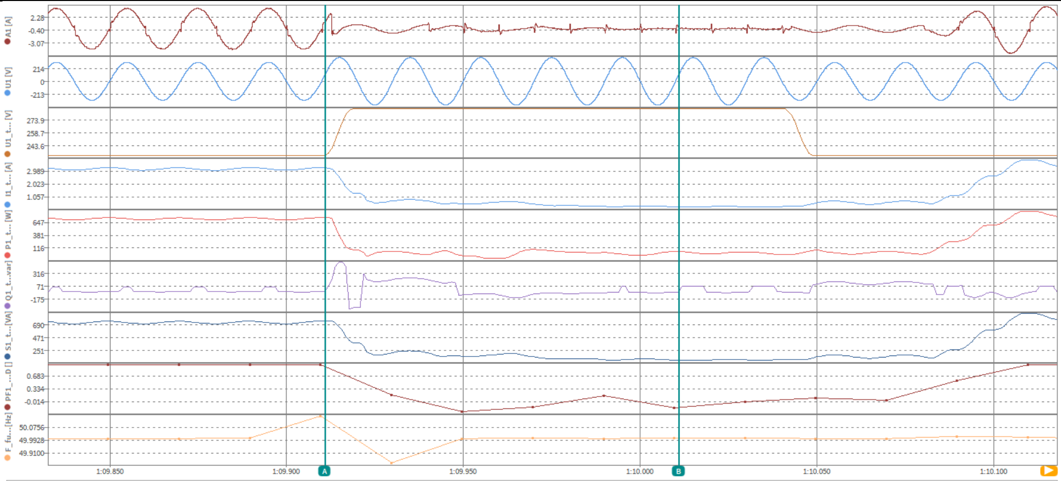
	A	B	间隔	有效值
时间 [s]	1:09.8097000	1:09.9100000	0.1003000	
A1 [A]	-0.488377	-0.274086	0.214291	3.141527
U1 [V]	-33.35428	-2.927542	30.42674	229.5489
U1_tRMS_rc@GIRD [V]	230.0047	229.9991	-5.615e-3	230.0041
I1_tRMS_rc@GIRD [A]	3.248692	3.240988	-7.703e-3	3.149244
P1_t_rc@GIRD [W]	745.2118	743.6743	-1.537537	722.6358
Q1_t_rc@GIRD [var]	-54.66709	-51.04884	3.618244	49.65300
S1_t_rc@GIRD [VA]	747.2142	745.4243	-1.789917	724.3396
PF1_t@GIRD []	0.997505	0.997395	-1.108e-4	0.997403
F_fund@GIRD [Hz]	49.99975	50.15056	0.150810	50.02159

Before dip (t1-100ms)



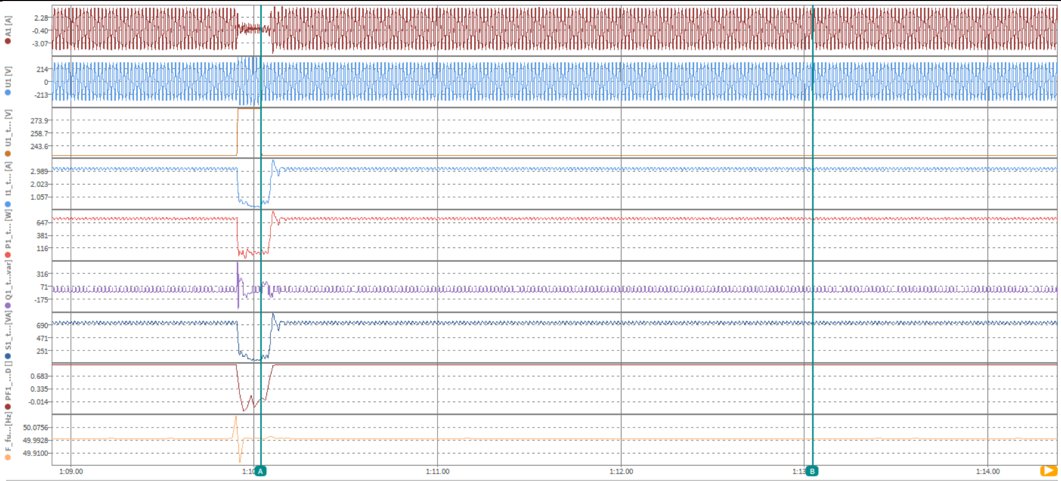
	A	B	间隔	有效值
时间 [s]	1:09.9109000	1:09.9709000	0.0600000	
A1 [A]	1.262283	0.396538	-0.865746	0.724777
U1 [V]	109.4911	108.4921	-0.998974	287.1986
U1_tRMS_rc@GIRD [V]	230.0004	287.3564	57.35608	282.7166
I1_tRMS_rc@GIRD [A]	3.244615	0.417501	-2.827114	1.200732
P1_t_rc@GIRD [W]	744.5825	68.09946	-676.4831	219.3552
Q1_t_rc@GIRD [var]	-50.04925	-98.77084	-48.72159	215.7349
S1_t_rc@GIRD [VA]	746.2627	119.9717	-626.2910	307.6658
PF1_t@GIRD []	0.997395	-0.195411	-1.192805	0.539115
F_fund@GIRD [Hz]	50.15056	50.00207	-0.148487	49.99696

During dip (t1+60ms)



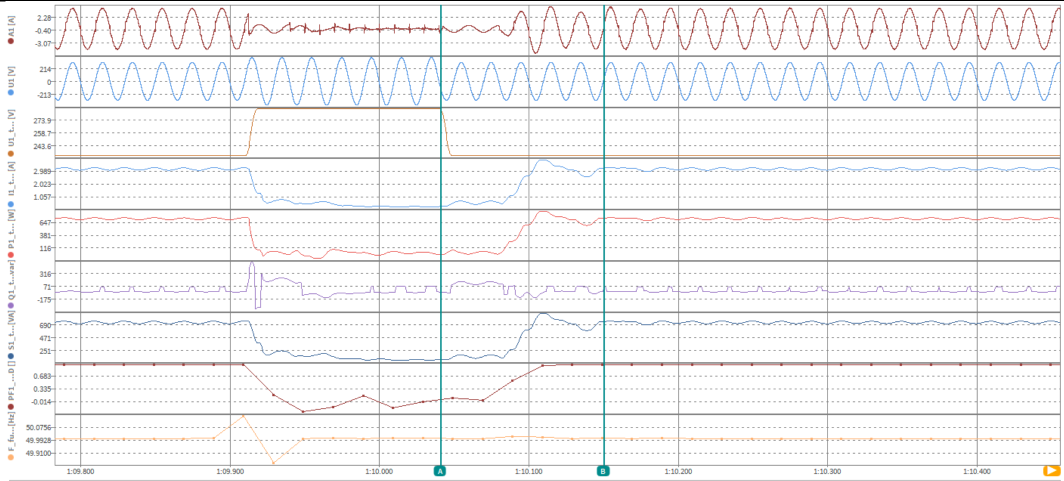
	A	B	间隔	有效值
时间 [s]	1:09.9109000	1:10.0110000	0.1001000	
A1 [A]	1.262283	-0.123024	-1.385307	0.585051
U1 [V]	109.4911	120.6203	11.12914	287.1458
U1_tRMS_rc@GIRD [V]	230.0004	287.3698	57.36942	284.5646
I1_tRMS_rc@GIRD [A]	3.244615	0.217731	-3.026884	0.949522
P1_t_rc@GIRD [W]	744.5825	25.95235	-718.6302	171.7736
Q1_t_rc@GIRD [var]	-50.04925	-56.93336	-6.884113	173.8081
S1_t_rc@GIRD [VA]	746.2627	62.56942	-683.6933	244.3674
PF1_t@GIRD []	0.997395	-0.206465	-1.203859	0.451325
F_fund@GIRD [Hz]	50.15056	50.00051	-0.150047	49.99783

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:10.0409000	1:13.0449000	3.0040000	
A1 [A]	-0.342751	-4.573059	-4.230309	3.125321
U1 [V]	-86.54619	-325.1980	-238.6518	230.0311
U1_tRMS_rc@GIRD [V]	287.3730	230.0075	-57.36546	230.1219
I1_tRMS_rc@GIRD [A]	0.237655	3.125273	2.887618	3.121894
P1_t_rc@GIRD [W]	-40.70123	715.9890	756.6902	716.1669
Q1_t_rc@GIRD [var]	-54.84249	-63.91691	-9.074425	52.03351
S1_t_rc@GIRD [VA]	68.29559	718.8362	650.5406	718.0547
PF1_t@GIRD []	-0.042326	0.997439	1.039765	0.984910
F_fund@GIRD [Hz]	50.00214	49.99995	-2.190e-3	50.00011

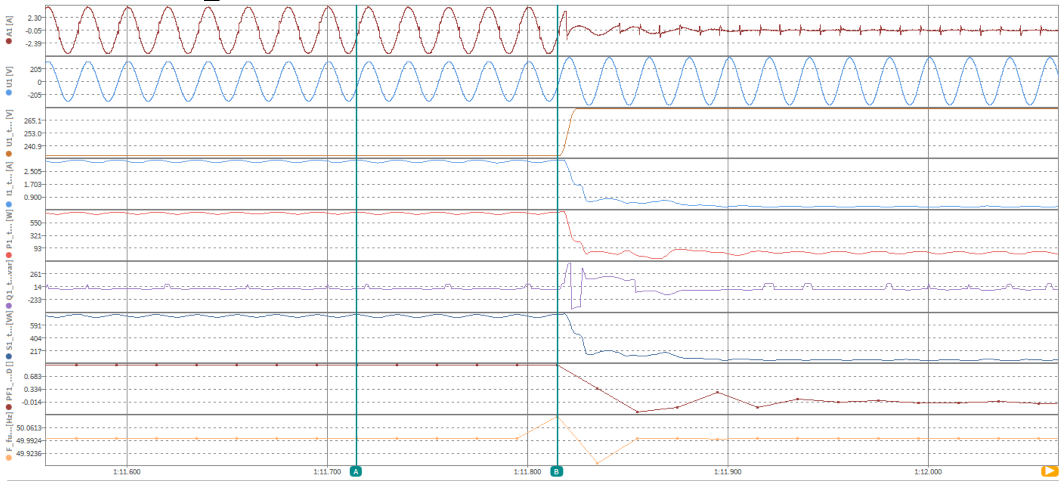
After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:10.0409000	1:10.1503000	0.1094000	
A1 [A]	-0.342751	0.202560	0.545311	2.364447
U1 [V]	-86.54619	28.49770	115.0439	230.4676
U1_tRMS_rc@GIRD [V]	287.3730	230.0366	-57.33635	233.1493
I1_tRMS_rc@GIRD [A]	0.237655	3.223254	2.985600	2.258800
P1_t_rc@GIRD [W]	-40.70123	740.2717	780.9730	510.6655
Q1_t_rc@GIRD [var]	-54.84249	-42.07765	12.76484	96.21302
S1_t_rc@GIRD [VA]	68.29559	741.4666	673.1710	519.6501
PF1_t@GIRD []	-0.042326	0.991007	1.033333	0.678775
F_fund@GIRD [Hz]	50.00214	50.00256	4.196e-4	50.00211

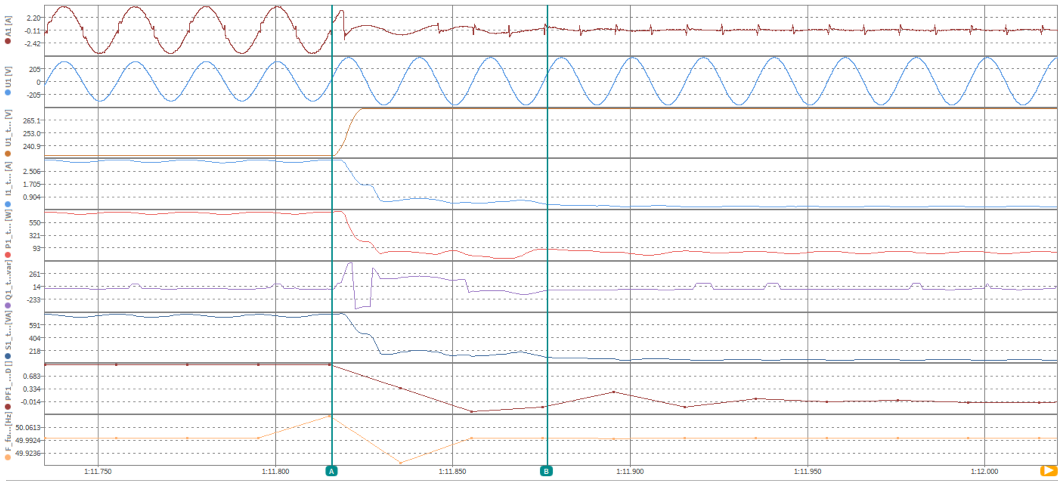
Recovery time

Graph of Test number 6.2_1.20Un



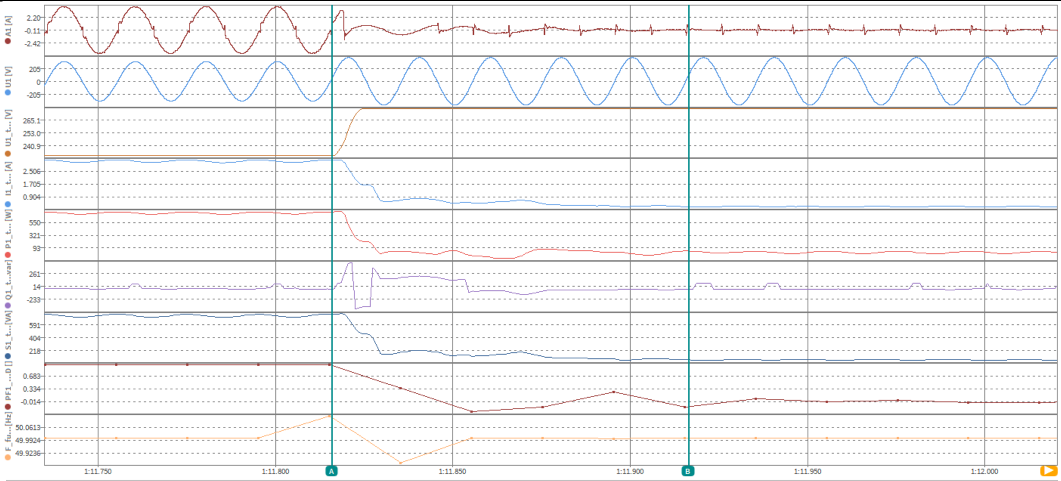
	A	B	间隔	有效值
时间 [s]	1:11.714700	1:11.815000	0.100300	
A1 [A]	-1.233673	-0.859737	0.373936	3.128220
U1 [V]	-94.03253	-64.38518	29.64735	229.5895
U1_tRMS_rc@GIRD [V]	230.0031	230.0055	2.472e-3	229.9925
I1_tRMS_rc@GIRD [A]	3.217538	3.227429	9.892e-3	3.135332
P1_t_rc@GIRD [W]	738.2617	740.4372	2.175476	719.4788
Q1_t_rc@GIRD [var]	-51.32338	-52.93001	-1.606636	48.38532
S1_t_rc@GIRD [VA]	740.0435	742.3266	2.283081	721.1039
PF1_t@GIRD []	0.997277	0.997367	9.060e-5	0.997472
F_fund@GIRD [Hz]	50.00002	49.99994	-8.011e-5	50.00005

Before dip (t1-100ms)



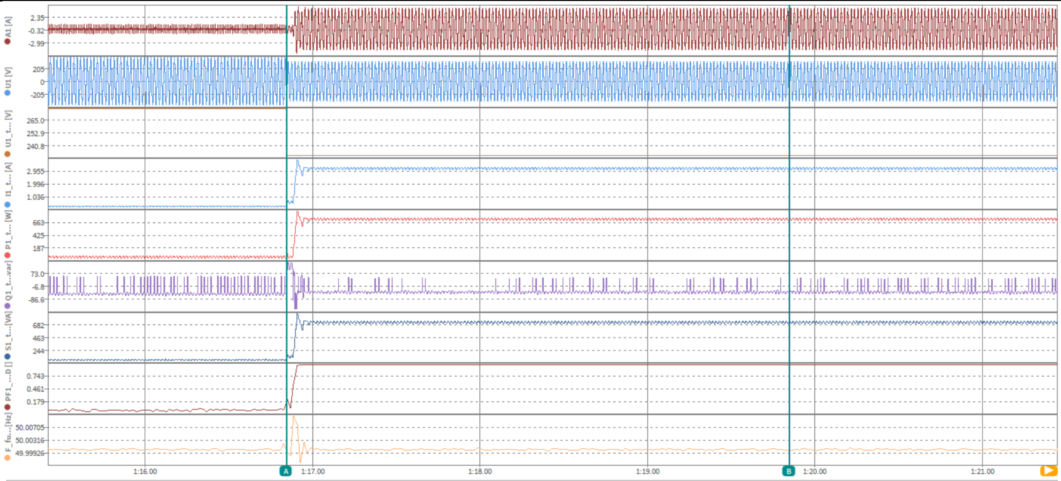
	A	B	间隔	有效值
时间 [s]	1:11.816100	1:11.876600	0.060500	
A1 [A]	1.122665	0.320148	-0.802517	0.826247
U1 [V]	57.73473	115.1493	57.41454	274.6747
U1_tRMS_rc@GIRD [V]	230.0068	275.8722	45.86533	272.1529
I1_tRMS_rc@GIRD [A]	3.230341	0.414104	-2.816237	1.252342
P1_t_rc@GIRD [W]	741.0474	60.00481	-681.0426	239.7674
Q1_t_rc@GIRD [var]	-53.83668	-97.21191	-43.37524	206.2441
S1_t_rc@GIRD [VA]	743.0004	114.2398	-628.7606	316.2674
PF1_t@GIRD []	0.997521	-0.201355	-1.198876	0.559377
F_fund@GIRD [Hz]	50.12361	50.00245	-0.121162	49.99688

During dip (t1+60ms)



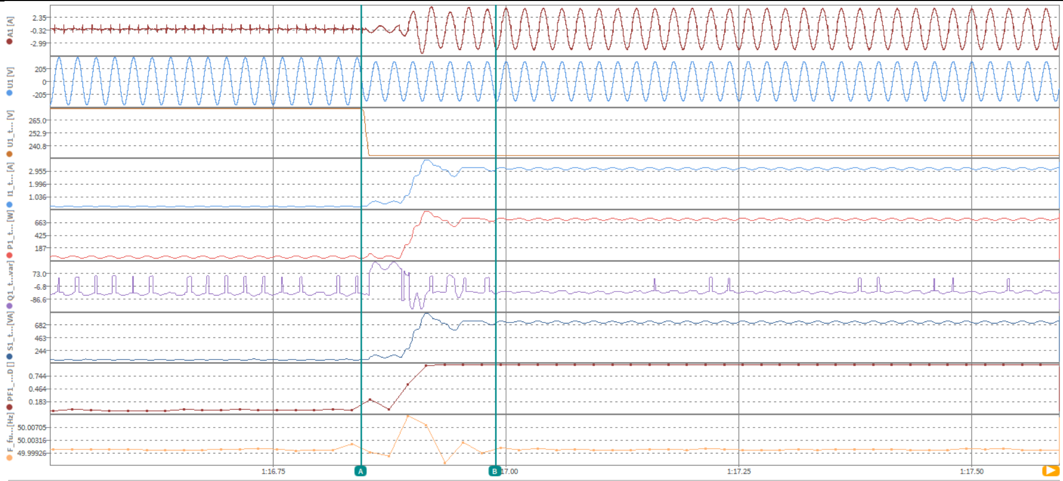
	A	B	间隔	有效值
时间 [s]	1:11.816100	1:11.916500	0.100400	
A1 [A]	1.122665	0.123596	-0.999069	0.662882
U1 [V]	57.73473	103.2686	45.53390	275.2664
U1_tRMS_rc@GIRD [V]	230.0068	275.9068	45.89999	273.6324
I1_tRMS_rc@GIRD [A]	3.230341	0.221091	-3.009250	0.988717
P1_t_rc@GIRD [W]	741.0474	23.75922	-717.2882	187.4699
Q1_t_rc@GIRD [var]	-53.83668	-56.18315	-2.346474	166.0565
S1_t_rc@GIRD [VA]	743.0004	61.00039	-682.0000	250.4391
PF1_t@GIRD []	0.997521	-0.190285	-1.187806	0.472902
F_fund@GIRD [Hz]	50.12361	50.00075	-0.122860	49.99782

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:16.844500	1:19.847500	3.003000	
A1 [A]	-0.168228	-2.780628	-2.612400	3.111880
U1 [V]	136.6427	-179.8966	-316.5393	229.8954
U1_tRMS_rc@GIRD [V]	275.8948	229.9741	-45.92072	230.1162
I1_tRMS_rc@GIRD [A]	0.215821	3.061975	2.846154	3.109456
P1_t_rc@GIRD [W]	-20.34998	702.5671	722.9171	713.3439
Q1_t_rc@GIRD [var]	-55.95850	-47.55978	8.398724	50.85851
S1_t_rc@GIRD [VA]	59.54390	704.1750	644.6312	715.1546
PF1_t@GIRD []	-0.036068	0.997407	1.033475	0.985253
F_fund@GIRD [Hz]	50.00171	49.99989	-1.820e-3	50.00010

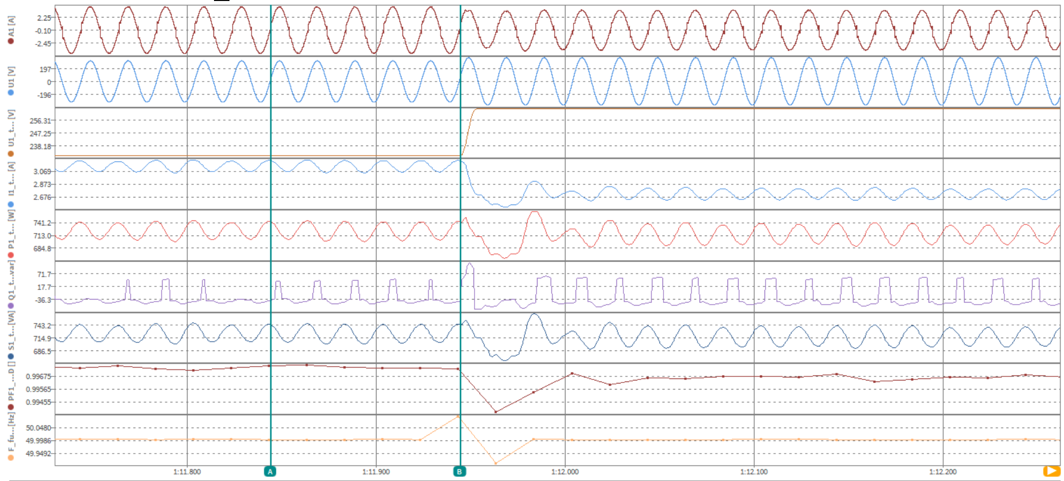
After dip(t2+3s)



	A	B	间隔	有效值
时间 [s]	1:16.844500	1:16.988900	0.144400	
A1 [A]	-0.168228	-4.025746	-3.857517	2.526378
U1 [V]	136.6427	-278.4100	-415.0527	228.0678
U1_tRMS_rc@GIRD [V]	275.8948	230.0061	-45.88869	232.5434
I1_tRMS_rc@GIRD [A]	0.215821	3.010743	2.794922	2.468144
P1_t_rc@GIRD [W]	-20.34998	690.0675	710.4175	561.3830
Q1_t_rc@GIRD [var]	-55.95850	-57.86448	-1.905975	85.00727
S1_t_rc@GIRD [VA]	59.54390	692.4893	632.9454	567.7826
PF1_t@GIRD []	-0.036068	0.997739	1.033806	0.731201
F_fund@GIRD [Hz]	50.00171	49.99886	-2.850e-3	50.00173

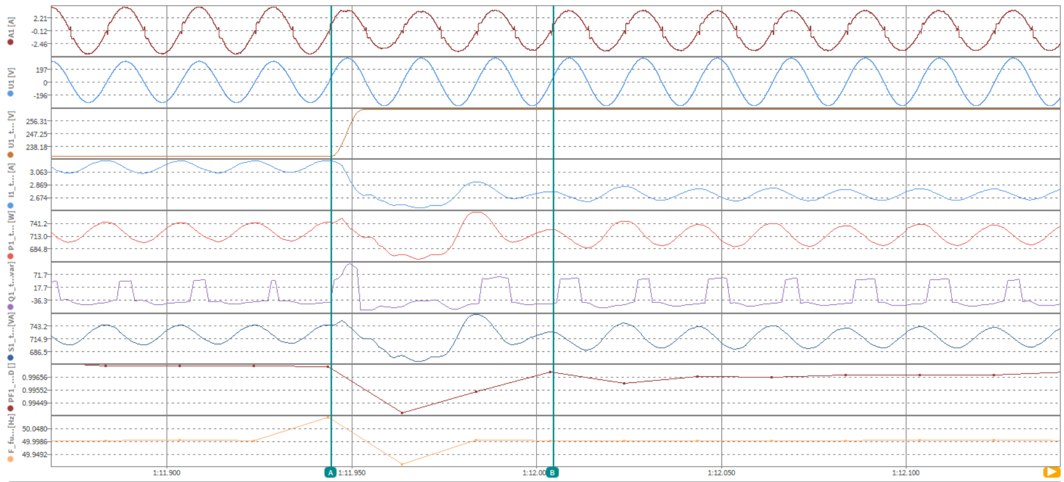
Recovery time

Graph of Test number 7.2_1.15Un



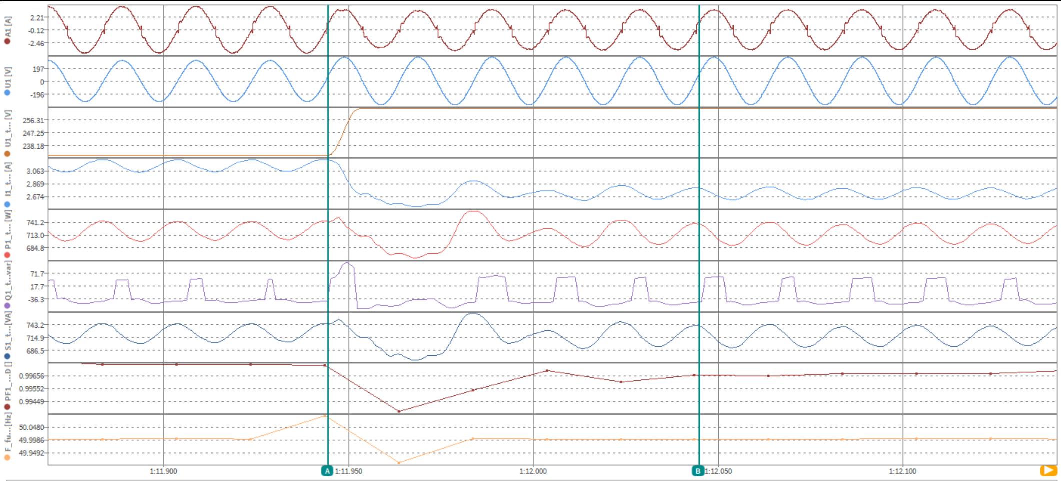
	A	B	间隔	有效值
时间 [s]	1:11.84420	1:11.94450	0.10030	
A1 [A]	-0.652599	1.108360	1.760960	3.139045
U1 [V]	16.86978	56.44083	39.57105	229.5473
U1_tRMS_rc@GIRD [V]	230.0015	230.0011	-4.120e-4	229.9913
I1_tRMS_rc@GIRD [A]	3.238325	3.237520	-8.056e-4	3.145948
P1_t_rc@GIRD [W]	743.3223	742.9653	-0.356995	721.9081
Q1_t_rc@GIRD [var]	-47.20716	-49.81036	-2.603203	48.59068
S1_t_rc@GIRD [VA]	744.8199	744.6332	-0.186707	723.5416
PF1_t@GIRD []	0.997654	0.997395	-2.588e-4	0.997535
F_fund@GIRD [Hz]	49.99963	50.09267	0.093040	50.01539

Before dip (t1-100ms)



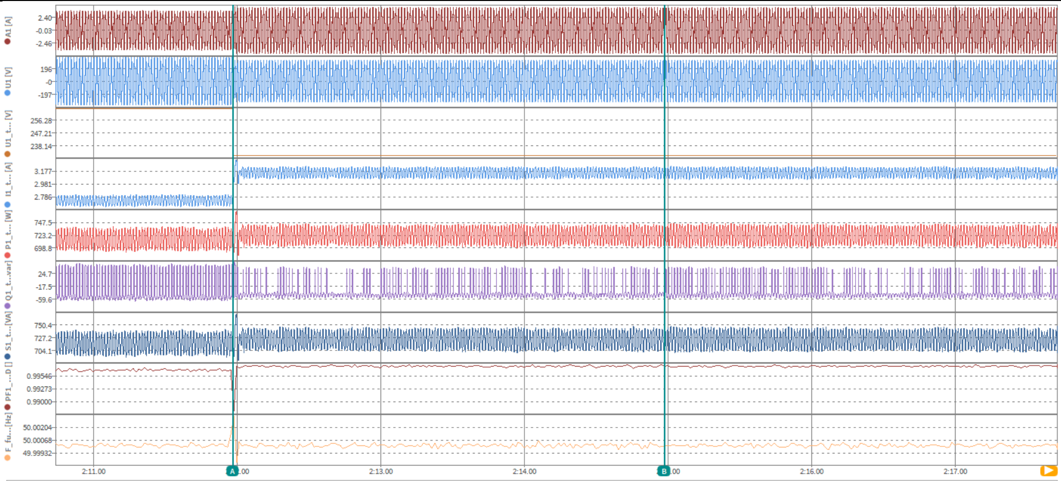
	A	B	间隔	有效值
时间 [s]	1:11.94450	1:12.00450	0.06000	
A1 [A]	1.108360	1.108074	-2.861e-4	2.683863
U1 [V]	56.44083	56.77438	0.333548	264.2718
U1_tRMS_rc@GIRD [V]	230.0011	264.4809	34.47974	261.3577
I1_tRMS_rc@GIRD [A]	3.237520	2.756300	-0.481220	2.736470
P1_t_rc@GIRD [W]	742.9653	726.7827	-16.18262	709.3003
Q1_t_rc@GIRD [var]	-49.81036	-56.66681	-6.856445	65.36321
S1_t_rc@GIRD [VA]	744.6332	728.9885	-15.64465	712.3056
PF1_t@GIRD []	0.997395	0.996987	-4.085e-4	0.995818
F_fund@GIRD [Hz]	50.09267	49.99968	-0.092991	49.99949

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:11.94450	1:12.04480	0.10030	
A1 [A]	1.108360	1.298046	0.189686	2.692795
U1 [V]	56.44083	90.04164	33.60081	263.9907
U1_tRMS_rc@GIRD [V]	230.0011	264.4792	34.47812	262.6126
I1_tRMS_rc@GIRD [A]	3.237520	2.797448	-0.440071	2.726435
P1_t_rc@GIRD [W]	742.9653	737.7679	-5.197449	711.4808
Q1_t_rc@GIRD [var]	-49.81036	-55.69379	-5.883434	62.64006
S1_t_rc@GIRD [VA]	744.6332	739.8671	-4.766113	714.2329
PF1_t@GIRD []	0.997395	0.996611	-7.846e-4	0.995980
F_fund@GIRD [Hz]	50.09267	49.99983	-0.092842	49.99961

During dip (t1+100ms)



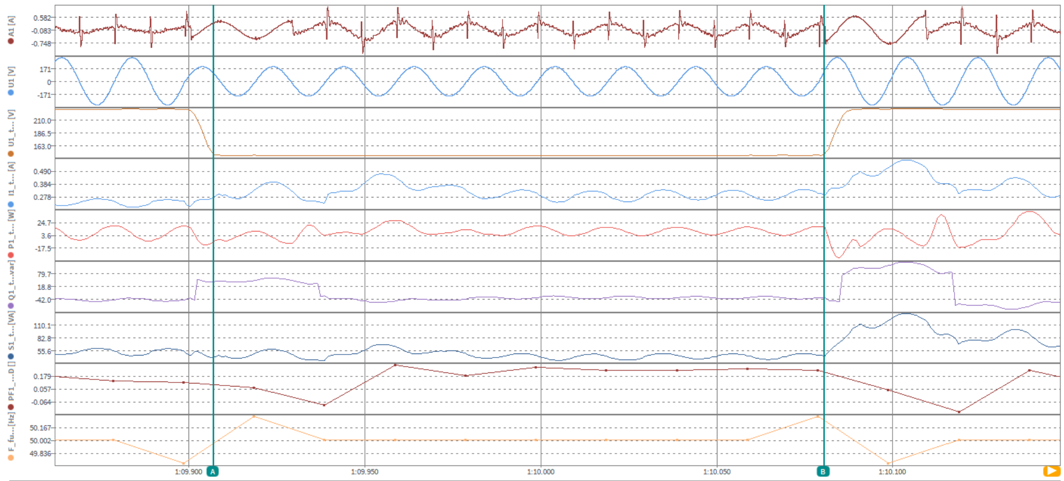
	A	B	间隔	有效值
时间 [s]	2:11.9731000	2:14.9750000	3.0019000	
A1 [A]	1.005364	-1.577282	-2.582646	3.143234
U1 [V]	106.1695	-98.60945	-204.7789	229.9124
U1_tRMS_rc@GIRD [V]	264.4572	229.9770	-34.48024	230.0681
I1_tRMS_rc@GIRD [A]	2.636321	3.058283	0.421962	3.143226
P1_t_rc@GIRD [W]	695.0947	701.6870	6.592224	721.4419
Q1_t_rc@GIRD [var]	-54.06380	-48.11652	5.947273	48.69177
S1_t_rc@GIRD [VA]	697.1941	703.3348	6.140686	723.0832
PF1_t@GIRD []	0.996767	0.997778	1.011e-3	0.997462
F_fund@GIRD [Hz]	50.00118	49.99996	-1.217e-3	50.00003

After dip(t2+3s)

