Product Service

TEST REPORT

Standard VDE-AR-N 4105:2018

TUV SUD Test Report for Technical requirements for the connection of generator to and parallel operation with low-voltage distribution networks

Report No.:	64.290.22.31001.01
Date of issue:	2020-10-13
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Client:	AISWEI Technology (Shanghai) Co., Ltd.
Client number:	099567
Address:	Room 905B,757 Mengzi Road Huangpu District 200023 Shanghai PEOPLE'S REPUBLIC OF CHINA
Contact person:	Sandy Gong
Standard:	This TUV SUD test report form is based on the following requirements: VDE-AR-N 4105:2018 and DIN VDE V 0124-100:2020.
TRF number and revision*:*	*T*RF VDE-AR-N 4105:2018 re*v.0/2018-11*
TRF originated by:	TUV SUD Product Service, Mr. Billy Qiu
Copyright blank test report:	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service. TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
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Scheme:	☐ TUV Mark ☒ Type verification of conformity ☐ GS Mark ☐ NRTL Mark ☐ EU-Directive
Non-standard test method:	☒ No ☐ Yes, see details under Summary of testing
National deviations:	N/A
Number of pages *(Report)*:	227 pages
Number of pages *(Attachments)*:	N/A
Compiled by:	Wendy Zhao, Jenn Huang *(Printed Name and Signature)* Wendy Zhao Jenn Huang
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Test sample: Trademark: Model and/or type reference:	Hybrid Solar Inverter  ASW06kH-T1, ASW08kH-T1, ASW10kH-T1, ASW12kH-T1, ASW15kH-T1
Rating(s):	Refer to page 9
Manufacturer: Manufacturer number: Address:	Same as applicant Same as applicant Same as applicant
Sub-contractors/ tests (clause): Name:	N/A N/A
Order description:	☒ Complete test according to TRF
	☐ Partial test according to manufacturer's specifications
	☐ Preliminary test
	☐ Spot check
	☐ Others:
Date of order: Date of receipt of test item: Date(s) of performance of test:	2021-08-02; 2022-08-02 2021-08-02;2022-08-02 2022-04-01 to 2022-08-22; 2022-08-02 to 2022-10-13

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Test item particulars ..... :	
Equipment mobility ..... :	☐ movable ☐ hand-held ☒ stationary ☒ fixed ☐ transportable ☐ for building-in
Connection to the mains ..... :	☐ pluggable equipment ☐ direct plug-in ☒ permanent connection ☐ for building-in
Enviromental category ..... :	☒ outdoor ☐ indoor unconditional ☐ indoor conditional
Over voltage category Mains..... :	☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV
Over voltage category PV..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%) ..... :	+/- 10%
Tested for power systems ..... :	TN system
IT testing, phase-phase voltage (V) .....:	N/A
Class of equipment.....:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg) .....:	ASW06kH-T1:30kg, ASW08kH-T1:30kg, ASW10kH-T1:31kg, ASW12kH-T1:32kg, ASW15kH-T1:34kg
Pollution degree.....:	External: PD3, Internal: PD2
IP protection class .....:	IP 65
Possible test case verdicts:	
test case does not apply to the test object:	N/A (not applicable / not included in the order)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)
Possible suffixes to the verdicts:	
suffix for detailed information for the client:	C (Comment)
suffix for important information for factory inspection:	M (Manufacturing)

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Summary of testing:

Clause of DIN VDE V 0124-100	Requirement + Test
5.2.2	Rapid voltage change
5.2.3	Flicker
5.2.4&5.2.6	Harmonics and inter-harmonics& Feed-in of direct currents
5.3.2	Calculation of the asymmetry of three-phase inverters
5.4.2	Measurement of reactive and active power range
5.4.3	Reduction of active power by setpoint specification
5.4.4	Active power feed-in from EZE at overfrequency
5.4.6	Active power supply for EZE at underfrequency
5.4.8.3	Testing of the displacement factor/active power characteristic cos φ (P)
5.4.8.4	Testing the reactive power-voltage characteristic curve Q(U)
5.5.2 & 5.5.6.3	NA protection safety fault test
5.5.4 & 5.5.7.4	Integrated NA Protection and Protective devices and settings
5.5.7.2	Voltage monitoring (integrated protection and interface switch)-setting check
5.5.7.3	Wiring test
5.5.7.5	Reading the fault messages
5.5.9	Structural features of NA protection
5.5.10	Islanding detection
5.6	Connection conditions and synchronization
5.8	Proof of dynamic grid support

Remark: If no special indicates, all the test is applied for model: ASW15KH-T1.