Verification of dynamic network support									P
Short-circuited power at generator terminal [VA]			6K						
NS protection settings			See table 5.5 for detail.						
	No.	Parameter	Phase ref.	Time ref.	unit	Result			
General Info.	0	Test number	--	--	--	1.3	2.3	3.3	4.3
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025			
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph			
	3	Fault type (phase)	--	--		D1	D1	D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	0.15	0.50	0.50	0.85
	5	Setting dip duration		--	ms	150	1500	1500	60000
	6	Point of fault entry	Total	--	ms	20ms			
	7	Point of fault clearance	Total	--	ms	20ms			
	8	Fault duration in empty load test	Total	--	ms	173.3	1522.3	1522.3	60016
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.62	0.76	0.76	0.93
	10		Positive sequence		p.u.	--	--	--	--
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00	1.00
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--	--
	13	Active power	Total	t1-10s to t1	p.u.	1.009	1.006	1.008	1.013
	14		Positive sequence			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.022	0.327	-0.332	-0.024
	16		Positive sequence			--	--	--	--
	17	Cos_{φ}	--	t1-10s to t1	--	0.9997	0.9499	0.9497	0.9997
During	18	Voltage	Phase 1	t1+100ms	p.u.	--	--	--	--

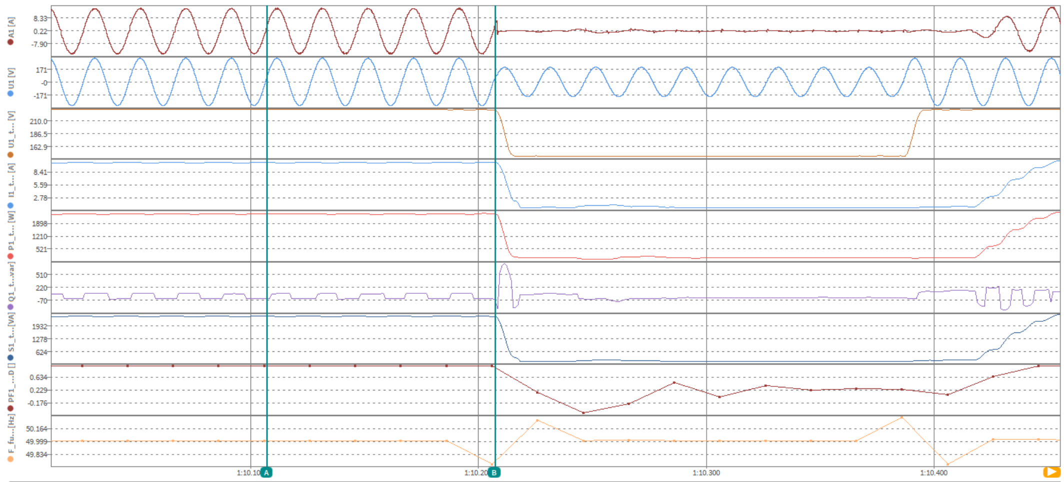
dip t1 to t2			Phase 2	to t2-20ms		--	--	--	--
			Phase 3			0.620	0.759	0.760	0.930
	19	Line current	Phase 1	t1+60ms	p.u.	--	--	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			0.056	0.038	0.039	1.104
	22	Line current	Phase 1	t1+100ms	p.u.	--	--	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			0.028	0.038	0.039	1.096
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.008	0.004	0.003	1.017
	26		Positive sequence			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--	--
	29		Total			1.010	1.014	1.010	0.996
	39	Active power rising time	Positive sequence	--	s	0.118	0.144	0.147	0.070
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--	--
	32		Total			-0.025	0.312	-0.313	-0.026
	33	Reactive power rising time	Positive sequence	--	s	0.118	9.229	9.354	0.070
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 1.3



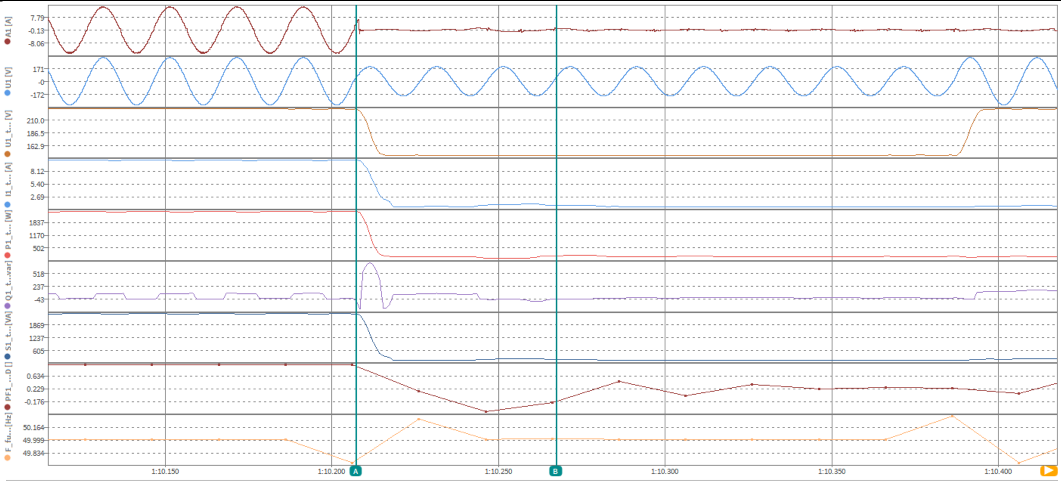
	A	B	间隔	有效值
时间 [s]	1:09.9071000	1:10.0804000	0.1733000	
A1 [A]	0.290680	0.277805	-0.012875	0.312910
U1 [V]	117.1134	131.8092	14.69588	141.5189
U1_tRMS_rc@GIRD [V]	149.0037	142.2630	-6.740662	142.5811
I1_tRMS_rc@GIRD [A]	0.258779	0.303458	0.044679	0.311371
P1_t_rc@GIRD [W]	-10.19631	17.55885	27.75515	11.55621
Q1_t_rc@GIRD [var]	37.18644	-39.43866	-76.62510	42.86165
S1_t_rc@GIRD [VA]	38.55899	43.17084	4.611851	44.39220
PF1_t@GIRD []	0.116911	0.237419	0.120509	0.211003
F_fund@GIRD [Hz]	49.68658	50.31318	0.626598	50.03220

Empty load



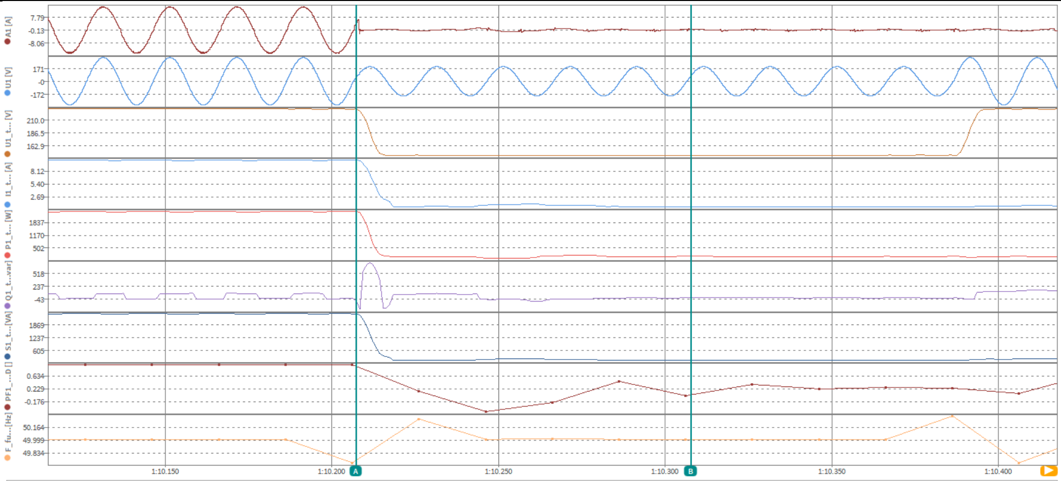
	A	B	间隔	有效值
时间 [s]	1:10.1072000	1:10.2072000	0.1000000	
A1 [A]	3.492737	3.443527	-0.049210	10.47516
U1 [V]	65.63163	40.81178	-24.81985	230.0357
U1_tRMS_rc@GIRD [V]	230.1533	229.0121	-1.141220	230.1564
I1_tRMS_rc@GIRD [A]	10.52942	10.49034	-0.039083	10.47953
P1_t_rc@GIRD [W]	2422.795	2401.753	-21.04199	2411.220
Q1_t_rc@GIRD [var]	-53.33752	-56.41064	-3.073120	58.97837
S1_t_rc@GIRD [VA]	2423.382	2402.416	-20.96655	2411.942
PF1_t@GIRD []	0.999742	0.999688	-5.323e-5	0.999698
F_fund@GIRD [Hz]	49.99976	49.68518	-0.314579	49.94765

Before dip (t1-100ms)



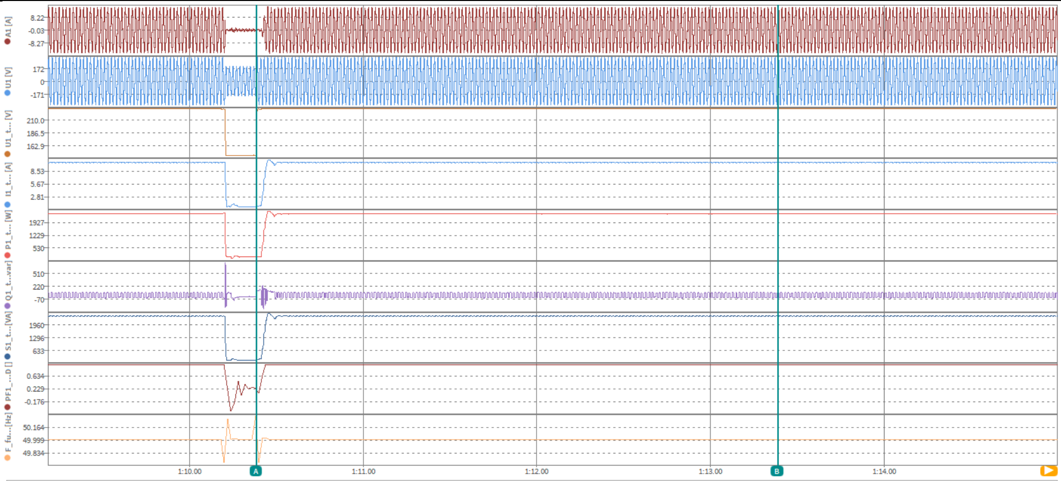
	A	B	间隔	有效值
时间 [s]	1:10.2074000	1:10.2674000	0.0600000	
A1 [A]	3.884411	0.756455	-3.127957	0.869505
U1 [V]	52.87576	51.35370	-1.522064	142.2495
U1_tRMS_rc@GIRD [V]	229.0121	142.4001	-86.61198	152.0502
I1_tRMS_rc@GIRD [A]	10.49034	0.581718	-9.908624	3.240849
P1_t_rc@GIRD [W]	2401.753	50.28389	-2351.469	653.9430
Q1_t_rc@GIRD [var]	-56.41064	-65.82903	-9.418388	216.8119
S1_t_rc@GIRD [VA]	2402.416	82.83678	-2319.579	688.9477
PF1_t@GIRD []	0.999688	-0.240844	-1.240533	0.584660
F_fund@GIRD [Hz]	49.68518	50.00818	0.322998	49.99085

During dip (t1+60ms)



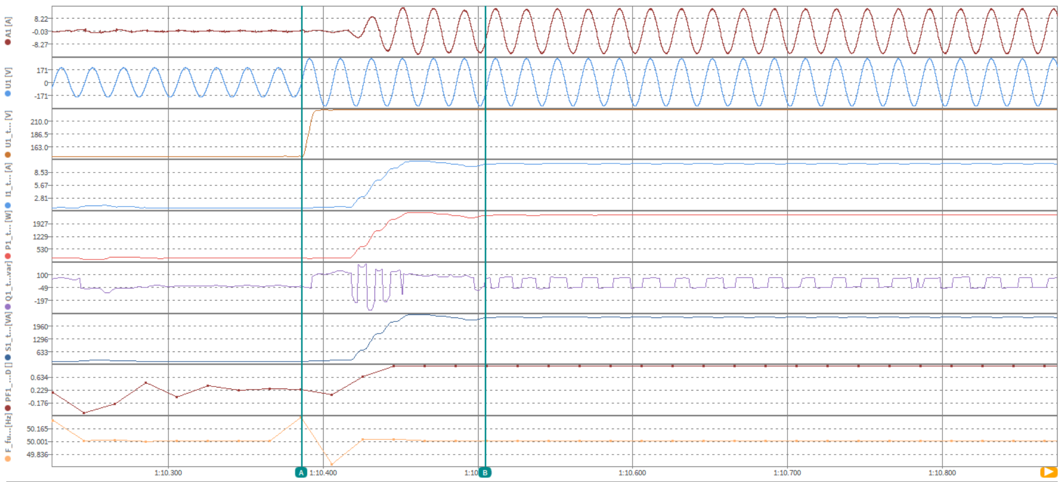
	A	B	间隔	有效值
时间 [s]	1:10.2074000	1:10.3078000	0.1004000	
A1 [A]	3.884411	0.155067	-3.729344	0.721642
U1 [V]	52.87576	75.32573	22.44997	142.1007
U1_tRMS_rc@GIRD [V]	229.0121	142.4549	-86.55717	148.2565
I1_tRMS_rc@GIRD [A]	10.49034	0.289727	-10.20061	2.521910
P1_t_rc@GIRD [W]	2401.753	19.54905	-2382.204	506.2286
Q1_t_rc@GIRD [var]	-56.41064	-36.34974	20.06091	170.8474
S1_t_rc@GIRD [VA]	2402.416	41.27310	-2361.142	534.2810
PF1_t@GIRD []	0.999688	-0.027163	-1.026851	0.510643
F_fund@GIRD [Hz]	49.68518	50.00191	0.316730	49.99346

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:10.3864000	1:13.3866000	3.0002000	
A1 [A]	0.182247	-0.843144	-1.025391	10.39550
U1 [V]	-10.77366	2.666235	13.43989	230.1514
U1_tRMS_rc@GIRD [V]	143.1086	230.1525	87.04381	230.0103
I1_tRMS_rc@GIRD [A]	0.325563	10.53307	10.20751	10.38470
P1_t_rc@GIRD [W]	16.59615	2423.445	2406.849	2389.360
Q1_t_rc@GIRD [var]	-43.53476	-61.01434	-17.47958	62.90953
S1_t_rc@GIRD [VA]	46.59085	2424.213	2377.622	2390.188
PF1_t@GIRD []	0.236817	0.999705	0.762888	0.991194
F_fund@GIRD [Hz]	50.31319	50.00006	-0.313129	50.00033

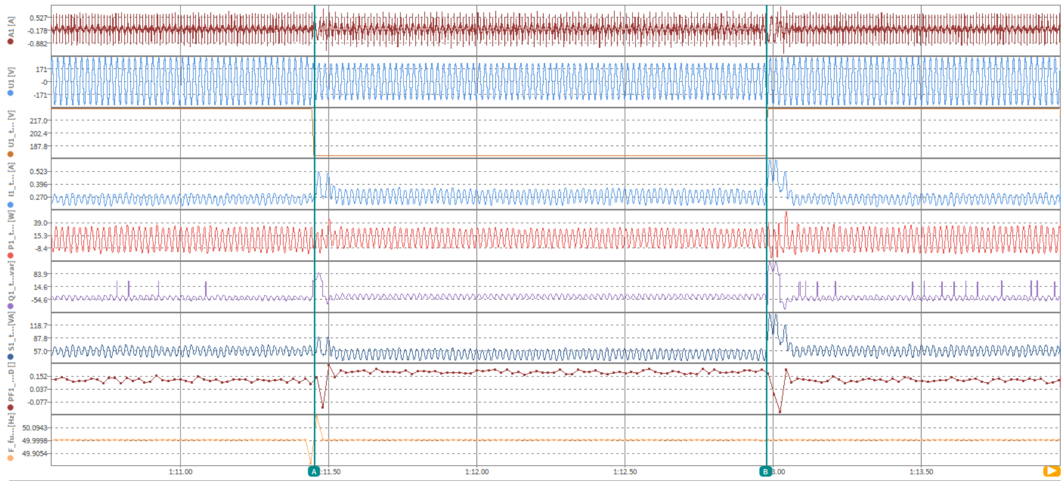
After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:10.3864000	1:10.5049000	0.1185000	
A1 [A]	0.182247	-7.475853	-7.658101	8.231253
U1 [V]	-10.77366	-162.4673	-151.6936	231.2844
U1_tRMS_rc@GIRD [V]	143.1086	230.2299	87.12125	226.3301
I1_tRMS_rc@GIRD [A]	0.325563	10.29452	9.968956	7.843942
P1_t_rc@GIRD [W]	16.59615	2369.592	2352.996	1801.306
Q1_t_rc@GIRD [var]	-43.53476	-49.35997	-5.825214	131.8738
S1_t_rc@GIRD [VA]	46.59085	2370.106	2323.515	1806.127
PF1_t@GIRD []	0.236817	0.999449	0.762633	0.757328
F_fund@GIRD [Hz]	50.31319	49.99705	-0.316139	50.00813

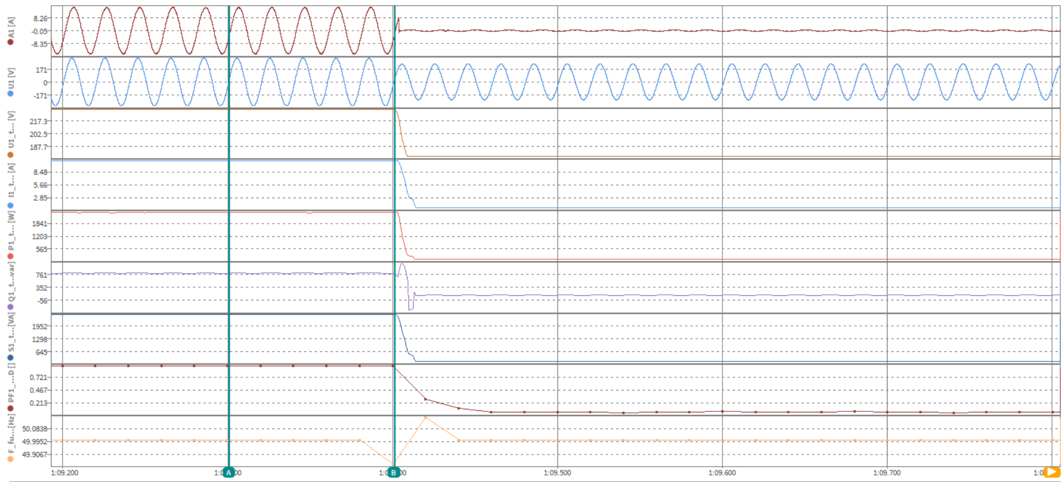
Recovery time

Graph of Test number 2.3



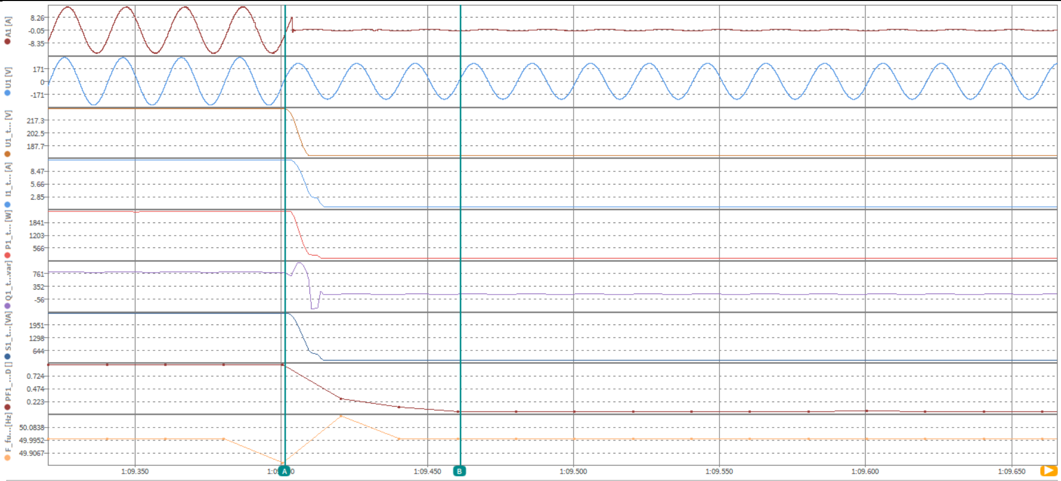
	A	B	间隔
时间 [s]	1:11.454700	1:12.977000	1.522300
A1 [A]	0.357628	-0.714970	-1.072598
U1 [V]	116.2772	-75.26756	-191.5448
U1_tRMS_rc@GIRD [V]	179.8141	174.8315	-4.982651
I1_tRMS_rc@GIRD [A]	0.233846	0.264903	0.031057
P1_t_rc@GIRD [W]	-8.805617	-10.76838	-1.962758
Q1_t_rc@GIRD [var]	41.11649	-45.04419	-86.16068
S1_t_rc@GIRD [VA]	42.04884	46.31346	4.264622
PF1_t@GIRD []	0.082404	0.208857	0.126453
F_fund@GIRD [Hz]	49.81991	49.99650	0.176590

Empty load



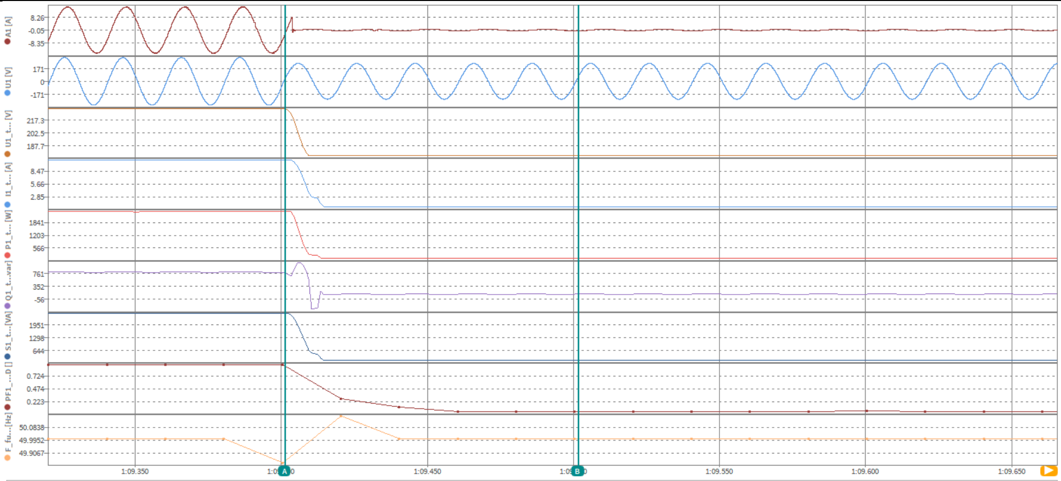
	A	B	间隔	有效值
时间 [s]	1:09.301200	1:09.401300	0.100100	
A1 [A]	-2.958422	-2.278929	0.679493	10.93321
U1 [V]	36.05744	34.96835	-1.089096	230.5240
U1_tRMS_rc@GIRD [V]	230.7335	230.7356	2.075e-3	230.7506
I1_tRMS_rc@GIRD [A]	11.00744	10.99764	-9.806e-3	10.94496
P1_t_rc@GIRD [W]	2415.321	2413.255	-2.065674	2399.031
Q1_t_rc@GIRD [var]	785.3275	784.4371	-0.890442	789.3491
S1_t_rc@GIRD [VA]	2539.786	2537.546	-2.239746	2525.554
PF1_t@GIRD []	0.949907	0.949688	-2.189e-4	0.949847
F_fund@GIRD [Hz]	50.00007	49.82658	-0.173489	49.97115

Before dip (t1-100ms)



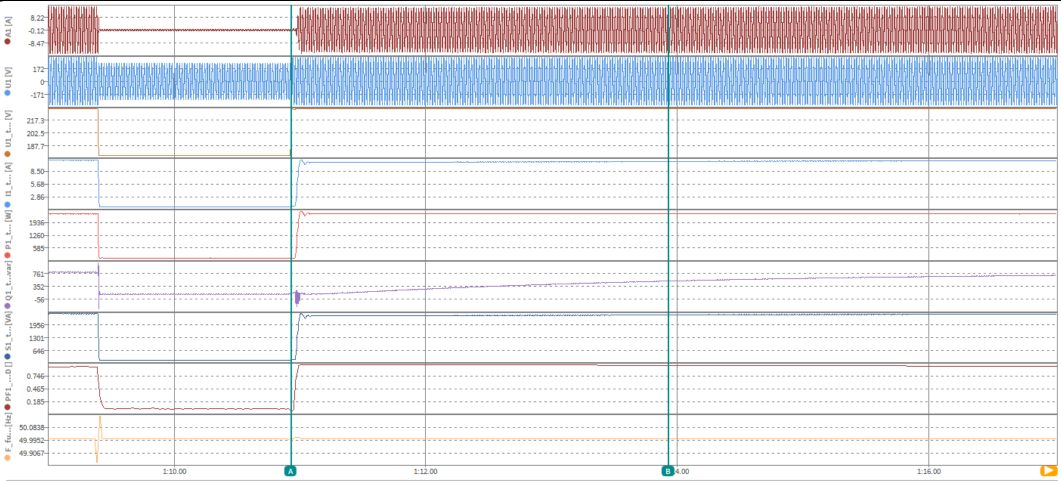
	A	B	间隔	有效值
时间 [s]	1:09.401300	1:09.461300	0.060000	
A1 [A]	-2.278929	-0.594740	1.684189	1.052058
U1 [V]	34.96835	34.35656	-0.611782	174.3834
U1_tRMS_rc@GIRD [V]	230.7356	174.5557	-56.17987	180.4092
I1_tRMS_rc@GIRD [A]	10.99764	0.400698	-10.59694	3.760398
P1_t_rc@GIRD [W]	2413.255	10.32519	-2402.930	725.4656
Q1_t_rc@GIRD [var]	784.4371	69.17784	-715.2592	367.6538
S1_t_rc@GIRD [VA]	2537.546	69.94415	-2467.602	813.3079
PF1_t@GIRD []	0.949688	8.870e-3	-0.940818	0.494349
F_fund@GIRD [Hz]	49.82658	49.99979	0.173210	49.99782

During dip (t1+60ms)



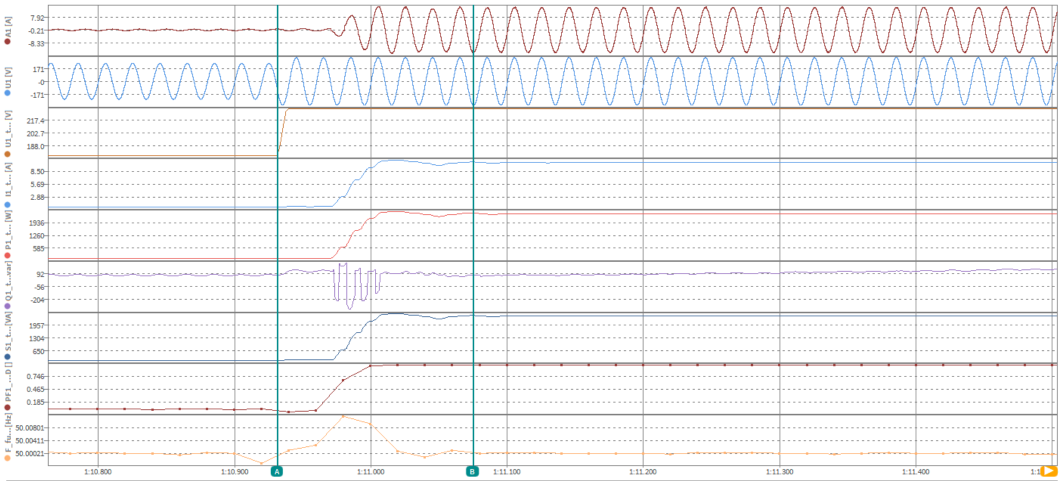
	A	B	间隔	有效值
时间 [s]	1:09.401300	1:09.501700	0.100400	
A1 [A]	-2.278929	-0.597601	1.681328	0.852200
U1 [V]	34.96835	64.16604	29.19769	174.1506
U1_tRMS_rc@GIRD [V]	230.7356	174.6044	-56.13121	178.1241
I1_tRMS_rc@GIRD [A]	10.99764	0.396269	-10.60137	2.933110
P1_t_rc@GIRD [W]	2413.255	10.73296	-2402.522	563.8130
Q1_t_rc@GIRD [var]	784.4371	68.35281	-716.0843	289.0151
S1_t_rc@GIRD [VA]	2537.546	69.19033	-2468.356	633.5730
PF1_t@GIRD []	0.949688	9.449e-3	-0.940239	0.403653
F_fund@GIRD [Hz]	49.82658	50.00008	0.173500	49.99859

During dip (t1+100ms)



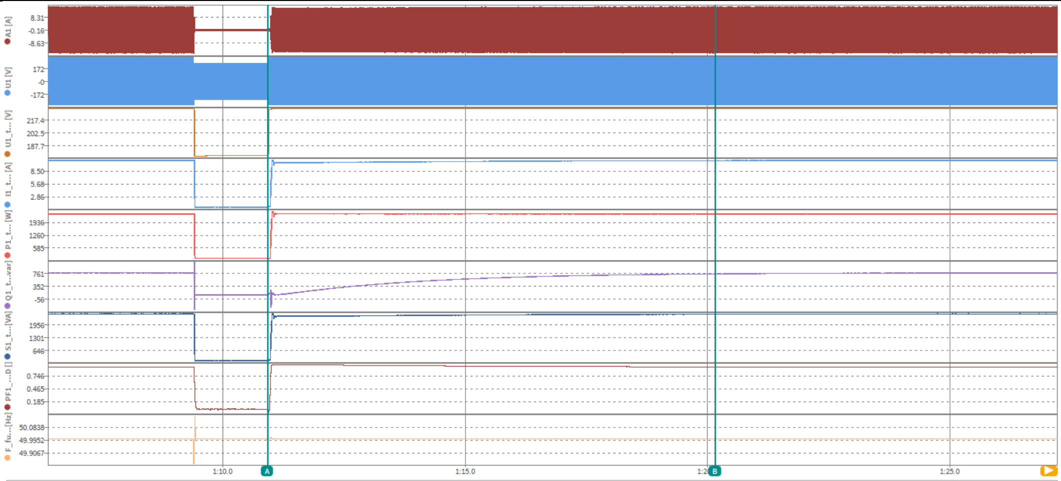
	A	B	间隔	有效值
时间 [s]	1:10.9317000	1:13.9320000	3.0003000	
A1 [A]	0.642176	-2.288942	-2.931118	10.42278
U1 [V]	-84.75188	-114.6126	-29.86074	230.6802
U1_tRMS_rc@GIRD [V]	174.7267	230.7444	56.01775	230.6008
I1_tRMS_rc@GIRD [A]	0.397760	10.58558	10.18782	10.41234
P1_t_rc@GIRD [W]	-9.687176	2390.087	2399.774	2380.220
Q1_t_rc@GIRD [var]	68.82082	503.5857	434.7648	324.0661
S1_t_rc@GIRD [VA]	69.49926	2442.563	2373.064	2402.180
PF1_t@GIRD []	7.283e-3	0.979346	0.972063	0.979171
F_fund@GIRD [Hz]	49.99669	49.99969	3.002e-3	50.00002

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:10.9317000	1:11.0752000	0.1435000	
A1 [A]	0.642176	-14.73392	-15.37609	8.154292
U1 [V]	-84.75188	-319.5663	-234.8144	230.5374
U1_tRMS_rc@GIRD [V]	174.7267	230.6327	55.90598	228.4906
I1_tRMS_rc@GIRD [A]	0.397760	10.55716	10.15940	7.901744
P1_t_rc@GIRD [W]	-9.687176	2433.820	2443.507	1817.779
Q1_t_rc@GIRD [var]	68.82082	70.00069	1.179871	127.9890
S1_t_rc@GIRD [VA]	69.49926	2434.826	2365.327	1822.279
PF1_t@GIRD []	7.283e-3	0.999297	0.992014	0.741378
F_fund@GIRD [Hz]	49.99669	50.00083	4.143e-3	50.00256

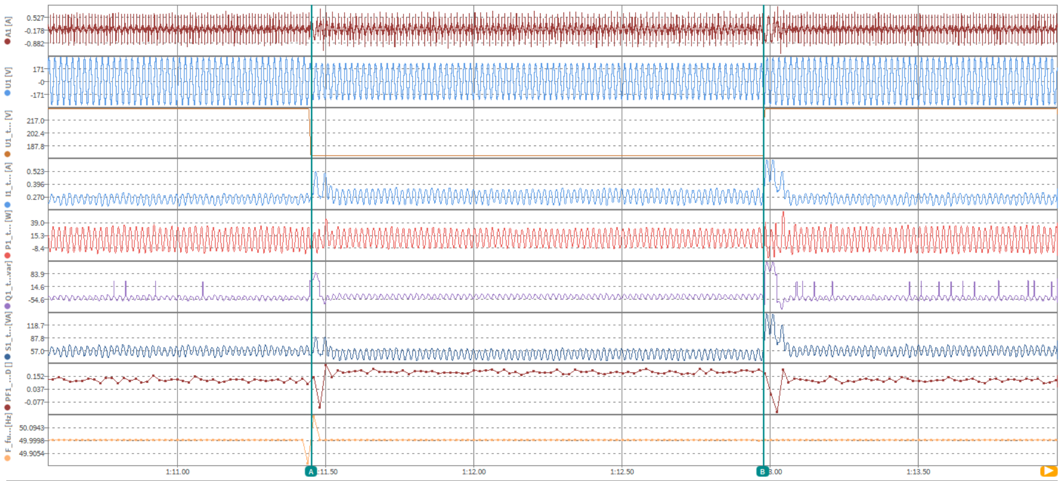
Recovery time-P



	A	B	间隔	有效值
时间 [s]	1:10.9317000	1:20.1610000	9.2293000	
A1 [A]	0.642176	-4.239683	-4.881859	10.68064
U1 [V]	-84.75188	13.44535	98.19723	230.7327
U1_tRMS_rc@GIRD [V]	174.7267	230.7314	56.00471	230.6956
I1_tRMS_rc@GIRD [A]	0.397760	10.92783	10.53007	10.67636
P1_t_rc@GIRD [W]	-9.687176	2407.704	2417.392	2393.897
Q1_t_rc@GIRD [var]	68.82082	748.5860	679.7652	580.8505
S1_t_rc@GIRD [VA]	69.49926	2521.393	2451.894	2463.358
PF1_t@GIRD []	7.283e-3	0.954094	0.946811	0.968474
F_fund@GIRD [Hz]	49.99669	49.99971	3.021e-3	49.99995