☐ deviation(s) found

☒ no deviations found

Additional information on Non-standard test method(s)

Sub clause: N/A

Page: N/A

Rational: N/A

If additional information is necessary, please provide

N/A

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Copy of marking plate:

Solplanet

Model: ASW06kH-T1

PV input port	Max. PV input power	9kW
	Max. PV input voltage	dc,1000V
	MPPT voltage range	dc,180-850V
	Full Power MPPT voltage range	dc,250-850V
	Max. PV input current	dc,2*13A
	Isc PV(adsolute maximum)	dc,2*25A
Battery input port	Rated battery voltage	200V
	Battery voltage range	125V-600V
	Rated battery charge /discharge current	dc,40/40A
	Max. battery charge /discharge current	dc,50/50A
	Battery type	Lithium-ion
Grid output/input port	Rated grid voltage	3W+N+PE,230/400V
	Rated grid frequency	50Hz/60Hz
	Rated output power	6000W
	Max. grid output apparent power	6600VA
	Max. grid output current	ac,9.5A
	Max. grid input apparent power	13200VA
	Max. grid input current	ac,19A
Back-up output port	Rated BACK-UP voltage	3W+N+PE,230/400V
	Rated BACK-UP frequency	50Hz/60Hz
	Max. BACK-UP output apparent power	6600VA
	Max.BACK-UP output current	ac,9.5A
General information	Adjustable cos (φ)	0.8ind...0.8cap
	Operating temperature range	-25.....+60℃
	Inverter topology	Non-Isolated
	Ingress protection	IP65
	Protective class	I
	Overvoltage category	II(PV),III(MAINS)

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Model: ASW08kH-T1

PV input port	Max. PV input power	12kW
	Max. PV input voltage	dc,1000V
	MPPT voltage range	dc,180-850V
	Full Power MPPT voltage range	dc,330-850V
	Max. PV input current	dc,2*13A
	Isc PV(adsolute maximum)	dc,2*25A
Battery input port	Rated battery voltage	250V
	Battery voltage range	125V-600V
	Rated battery charge /discharge current	dc,40/40A
	Max. battery charge /discharge current	dc,50/50A
	Battery type	Lithium-ion
Grid output/input port	Rated grid voltage	3W+N+PE,230/400V
	Rated grid frequency	50Hz/60Hz
	Rated output power	8000W
	Max. grid output apparent power	8800VA
	Max. grid output current	ac,12.7A
	Max. grid input apparent power	17600VA
	Max. grid input current	ac,25.5A
Back-up output port	Rated BACK-UP voltage	3W+N+PE,230/400V
	Rated BACK-UP frequency	50Hz/60Hz
	Max. BACK-UP output apparent power	8800VA
	Max. BACK-UP output current	ac,12.7A
General information	Adjustable cos (φ)	0.8ind...0.8cap
	Operating temperature range	-25.....+60℃
	Inverter topology	Non-Isolated
	Ingress protection	IP65
	Protective class	I
	Overvoltage category	II(PV),III(MAINS)

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Solplanet

Model: ASW10kH-T1

PV input port	Max. PV input power	15kW
	Max. PV input voltage	dc,1000V
	MPPT voltage range	dc,180-850V
	Full Power MPPT voltage range	dc,430-850V
	Max. PV input current	dc,2*13A
	Isc PV(adsolute maximum)	dc,2*25A
Battery input port	Rated battery voltage	300V
	Battery voltage range	125V-600V
	Rated battery charge /discharge current	dc,40/40A
	Max. battery charge /discharge current	dc,50/50A
	Battery type	Lithium-ion
Grid output/input port	Rated grid voltage	3W+N+PE,230/400V
	Rated grid frequency	50Hz/60Hz
	Rated output power	10000W
	Max. grid output apparent power	11000VA
	Max. grid output current	ac,15.9A
	Max. grid input apparent power	22000VA
	Max. grid input current	ac,31.9A
Back-up output port	Rated BACK-UP voltage	3W+N+PE,230/400V
	Rated BACK-UP frequency	50Hz/60Hz
	Max. BACK-UP output apparent power	11000VA
	Max. BACK-UP output current	ac,15.9A
General information	Adjustable cos (φ)	0.8ind...0.8cap
	Operating temperature range	-25.....+60℃
	Inverter topology	Non-Isolated
	Ingress protection	IP65
	Protective class	I
	Overvoltage category	II(PV),III(MAINS)