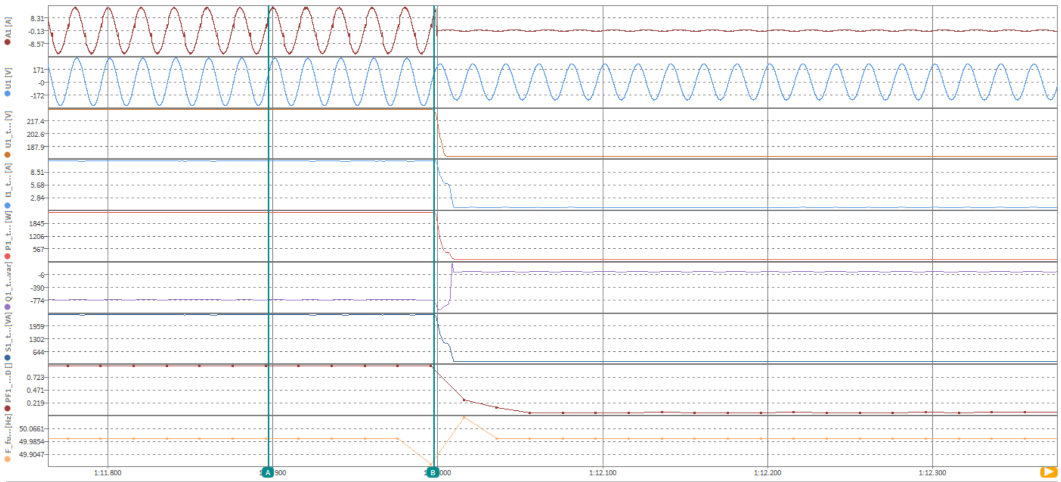
Recovery time-Q

Graph of Test number 3.3



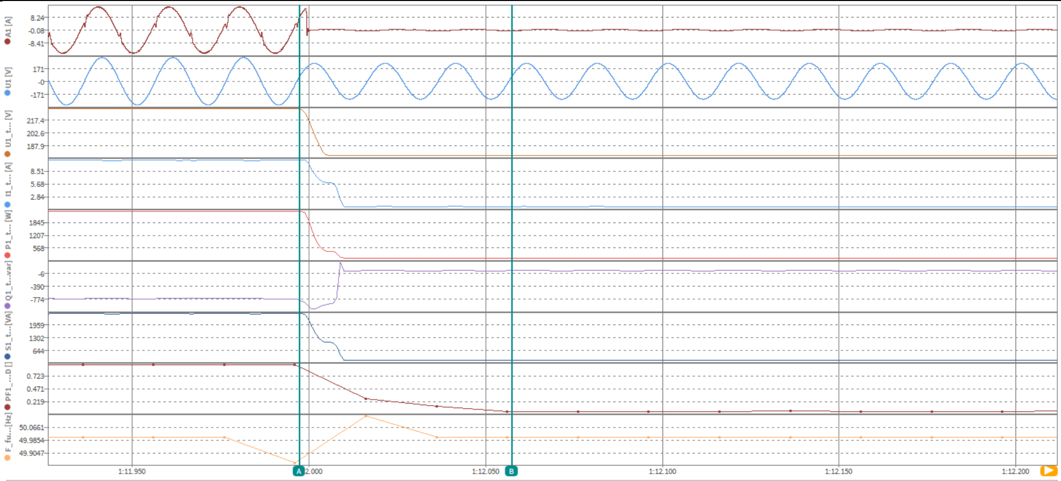
	A	B	间隔
时间 [s]	1:11.454700	1:12.977000	1.522300
A1 [A]	0.357628	-0.714970	-1.072598
U1 [V]	116.2772	-75.26756	-191.5448
U1_tRMS_rc@GIRD [V]	179.8141	174.8315	-4.982651
I1_tRMS_rc@GIRD [A]	0.233846	0.264903	0.031057
P1_t_rc@GIRD [W]	-8.805617	-10.76838	-1.962758
Q1_t_rc@GIRD [var]	41.11649	-45.04419	-86.16068
S1_t_rc@GIRD [VA]	42.04884	46.31346	4.264622
PF1_t@GIRD []	0.082404	0.208857	0.126453
F_fund@GIRD [Hz]	49.81991	49.99650	0.176590

Empty load



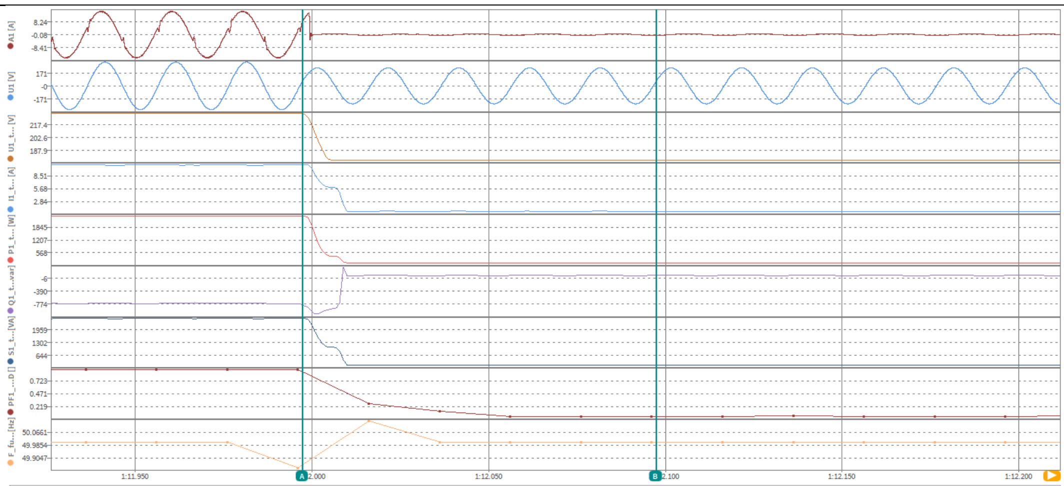
	A	B	间隔	有效值
时间 [s]	1:11.897500	1:11.997600	0.100100	
A1 [A]	9.454604	9.667273	0.212669	10.97515
U1 [V]	99.97556	83.91139	-16.06417	230.4849
U1_tRMS_rc@GIRD [V]	230.6944	230.6156	-0.078766	230.7129
I1_tRMS_rc@GIRD [A]	11.03821	11.07589	0.037685	10.97681
P1_t_rc@GIRD [W]	2418.556	2421.226	2.670410	2405.819
Q1_t_rc@GIRD [var]	-796.8739	-813.6199	-16.74603	790.9125
S1_t_rc@GIRD [VA]	2546.453	2554.274	7.821045	2532.491
PF1_t@GIRD []	0.949672	0.949270	-4.027e-4	0.949887
F_fund@GIRD [Hz]	50.00003	49.83162	-0.168411	49.97193

Before dip (t1-100ms)



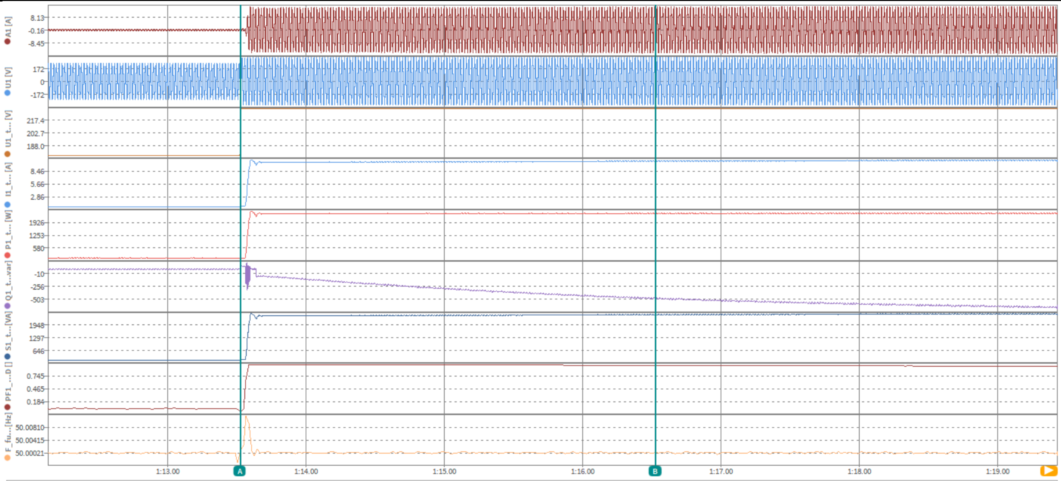
	A	B	间隔	有效值
时间 [s]	1:11.997400	1:12.057500	0.060100	
A1 [A]	9.306308	-0.624780	-9.931088	2.253561
U1 [V]	68.71864	74.85506	6.136418	174.5638
U1_tRMS_rc@GIRD [V]	230.6156	174.8276	-55.78796	179.8782
I1_tRMS_rc@GIRD [A]	11.07589	0.402508	-10.67339	3.654963
P1_t_rc@GIRD [W]	2421.226	8.083597	-2413.143	639.2456
Q1_t_rc@GIRD [var]	-813.6199	69.90369	883.5236	432.2955
S1_t_rc@GIRD [VA]	2554.274	70.36953	-2483.904	771.6957
PF1_t@GIRD []	0.949270	-6.094e-3	-0.955363	0.494316
F_fund@GIRD [Hz]	49.83162	49.99964	0.168022	49.99282

During dip (t1+60ms)



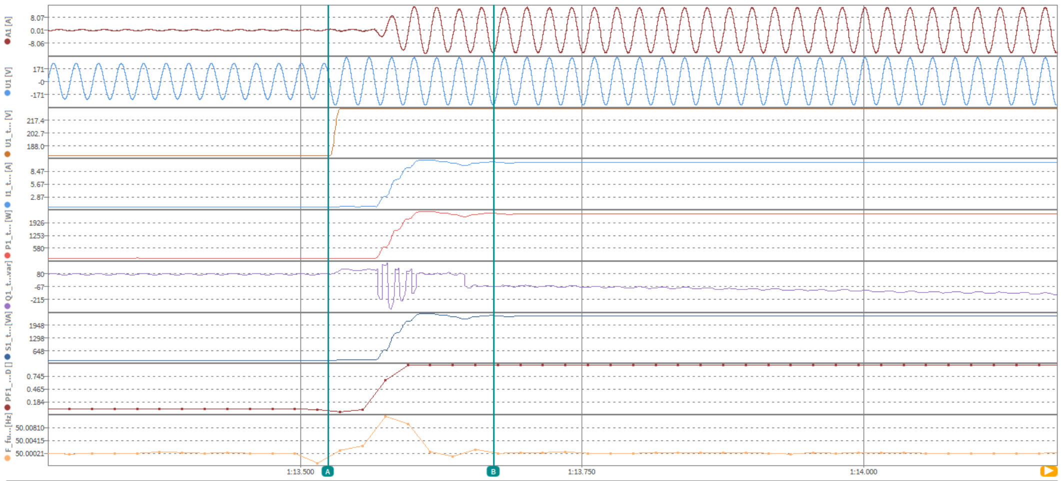
	A	B	间隔	有效值
时间 [s]	1:11.997400	1:12.097400	0.100000	
A1 [A]	9.306308	-0.592832	-9.899140	1.765476
U1 [V]	68.71864	67.22948	-1.489163	174.7359
U1_tRMS_rc@GIRD [V]	230.6156	174.7979	-55.81766	177.8920
I1_tRMS_rc@GIRD [A]	11.07589	0.401509	-10.67438	2.851434
P1_t_rc@GIRD [W]	2421.226	8.309842	-2412.916	496.8042
Q1_t_rc@GIRD [var]	-813.6199	69.68934	883.3093	338.7674
S1_t_rc@GIRD [VA]	2554.274	70.18302	-2484.091	601.3134
PF1_t@GIRD []	0.949270	-1.423e-3	-0.950693	0.403613
F_fund@GIRD [Hz]	49.83162	50.00018	0.168560	49.99526

During dip (t1+100ms)



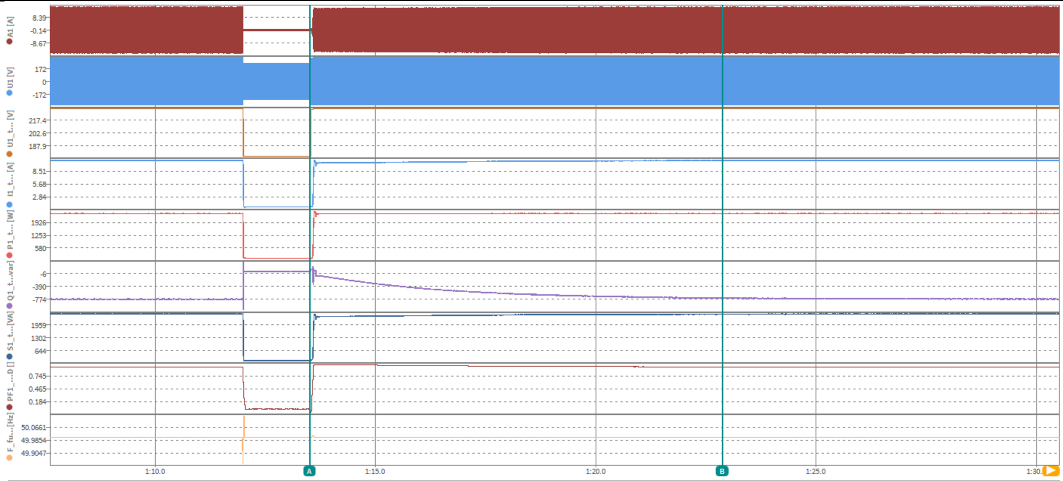
	A	B	间隔	有效值
时间 [s]	1:13.524900	1:16.526600	3.001700	
A1 [A]	0.424261	-0.788812	-1.213074	10.40964
U1 [V]	120.3227	-6.507906	-126.8306	230.5922
U1_tRMS_rc@GIRD [V]	174.7276	230.7036	55.97597	230.5263
I1_tRMS_rc@GIRD [A]	0.423093	10.59324	10.17014	10.40000
P1_t_rc@GIRD [W]	-5.142409	2391.938	2397.080	2375.741
Q1_t_rc@GIRD [var]	73.74693	-501.2672	-575.0141	332.7811
S1_t_rc@GIRD [VA]	73.92600	2443.897	2369.971	2398.935
PF1_t@GIRD []	-5.883e-3	0.978308	0.984190	0.978684
F_fund@GIRD [Hz]	49.99664	49.99979	3.151e-3	50.00010

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:13.524900	1:13.671700	0.146800	
A1 [A]	0.424261	-14.42683	-14.85109	8.107873
U1 [V]	120.3227	-325.4707	-445.7934	229.3911
U1_tRMS_rc@GIRD [V]	174.7276	230.6090	55.88138	227.7618
I1_tRMS_rc@GIRD [A]	0.423093	10.51950	10.09641	7.824926
P1_t_rc@GIRD [W]	-5.142409	2424.742	2429.884	1800.093
Q1_t_rc@GIRD [var]	73.74693	-74.66094	-148.4079	124.3802
S1_t_rc@GIRD [VA]	73.92600	2425.891	2351.965	1804.385
PF1_t@GIRD []	-5.883e-3	0.999296	1.005179	0.741943
F_fund@GIRD [Hz]	49.99664	50.00116	4.520e-3	50.00263

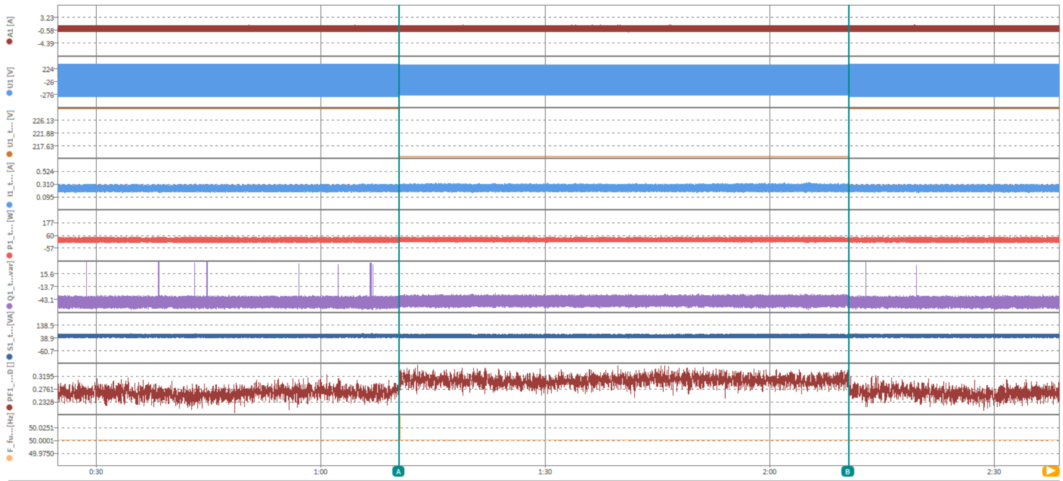
Recovery time-P



	A	B	间隔	有效值
时间 [s]	1:13.524900	1:22.879000	9.354100	
A1 [A]	0.424261	13.80622	13.38196	10.69765
U1 [V]	120.3227	229.1655	108.8429	230.6485
U1_tRMS_rc@GIRD [V]	174.7276	230.6953	55.96771	230.6453
I1_tRMS_rc@GIRD [A]	0.423093	10.95457	10.53148	10.69474
P1_t_rc@GIRD [W]	-5.142409	2412.905	2418.047	2395.853
Q1_t_rc@GIRD [var]	73.74693	-751.3091	-825.0561	588.9537
S1_t_rc@GIRD [VA]	73.92600	2527.168	2453.242	2467.180
PF1_t@GIRD []	-5.883e-3	0.953986	0.959869	0.967866
F_fund@GIRD [Hz]	49.99664	49.99964	3.002e-3	49.99999

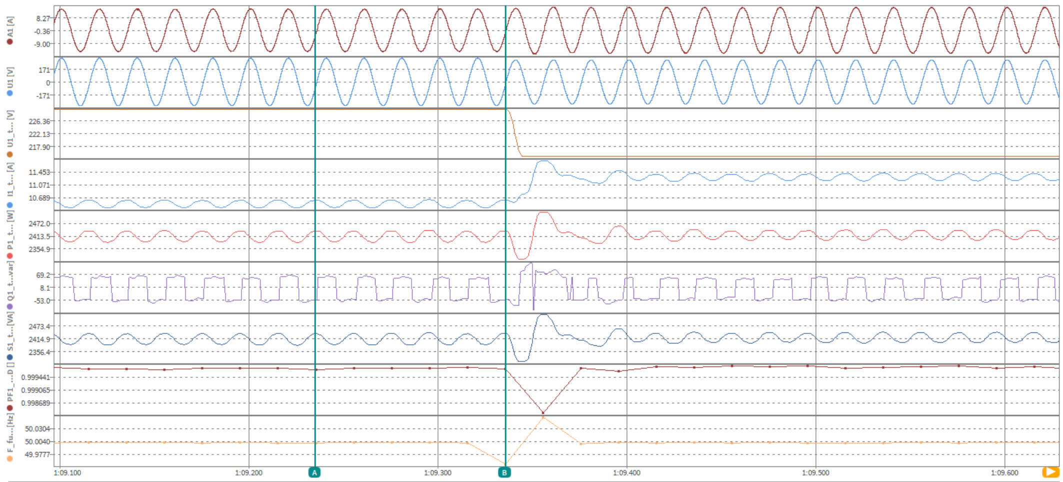
Recovery time-Q

Graph of Test number 4.3



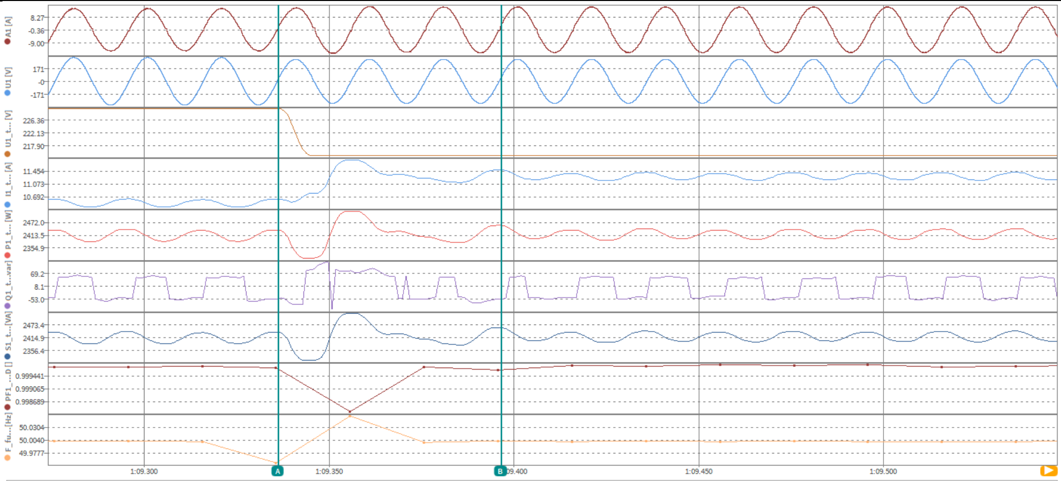
	A	B	间隔	有效值
时间 [s]	1:10.51150	2:10.52760	1:00.01610	
A1 [A]	-0.167370	-0.131893	0.035477	0.247264
U1 [V]	24.74451	291.0500	266.3055	213.8333
U1_tRMS_rc@GIRD [V]	213.8252	213.8430	0.017807	213.8323
I1_tRMS_rc@GIRD [A]	0.197113	0.199565	2.451e-3	0.247261
P1_t_rc@GIRD [W]	-2.989685	15.14769	18.13737	21.17503
Q1_t_rc@GIRD [var]	-42.04161	-39.89669	2.144913	48.44714
S1_t_rc@GIRD [VA]	42.14777	42.67551	0.527733	52.87256
PF1_t@GIRD []	0.302399	0.320572	0.018173	0.305874
F_fund@GIRD [Hz]	49.95232	49.99944	0.047119	50.00003

Empty load



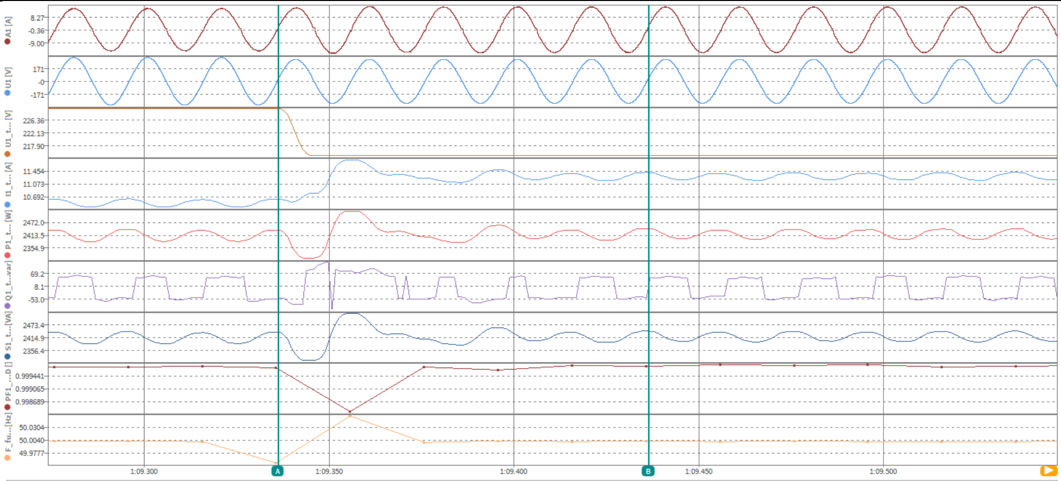
	A	B	间隔	有效值
时间 [s]	1:09.23500	1:09.33550	0.10050	
A1 [A]	-5.201340	-2.909661	2.291680	10.44467
U1 [V]	-112.4816	-63.23123	49.25037	229.5853
U1_tRMS_rc@GIRD [V]	230.1694	230.1762	6.790e-3	230.1683
I1_tRMS_rc@GIRD [A]	10.57026	10.58641	0.016148	10.47278
P1_t_rc@GIRD [W]	2432.280	2436.032	3.752686	2409.867
Q1_t_rc@GIRD [var]	-57.17382	-58.72008	-1.546261	55.35374
S1_t_rc@GIRD [VA]	2432.951	2436.740	3.788574	2410.502
PF1_t@GIRD []	0.999694	0.999723	2.861e-5	0.999693
F_fund@GIRD [Hz]	49.99967	49.99971	4.196e-5	49.99997

Before dip (t1-100ms)



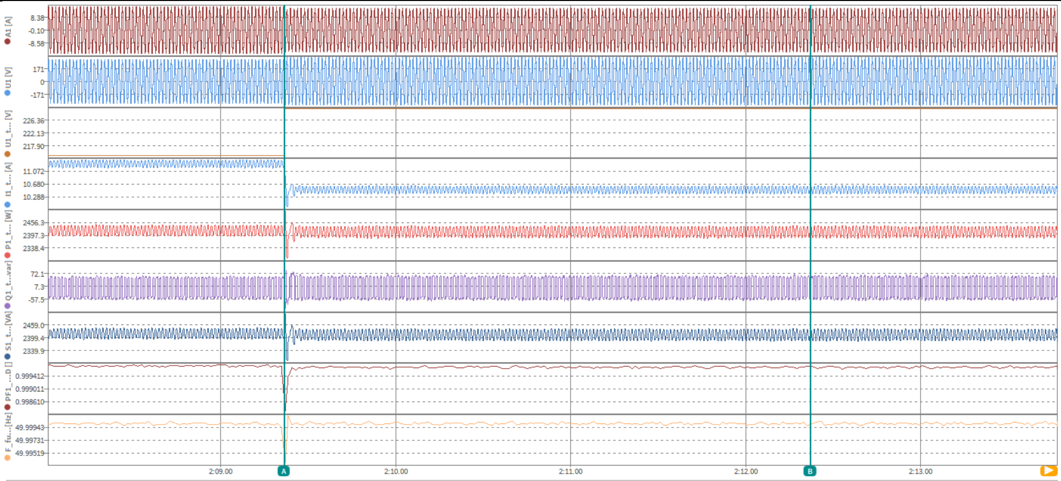
	A	B	间隔	有效值
时间 [s]	1:09.33630	1:09.39660	0.06030	
A1 [A]	0.155926	2.846718	2.690792	11.25528
U1 [V]	16.36553	46.26990	29.90437	213.4033
U1_tRMS_rc@GIRD [V]	230.1777	214.0936	-16.08411	215.5914
I1_tRMS_rc@GIRD [A]	10.58820	11.48635	0.898152	11.21861
P1_t_rc@GIRD [W]	2436.442	2458.478	22.03589	2415.632
Q1_t_rc@GIRD [var]	-59.47068	-57.70065	1.770031	72.90811
S1_t_rc@GIRD [VA]	2437.168	2459.155	21.98706	2416.732
PF1_t@GIRD []	0.999689	0.999614	-7.522e-5	0.999339
F_fund@GIRD [Hz]	49.95385	50.00086	0.047009	50.00175

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:09.33630	1:09.43650	0.10020	
A1 [A]	0.155926	2.166081	2.010155	11.27259
U1 [V]	16.36553	37.01377	20.64824	213.7811
U1_tRMS_rc@GIRD [V]	230.1777	214.1022	-16.07556	215.0002
I1_tRMS_rc@GIRD [A]	10.58820	11.40764	0.819437	11.24706
P1_t_rc@GIRD [W]	2436.442	2441.879	5.436768	2416.035
Q1_t_rc@GIRD [var]	-59.47068	-50.44679	9.023891	65.38582
S1_t_rc@GIRD [VA]	2437.168	2442.400	5.231934	2416.920
PF1_t@GIRD []	0.999689	0.999730	4.041e-5	0.999473
F_fund@GIRD [Hz]	49.95385	50.00052	0.046669	50.00113

During dip (t1+100ms)



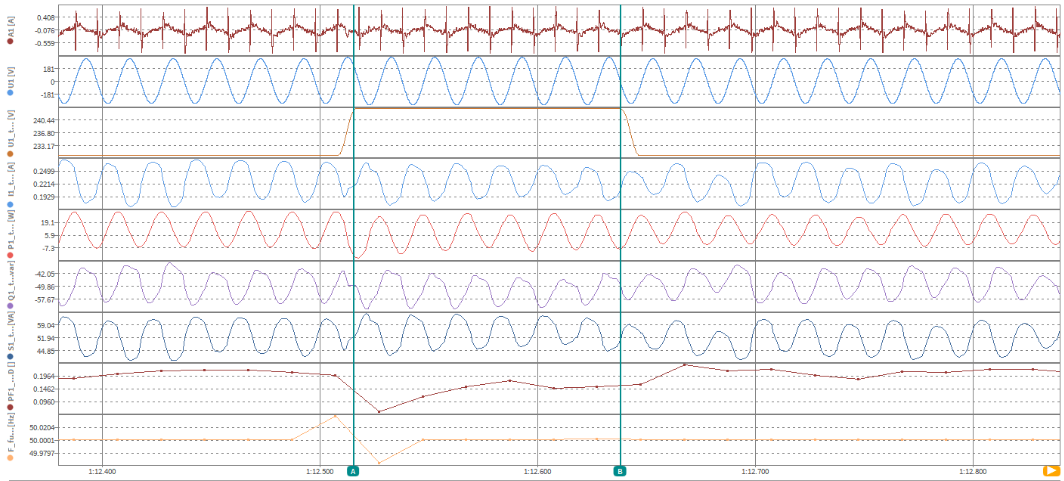
	A	B	间隔	有效值
时间 [s]	2:09.3662000	2:12.3700000	3.0038000	
A1 [A]	0.663471	-14.05163	-14.71510	10.47069
U1 [V]	-7.275343	-306.0639	-298.7886	230.1347
U1_tRMS_rc@GIRD [V]	214.0861	230.1800	16.09386	230.1429
I1_tRMS_rc@GIRD [A]	11.17104	10.40736	-0.763680	10.47350
P1_t_rc@GIRD [W]	2391.100	2394.740	3.639160	2409.679
Q1_t_rc@GIRD [var]	47.06989	-62.88302	-109.9529	57.26934
S1_t_rc@GIRD [VA]	2391.564	2395.565	4.001221	2410.359
PF1_t@GIRD []	0.999718	0.999711	-6.914e-6	0.999674
F_fund@GIRD [Hz]	49.99942	49.99963	2.098e-4	49.99997

After dip (t2+3s)

Verification of dynamic network support										P
Short-circuited power at generator terminal [VA]		6K								
NS protection settings		See table 5.5 for detail.								
	No.	Parameter	Phase ref.	Time ref.	unit	Result				
General Info.	0	Test number	--	--	--	5.3	6.3	7.3	1.4	
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025				
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph				
	3	Fault type (phase)	--	--		D1	D1	D1	D1	
	4	Setting voltage depth	Line to line	--	p.u.	1.25	1.20	1.15	0.15	
	5	Setting dip duration		--	ms	100	5000	60000	150	
	6	Point of fault entry	Total	--	ms	20ms				
	7	Point of fault clearance	Total	--	ms	20ms				
	8	Fault duration in empty load test	Total	--	ms	122.4	5020.5	60018	173.3	
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.060	1.050	1.040	0.620	
	10		Positive sequence		p.u.	--	--	--	--	
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00	1.00	
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--	--	
	13	Active power	Total	t1-10s to t1	p.u.	1.010	1.010	1.014	0.306	
	14		Positive sequence			--	--	--	--	
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.023	-0.023	-0.026	-0.019	
	16		Positive sequence			--	--	--	--	
	17	Cos$_{\varphi}$	--	t1-10s to t1	--	0.9997	0.9997	0.9997	0.9977	
During	18	Voltage	Phase 1	t1+100ms	p.u.	--	--	--	--	

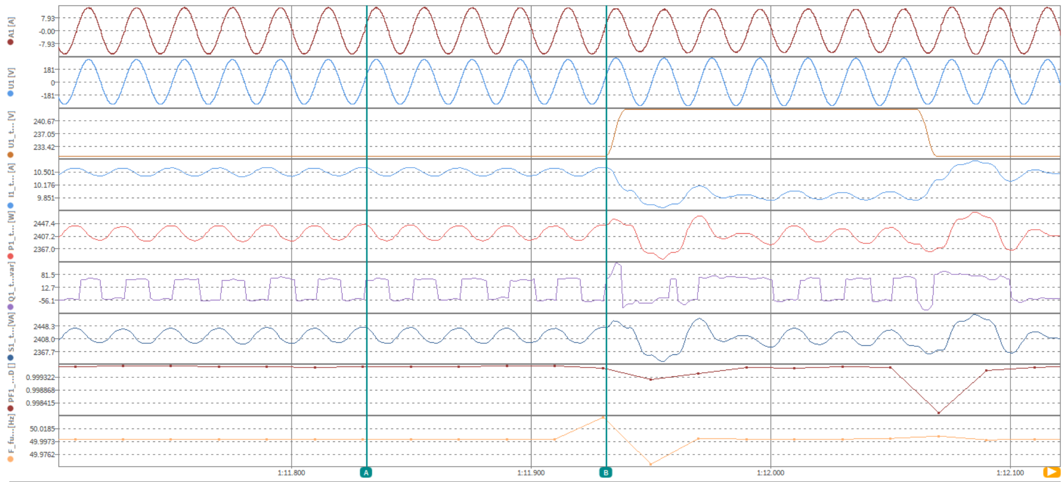
dip t1 to t2			Phase 2	to t2-20ms		--	--	--	--
			Phase 3			1.060	1.050	1.040	0.620
	19	Line current	Phase 1	t1+60ms	p.u.	--	--	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			0.952	0.960	0.973	0.053
	22	Line current	Phase 1	t1+100ms	p.u.	--	--	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			0.957	0.965	0.976	0.031
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.012	1.010	1.012	0.010
	26		Positive sequence			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--	--
	29		Total			0.997	1.002	1.001	0.306
	39	Active power rising time	Positive sequence	--	s	0.071	0.083	0.072	0.099
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--	--
	32		Total			0.021	-0.028	-0.001	-0.020
	33	Reactive power rising time	Positive sequence	--	s	0.071	0.083	0.072	0.099
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 5.3