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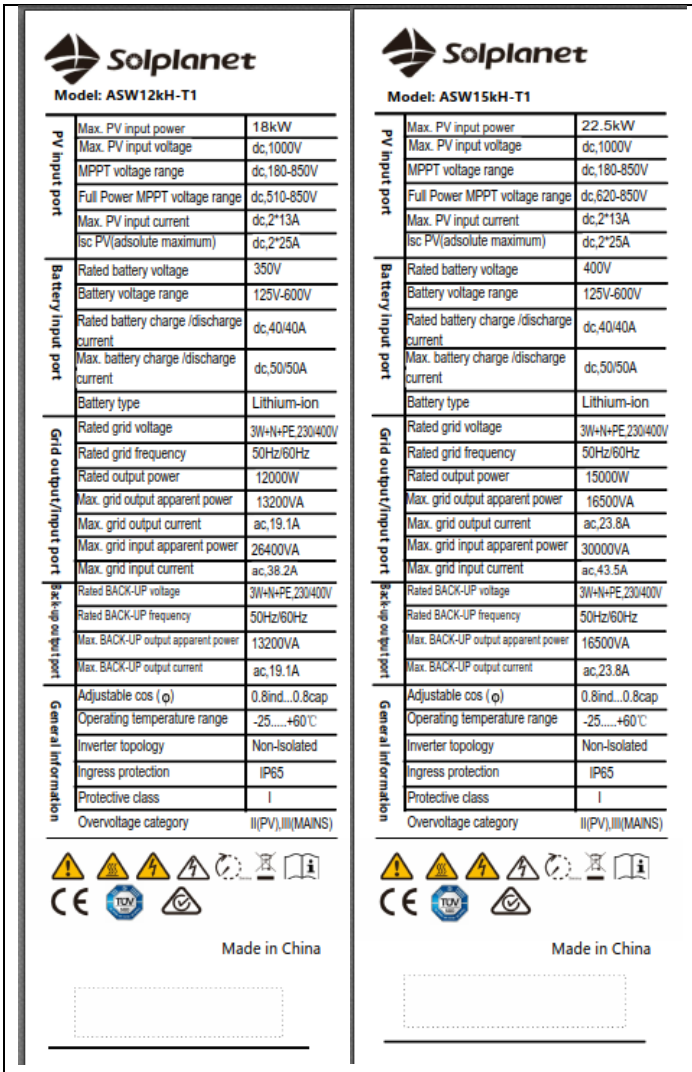

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Model: ASW12kH-T1

PV input port	Max. PV input power	18kW
	Max. PV input voltage	dc,1000V
	MPPT voltage range	dc,180-850V
	Full Power MPPT voltage range	dc,510-850V
	Max. PV input current	dc,2*13A
	Isc PV(adsolute maximum)	dc,2*25A
Battery input port	Rated battery voltage	350V
	Battery voltage range	125V-600V
	Rated battery charge /discharge current	dc,40/40A
	Max. battery charge /discharge current	dc,50/50A
	Battery type	Lithium-ion
Grid output/input port	Rated grid voltage	3W+N+PE,230/400V
	Rated grid frequency	50Hz/60Hz
	Rated output power	12000W
	Max. grid output apparent power	13200VA
	Max. grid output current	ac,19.1A
	Max. grid input apparent power	26400VA
	Max. grid input current	ac,38.2A
Backup output port	Rated BACK-UP voltage	3W+N+PE,230/400V
	Rated BACK-UP frequency	50Hz/60Hz
	Max. BACK-UP output apparent power	13200VA
	Max. BACK-UP output current	ac,19.1A
General information	Adjustable cos (φ)	0.8ind...0.8cap
	Operating temperature range	-25.....+60℃
	Inverter topology	Non-Isolated
	Ingress protection	IP65
	Protective class	I
	Overvoltage category	II(PV),III(MAINS)