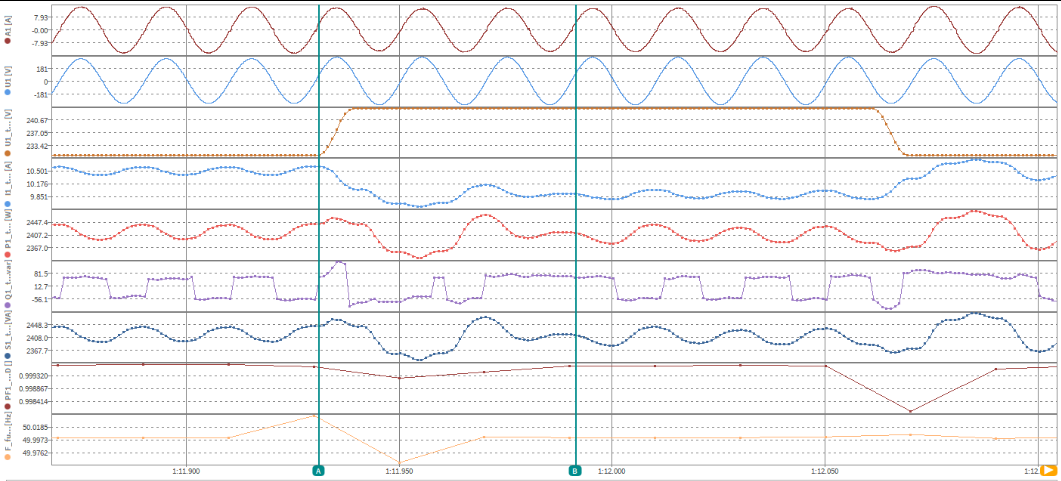
	A	B	间隔	有效值
时间 [s]	1:12.5156000	1:12.6380000	0.1224000	
A1 [A]	-0.078678	0.738430	0.817108	0.225366
U1 [V]	224.3648	-13.78274	-238.1475	241.9323
U1_tRMS_rc@GIRD [V]	242.7491	243.6949	0.945801	243.6948
I1_tRMS_rc@GIRD [A]	0.214396	0.198941	-0.015455	0.226231
P1_t_rc@GIRD [W]	-15.04700	-9.688038	5.358958	15.98517
Q1_t_rc@GIRD [var]	-49.82178	-47.50301	2.318775	52.76326
S1_t_rc@GIRD [VA]	52.04443	48.48086	-3.563564	55.13154
PF1_t@GIRD []	0.199301	0.152744	-0.046557	0.148650
F_fund@GIRD [Hz]	50.03879	50.00083	-0.037960	50.00009

Empty load



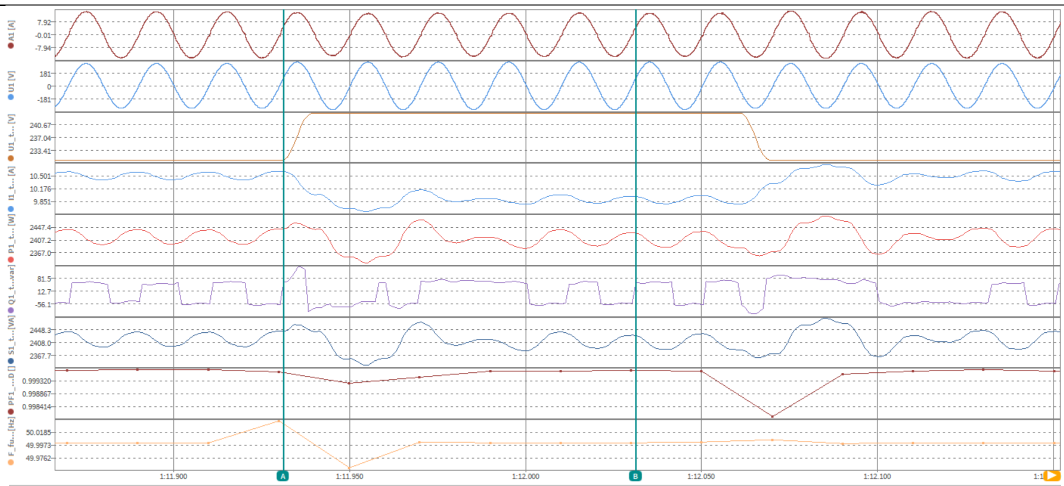
	A	B	间隔	有效值
时间 [s]	1:11.8313000	1:11.9313000	0.1000000	
A1 [A]	4.520989	4.495240	-0.025749	10.49235
U1 [V]	97.07142	102.4733	5.401850	230.0926
U1_tRMS_rc@GIRD [V]	230.1603	230.1635	3.250e-3	230.1774
I1_tRMS_rc@GIRD [A]	10.61565	10.60963	-6.025e-3	10.49818
P1_t_rc@GIRD [W]	2442.643	2441.074	-1.569092	2415.784
Q1_t_rc@GIRD [var]	-56.76357	-65.40509	-8.641521	56.46058
S1_t_rc@GIRD [VA]	2443.302	2441.950	-1.352295	2416.444
PF1_t@GIRD []	0.999702	0.999648	-5.394e-5	0.999700
F_fund@GIRD [Hz]	50.00011	50.03764	0.037529	50.00633

Before dip (t1-100ms)



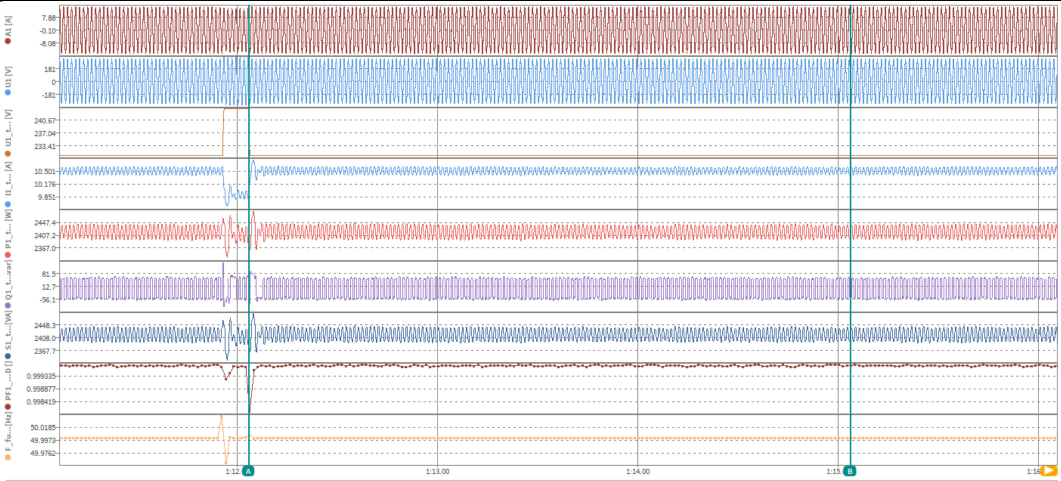
	A	B	间隔	有效值
时间 [s]	1:11.9313000	1:11.9915000	0.0602000	
A1 [A]	4.495240	4.885769	0.390530	9.841036
U1 [V]	102.4733	123.2719	20.79868	243.4656
U1_tRMS_rc@GIRD [V]	230.1635	243.9536	13.79002	242.7763
I1_tRMS_rc@GIRD [A]	10.60963	9.900702	-0.708928	9.923666
P1_t_rc@GIRD [W]	2441.074	2414.539	-26.53467	2406.653
Q1_t_rc@GIRD [var]	-65.40509	61.07692	126.4820	74.09228
S1_t_rc@GIRD [VA]	2441.950	2415.312	-26.63843	2407.793
PF1_t@GIRD []	0.999648	0.999671	2.223e-5	0.999494
F_fund@GIRD [Hz]	50.03764	49.99940	-0.038239	49.99887

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:11.9313000	1:12.0314000	0.1001000	
A1 [A]	4.495240	4.507828	0.012589	9.858519
U1 [V]	102.4733	112.6301	10.15687	243.7416
U1_tRMS_rc@GIRD [V]	230.1635	243.9237	13.76013	243.2354
I1_tRMS_rc@GIRD [A]	10.60963	9.959407	-0.650223	9.902627
P1_t_rc@GIRD [W]	2441.074	2428.664	-12.40967	2406.795
Q1_t_rc@GIRD [var]	-65.40509	-57.09152	8.313572	68.56069
S1_t_rc@GIRD [VA]	2441.950	2429.335	-12.61499	2407.771
PF1_t@GIRD []	0.999648	0.999681	3.237e-5	0.999551
F_fund@GIRD [Hz]	50.03764	49.99983	-0.037811	49.99921

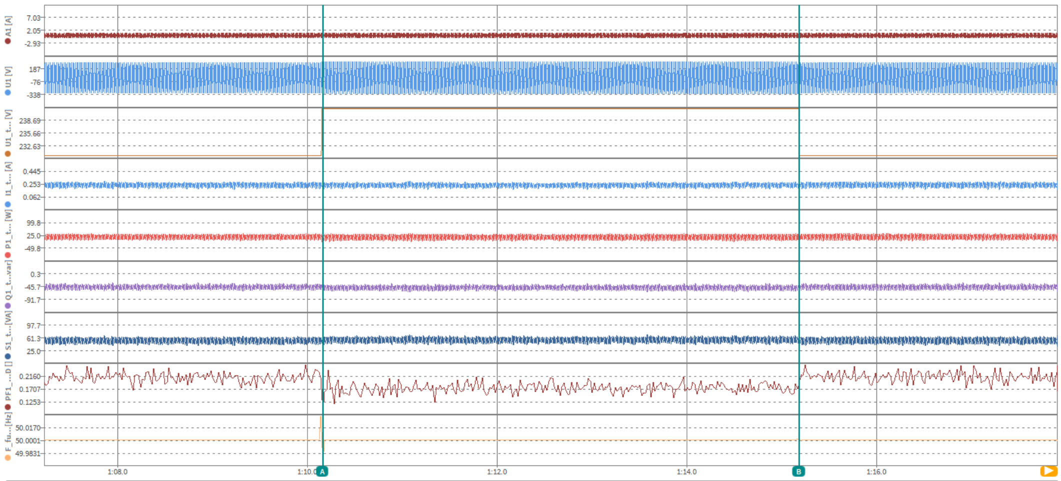
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:12.0596000	1:15.0610000	3.0014000	
A1 [A]	3.110218	-3.645516	-6.755734	10.49544
U1 [V]	79.07176	-68.23469	-147.3065	230.1210
U1_tRMS_rc@GIRD [V]	243.9306	230.1913	-13.73930	230.2060
I1_tRMS_rc@GIRD [A]	9.766737	10.39795	0.631208	10.49663
P1_t_rc@GIRD [W]	2381.552	2392.968	11.41626	2415.688
Q1_t_rc@GIRD [var]	63.80137	51.23812	-12.56324	56.53642
S1_t_rc@GIRD [VA]	2382.406	2393.516	11.11035	2416.350
PF1_t@GIRD []	0.999657	0.999719	6.193e-5	0.999690
F_fund@GIRD [Hz]	50.00078	50.00010	-6.790e-4	50.00005

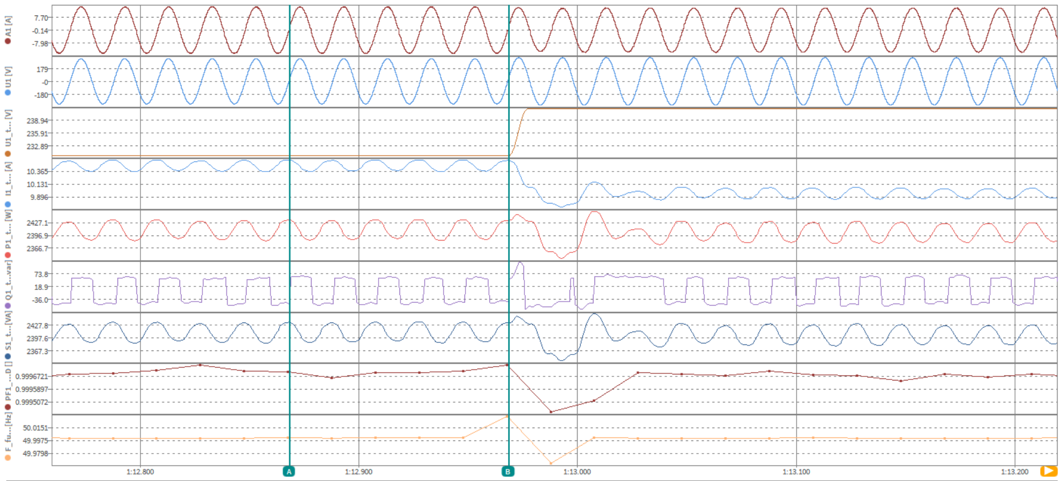
After dip (t2+3s)

Graph of Test number 6.3



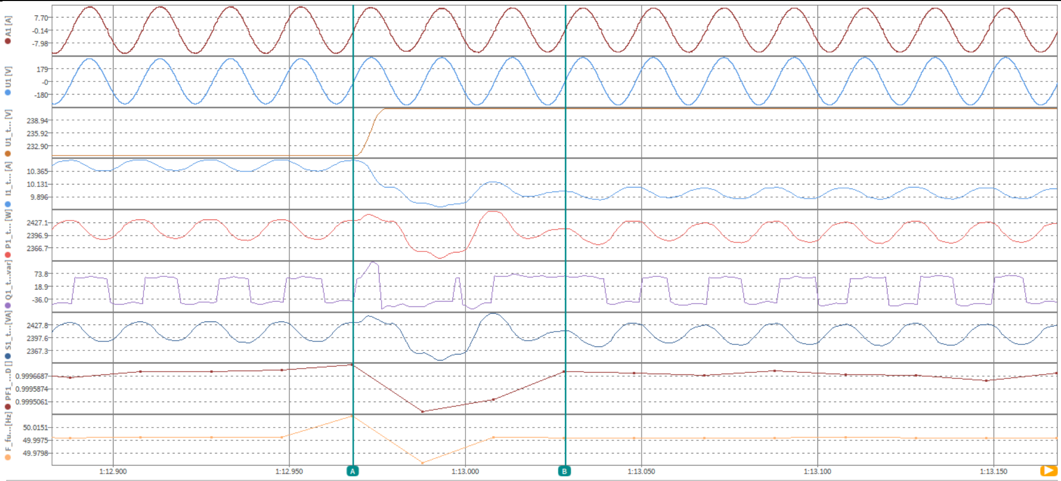
	A	B	间隔	有效值
时间 [s]	1:10.163000	1:15.183500	5.020500	
A1 [A]	-0.169086	-0.221729	-0.052643	0.225497
U1 [V]	126.3325	74.94379	-51.38874	241.4000
U1_tRMS_rc@GIRD [V]	241.2563	241.4081	0.151779	241.4118
I1_tRMS_rc@GIRD [A]	0.205338	0.195652	-9.686e-3	0.225505
P1_t_rc@GIRD [W]	-12.99863	-8.885441	4.113194	16.63975
Q1_t_rc@GIRD [var]	-47.80320	-46.38858	1.414623	51.83419
S1_t_rc@GIRD [VA]	49.53898	47.23189	-2.307091	54.43955
PF1_t@GIRD []	0.210279	0.168755	-0.041524	0.172831
F_fund@GIRD [Hz]	50.03234	50.00062	-0.031719	50.00000

Empty load



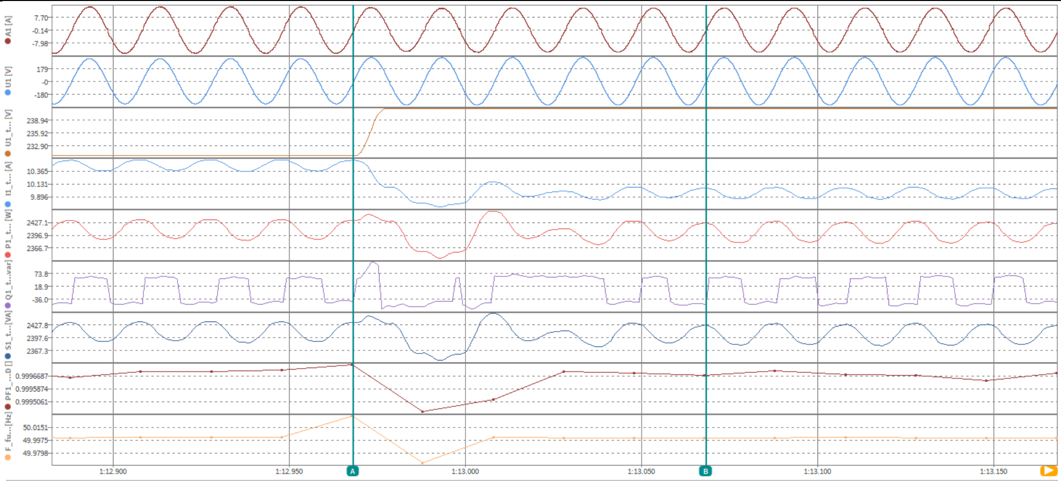
	A	B	间隔	有效值
时间 [s]	1:12.868400	1:12.968600	0.100200	
A1 [A]	-0.827694	1.144123	1.971817	10.45315
U1 [V]	6.578446	30.92194	24.34349	229.8337
U1_tRMS_rc@GIRD [V]	230.1792	230.1814	2.151e-3	230.1756
I1_tRMS_rc@GIRD [A]	10.57060	10.56508	-5.516e-3	10.47108
P1_t_rc@GIRD [W]	2432.494	2431.324	-1.170166	2409.531
Q1_t_rc@GIRD [var]	-55.71659	-52.24178	3.474815	56.28240
S1_t_rc@GIRD [VA]	2433.132	2431.885	-1.247070	2410.188
PF1_t@GIRD []	0.999698	0.999742	4.470e-5	0.999700
F_fund@GIRD [Hz]	50.00017	50.03106	0.030888	50.00532

Before dip (t1-100ms)



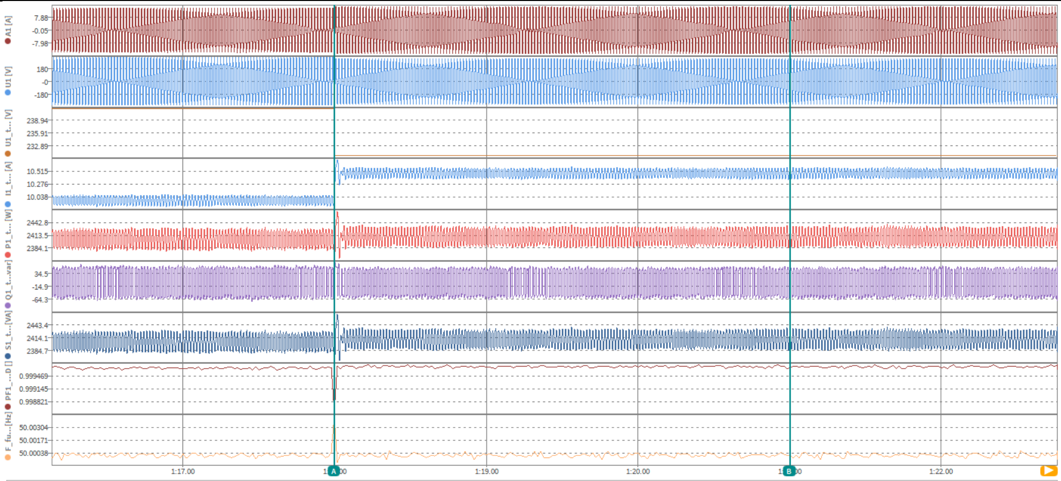
	A	B	间隔	有效值
时间 [s]	1:12.968300	1:13.028400	0.060100	
A1 [A]	-0.669479	-0.770187	-0.100708	9.915517
U1 [V]	-2.543211	7.144452	9.687663	241.2584
U1_tRMS_rc@GIRD [V]	230.1800	241.6675	11.48747	240.5012
I1_tRMS_rc@GIRD [A]	10.56468	9.982011	-0.582672	9.993290
P1_t_rc@GIRD [W]	2431.309	2411.613	-19.69556	2401.244
Q1_t_rc@GIRD [var]	-47.82144	58.70562	106.5271	67.43748
S1_t_rc@GIRD [VA]	2431.779	2412.328	-19.45117	2402.191
PF1_t@GIRD []	0.999742	0.999695	-4.739e-5	0.999595
F_fund@GIRD [Hz]	50.03106	49.99977	-0.031288	49.99891

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:12.968300	1:13.068400	0.100100	
A1 [A]	-0.669479	-0.680351	-0.010872	9.927923
U1 [V]	-2.543211	7.302046	9.845257	241.4180
U1_tRMS_rc@GIRD [V]	230.1800	241.6628	11.48282	240.9605
I1_tRMS_rc@GIRD [A]	10.56468	10.03824	-0.526443	9.972743
P1_t_rc@GIRD [W]	2431.309	2425.101	-6.207275	2401.430
Q1_t_rc@GIRD [var]	-47.82144	-61.04861	-13.22718	63.83662
S1_t_rc@GIRD [VA]	2431.779	2425.870	-5.909180	2402.279
PF1_t@GIRD []	0.999742	0.999673	-6.944e-5	0.999623
F_fund@GIRD [Hz]	50.03106	50.00012	-0.030941	49.99931

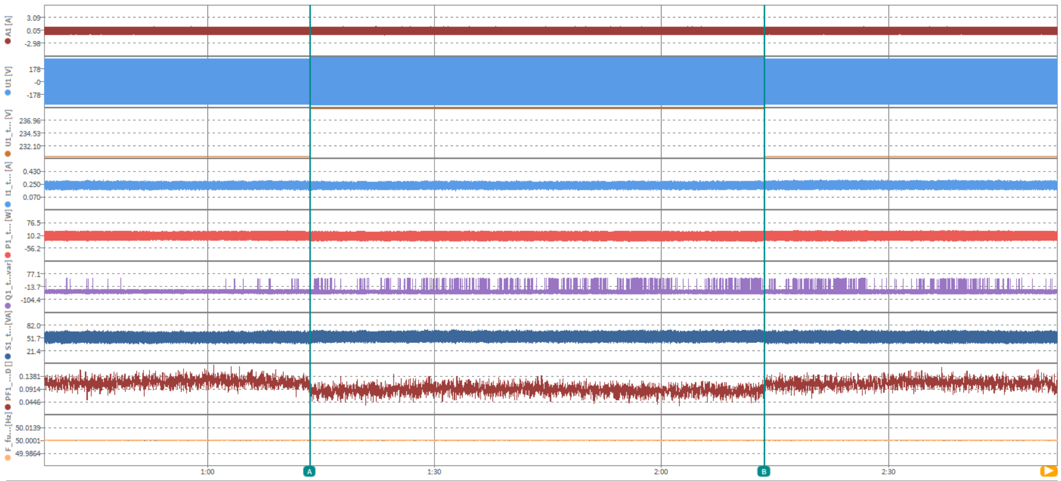
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:18.0001000	1:21.0028000	3.0027000	
A1 [A]	-7.816029	-14.75487	-6.938839	10.46724
U1 [V]	-172.7016	-321.7433	-149.0417	230.2100
U1_tRMS_rc@GIRD [V]	241.5230	230.1721	-11.35091	230.1906
I1_tRMS_rc@GIRD [A]	9.858085	10.45199	0.593903	10.46459
P1_t_rc@GIRD [W]	2380.063	2404.836	24.77344	2408.184
Q1_t_rc@GIRD [var]	-65.14341	-66.50677	-1.363365	55.93108
S1_t_rc@GIRD [VA]	2380.954	2405.755	24.80151	2408.834
PF1_t@GIRD []	0.999670	0.999657	-1.287e-5	0.999698
F_fund@GIRD [Hz]	50.00037	49.99998	-3.891e-4	50.00004

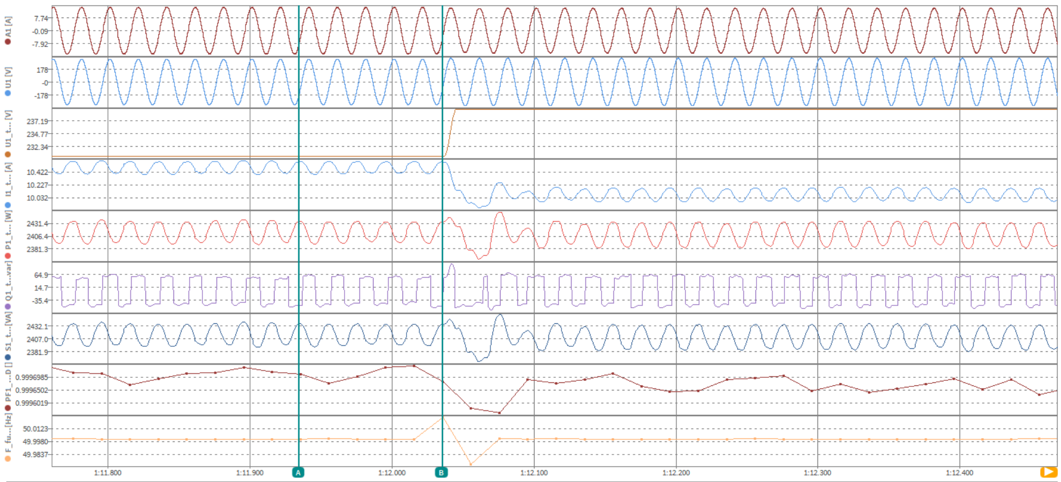
After dip (t2+3s)

Graph of Test number 7.3



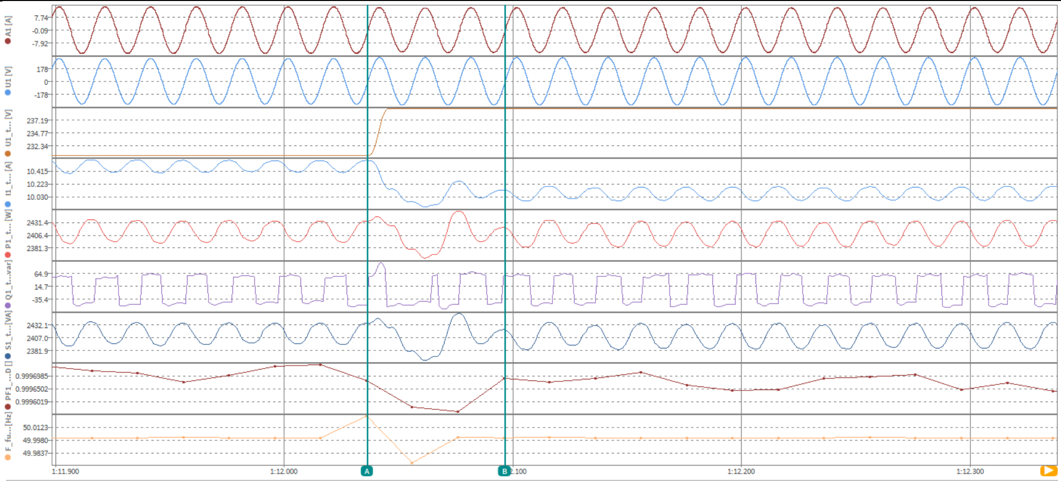
	A	B	间隔	有效值
时间 [s]	1:13.5755	2:13.5943	1:00.0188	
A1 [A]	-0.222874	-0.208569	0.014305	0.232698
U1 [V]	110.8658	216.7468	105.8810	239.1318
U1_tRMS_rc@GIRD [V]	239.0075	239.1308	0.123352	239.1307
I1_tRMS_rc@GIRD [A]	0.214519	0.198330	-0.016188	0.232699
P1_t_rc@GIRD [W]	-20.57864	-12.31886	8.259785	17.07670
Q1_t_rc@GIRD [var]	-46.96055	-45.79906	1.161488	52.96038
S1_t_rc@GIRD [VA]	51.27157	47.42687	-3.844696	55.64544
PF1_t@GIRD []	0.113279	0.079236	-0.034043	0.088317
F_fund@GIRD [Hz]	50.02632	50.00029	-0.026031	50.00004

Empty load



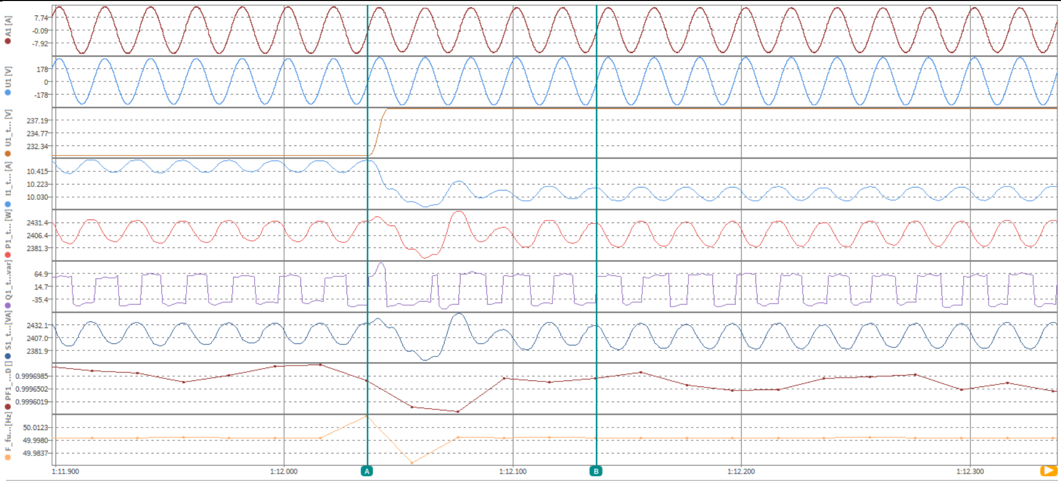
	A	B	间隔	有效值
时间 [s]	1:11.93460	1:12.03540	0.10080	
A1 [A]	-8.911515	-5.680848	3.230667	10.46272
U1 [V]	-193.3801	-122.3254	71.05470	229.6402
U1_tRMS_rc@GIRD [V]	230.1853	230.1827	-2.640e-3	230.1695
I1_tRMS_rc@GIRD [A]	10.57505	10.57165	-3.401e-3	10.48689
P1_t_rc@GIRD [W]	2433.427	2432.564	-0.862549	2413.109
Q1_t_rc@GIRD [var]	-62.19741	-64.18223	-1.984814	56.23702
S1_t_rc@GIRD [VA]	2434.222	2433.411	-0.810791	2413.764
PF1_t@GIRD []	0.999716	0.999742	2.581e-5	0.999713
F_fund@GIRD [Hz]	50.00009	49.99993	-1.602e-4	50.00002

Before dip (t1-100ms)



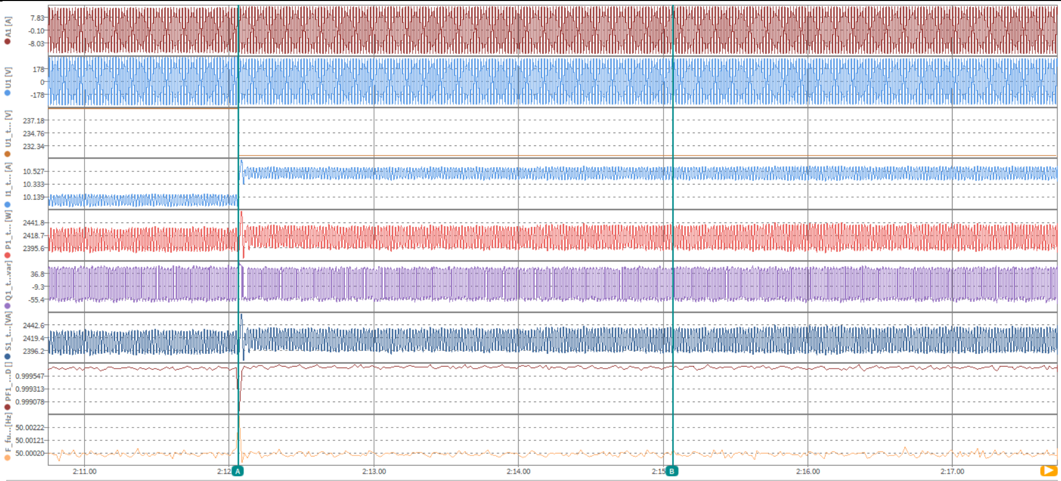
	A	B	间隔	有效值
时间 [s]	1:12.03660	1:12.09670	0.06010	
A1 [A]	-0.675488	-0.751305	-0.075817	10.03973
U1 [V]	-2.894879	6.413222	9.308100	238.9605
U1_tRMS_rc@GIRD [V]	230.1838	239.3775	9.193710	238.5160
I1_tRMS_rc@GIRD [A]	10.57882	10.11675	-0.462066	10.10051
P1_t_rc@GIRD [W]	2434.224	2421.098	-13.12573	2407.558
Q1_t_rc@GIRD [var]	-64.29049	55.01746	119.3080	64.43627
S1_t_rc@GIRD [VA]	2435.073	2421.723	-13.34961	2408.420
PF1_t@GIRD []	0.999679	0.999688	8.821e-6	0.999626
F_fund@GIRD [Hz]	50.02530	49.99977	-0.025528	49.99919

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:12.03660	1:12.13670	0.10010	
A1 [A]	-0.675488	-0.708103	-0.032616	10.05059
U1 [V]	-2.894879	6.546736	9.441615	239.1198
U1_tRMS_rc@GIRD [V]	230.1838	239.3716	9.187805	238.8508
I1_tRMS_rc@GIRD [A]	10.57882	10.15306	-0.425761	10.08596
P1_t_rc@GIRD [W]	2434.224	2429.744	-4.479980	2407.797
Q1_t_rc@GIRD [var]	-64.29049	-54.45212	9.838371	61.92837
S1_t_rc@GIRD [VA]	2435.073	2430.354	-4.718750	2408.593
PF1_t@GIRD []	0.999679	0.999690	1.061e-5	0.999645
F_fund@GIRD [Hz]	50.02530	49.99985	-0.025448	49.99950

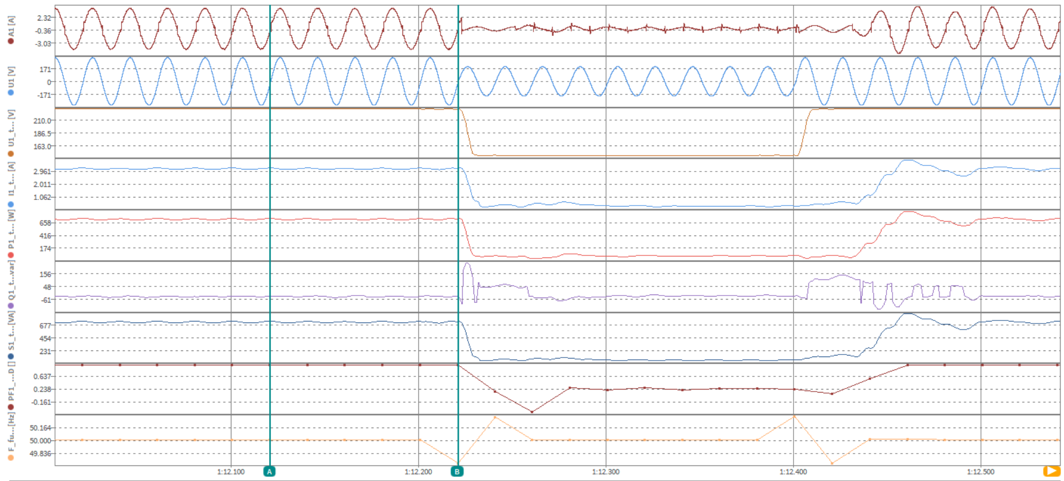
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	2:12.0656000	2:15.0658000	3.0002000	
A1 [A]	4.660321	3.894711	-0.765610	10.48860
U1 [V]	106.9260	83.13394	-23.79203	230.1629
U1_tRMS_rc@GIRD [V]	239.3528	230.1639	-9.188889	230.1931
I1_tRMS_rc@GIRD [A]	9.975530	10.38751	0.411977	10.48813
P1_t_rc@GIRD [W]	2386.977	2390.281	3.303955	2413.623
Q1_t_rc@GIRD [var]	57.58541	51.21774	-6.367676	56.21153
S1_t_rc@GIRD [VA]	2387.671	2390.829	3.157959	2414.277
PF1_t@GIRD []	0.999691	0.999720	2.897e-5	0.999702
F_fund@GIRD [Hz]	50.00050	49.99993	-5.684e-4	50.00002

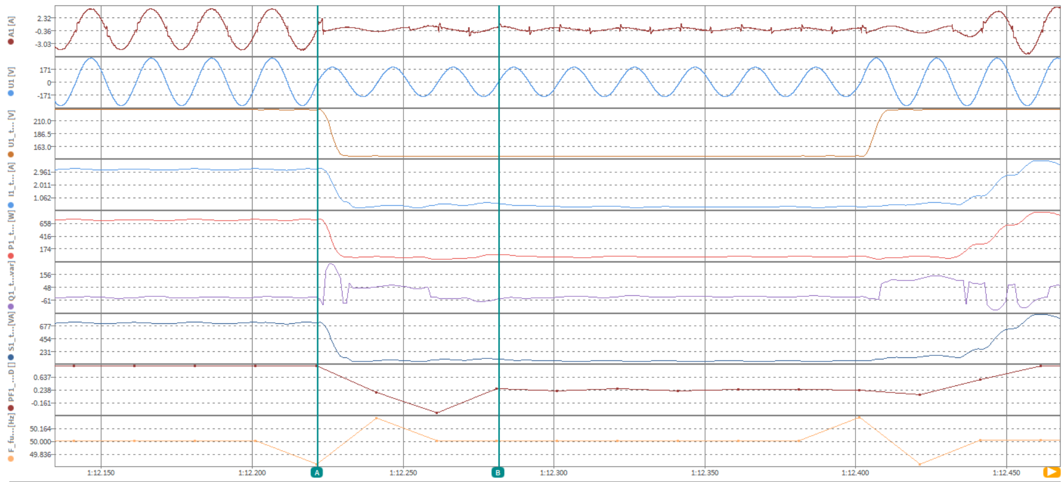
After dip (t2+3s)

Graph of Test number 1.4



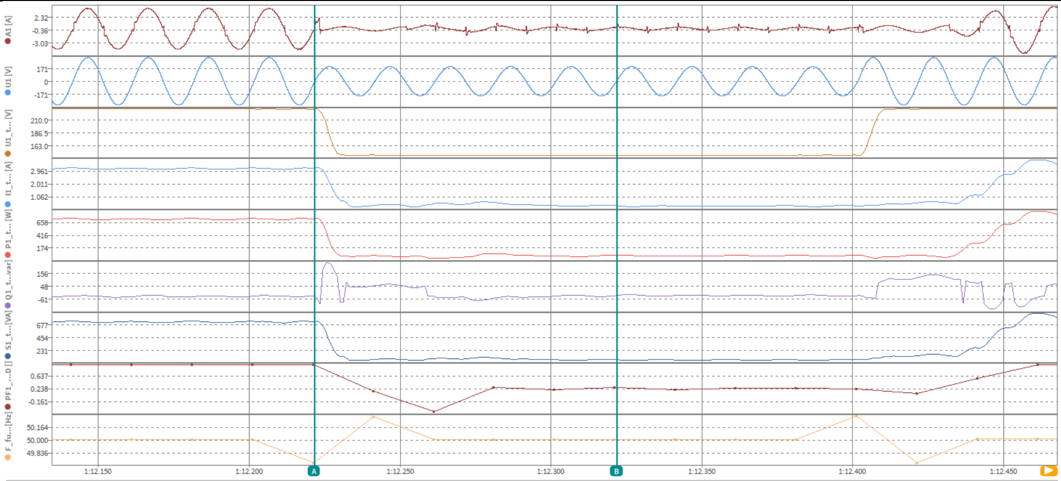
	A	B	间隔	有效值
时间 [s]	1:12.1210000	1:12.2211000	0.1001000	
A1 [A]	-0.819969	-0.594807	0.225163	3.137544
U1 [V]	-59.26609	-49.34502	9.921075	229.7617
U1_tRMS_rc@GIRD [V]	229.9802	229.0492	-0.930984	229.9895
I1_tRMS_rc@GIRD [A]	3.197313	3.188438	-8.875e-3	3.141075
P1_t_rc@GIRD [W]	733.9168	728.8926	-5.024170	720.9545
Q1_t_rc@GIRD [var]	-45.38599	-45.46569	-0.079693	45.97518
S1_t_rc@GIRD [VA]	735.3188	730.3093	-5.009583	722.4189
PF1_t@GIRD []	0.997782	0.997722	-5.949e-5	0.997864
F_fund@GIRD [Hz]	49.99992	49.99998	6.104e-5	49.99993

Before dip (t1-100ms)



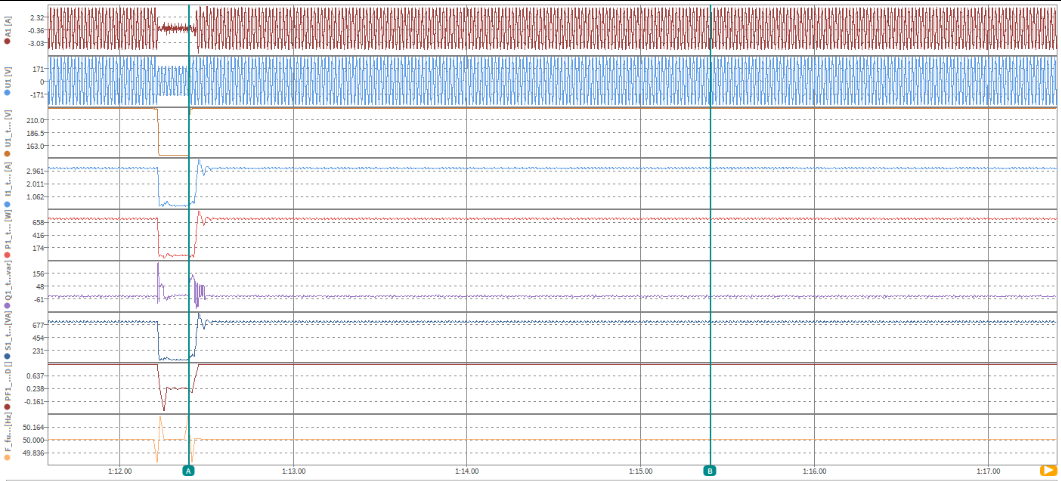
	A	B	间隔	有效值
时间 [s]	1:12.2217000	1:12.2817000	0.0600000	
A1 [A]	-0.376511	-0.499821	-0.123310	0.471697
U1 [V]	6.165266	5.529642	-0.635624	142.3395
U1_tRMS_rc@GIRD [V]	228.8385	142.4810	-86.35751	152.1711
I1_tRMS_rc@GIRD [A]	3.186980	0.553929	-2.633051	1.044528
P1_t_rc@GIRD [W]	727.9106	51.40335	-676.5072	197.4821
Q1_t_rc@GIRD [var]	-45.05622	-59.88954	-14.83332	85.61604
S1_t_rc@GIRD [VA]	729.3037	78.92440	-650.3793	215.2424
PF1_t@GIRD []	0.997974	0.250255	-0.747718	0.580728
F_fund@GIRD [Hz]	49.68751	50.00362	0.316109	49.99852

During dip (t1+60ms)



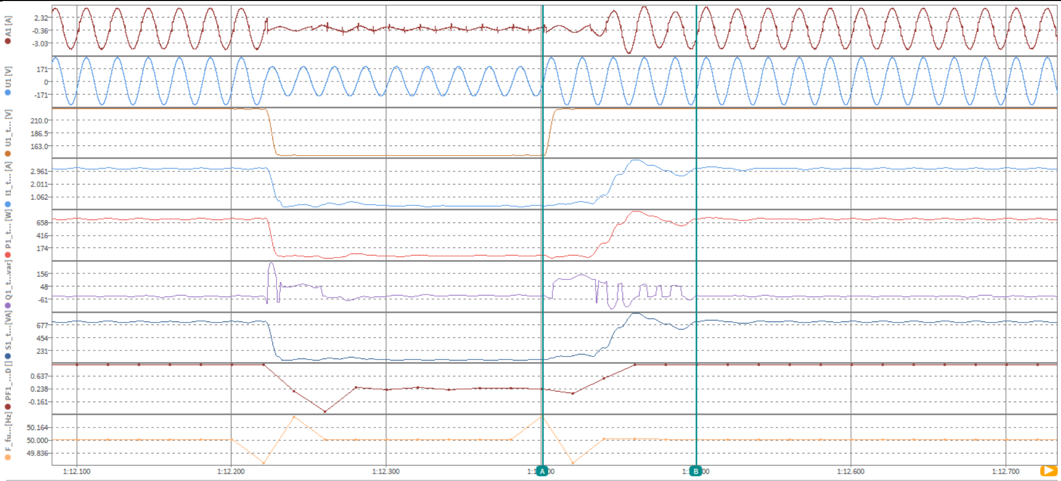
	A	B	间隔	有效值
时间 [s]	1:12.2217000	1:12.3219000	0.1002000	
A1 [A]	-0.376511	0.650024	1.026535	0.422727
U1 [V]	6.165266	21.27266	15.10739	142.2606
U1_tRMS_rc@GIRD [V]	228.8385	142.5013	-86.33720	148.4118
I1_tRMS_rc@GIRD [A]	3.186980	0.326886	-2.860094	0.841488
P1_t_rc@GIRD [W]	727.9106	25.07211	-702.8385	153.9520
Q1_t_rc@GIRD [var]	-45.05622	-39.25873	5.797489	72.64857
S1_t_rc@GIRD [VA]	729.3037	46.58175	-682.7220	170.2323
PF1_t@GIRD []	0.997974	0.253377	-0.744596	0.491088
F_fund@GIRD [Hz]	49.68751	50.00045	0.312939	49.99880

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:12.4011000	1:15.4014000	3.0003000	
A1 [A]	0.201988	-0.190258	-0.392246	3.122422
U1 [V]	-30.67351	-18.24856	12.42495	229.9669
U1_tRMS_rc@GIRD [V]	143.1240	229.9758	86.85181	229.8291
I1_tRMS_rc@GIRD [A]	0.313039	3.203725	2.890687	3.119215
P1_t_rc@GIRD [W]	16.82263	735.1764	718.3538	715.7165
Q1_t_rc@GIRD [var]	-41.52519	-48.57606	-7.050869	48.48463
S1_t_rc@GIRD [VA]	44.80338	736.7794	691.9760	717.3569
PF1_t@GIRD []	0.243999	0.997731	0.753732	0.985825
F_fund@GIRD [Hz]	50.00023	49.99986	-3.700e-4	50.00013

After dip (t2+3s)



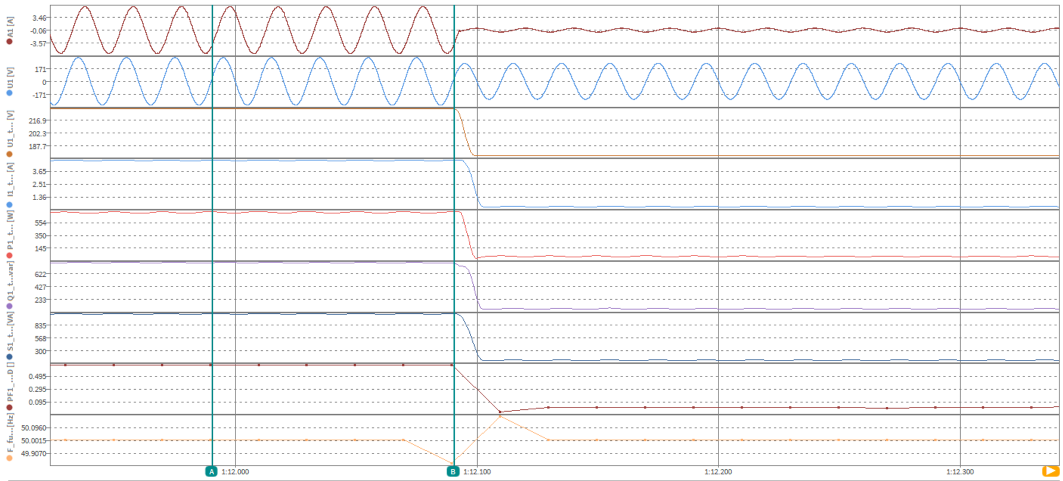
	A	B	间隔	有效值
时间 [s]	1:12.4011000	1:12.5002000	0.0991000	
A1 [A]	0.201988	-1.945496	-2.147484	2.476092
U1 [V]	-30.67351	-136.8058	-106.1323	230.7724
U1_tRMS_rc@GIRD [V]	143.1240	230.0166	86.89255	225.3794
I1_tRMS_rc@GIRD [A]	0.313039	3.149422	2.836384	2.335837
P1_t_rc@GIRD [W]	16.82263	723.0385	706.2159	529.8918
Q1_t_rc@GIRD [var]	-41.52519	-44.70722	-3.182030	87.48043
S1_t_rc@GIRD [VA]	44.80338	724.4194	679.6160	537.0644
PF1_t@GIRD []	0.243999	0.995657	0.751658	0.630363
F_fund@GIRD [Hz]	50.00023	49.99551	-4.719e-3	50.00288

Recovery time

Verification of dynamic network support									P
Short-circuited power at generator terminal [VA]		6K							
NS protection settings		See table 5.5 for detail.							
	No.	Parameter	Phase ref.	Time ref.	unit	Result			
General Info.	0	Test number	--	--	--	2.4	3.4	4.4	5.4
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025			
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph			
	3	Fault type (phase)	--	--		D1	D1	D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	0.50	0.50	0.85	1.25
	5	Setting dip duration		--	ms	1500	1500	60000	100
	6	Point of fault entry	Total	--	ms	20ms			
	7	Point of fault clearance	Total	--	ms	20ms			
	8	Fault duration in empty load test	Total	--	ms	1522.3	1522.3	60016	122.4
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.760	0.760	0.930	1.060
	10		Positive sequence		p.u.	--	--	--	--
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00	1.00
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--	--
	13	Active power	Total	t1-10s to t1	p.u.	0.304	0.304	0.309	0.311
	14		Positive sequence			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	0.327	-0.332	-0.020	-0.022
	16		Positive sequence			--	--	--	--
	17	$\cos_{\varphi}$	--	t1-10s to t1	--	0.6743	0.6744	0.9975	0.9975
During	18	Voltage	Phase 1	t1+100ms	p.u.	--	--	--	--

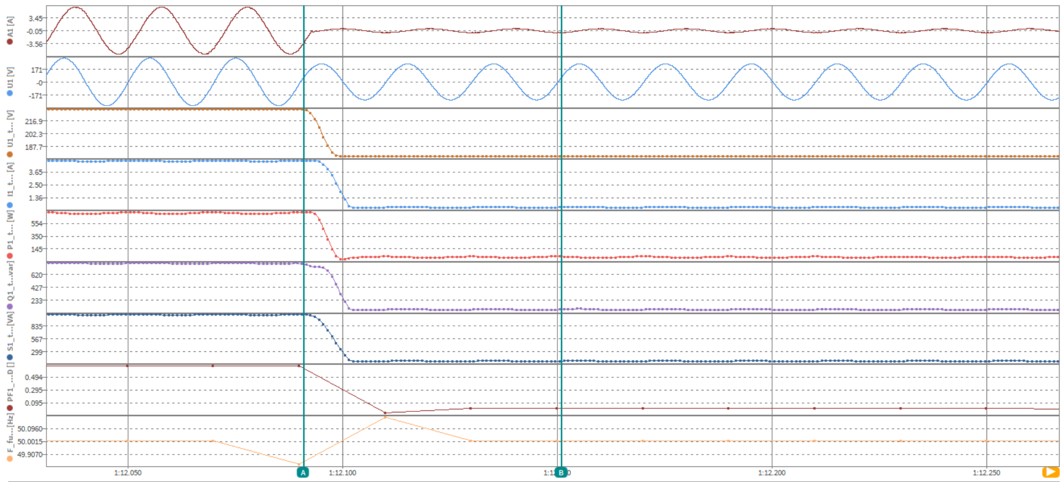
dip t1 to t2			Phase 2	to t2-20ms		--	--	--	--
			Phase 3			0.759	0.760	0.930	1.060
	19	Line current	Phase 1	t1+60ms	p.u.	--	--	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			0.039	0.038	0.337	0.292
	22	Line current	Phase 1	t1+100ms	p.u.	--	--	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			0.039	0.039	0.335	0.294
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.004	0.003	0.310	0.310
	26		Positive sequence			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--	--
	29		Total			0.305	0.504	0.293	0.298
	39	Active power rising time	Positive sequence	--	s	0.147	0.157	0.068	0.049
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--	--
	32		Total			0.314	-0.314	-0.021	-0.025
	33	Reactive power rising time	Positive sequence	--	s	9.843	9.640	0.068	0.049
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 2.4



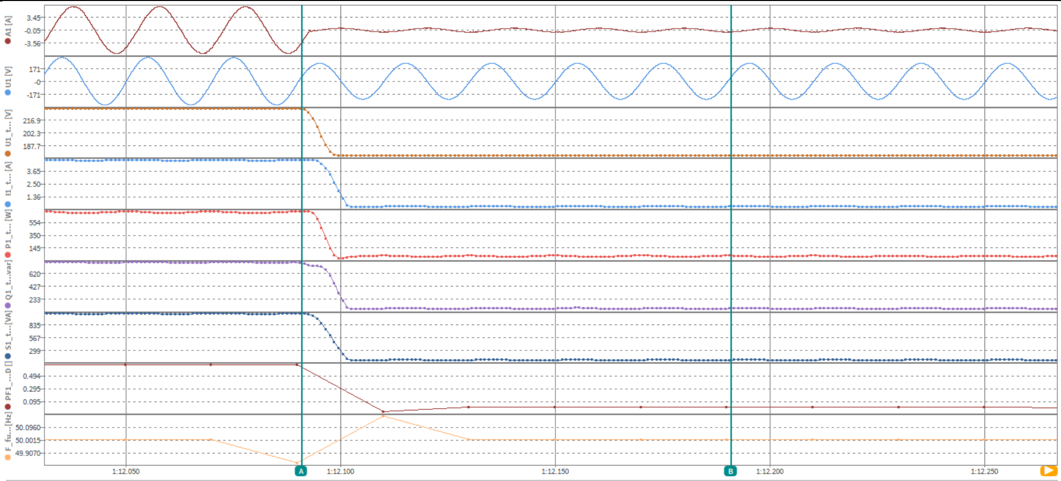
	A	B	间隔	有效值
时间 [s]	1:11.9903000	1:12.0904000	0.1001000	
A1 [A]	-4.842405	-4.270678	0.571728	4.634111
U1 [V]	18.45357	21.83673	3.383160	229.8824
U1_tRMS_rc@GIRD [V]	230.1076	230.1065	-1.099e-3	230.1107
I1_tRMS_rc@GIRD [A]	4.659185	4.662043	2.858e-3	4.635109
P1_t_rc@GIRD [W]	729.9153	729.7525	-0.162781	720.1121
Q1_t_rc@GIRD [var]	785.2722	786.3137	1.041565	786.7967
S1_t_rc@GIRD [VA]	1072.114	1072.766	0.652344	1066.588
PF1_t@GIRD []	0.674276	0.673893	-3.831e-4	0.674709
F_fund@GIRD [Hz]	50.00019	49.82153	-0.178661	49.97028

Before dip (t1-100ms)



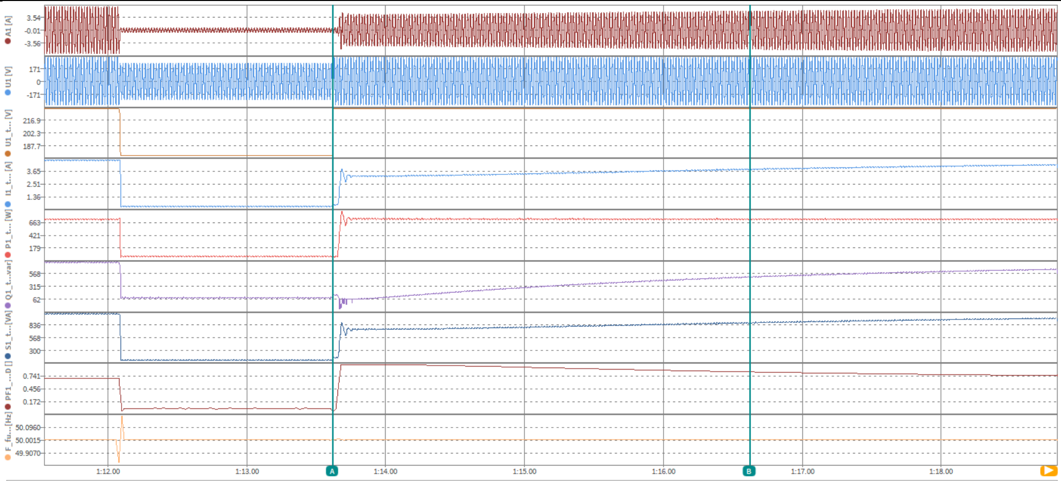
	A	B	间隔	有效值
时间 [s]	1:12.0909000	1:12.1510000	0.0601000	
A1 [A]	-3.729467	-0.636701	3.092766	0.553409
U1 [V]	59.36501	66.96174	7.596732	174.2767
U1_tRMS_rc@GIRD [V]	230.0274	174.5621	-55.46526	179.5930
I1_tRMS_rc@GIRD [A]	4.661383	0.408175	-4.253208	1.678610
P1_t_rc@GIRD [W]	731.8463	9.852250	-721.9941	214.1716
Q1_t_rc@GIRD [var]	783.6527	70.56748	-713.0852	278.3992
S1_t_rc@GIRD [VA]	1072.246	71.25192	-1000.994	351.2486
PF1_t@GIRD []	0.673893	-3.445e-3	-0.677337	0.339689
F_fund@GIRD [Hz]	49.82153	49.99998	0.178452	50.00094

During dip (t1+60ms)



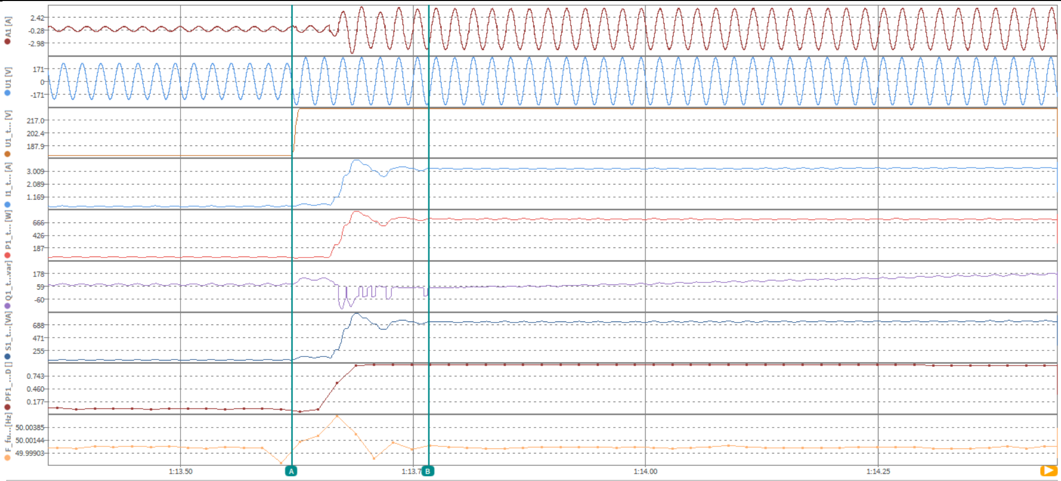
	A	B	间隔	有效值
时间 [s]	1:12.0909000	1:12.1909000	0.1000000	
A1 [A]	-3.729467	-0.548487	3.180981	0.497018
U1 [V]	59.36501	59.63728	0.272274	174.4781
U1_tRMS_rc@GIRD [V]	230.0274	174.6153	-55.41202	177.6285
I1_tRMS_rc@GIRD [A]	4.661383	0.405838	-4.255545	1.328394
P1_t_rc@GIRD [W]	731.8463	9.327273	-722.5190	166.5144
Q1_t_rc@GIRD [var]	783.6527	70.24902	-713.4037	220.6856
S1_t_rc@GIRD [VA]	1072.246	70.86552	-1001.380	276.4583
PF1_t@GIRD []	0.673893	-8.493e-3	-0.682386	0.277403
F_fund@GIRD [Hz]	49.82153	50.00009	0.178562	50.00067

During dip (t1+100ms)



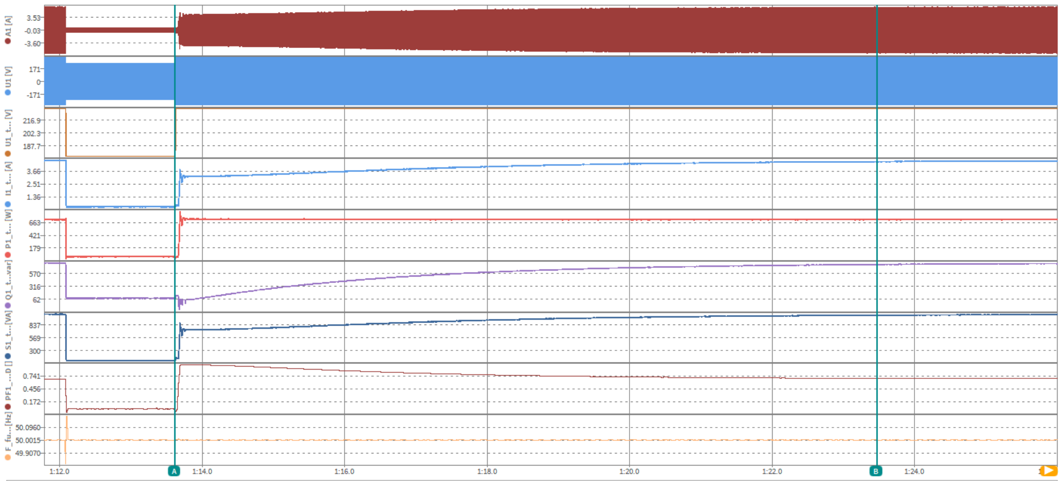
	A	B	间隔	有效值
时间 [s]	1:13.620100	1:16.622000	3.001900	
A1 [A]	0.518198	-0.086908	-0.605106	3.410176
U1 [V]	1.124589	-181.1092	-182.2338	230.0505
U1_tRMS_rc@GIRD [V]	174.7259	230.1160	55.39009	230.0152
I1_tRMS_rc@GIRD [A]	0.403244	3.753773	3.350529	3.406345
P1_t_rc@GIRD [W]	-8.716256	713.1370	721.8532	719.4180
Q1_t_rc@GIRD [var]	69.91602	487.4340	417.5180	311.1941
S1_t_rc@GIRD [VA]	70.45724	863.8033	793.3461	783.8393
PF1_t@GIRD []	-0.018011	0.829608	0.847619	0.913300
F_fund@GIRD [Hz]	49.99684	49.99967	2.827e-3	49.99994

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:13.620100	1:13.767000	0.146900	
A1 [A]	0.518198	-3.811960	-4.330158	2.625319
U1 [V]	1.124589	-270.1059	-271.2305	231.1643
U1_tRMS_rc@GIRD [V]	174.7259	230.1070	55.38106	228.1137
I1_tRMS_rc@GIRD [A]	0.403244	3.181468	2.778223	2.533592
P1_t_rc@GIRD [W]	-8.716256	731.2327	739.9489	576.8910
Q1_t_rc@GIRD [var]	69.91602	-35.16920	-105.0852	83.16619
S1_t_rc@GIRD [VA]	70.45724	732.0779	661.6207	582.8549
PF1_t@GIRD []	-0.018011	0.998529	1.016540	0.731851
F_fund@GIRD [Hz]	49.99684	49.99951	2.670e-3	50.00084

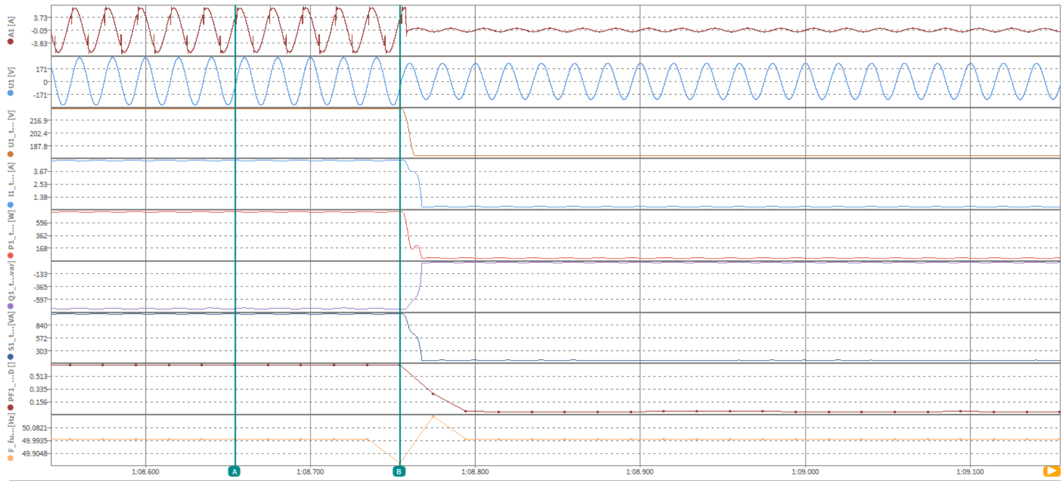
Recovery time-P



	A	B	间隔	有效值
时间 [s]	1:13.620100	1:23.463300	9.843200	
A1 [A]	0.518198	-1.217489	-1.735687	4.042482
U1 [V]	1.124589	-273.2127	-274.3373	230.0952
U1_tRMS_rc@GIRD [V]	174.7259	230.1138	55.38789	230.0838
I1_tRMS_rc@GIRD [A]	0.403244	4.510204	4.106960	4.041197
P1_t_rc@GIRD [W]	-8.716256	712.6744	721.3906	720.7195
Q1_t_rc@GIRD [var]	69.91602	754.4860	684.5699	587.6564
S1_t_rc@GIRD [VA]	70.45724	1037.860	967.4030	929.9337
PF1_t@GIRD []	-0.018011	0.689407	0.707418	0.793585
F_fund@GIRD [Hz]	49.99684	50.00003	3.189e-3	49.99993