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Solplanet

Model: ASW15kH-T1

PV input port	Max. PV input power	22.5kW
	Max. PV input voltage	dc,1000V
	MPPT voltage range	dc,180-850V
	Full Power MPPT voltage range	dc,620-850V
	Max. PV input current	dc,2*13A
	Isc PV(adsolute maximum)	dc,2*25A
Battery input port	Rated battery voltage	400V
	Battery voltage range	125V-600V
	Rated battery charge /discharge current	dc,40/40A
	Max. battery charge /discharge current	dc,50/50A
	Battery type	Lithium-ion
Grid output/input port	Rated grid voltage	3W+N+PE,230/400V
	Rated grid frequency	50Hz/60Hz
	Rated output power	15000W
	Max. grid output apparent power	16500VA
	Max. grid output current	ac,23.8A
	Max. grid input apparent power	30000VA
	Max. grid input current	ac,43.5A
Backup output port	Rated BACK-UP voltage	3W+N+PE,230/400V
	Rated BACK-UP frequency	50Hz/60Hz
	Max. BACK-UP output apparent power	16500VA
	Max. BACK-UP output current	ac,23.8A
General information	Adjustable cos (φ)	0.8ind...0.8cap
	Operating temperature range	-25.....+60℃
	Inverter topology	Non-Isolated
	Ingress protection	IP65
	Protective class	I
	Overvoltage category	II(PV),III(MAINS)

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Remark: For application of this standard, the nominal voltage is 230/400 Va.c., nominal frequency is 50Hz, and the power factor range: 0.9 leading to 0.9 lagging. The maximum use power of the PCE will not exceed 30kVA.

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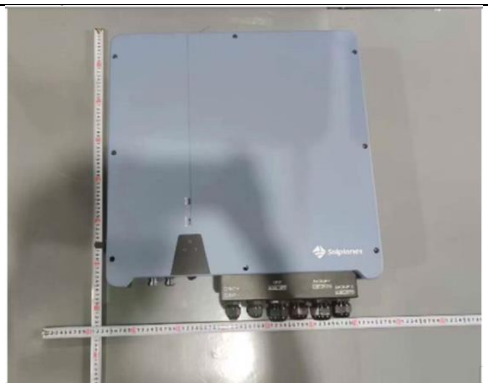
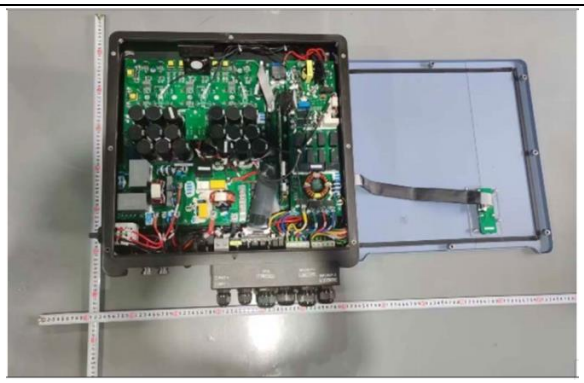
Picture of the product:

Front view	Inside view
	

Terminal View

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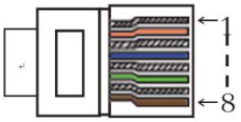
Purpose of the product (Description of intended use):

(1)	All the models are three phase non-isolated type multi-functions hybrid solar inverter which will be installed and connected to the grid network after installation, for indoor and outdoor use.
(2)	If certain functions are not permitted by local regulation, the function shall be disabled by hardware or software setting (if applicable) by the manufacturer before putting into the market. For example, it's not permissible to draw electricity from the grid and then feed it back in order to claim statutory reimbursement in some nations.
(3)	Low voltage electrical installations shall comply with national and local regulation. Only qualified electricians are allowed to install and maintain the converter.
(4)	In order to protect the inverter, user and installer, external DC and AC circuit breaker shall be equipped for all source port (battery, AC grid) at the end-use application.
(5)	The software version: ARM: V1.03.08, DSP: V1.02.11
(6)	The PCE uses the DRM port for remote logic control, after receiving the signal, the inverter will decrease output active power to zero in 5 seconds. The DRM port is connected to pin 5 and pin 7 or 8 of the terminal. 

1	2	3	4	5	6	7	8
DRM1/5	DRM2/6	DRM3/7	DRM4/8	+5V	DRM0	GND	GND

Model difference:

No	Component	Usage amount		
		ASW06kH-T1, ASW08kH-T1, ASW10kH-T1	ASW12kH-T1	ASW15kH-T1
1	IGBT (ST#STGWA40H120DF2)	Quantity 2 (IGBT2-IGBT3)	Quantity 4 (IGBT1-IGBT4)	Quantity 4 (IGBT1-IGBT4)
2	IGB (IKW40N120CS6)	Quantity 6 (IGBT10, IGBT13, IGBT14, IGBT16, IGBT19, IGBT20)		Quantity 12 (IGBT10-IGBT21)
3	Inductor	PV: 1.2mH±10%@0A"0.7mH±10%@15A0.7mH±10%@15A" INV: 1.5mH±10%@0A0.77mH±10%@20.4Apk BAT: 0.44mH±10%@0A0.21mH±10%@50A*2PCS		PV:1.5mH±10%@0A0.6mH±10%@25A INV:1mH±10%@0A0.42mH±10%@30A BAT:0.44mH±10%@0A0.21mH±10%@50A

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Characteristic data:

Model	ASW06kH-T1	ASW08kH-T1	ASW10kH-T1	ASW12kH-T1	ASW15kH-T1
Battery terminal parameters					
Rated battery DC voltage	200 Vd.c.	250 Vd.c.	300 Vd.c.	350 Vd.c.	400 Vd.c.
Battery DC voltage range	125-600 Vd.c.				
Max charging / discharging current	50 Ad.c.				
Battery type	Lithium-ion				
Maximum charge/discharge power	15000 W				
PV terminal parameters					
Max. Input Power	9000 W	12000 W	15000 W	18000 W	22500 W
Maximum DC input voltage	1000 Vd.c.				
MPPT Range	180~850 Vd.c.				
MPPT Range (full load)	250~850 Vd.c.	330~850 Vd.c.	430~850 Vd.c.	510~850 Vd.c.	620~850 Vd.c.
Max. Input Current	2*13 Ad.c.				
Isc PV	2*25 Ad.c.				
Grid terminal parameters					
Rated output Power	6000 W	8000 W	10000 W	12000 W	15000 W
Maximum continuous output apparent power	6600 VA	8800 VA	11000 VA	13200 VA	16500 VA
Max. AC output current	9.5 Aa.c.	12.7 Aa.c.	15.9 Aa.c.	19.1 Aa.c.	23.8 Aa.c.
Max. active power P_{Emax}	5999.1 W	7980.2 W	9987.6 W	11992.4 W	15004.9 W
Max. apparent power S_{Emax}	6614.0 VA	8837.8 VA	11003.5 VA	13192.0 VA	16540.9 VA
Maximum continuous input apparent power	13200 VA	17600 VA	22000 VA	26400 VA	30000 VA
Max. AC input current	19 Aa.c.	25.5 Aa.c.	31.9 Aa.c.	38.2 Aa.c.	43.5 Aa.c.
Rated AC voltage	230/400 Va.c., 3W+N+PE				
Rated AC frequency	50 Hz				
Power factor	0.9lagging to 0.9leading				
Backup terminal parameters					
Rated apparent power	6000 VA	8000 VA	10000 VA	12000 VA	15000 VA
Maximum continuous output apparent power	6600 VA	8800 VA	11000 VA	13200 VA	16500 VA
Max. AC current	9.5 Aa.c.	12.7 Aa.c.	15.9 Aa.c.	19.1 Aa.c.	23.8 Aa.c.
Rated AC voltage	230/400 Va.c., 3W+N+PE				
Rated AC frequency	50 Hz				

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Attachments:

N/A

General remarks:

"(see remark #)" refers to a remark appended to the report.
"(see appended table)" refers to a table appended to the report.
*Throughout this report **a dot** is used as the decimal separator.*
The test results presented in this report relate only to the object tested.
This report shall not be reproduced except in full without the written approval of the testing laboratory.

Name and address of factory (ies) (only if certification is provided):

Factory name: AISWEI New Energy Technology (Yangzhong) Co., Ltd.