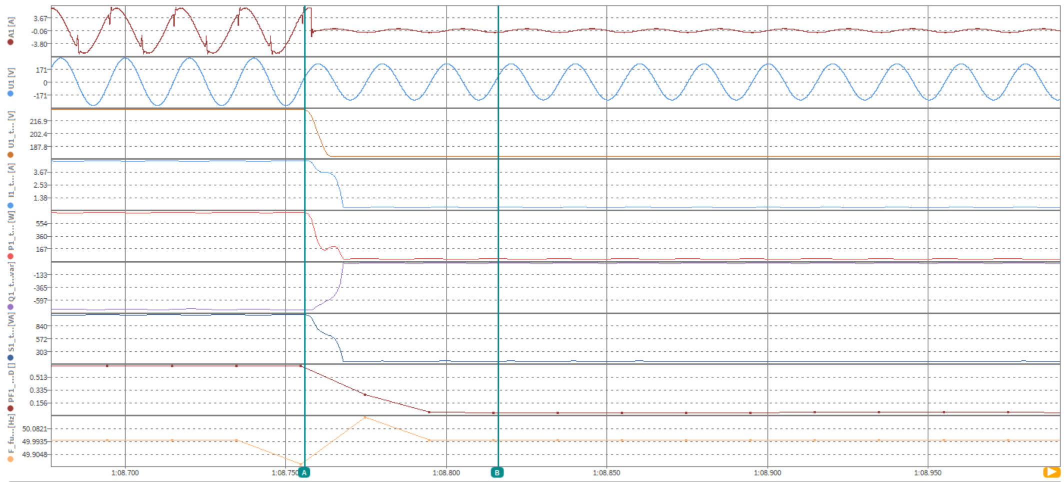
Recovery time-Q

Graph of Test number 3.4



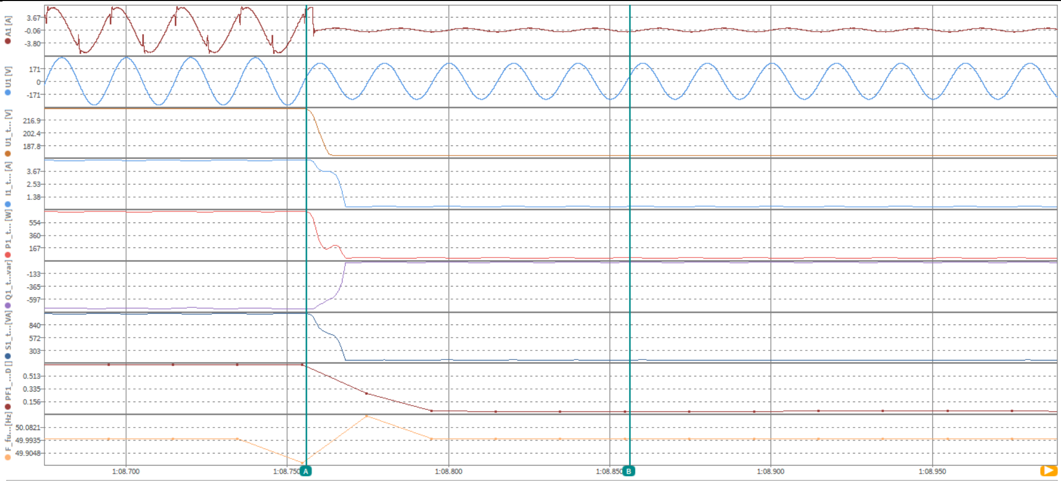
	A	B	间隔	有效值
时间 [s]	1:08.6543000	1:08.7543000	0.1000000	
A1 [A]	3.421660	3.534670	0.113010	4.647118
U1 [V]	-90.11296	-90.06885	0.044107	230.0067
U1_tRMS_rc@GIRD [V]	230.1045	230.0987	-5.737e-3	230.1040
I1_tRMS_rc@GIRD [A]	4.695224	4.704682	9.458e-3	4.648357
P1_t_rc@GIRD [W]	729.7518	727.3322	-2.419617	720.6944
Q1_t_rc@GIRD [var]	-796.6863	-801.8003	-5.113953	790.3514
S1_t_rc@GIRD [VA]	1080.392	1082.541	2.149414	1069.605
PF1_t@GIRD []	0.674390	0.673859	-5.311e-4	0.673838
F_fund@GIRD [Hz]	49.99991	49.99989	-1.907e-5	49.99986

Before dip (t1-100ms)



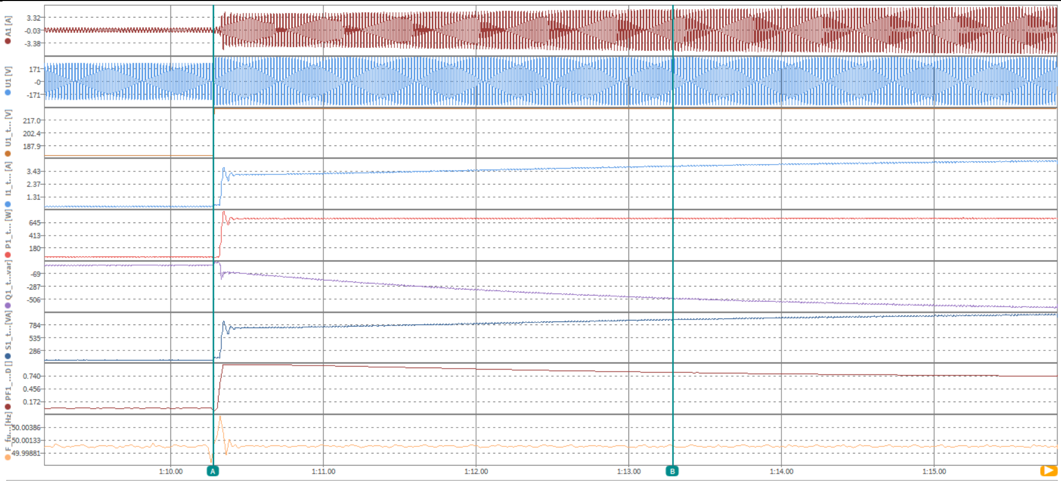
	A	B	间隔	有效值
时间 [s]	1:08.7560000	1:08.8161000	0.0601000	
A1 [A]	6.431933	-0.607137	-7.039071	1.273316
U1 [V]	62.22555	68.76371	6.538153	174.6258
U1_tRMS_rc@GIRD [V]	230.1008	174.9015	-55.19930	180.3767
I1_tRMS_rc@GIRD [A]	4.695590	0.398269	-4.297320	1.805269
P1_t_rc@GIRD [W]	727.9393	7.848895	-720.0904	195.0637
Q1_t_rc@GIRD [var]	-798.4330	69.21430	867.6473	316.4422
S1_t_rc@GIRD [VA]	1080.459	69.65791	-1010.801	371.7331
PF1_t@GIRD []	0.672203	-1.275e-3	-0.673478	0.359473
F_fund@GIRD [Hz]	49.82458	49.99990	0.175320	49.99698

During dip (t1+60ms)



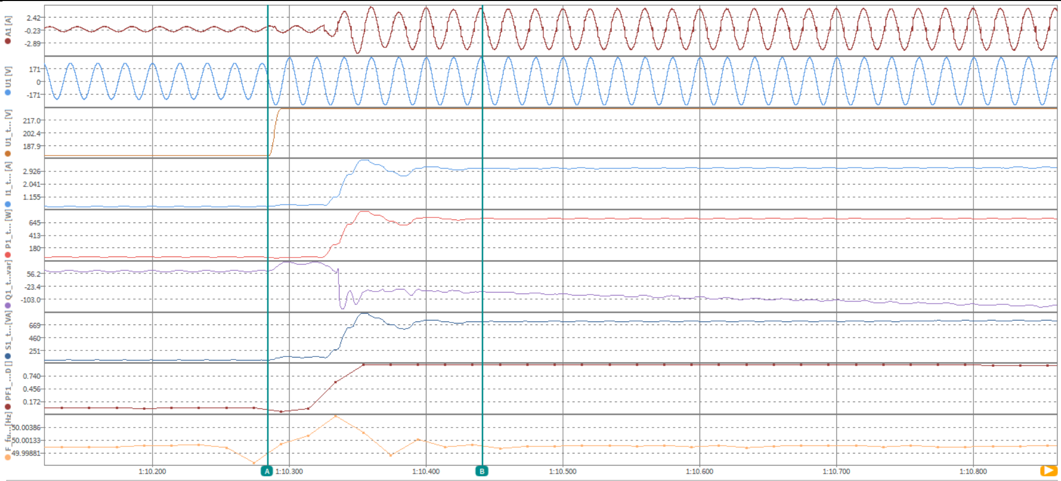
	A	B	间隔	有效值
时间 [s]	1:08.7560000	1:08.8561000	0.1001000	
A1 [A]	6.431933	-0.600462	-7.032395	1.018143
U1 [V]	62.22555	68.71984	6.494284	174.7233
U1_tRMS_rc@GIRD [V]	230.1008	174.8523	-55.24841	178.2181
I1_tRMS_rc@GIRD [A]	4.695590	0.402931	-4.292659	1.424903
P1_t_rc@GIRD [W]	727.9393	8.063744	-719.8756	151.6293
Q1_t_rc@GIRD [var]	-798.4330	69.99044	868.4234	249.7289
S1_t_rc@GIRD [VA]	1080.459	70.45343	-1010.005	292.1574
PF1_t@GIRD []	0.672203	4.928e-4	-0.671710	0.293509
F_fund@GIRD [Hz]	49.82458	49.99960	0.175018	49.99789

During dip (t1+100ms)



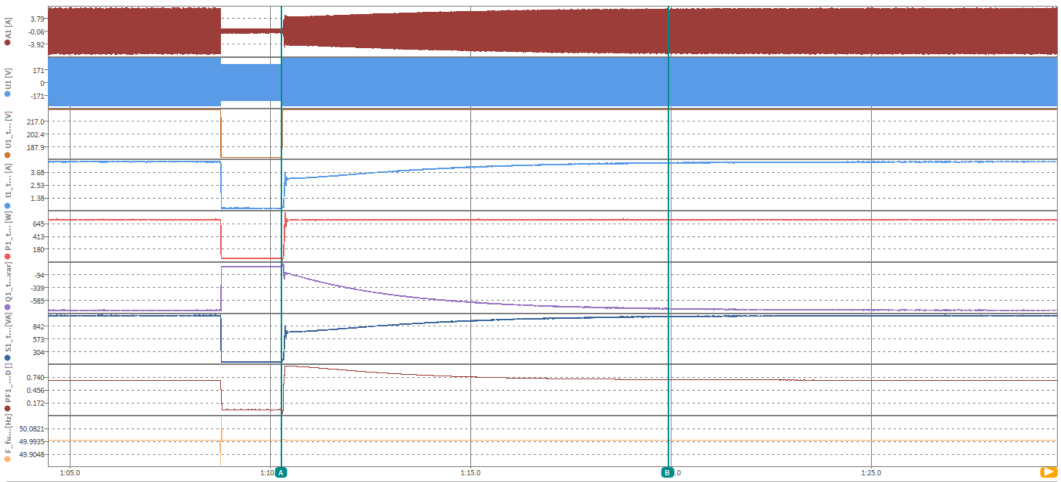
	A	B	间隔	有效值
时间 [s]	1:10.2842000	1:13.2889000	3.0047000	
A1 [A]	0.486727	-5.377417	-5.864144	3.415402
U1 [V]	76.15683	-298.8503	-375.0072	230.0123
U1_tRMS_rc@GIRD [V]	174.7246	230.1006	55.37593	229.9747
I1_tRMS_rc@GIRD [A]	0.408301	3.836864	3.428562	3.410488
P1_t_rc@GIRD [W]	-4.547935	716.9523	721.5002	708.3410
Q1_t_rc@GIRD [var]	71.19519	-515.1982	-586.3934	337.7291
S1_t_rc@GIRD [VA]	71.34030	882.8645	811.5242	784.7344
PF1_t@GIRD []	3.460e-4	0.815268	0.814922	0.899671
F_fund@GIRD [Hz]	49.99652	50.00023	3.708e-3	50.00001

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:10.2842000	1:10.4413000	0.1571000	
A1 [A]	0.486727	3.980036	3.493309	2.590410
U1 [V]	76.15683	305.8967	229.7399	230.0857
U1_tRMS_rc@GIRD [V]	174.7246	230.0958	55.37119	227.7716
I1_tRMS_rc@GIRD [A]	0.408301	3.121848	2.713547	2.503981
P1_t_rc@GIRD [W]	-4.547935	715.4422	719.9901	569.3483
Q1_t_rc@GIRD [var]	71.19519	-64.28091	-135.4761	87.15261
S1_t_rc@GIRD [VA]	71.34030	718.3242	646.9839	575.9801
PF1_t@GIRD []	3.460e-4	0.995842	0.995496	0.765932
F_fund@GIRD [Hz]	49.99652	50.00023	3.708e-3	50.00082

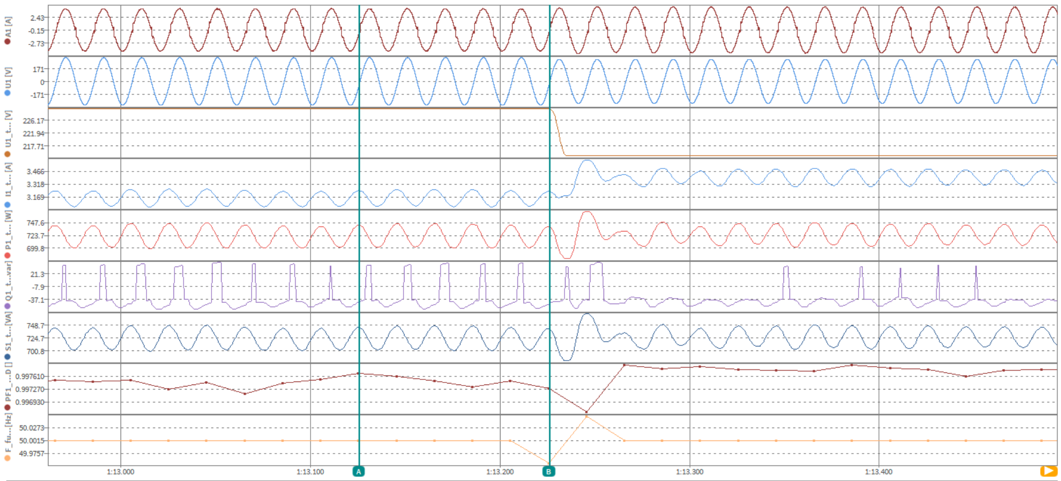
Recovery time-P



	A	B	间隔	有效值
时间 [s]	1:10.2842000	1:19.9251000	9.6409000	
A1 [A]	0.486727	-4.510527	-4.997254	4.049224
U1 [V]	76.15683	10.87400	-65.28283	230.0872
U1_tRMS_rc@GIRD [V]	174.7246	230.1062	55.38162	230.0614
I1_tRMS_rc@GIRD [A]	0.408301	4.514309	4.106008	4.048038
P1_t_rc@GIRD [W]	-4.547935	714.0347	718.5826	715.7039
Q1_t_rc@GIRD [var]	71.19519	-754.4530	-825.6482	596.1281
S1_t_rc@GIRD [VA]	71.34030	1038.771	967.4306	931.4509
PF1_t@GIRD []	3.460e-4	0.687358	0.687012	0.786426
F_fund@GIRD [Hz]	49.99652	49.99966	3.139e-3	49.99996

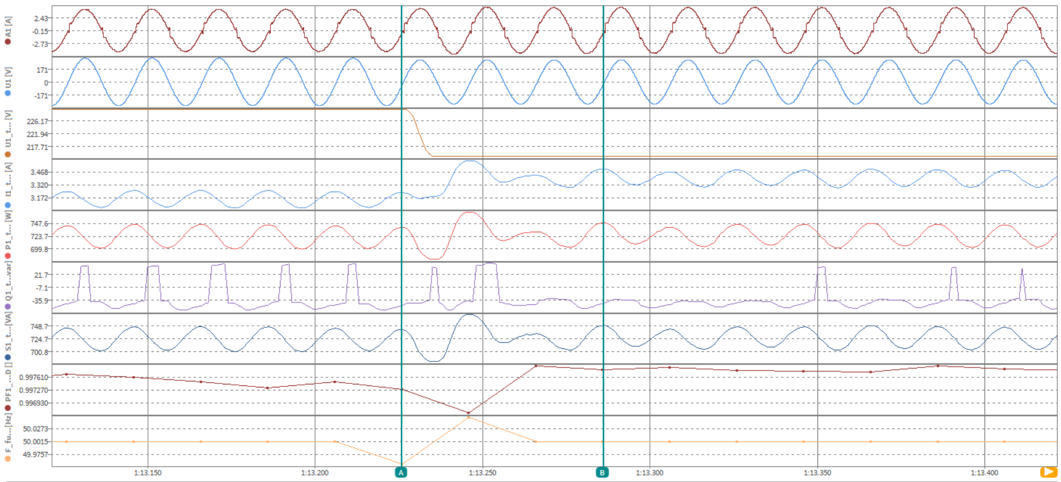
Recovery time-Q

Graph of Test number 4.4



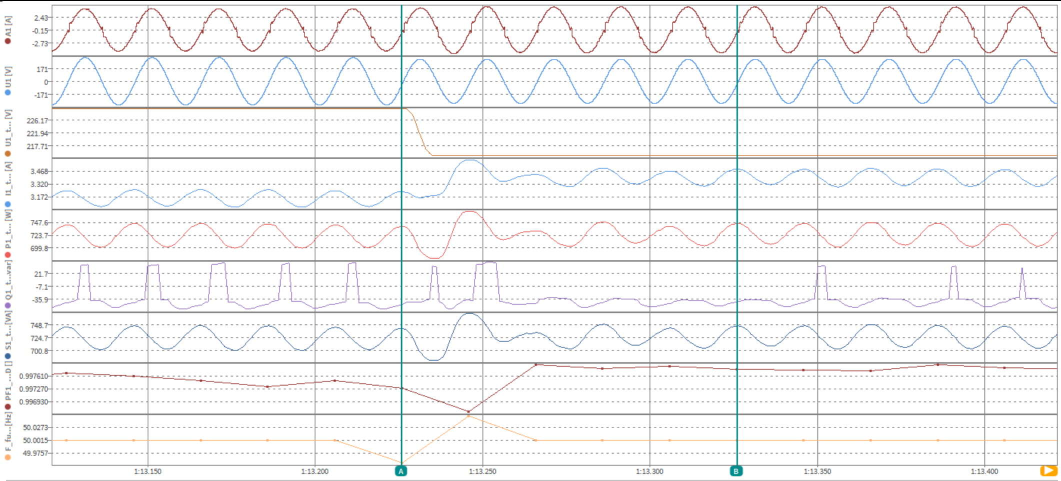
	A	B	间隔	有效值
时间 [s]	1:13.1260	1:13.2262	0.1002	
A1 [A]	-0.501537	-0.207710	0.293827	3.137879
U1 [V]	-29.90699	-9.333134	20.57386	229.6523
U1_tRMS_rc@GIRD [V]	229.9943	229.9965	2.197e-3	229.9933
I1_tRMS_rc@GIRD [A]	3.230797	3.220585	-0.010212	3.144178
P1_t_rc@GIRD [W]	741.5461	738.8964	-2.649780	721.4604
Q1_t_rc@GIRD [var]	-47.48763	-51.99410	-4.506474	49.25596
S1_t_rc@GIRD [VA]	743.0651	740.7234	-2.341675	723.1398
PF1_t@GIRD []	0.997518	0.997468	-4.965e-5	0.997507
F_fund@GIRD [Hz]	49.99976	50.00000	2.403e-4	49.99994

Before dip (t1-100ms)



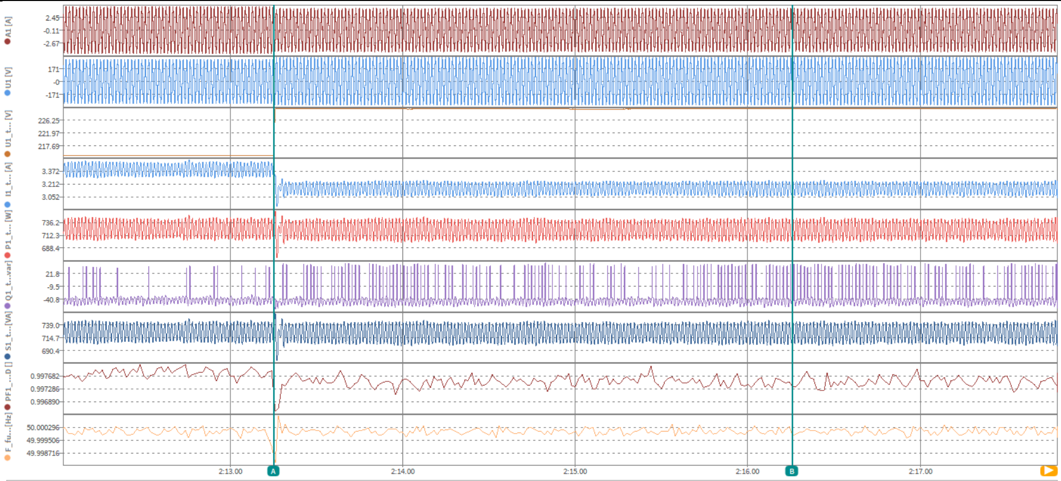
	A	B	间隔	有效值
时间 [s]	1:13.2259	1:13.2860	0.0601	
A1 [A]	-0.598526	-0.491238	0.107288	3.385794
U1 [V]	-40.38716	-27.54259	12.84456	213.5535
U1_tRMS_rc@GIRD [V]	229.9965	213.9005	-16.09599	215.6576
I1_tRMS_rc@GIRD [A]	3.220585	3.499138	0.278553	3.364854
P1_t_rc@GIRD [W]	738.8964	747.0142	8.117798	723.6040
Q1_t_rc@GIRD [var]	-51.99410	-46.62019	5.373913	46.18453
S1_t_rc@GIRD [VA]	740.7234	748.4675	7.744080	725.0764
PF1_t@GIRD []	0.997468	0.997918	4.495e-4	0.997318
F_fund@GIRD [Hz]	50.00000	49.99936	-6.409e-4	50.00060

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:13.2259	1:13.3260	0.1001	
A1 [A]	-0.598526	-0.517845	0.080681	3.387676
U1 [V]	-40.38716	-27.61793	12.76922	213.6939
U1_tRMS_rc@GIRD [V]	229.9965	213.9063	-16.09024	214.9648
I1_tRMS_rc@GIRD [A]	3.220585	3.485499	0.264914	3.375270
P1_t_rc@GIRD [W]	738.8964	744.2093	5.312927	723.7250
Q1_t_rc@GIRD [var]	-51.99410	-45.02766	6.966438	46.10064
S1_t_rc@GIRD [VA]	740.7234	745.5703	4.846802	725.1918
PF1_t@GIRD []	0.997468	0.997864	3.958e-4	0.997490
F_fund@GIRD [Hz]	50.00000	49.99987	-1.297e-4	50.00038

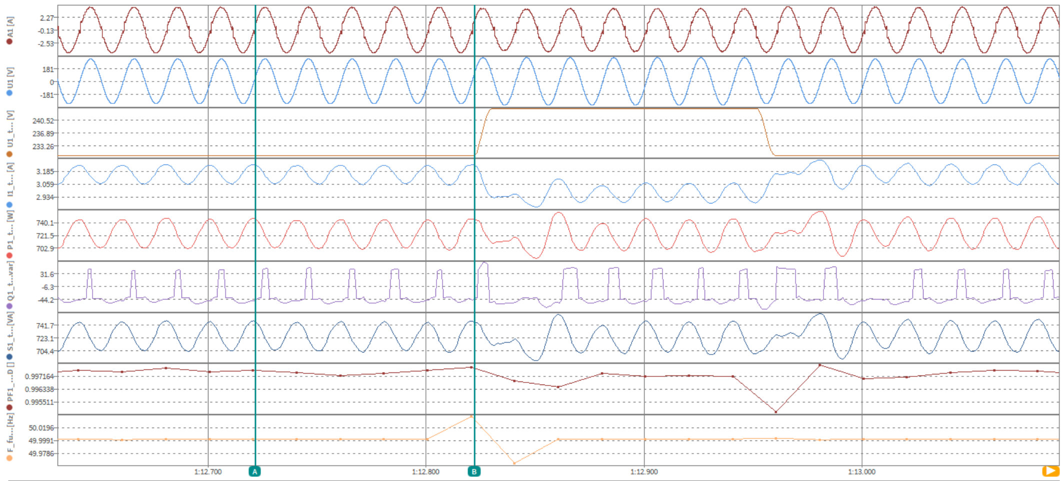
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	2:13.2547000	2:16.2580000	3.0033000	
A1 [A]	2.116013	-2.556610	-4.672623	3.142330
U1 [V]	144.1505	-167.3148	-311.4653	229.8627
U1_tRMS_rc@GIRD [V]	213.8191	230.0473	16.22821	229.9322
I1_tRMS_rc@GIRD [A]	3.297562	3.060776	-0.236786	3.144164
P1_t_rc@GIRD [W]	703.9724	702.3065	-1.665894	721.2732
Q1_t_rc@GIRD [var]	-39.53477	-50.54654	-11.01177	48.93582
S1_t_rc@GIRD [VA]	705.0817	704.1231	-0.958557	722.9314
PF1_t@GIRD []	0.997845	0.997473	-3.725e-4	0.997483
F_fund@GIRD [Hz]	49.99909	50.00033	1.244e-3	50.00000

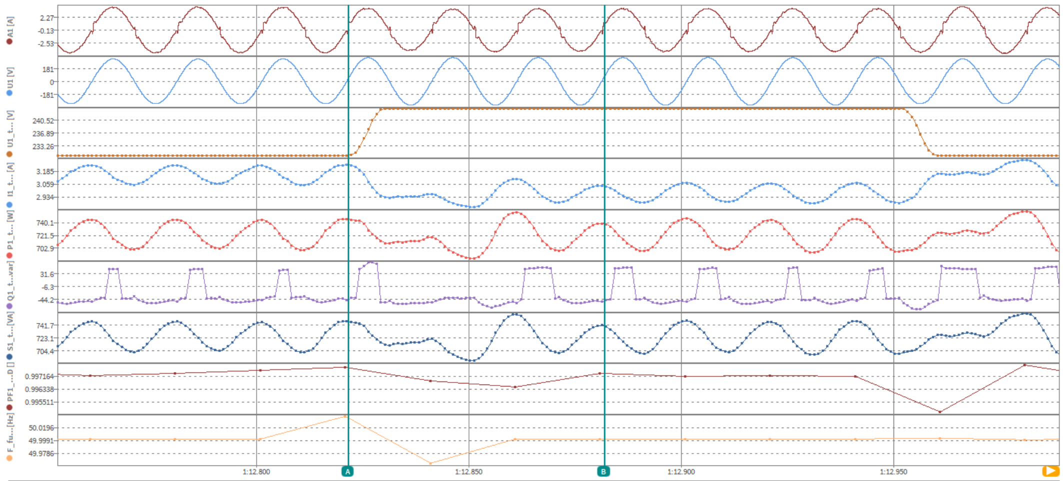
After dip (t2+3s)

Graph of Test number 5.4



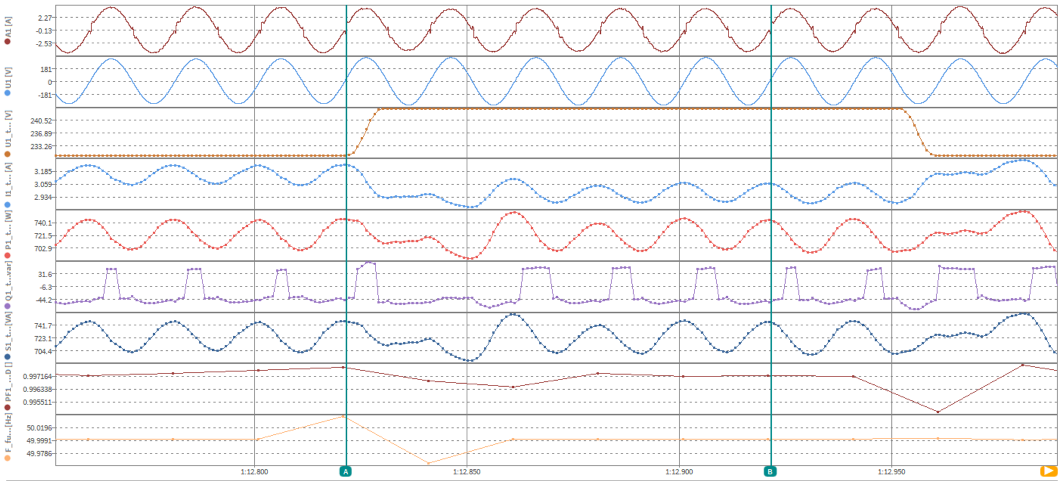
	A	B	间隔	有效值
时间 [s]	1:12.7217000	1:12.8224000	0.1007000	
A1 [A]	1.317501	1.473999	0.156498	3.139124
U1 [V]	45.41970	119.6859	74.26620	229.2127
U1_tRMS_rc@GIRD [V]	230.0003	230.0000	-2.594e-4	229.9961
I1_tRMS_rc@GIRD [A]	3.251587	3.248168	-3.419e-3	3.150442
P1_t_rc@GIRD [W]	745.9960	745.4222	-0.573792	722.9005
Q1_t_rc@GIRD [var]	-52.85423	-49.72544	3.128788	49.44520
S1_t_rc@GIRD [VA]	747.8660	747.0789	-0.787109	724.5895
PF1_t@GIRD []	0.997522	0.997726	2.047e-4	0.997451
F_fund@GIRD [Hz]	49.99981	50.03814	0.038330	50.00642

Before dip (t1-100ms)



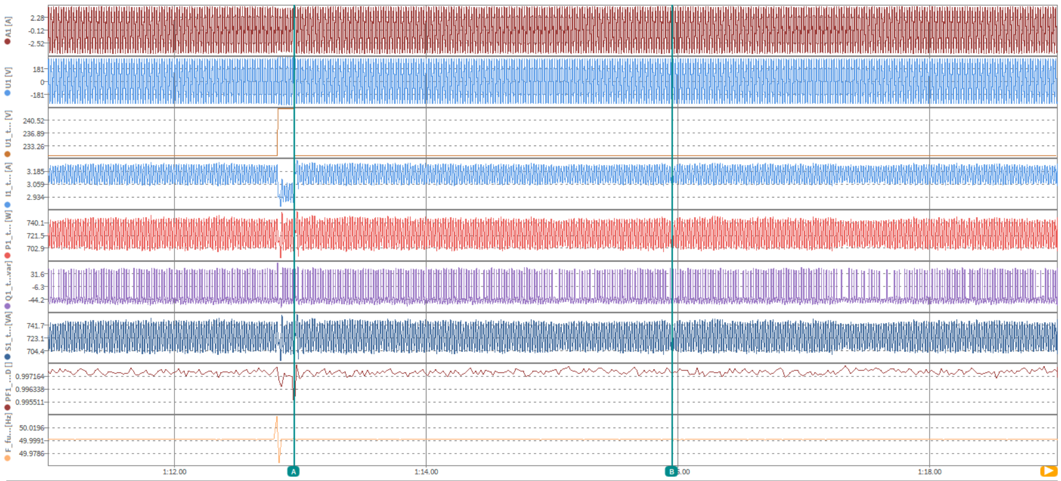
	A	B	间隔	有效值
时间 [s]	1:12.8216000	1:12.8819000	0.0603000	
A1 [A]	0.813675	1.419067	0.605392	2.944496
U1 [V]	37.60410	68.16292	30.55883	243.0295
U1_tRMS_rc@GIRD [V]	230.0000	243.7987	13.79861	242.6475
I1_tRMS_rc@GIRD [A]	3.248168	3.039322	-0.208847	2.972082
P1_t_rc@GIRD [W]	745.4222	738.9254	-6.496826	718.5977
Q1_t_rc@GIRD [var]	-49.72544	-55.17682	-5.451378	54.36737
S1_t_rc@GIRD [VA]	747.0789	740.9825	-6.096313	720.6515
PF1_t@GIRD []	0.997726	0.997351	-3.757e-4	0.997093
F_fund@GIRD [Hz]	50.03814	49.99993	-0.038208	49.99961

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:12.8216000	1:12.9216000	0.1000000	
A1 [A]	0.813675	0.738716	-0.074959	2.957464
U1 [V]	37.60410	37.55856	-0.045538	243.6785
U1_tRMS_rc@GIRD [V]	230.0000	243.7933	13.79327	243.1036
I1_tRMS_rc@GIRD [A]	3.248168	3.058847	-0.189322	2.970087
P1_t_rc@GIRD [W]	745.4222	743.5175	-1.904663	719.7487
Q1_t_rc@GIRD [var]	-49.72544	-57.35530	-7.629860	53.36253
S1_t_rc@GIRD [VA]	747.0789	745.7264	-1.352417	721.7242
PF1_t@GIRD []	0.997726	0.997196	-5.298e-4	0.997118
F_fund@GIRD [Hz]	50.03814	50.00031	-0.037830	49.99985

During dip (t1+100ms)



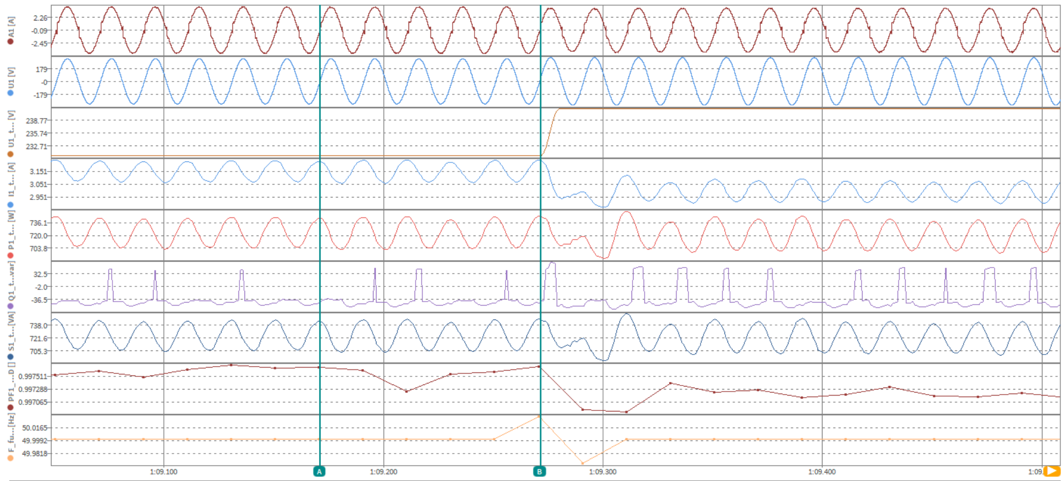
	A	B	间隔	有效值
时间 [s]	1:12.9508000	1:15.9546000	3.0038000	
A1 [A]	0.464630	-4.002285	-4.466915	3.150611
U1 [V]	50.68493	-281.7829	-332.4678	229.9254
U1_tRMS_rc@GIRD [V]	243.7896	230.0028	-13.78680	230.0259
I1_tRMS_rc@GIRD [A]	2.865467	3.116402	0.250935	3.150863
P1_t_rc@GIRD [W]	697.1294	714.3044	17.17505	723.0748
Q1_t_rc@GIRD [var]	-44.85561	-59.53459	-14.67898	49.48729
S1_t_rc@GIRD [VA]	698.5710	716.7811	18.21014	724.7663
PF1_t@GIRD []	0.997126	0.997551	4.251e-4	0.997398
F_fund@GIRD [Hz]	50.00052	50.00019	-3.281e-4	50.00003

After dip (t2+3s)

Verification of dynamic network support									P
Short-circuited power at generator terminal [VA]		6K							
NS protection settings		See table 5.5 for detail.							
	No.	Parameter	Phase ref.	Time ref.	unit	Result			
General Info.	0	Test number	--	--	--	6.4	7.4	1.5	5.5
	1	Date	--	--	dd.mm.yyyy	25-Oct-2025 to 10-Nov-2025			
	2	Time (start of test)	--	--	hh:mm:ss.f	See graph			
	3	Fault type (phase)	--	--		D1	D1	D2	D2
	4	Setting voltage depth	Line to line	--	p.u.	1.20	1.15	0.15	1.25
	5	Setting dip duration		--	ms	5000	60000	150	100
	6	Point of fault entry	Total	--	ms	20ms			
	7	Point of fault clearance	Total	--	ms	20ms			
	8	Fault duration in empty load test	Total	--	ms	5020.5	60018	171.9	123.2
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.050	1.040	0.15	1.25
	10		Positive sequence		p.u.	--	--	--	--
Before dip <t1	11	Voltage	Line to neutral	t1-10s to t1	p.u.	1.00	1.00	1.00	1.00
	12	Current	Positive sequence	t1-500ms to t1-100ms	p.u.	--	--	--	--
	13	Active power	Total	t1-10s to t1	p.u.	0.309	0.309	1.010	1.016
	14		Positive sequence			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.021	-0.021	-0.024	-0.024
	16		Positive sequence			--	--	--	--
	17	$\cos_{\varphi}$	--	t1-10s to t1	--	0.9977	0.9974	0.9997	0.9996
During	18	Voltage	Phase 1	t1+100ms	p.u.	--	--	--	--

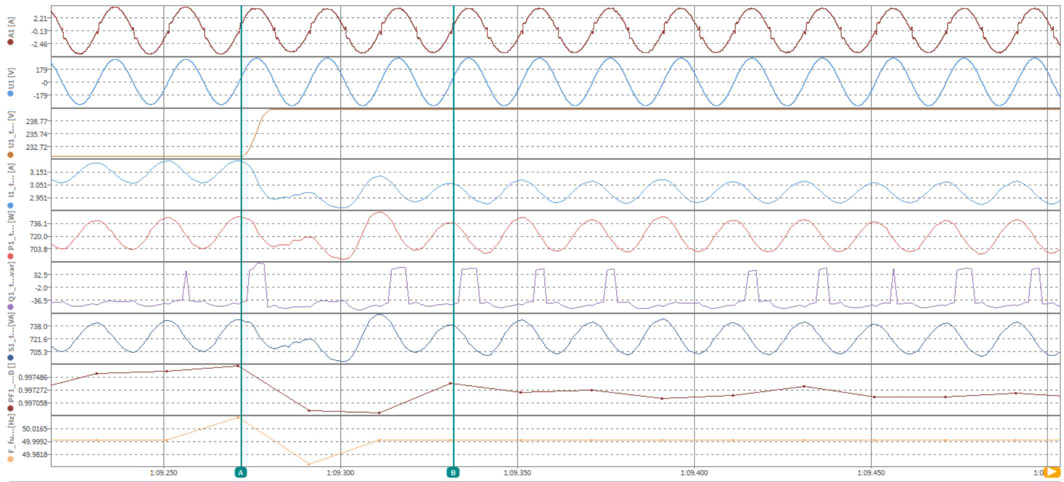
dip t1 to t2			Phase 2	to t2-20ms		--	--	0.149	1.250
			Phase 3			1.050	1.040	--	--
	19	Line current	Phase 1	t1+60ms	p.u.	--	--	--	--
	20		Phase 2			--	--	0.007	0.040
	21		Phase 3			0.294	0.295	--	--
	22	Line current	Phase 1	t1+100ms	p.u.	--	--	--	--
	23		Phase 2			--	--	0.008	0.021
	24		Phase 3			0.296	0.296	--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.309	0.308	-0.001	-0.005
	26		Positive sequence			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.00	1.00	1.00	1.00
	28	Active power	Positive sequence.	t2+3s to t2+10s	p.u	--	--	--	--
	29		Total			0.293	0.295	1.011	1.017
	39	Active power rising time	Positive sequence	--	s	0.090	0.090	0.147	0.134
	31	Reactive power	Positive sequence	t2+3s to t2+10s	p.u.	--	--	--	--
	32		Total			-0.020	-0.021	-0.024	-0.022
	33	Reactive power rising time	Positive sequence	--	s	0.090	0.090	0.147	0.134
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 6.4



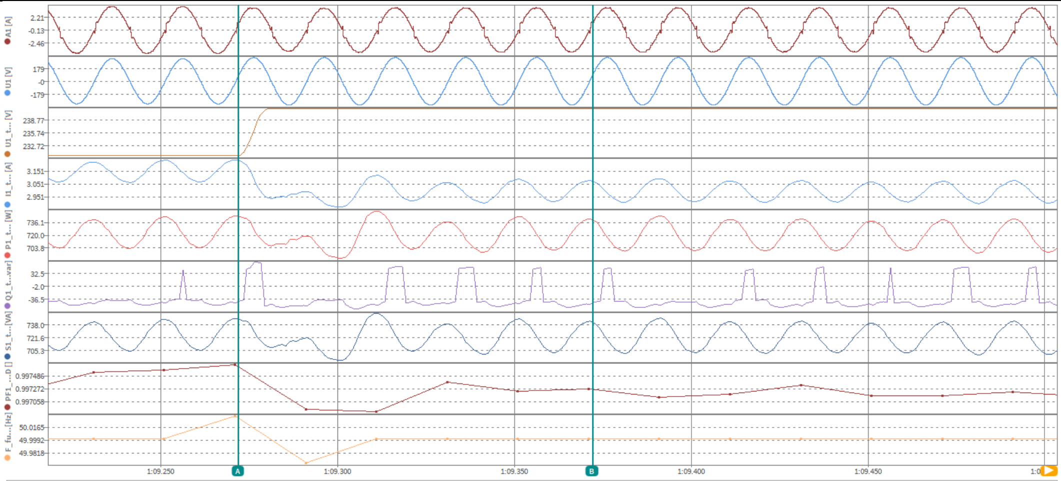
	A	B	间隔	有效值
时间 [s]	1:09.17120	1:09.27150	0.10030	
A1 [A]	-0.077534	-0.598240	-0.520706	3.141705
U1 [V]	-11.09552	18.69607	29.79160	229.5341
U1_tRMS_rc@GIRD [V]	230.0056	230.0033	-2.335e-3	229.9918
I1_tRMS_rc@GIRD [A]	3.227239	3.238763	0.011524	3.147948
P1_t_rc@GIRD [W]	740.6172	743.4177	2.800476	722.3616
Q1_t_rc@GIRD [var]	-49.70135	-47.37987	2.321484	48.72310
S1_t_rc@GIRD [VA]	742.2830	744.9260	2.642944	724.0029
PF1_t@GIRD []	0.997656	0.997679	2.283e-5	0.997569
F_fund@GIRD [Hz]	49.99999	50.03216	0.032173	50.00463

Before dip (t1-100ms)



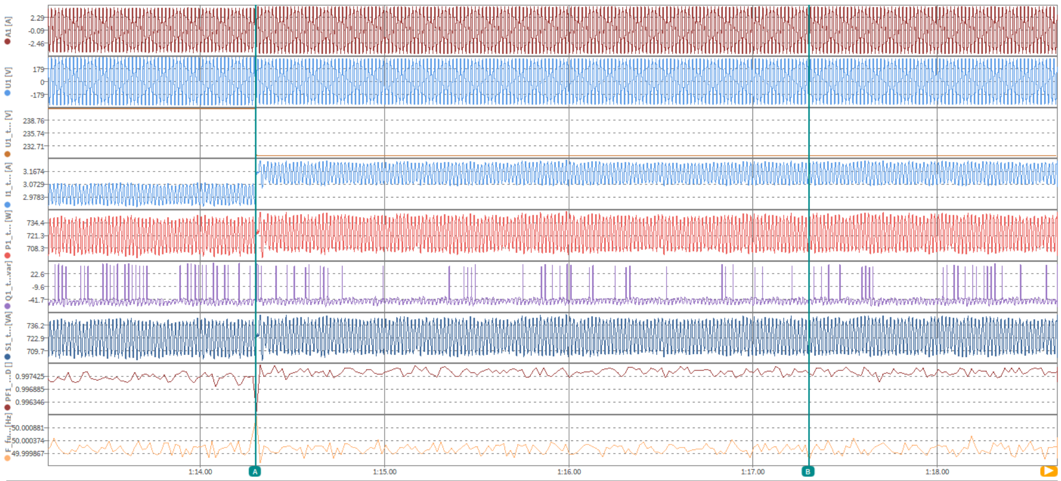
	A	B	间隔	有效值
时间 [s]	1:09.27200	1:09.33200	0.06000	
A1 [A]	1.425076	1.461411	0.036335	2.976183
U1 [V]	72.36219	72.57629	0.214100	241.3089
U1_tRMS_rc@GIRD [V]	230.0042	241.5056	11.50136	240.5199
I1_tRMS_rc@GIRD [A]	3.242339	3.059617	-0.182722	2.995161
P1_t_rc@GIRD [W]	744.0098	736.9976	-7.012207	718.0452
Q1_t_rc@GIRD [var]	-50.94189	-53.19080	-2.248905	53.18500
S1_t_rc@GIRD [VA]	745.7518	738.9146	-6.837158	720.0121
PF1_t@GIRD []	0.997679	0.997378	-3.007e-4	0.997209
F_fund@GIRD [Hz]	50.03216	49.99994	-0.032223	49.99970

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:09.27200	1:09.37210	0.10010	
A1 [A]	1.425076	1.312351	-0.112724	2.980589
U1 [V]	72.36219	82.58391	10.22172	241.2748
U1_tRMS_rc@GIRD [V]	230.0042	241.5006	11.49637	240.9049
I1_tRMS_rc@GIRD [A]	3.242339	3.074384	-0.167955	2.993084
P1_t_rc@GIRD [W]	744.0098	740.4227	-3.587158	718.9057
Q1_t_rc@GIRD [var]	-50.94189	-55.04127	-4.099380	52.43152
S1_t_rc@GIRD [VA]	745.7518	742.4656	-3.286133	720.8151
PF1_t@GIRD []	0.997679	0.997262	-4.174e-4	0.997219
F_fund@GIRD [Hz]	50.03216	50.00012	-0.032043	49.99986

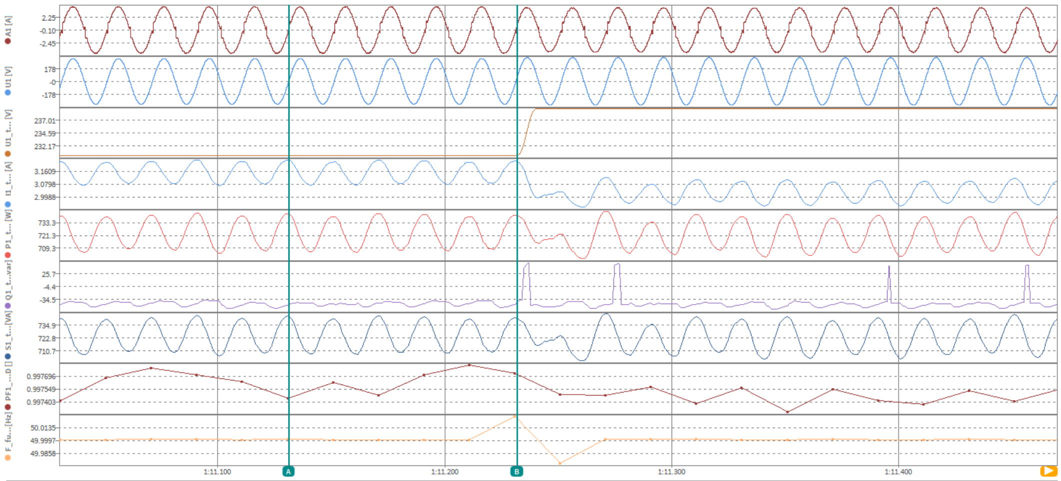
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:14.3007000	1:17.3033000	3.0026000	
A1 [A]	0.718975	-2.791786	-3.510761	3.147920
U1 [V]	65.48191	-189.9905	-255.4724	229.9063
U1_tRMS_rc@GIRD [V]	241.4735	229.9777	-11.49582	230.0139
I1_tRMS_rc@GIRD [A]	2.915546	3.069522	0.153975	3.148589
P1_t_rc@GIRD [W]	702.5567	704.3358	1.779053	722.6021
Q1_t_rc@GIRD [var]	-45.47831	-47.28840	-1.810097	48.24700
S1_t_rc@GIRD [VA]	704.0271	705.9214	1.894348	724.2110
PF1_t@GIRD []	0.997394	0.997661	2.671e-4	0.997592
F_fund@GIRD [Hz]	50.00062	50.00015	-4.730e-4	50.00001

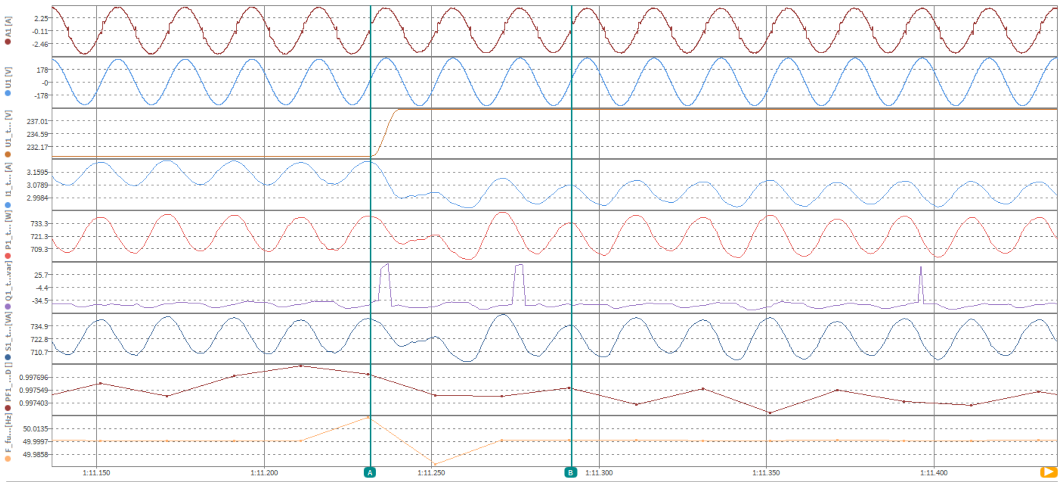
After dip (t2+3s)

Graph of Test number 7.4



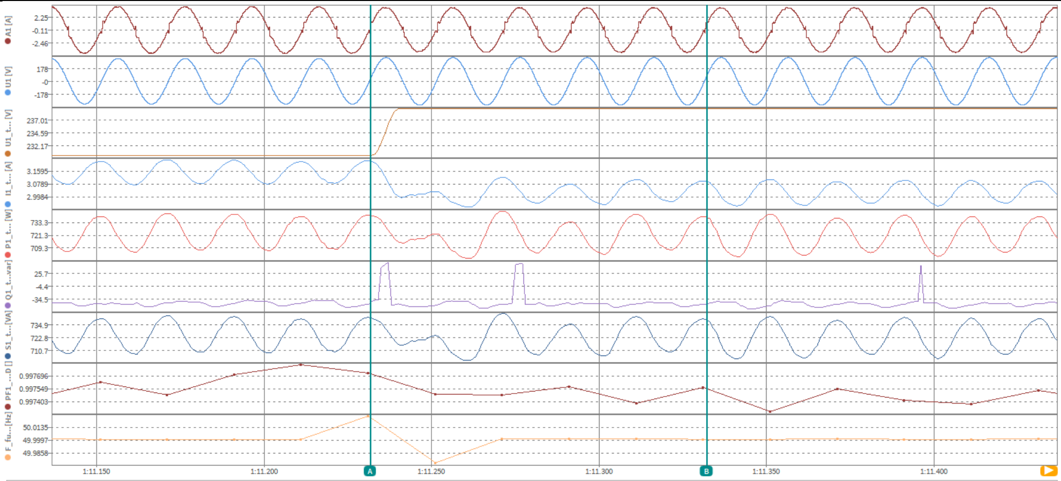
	A	B	间隔	有效值
时间 [s]	1:11.13160	1:11.23210	0.10050	
A1 [A]	-0.784206	1.409340	2.193546	3.142884
U1 [V]	16.24489	70.88328	54.63839	229.3372
U1_tRMS_rc@GIRD [V]	230.0056	230.0034	-2.213e-3	229.9933
I1_tRMS_rc@GIRD [A]	3.232971	3.226472	-6.499e-3	3.152322
P1_t_rc@GIRD [W]	741.8438	740.4257	-1.418091	723.4305
Q1_t_rc@GIRD [var]	-51.09681	-49.81526	1.281555	47.88675
S1_t_rc@GIRD [VA]	743.6014	742.0995	-1.501892	725.0136
PF1_t@GIRD []	0.997437	0.997727	2.905e-4	0.997631
F_fund@GIRD [Hz]	50.00009	50.02605	0.025959	50.00426

Before dip (t1-100ms)



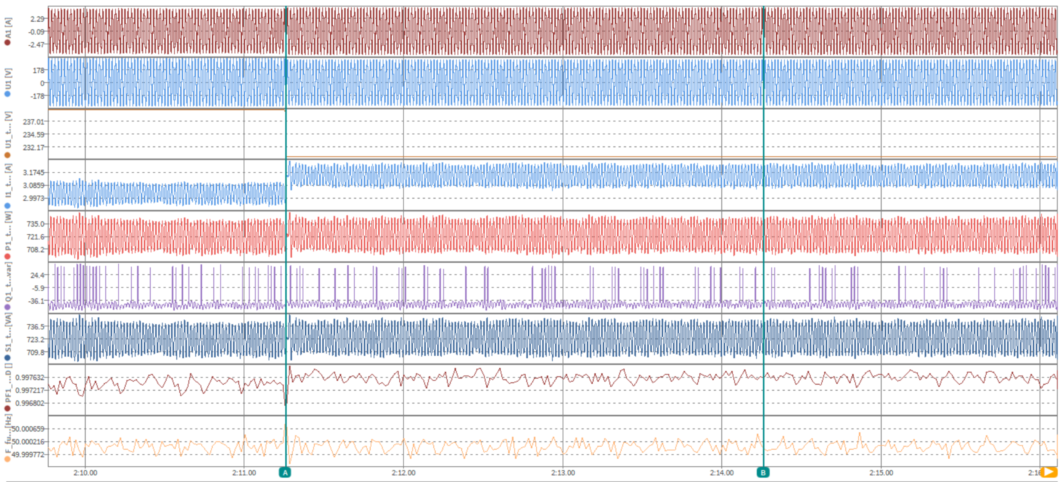
	A	B	间隔	有效值
时间 [s]	1:11.23180	1:11.29180	0.06000	
A1 [A]	1.144695	1.150990	6.294e-3	3.012391
U1 [V]	41.02707	41.33010	0.303030	239.0010
U1_tRMS_rc@GIRD [V]	230.0034	239.2037	9.200287	238.3529
I1_tRMS_rc@GIRD [A]	3.226472	3.073653	-0.152819	3.029543
P1_t_rc@GIRD [W]	740.4257	733.7529	-6.672729	720.1309
Q1_t_rc@GIRD [var]	-49.81526	-46.56664	3.248623	49.56354
S1_t_rc@GIRD [VA]	742.0995	735.2291	-6.870422	721.8345
PF1_t@GIRD []	0.997727	0.997570	-1.574e-4	0.997562
F_fund@GIRD [Hz]	50.02605	50.00015	-0.025902	49.99992

During dip (t1+60ms)



	A	B	间隔	有效值
时间 [s]	1:11.23180	1:11.33220	0.10040	
A1 [A]	1.144695	1.432228	0.287533	3.013359
U1 [V]	41.02707	80.81031	39.78324	238.6376
U1_tRMS_rc@GIRD [V]	230.0034	239.1998	9.196365	238.6851
I1_tRMS_rc@GIRD [A]	3.226472	3.095657	-0.130815	3.027701
P1_t_rc@GIRD [W]	740.4257	738.8030	-1.622620	720.8000
Q1_t_rc@GIRD [var]	-49.81526	-49.81342	1.839e-3	49.60980
S1_t_rc@GIRD [VA]	742.0995	740.4804	-1.619080	722.5052
PF1_t@GIRD []	0.997727	0.997556	-1.712e-4	0.997530
F_fund@GIRD [Hz]	50.02605	49.99972	-0.026329	49.99991

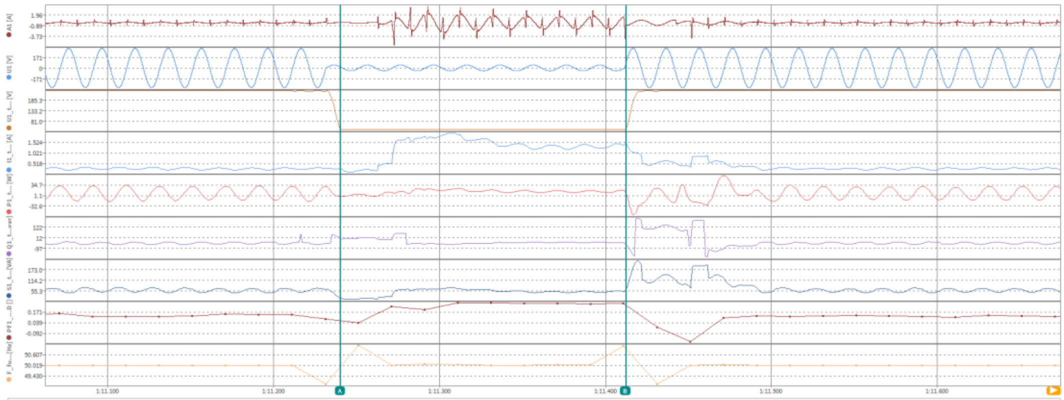
During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	2:11.26090	2:14.26380	3.00290	
A1 [A]	0.513554	-3.298474	-3.812027	3.147068
U1 [V]	55.20130	-221.3390	-276.5403	229.9095
U1_tRMS_rc@GIRD [V]	239.1809	229.9898	-9.191162	230.0125
I1_tRMS_rc@GIRD [A]	2.957934	3.087038	0.129103	3.147713
P1_t_rc@GIRD [W]	705.6748	708.1862	2.511353	722.3983
Q1_t_rc@GIRD [var]	-50.52808	-50.53759	-9.518e-3	48.23865
S1_t_rc@GIRD [VA]	707.4814	709.9871	2.505615	724.0071
PF1_t@GIRD []	0.997356	0.997652	2.954e-4	0.997596
F_fund@GIRD [Hz]	50.00014	50.00010	-4.196e-5	50.00001

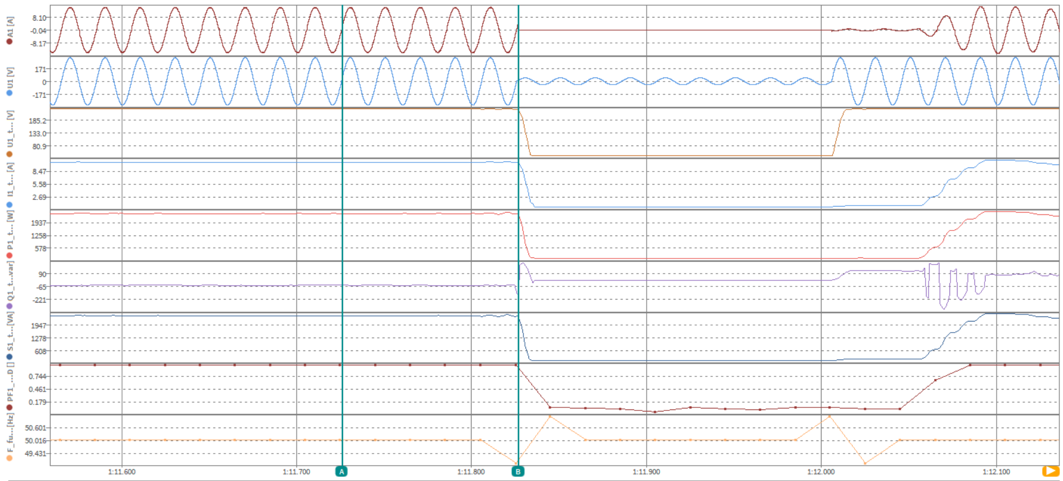
After dip (t2+3s)

Graph of Test number 1.5



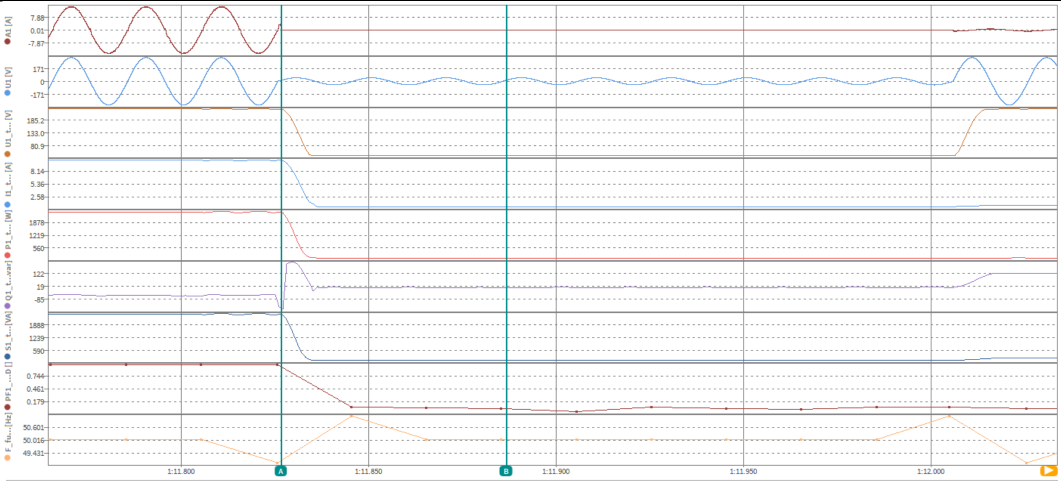
	A	B	间隔	有效值
时间 [s]	1:11.240400	1:11.412300	0.171900	
A1 [A]	-0.010872	-3.700733	-3.689862	1.392553
U1 [V]	20.01524	54.07882	34.06358	34.28700
U1_tRMS_rc@GIRD [V]	53.11282	34.45995	-18.65286	34.55493
I1_tRMS_rc@GIRD [A]	0.243380	1.372971	1.129591	1.367380
P1_t_rc@GIRD [W]	-3.448892	16.47162	19.92051	13.29114
Q1_t_rc@GIRD [var]	12.45800	-44.35269	-56.81069	45.15639
S1_t_rc@GIRD [VA]	12.92659	47.31253	34.38594	47.07180
PF1_t@GIRD []	0.082372	0.281321	0.198949	0.240194
F_fund@GIRD [Hz]	48.89782	51.10238	2.204559	50.12060

Empty Load



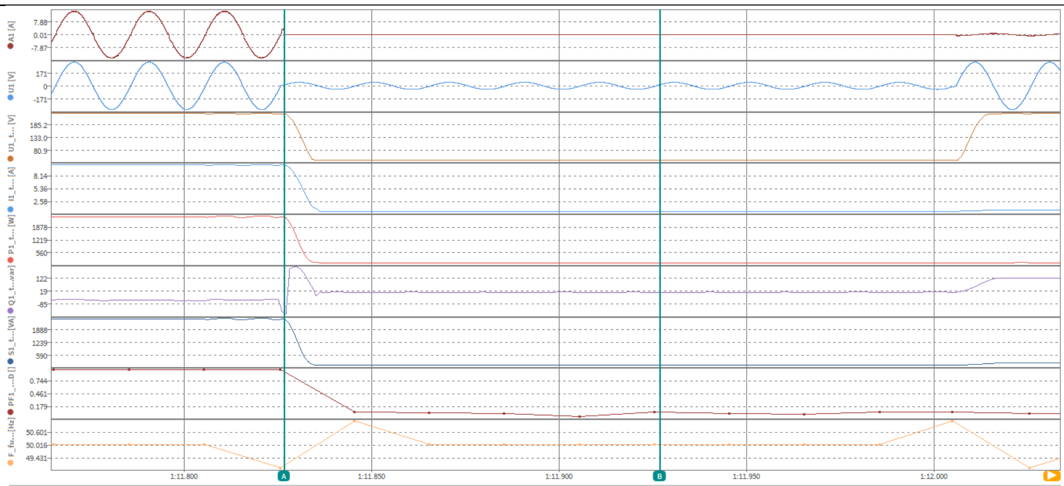
	A	B	间隔	有效值
时间 [s]	1:11.726100	1:11.827000	0.100900	
A1 [A]	2.437359	-0.208134	-2.645493	10.49219
U1 [V]	40.84993	18.63027	-22.21966	229.0409
U1_tRMS_rc@GIRD [V]	230.1108	228.7693	-1.341553	230.1681
I1_tRMS_rc@GIRD [A]	10.54249	10.50699	-0.035495	10.54143
P1_t_rc@GIRD [W]	2425.258	2398.639	-26.61841	2425.528
Q1_t_rc@GIRD [var]	-57.57627	-155.5516	-97.97532	62.96390
S1_t_rc@GIRD [VA]	2425.941	2403.677	-22.26343	2426.345
PF1_t@GIRD []	0.999711	0.999455	-2.561e-4	0.999644
F_fund@GIRD [Hz]	49.99991	48.90174	-1.098167	49.81846

Before dip (t1-100ms)



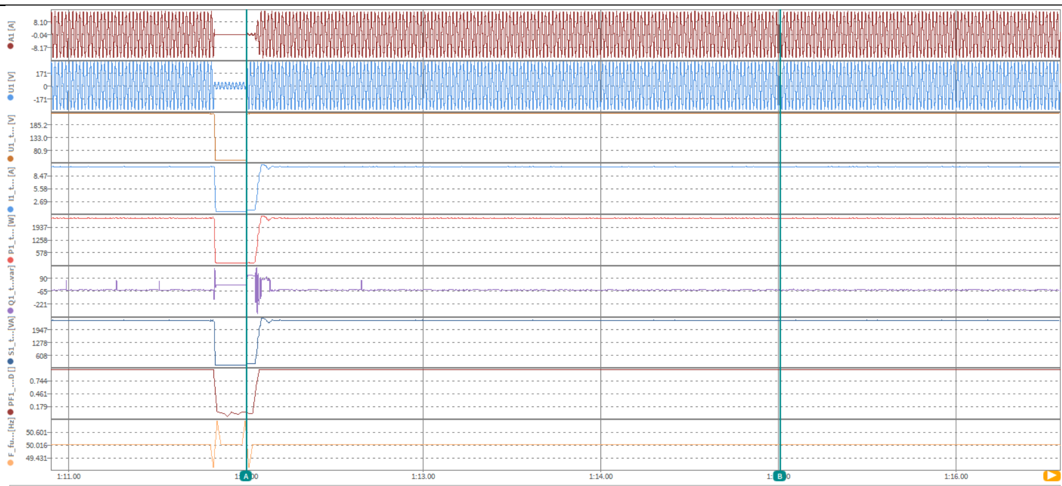
	A	B	间隔	有效值
时间 [s]	1:11.826800	1:11.886800	0.060000	
A1 [A]	-0.119442	-0.105137	0.014305	0.080625
U1 [V]	16.35146	16.45923	0.107765	34.25608
U1_tRMS_rc@GIRD [V]	228.7693	34.32745	-194.4418	71.39396
I1_tRMS_rc@GIRD [A]	10.50699	0.077117	-10.42988	2.910015
P1_t_rc@GIRD [W]	2398.639	-0.188183	-2398.827	588.9526
Q1_t_rc@GIRD [var]	-155.5516	2.640530	158.1921	65.09434
S1_t_rc@GIRD [VA]	2403.677	2.647227	-2401.030	592.5390
PF1_t@GIRD []	0.999455	-4.129e-3	-1.003584	0.500185
F_fund@GIRD [Hz]	48.90174	50.00098	1.099239	50.01524

During dip (t1+60ms)



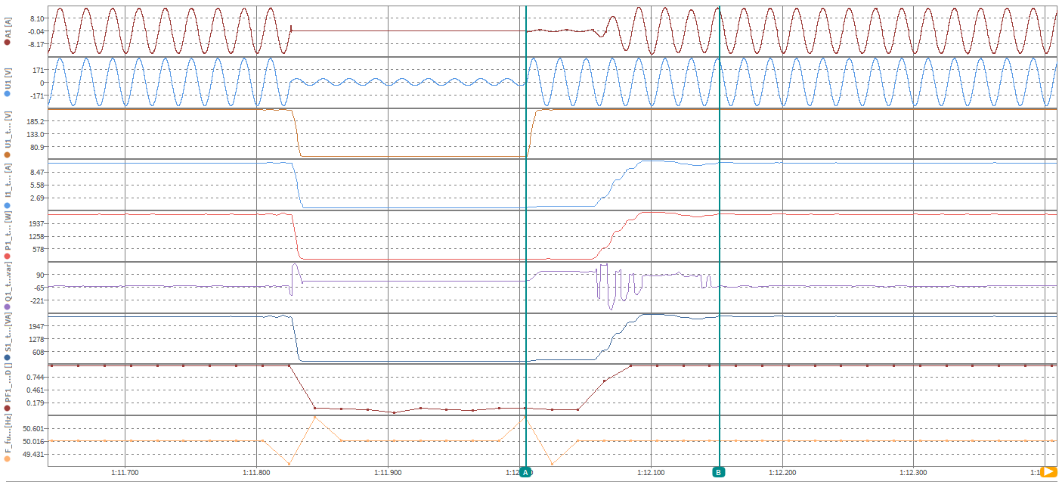
	A	B	间隔	有效值
时间 [s]	1:11.826800	1:11.926900	0.100100	
A1 [A]	-0.119442	-0.083679	0.035763	0.079739
U1 [V]	16.35146	17.94696	1.595497	34.30835
U1_tRMS_rc@GIRD [V]	228.7693	34.35185	-194.4174	59.56113
I1_tRMS_rc@GIRD [A]	10.50699	0.078247	-10.42875	2.262049
P1_t_rc@GIRD [W]	2398.639	-0.095991	-2398.735	457.7039
Q1_t_rc@GIRD [var]	-155.5516	2.686202	158.2378	50.61609
S1_t_rc@GIRD [VA]	2403.677	2.687916	-2400.990	460.4941
PF1_t@GIRD []	0.999455	0.036356	-0.963100	0.409881
F_fund@GIRD [Hz]	48.90174	50.00009	1.098351	50.01025

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:12.005000	1:15.008100	3.003100	
A1 [A]	-0.106568	10.38290	10.48946	10.41925
U1 [V]	-10.59794	222.0757	232.6737	230.0880
U1_tRMS_rc@GIRD [V]	34.64400	230.1202	195.4762	229.9209
I1_tRMS_rc@GIRD [A]	0.082311	10.55076	10.46845	10.41139
P1_t_rc@GIRD [W]	-0.257610	2427.234	2427.491	2395.619
Q1_t_rc@GIRD [var]	2.839919	-58.65751	-61.49743	65.42912
S1_t_rc@GIRD [VA]	2.851579	2427.942	2425.091	2396.513
PF1_t@GIRD []	0.034568	0.999681	0.965112	0.984454
F_fund@GIRD [Hz]	50.00333	49.99982	-3.510e-3	50.00048

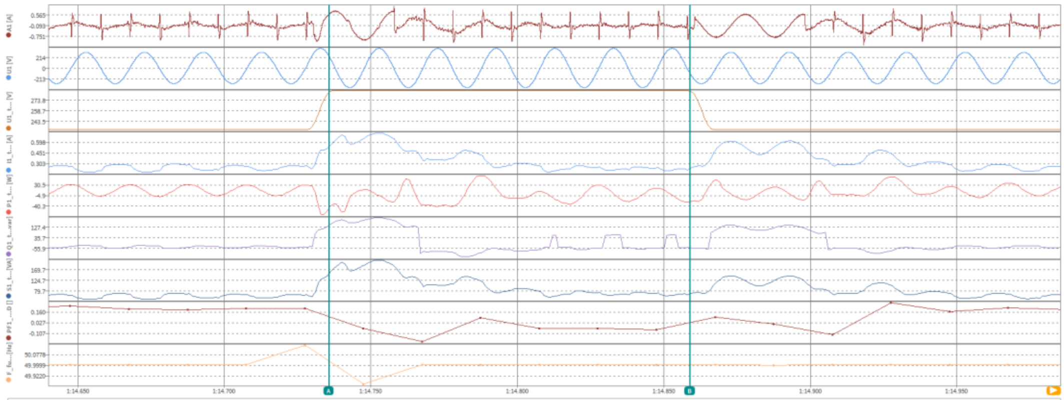
After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:12.005000	1:12.152100	0.147100	
A1 [A]	-0.106568	13.43179	13.53836	7.802094
U1 [V]	-10.59794	294.7731	305.3711	230.4929
U1_tRMS_rc@GIRD [V]	34.64400	230.2023	195.5583	224.8251
I1_tRMS_rc@GIRD [A]	0.082311	10.53183	10.44952	7.460176
P1_t_rc@GIRD [W]	-0.257610	2423.543	2423.801	1712.482
Q1_t_rc@GIRD [var]	2.839919	-66.39236	-69.23228	126.9466
S1_t_rc@GIRD [VA]	2.851579	2424.452	2421.601	1717.180
PF1_t@GIRD []	0.034568	0.999492	0.964923	0.699225
F_fund@GIRD [Hz]	50.00333	50.00066	-2.670e-3	50.00966

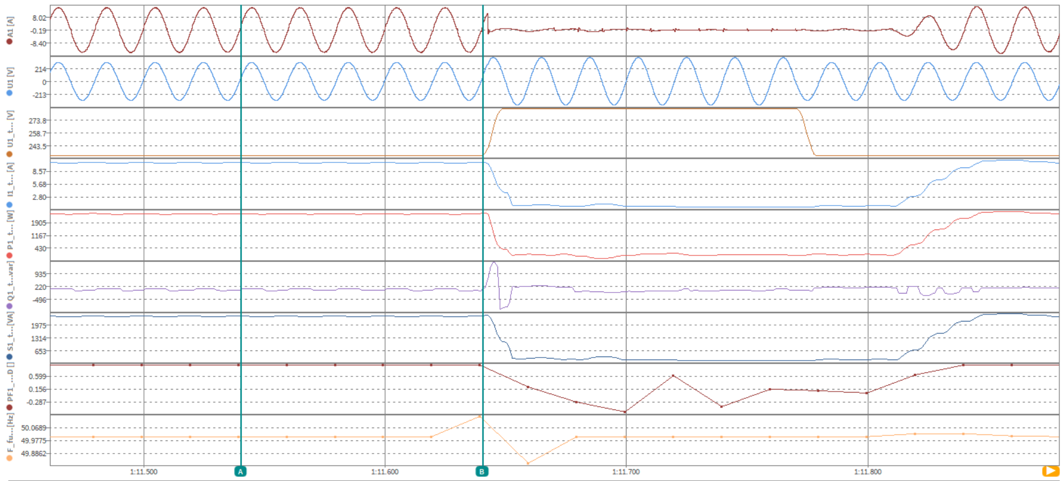
Recovery time

Graph of Test number 5.5



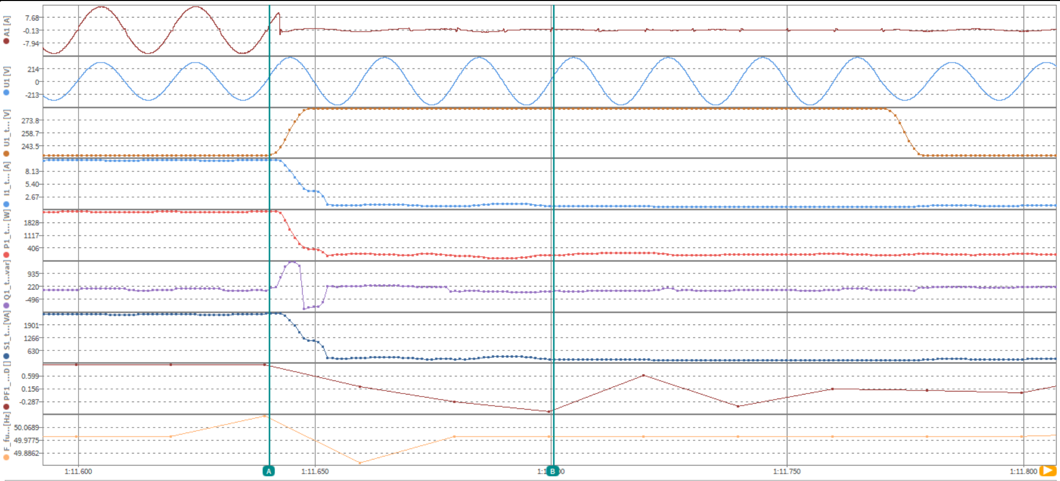
	A	B	间隔	有效值
时间 [s]	1:14.735800	1:14.859000	0.123200	
A1 [A]	0.626850	-0.146770	-0.773621	0.384957
U1 [V]	257.0727	-102.2720	-359.3447	284.3667
U1_tRMS_rc@GIRD [V]	282.0824	287.3679	5.285492	287.3545
I1_tRMS_rc@GIRD [A]	0.503611	0.203975	-0.299636	0.398498
P1_t_rc@GIRD [W]	-60.74826	-28.66552	32.08275	28.41491
Q1_t_rc@GIRD [var]	128.4160	-51.12848	-179.5444	110.9264
S1_t_rc@GIRD [VA]	142.0599	58.61597	-83.44392	114.5080
PF1_t@GIRD []	0.206491	-0.072520	-0.279011	0.129095
F_fund@GIRD [Hz]	50.14833	50.00222	-0.146111	50.00049

Empty Load



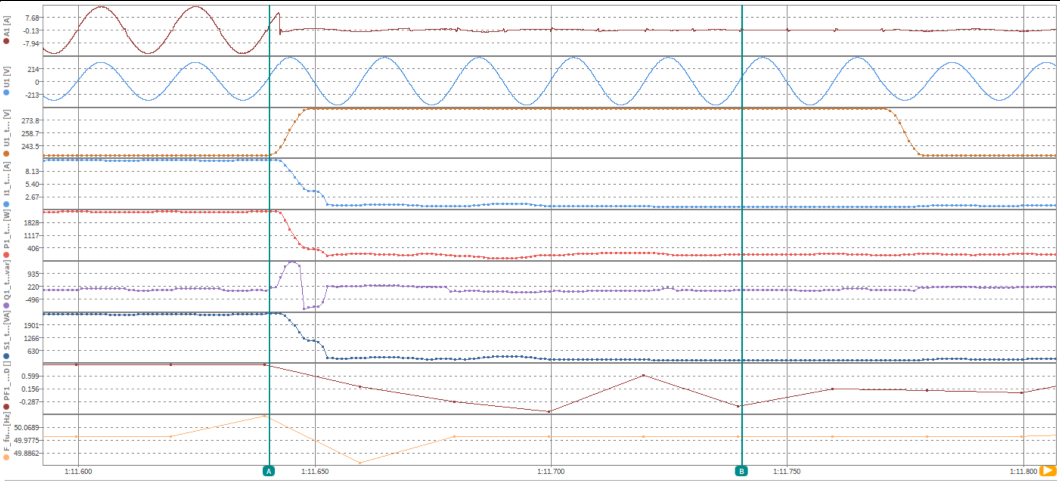
	A	B	间隔	有效值
时间 [s]	1:11.5405000	1:11.6405000	0.1000000	
A1 [A]	3.639508	3.735066	0.095558	10.48998
U1 [V]	70.03093	87.07023	17.03930	230.0898
U1_tRMS_rc@GIRD [V]	230.1767	230.1784	1.755e-3	230.1777
I1_tRMS_rc@GIRD [A]	10.59875	10.60280	4.052e-3	10.49581
P1_t_rc@GIRD [W]	2438.912	2439.628	0.715576	2415.240
Q1_t_rc@GIRD [var]	-57.26176	-66.55222	-9.290459	56.55778
S1_t_rc@GIRD [VA]	2439.584	2440.535	0.950928	2415.902
PF1_t@GIRD []	0.999689	0.999659	-3.040e-5	0.999698
F_fund@GIRD [Hz]	49.99994	50.15154	0.151600	50.02526

Before dip (t1-100ms)



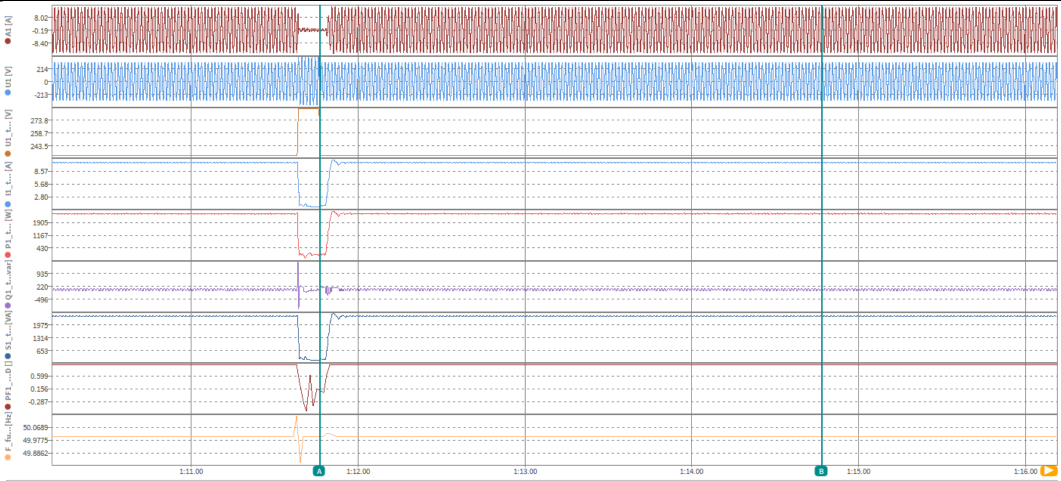
	A	B	间隔	有效值
时间 [s]	1:11.6404000	1:11.7005000	0.0601000	
A1 [A]	3.106785	0.857735	-2.249050	1.608892
U1 [V]	74.89300	84.34368	9.450675	286.8512
U1_tRMS_rc@GIRD [V]	230.1784	287.2514	57.07295	282.6985
I1_tRMS_rc@GIRD [A]	10.60280	0.417629	-10.18517	3.521662
P1_t_rc@GIRD [W]	2439.628	-52.01757	-2491.645	720.1475
Q1_t_rc@GIRD [var]	-66.55222	-108.1003	-41.54805	499.1581
S1_t_rc@GIRD [VA]	2440.535	119.9646	-2320.571	876.2255
PF1_t@GIRD []	0.999659	-0.687837	-1.687495	0.638983
F_fund@GIRD [Hz]	50.15154	50.00192	-0.149620	49.98930

During dip (t1+60ms)



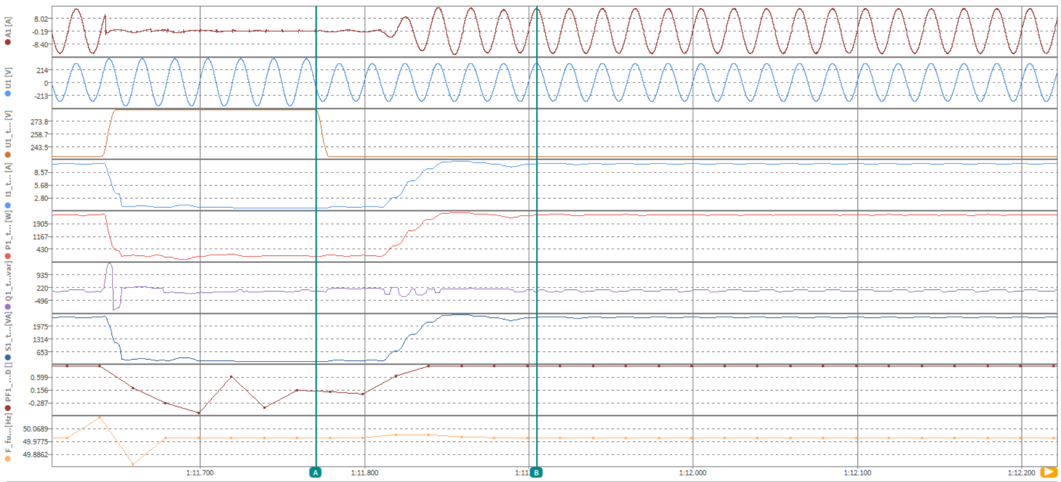
	A	B	间隔	有效值
时间 [s]	1:11.6404000	1:11.7404000	0.1000000	
A1 [A]	3.106785	0.629139	-2.477646	1.263855
U1 [V]	74.89300	72.02697	-2.866030	287.1632
U1_tRMS_rc@GIRD [V]	230.1784	287.3255	57.14711	284.5285
I1_tRMS_rc@GIRD [A]	10.60280	0.215016	-10.38778	2.745568
P1_t_rc@GIRD [W]	2439.628	-12.37174	-2452.000	560.6581
Q1_t_rc@GIRD [var]	-66.55222	-60.52827	6.023941	391.5458
S1_t_rc@GIRD [VA]	2440.535	61.77971	-2378.756	683.8461
PF1_t@GIRD []	0.999659	-0.495620	-1.495279	0.614690
F_fund@GIRD [Hz]	50.15154	49.99973	-0.151810	49.99278

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:11.7706000	1:14.7796000	3.0090000	
A1 [A]	-0.372505	-1.173592	-0.801086	10.40124
U1 [V]	-76.92647	-21.87348	55.05300	230.2168
U1_tRMS_rc@GIRD [V]	287.3306	230.1870	-57.14360	230.2988
I1_tRMS_rc@GIRD [A]	0.227023	10.60295	10.37593	10.39009
P1_t_rc@GIRD [W]	-33.75508	2440.052	2473.808	2390.893
Q1_t_rc@GIRD [var]	-55.81801	-54.53371	1.284306	61.26584
S1_t_rc@GIRD [VA]	65.23079	2440.662	2375.431	2391.677
PF1_t@GIRD []	0.130486	0.999676	0.869190	0.987711
F_fund@GIRD [Hz]	50.00225	50.00011	-2.140e-3	50.00033

After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:11.7706000	1:11.9049000	0.1343000	
A1 [A]	-0.372505	14.60867	14.98118	8.034180
U1 [V]	-76.92647	325.1667	402.0932	230.8285
U1_tRMS_rc@GIRD [V]	287.3306	230.2262	-57.10443	232.6689
I1_tRMS_rc@GIRD [A]	0.227023	10.43071	10.20369	7.722725
P1_t_rc@GIRD [W]	-33.75508	2400.577	2434.332	1773.283
Q1_t_rc@GIRD [var]	-55.81801	-63.75169	-7.933678	131.1451
S1_t_rc@GIRD [VA]	65.23079	2401.423	2336.193	1778.126
PF1_t@GIRD []	0.130486	0.999255	0.868769	0.741269
F_fund@GIRD [Hz]	50.00225	50.00108	-1.171e-3	50.00569

Recovery time

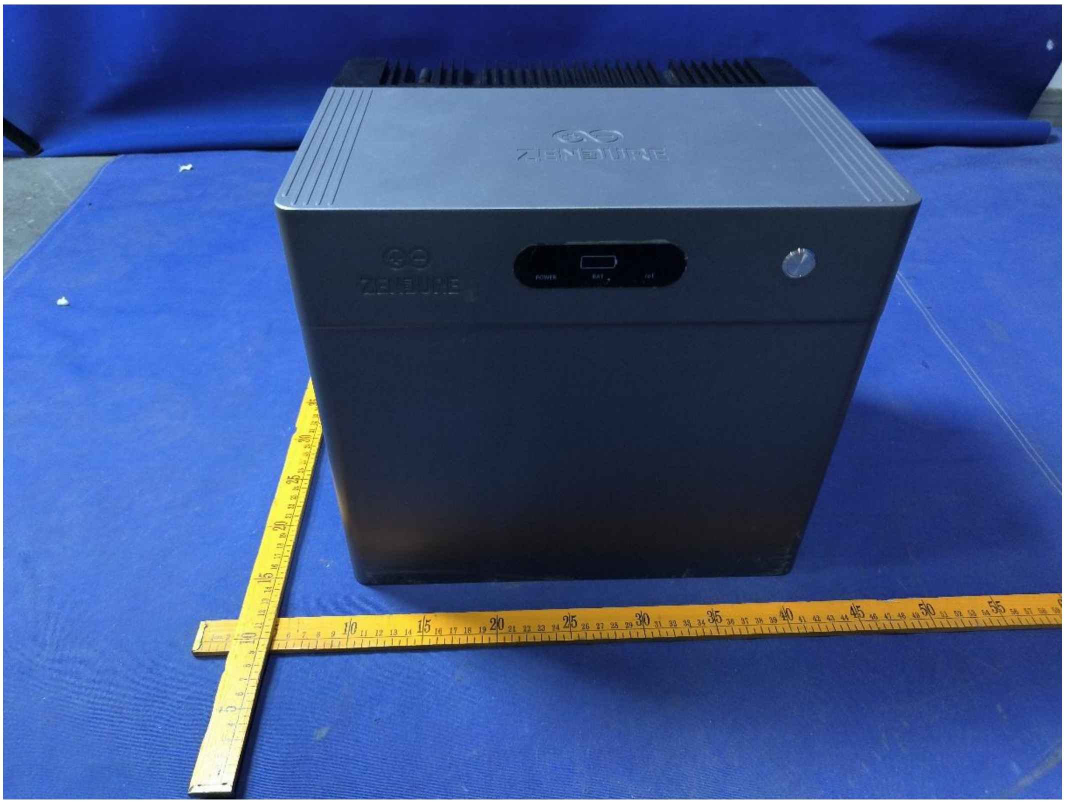
E.7 Requirements for the test report for the NS protection

Requirements for the NS protection (Anforderungen an den NA-Schutz)						
Extract of the test report for NS protection (Auszug aus dem Prüfbericht für den NA-Schutz)						
NS protection as integrated NS protection (NA-Schutz als integrierter)						
Manufacturer: (Hersteller)	ZENDURE TECHNOLOGY CO., LIMITED. RM 77A 2/F BLK F TUEN MUN INDUSTRIAL CENTRE 2 SAN PING CIRCUIT TUEN MUNNT					
Type of NS Protection: (Typ NA-Schutz)	**Integrierter NA-Schutz**					
Software Version:	V1					
Measurement Period: (Messzeitraum)	29 Sep 2025 to 10 Nov 2025					
	Stirling generators, fuel cells (Stirlinggeneratoren, Brennstoffzellen)			Inverter(s) (Umrichter)		
	Synchronous and asynchronous generators with *P*n ≤ 50 kW coupled directly or via inverters (direkt oder über Umrichter gekoppelte Synchron- und Asynchrongeneratoren mit Pn ≤ 50 kW)			Directly coupled synchronous and asynchronous generators with *P*n > 50 kW (direkt gekoppelte Synchron- und Asynchrongeneratoren mit Pn > 50 kW)		
Protective function （Schutzfunktion）	Set value （Einstellwert）	Tripping value (Auslösewert)	Tripping time NS protection * (Auslösezeit NA-Schutz*)	Set value (Einstellwert)	Tripping value (Auslösewert)	Tripping time NS protection * (Auslösezeit NA-Schutz*)
Rise-in-voltage protection (Spannungssteigerungsschutz) *U* >>	--	--	--	1,25 * Un	1.250* Un	128.4ms
Rise-in-voltage protection (Spannungssteigerungsschutz) *U* >	--	--	--	1,10 * Un	1.103* Un	506.6s
Voltage drop protection (Spannungsrückgangsschutz) *U* <	--	--	--	0,8 * Un	0.799* Un	3.034s
Voltage drop protection (Spannungsrückgangsschutz) *U* <<	--			0,45* Un	0.451* Un	327.0ms
Frequency decrease protection (Frequenzrückgangsschutz) *f* <	--	--	--	47,5 Hz	47.52Hz	170.5ms
Frequency increase protection (Frequenzsteigerungsschutz) *f* >	--	--	--	51,5 Hz	51.48Hz	173.5ms

* The tripping time includes the period from the limit value violation U/f until the tripping signal to the interface switch. When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above. The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms. * Die Auslösezeit umfasst den Zeitraum von der Grenzwertverletzung *U*/*f* bis zum Auslösesignal an den Kuppelschalter. Bei der Planung der Erzeugungsanlage ist die Eigenzeit des Kuppelschalters zum höchsten oben ermittelten Zeitwert zu addieren. Die Abschaltzeit (Summe der Auslösezeit NA-Schutz zzgl. Eigenzeit des Kuppelschalters) darf 200 ms nicht überschreiten.	
☒ For integrated NS protection (Bei integriertem NA-Schutz)	
Assigned to power generation unit of type zugeordnet zu Erzeugungseinheit Typ	ZDSF2400P, ZDSF2400AC+, ZDSF2400P-800, ZDSF2400AC+-800,
Type integrated interface switch Typ integrierter Kuppelschalter	XIAMEN HONGFA ELECTROACOUSTIC CO LTD, HF140FF-G
Response time of interface switch for integrated NS protection Eigenzeit des Kuppelschalters bei integriertem NA-Schutz	20ms
Verification of the entire functional chain “integrated NS protection – interface switch” has resulted in successful disconnection. Die Überprüfung der Gesamtwirkungskette „integrierter NA-Schutz – Kuppelschalter“ führte zu einer erfolgreichen Abschaltung.	

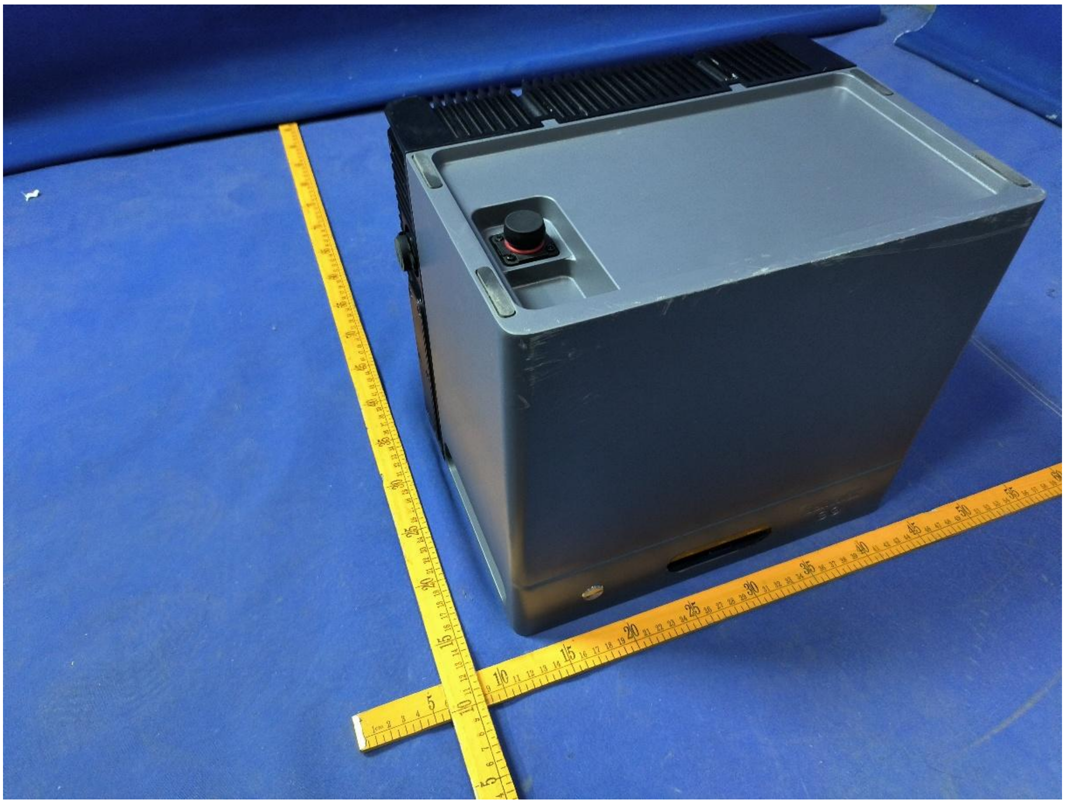
Appendix 1: photos

Overview 1 (ZDSF2400P)

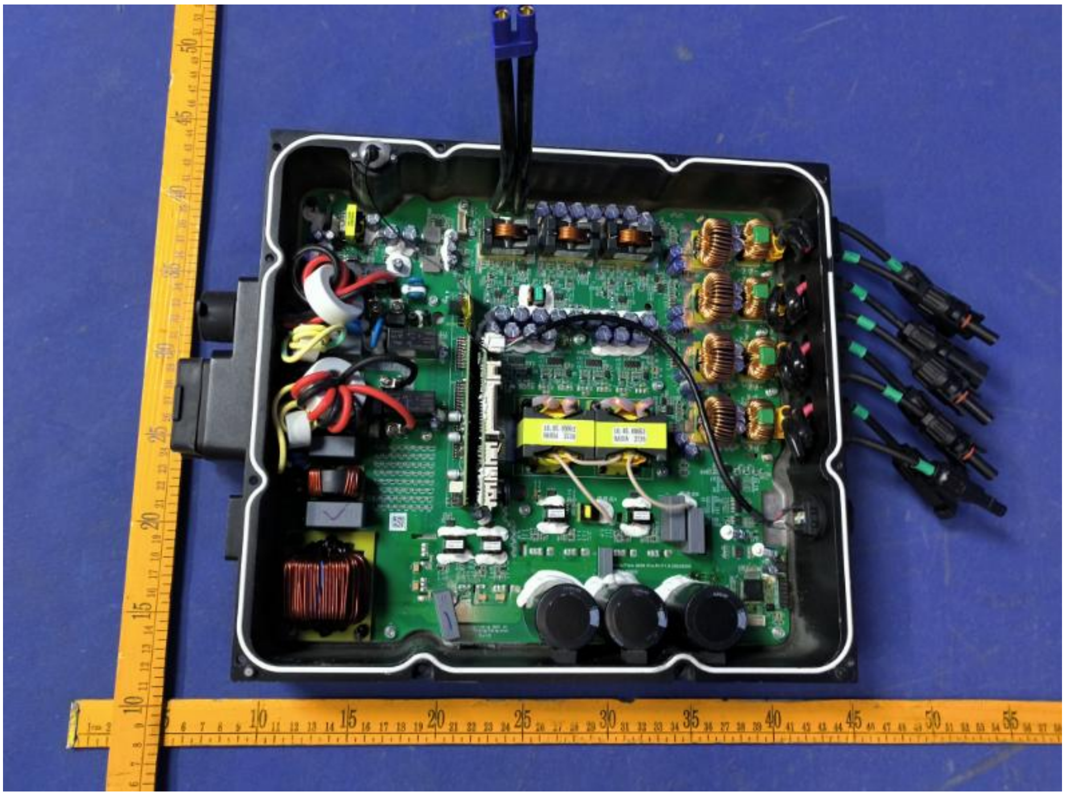

Overview 2 (ZDSF2400AC)

Overview 3

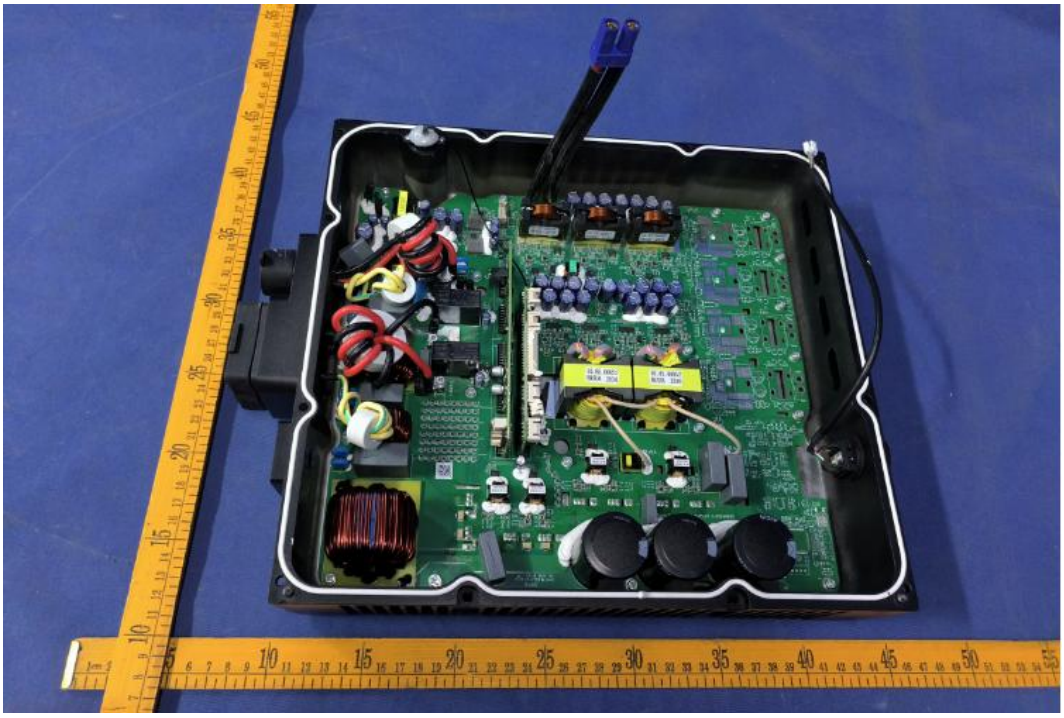
Overview 4 (ZDSF2400P)



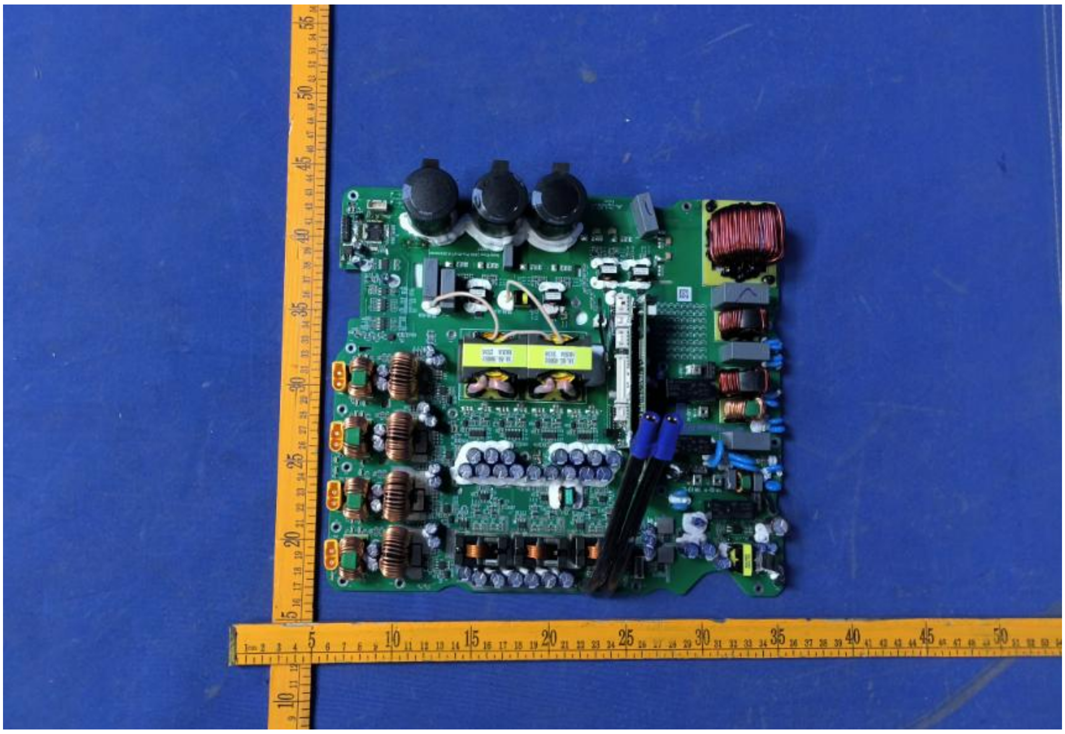
Overview 5 (ZDSF2400AC)



Internal view (ZDSF2400P)



Internal view (ZDSF2400AC)



Power board view (Components side)

Power board view (Soldered side)

Appendix 2: Equipment

Asset	Description	Manufacturer	Model	Cal Date	Cal Due
SA200-16	Precision Power Analyzer	YOKOGAWA	WT3000	21 Aug 2025	20 Aug 2026
SA200-02	RLC load	Qunling	ACLT-4830H	/	/
SA200-52	AC power source	Chroma	61860	/	/
SA050-33	Scope Corder	YOKOGAWA	DL 850E	05 Jan 2025	04 Jan 2026

(End of Report)