Address: No.588 Gangxing Road, Economic Development Zone, 212200 Yangzhong PEOPLE'S REPUBLIC OF CHINA

Possible test case verdicts:

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

Possible suffixes to the verdicts:

suffix for detailed information for the client:	C (Comment)
suffix for important information for factory inspection:	M (Manufacturing)

Abbreviations used in the report:

Active power (P),
Reactive power (Q),
Apparent power (S),
Maximum apparent power of a power generation system (SAmax),
Maximum apparent power of a power generation unit (S_{Emax}),
Maximum active power of a power generation system (P_{Amax}),
Maximum active power of a power generation unit (P_{EMax}),
Networks short-circuit power (S_{kV}),
Point of common coupling (PCC),
Displacement factor (cos φ),
Power factor (λ),
Network impedance angle (ψ_k),
Short-term flicker strength (P_{st}),
Long-term flicker strength (P_{lt}),
Automatic reclosing (AR; geman: Automatische Widereinschaltung, AWE),
Power generation system (PGS; german: Erzeugungsanlage, EZA),
Power generation unit (PGU; german: Erzeugungseinheit, EZE),
Network and system protection (NS protection; german Netz- und Anlagenshutz, NA-Shutz),
Maximum switching current factor (K_{imax}),

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Clause	Requirement + Test	result – Remark	Verdict

VDE-AR-N 4105:2018			
5	Grid connection		P
5.1	Principles for determining the grid connection point	To be considered in final PGS	N/A
5.2	Rating of grid operation equipment	To be considered in final PGS	N/A
5.3	Permissible voltage change	Evaluated in 5.4	P
	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		P
5.4	Grid reaction		P
	The permissible limits for network repercussions are also described for generation plants and storage in VDE-AR-N 4100, 5.4. For the connection assessment of generation plants and storage, the connector provides the network operator with the completed preprints E.2 to E.5	Evaluated according to DIN VDE V 0124-100:2020, see below table	P
5.5	Connection criteria		P
5.5.1	General		P
5.5.2	$P_{AV, E}$ monitoring (feed-in limitation)	Considered for final PGS	N/A
	The measurement of the feed-in limit described in this subsection must be carried out at the central meter panel according to VDE-AR-N 4100, 7.2		N/A
	If exceeding the PAV, E, the power of generation system and/or energy storage must be reduced within blue curve with specified time response according to Fig-1		N/A
5.5.3	Generation system ready for socket connection		P
5.6	Three-phase converter system		P
	In the case of three phase generation systems with grid feed-in via converters, the power must be fed three-phase symmetrically into the three outer conductors. The converter circuit is preferably to be built up as a rotary power unit. The positive sequence value must be used as a reference for the currents, even if the terminal voltages are not symmetrical.		P

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Clause	Requirement + Test	result – Remark	Verdict
5.7	Behaviour of the power generation system at the grid	See below table	P
5.7.1	General		P
	If the grid frequency is between 47.5Hz and 51.5Hz, disconnection from grid is not permitted. The active power output shall follow Cl. 5.7.4.3.	Declaration by manufacturer	P
	The frequency/time requirement of operation of generation system are: 47.5Hz to 49.0Hz: >30 min; 49.0Hz to 51.0Hz: permanent; 51.0Hz to 51.5Hz: >30 min.	Declaration by manufacturer	P
	Generation unit must remain connection during rapid frequency change (RoCoF): +/- 2.0Hz/s for average time window of 0.5s; +/- 1.5Hz/s for average time window of 1s or +/-1.25Hz/s for average time window of 2s	Declaration by manufacturer	P
5.7.2	Static voltage supporting/Reactive power control		P
5.7.2.1	General range condition		P
	For static voltage supporting, the generation system should control reactive power to support slow (quasi-station) voltage change in distribution grid within agree limit		P
	The reactive power controlling process is described in Cl. 5.7.2.4 with 3 methods		P
	For energy storage system, during energy consumption from grid, the requirement should follow VDE-AR-N 4100		P
5.7.2.2	Reactive power control during S_{Emax}		P
	For type 2 system with only converter, the output displacement factor should cover the area described in Fig-2 or Fig-3	Evaluated according to DIN VDE V 0124-100:2020, cl 5.4.2, see below table, 0.9 leading to 0.9 lagging	P
5.7.2.3	Reactive power control under P_{Emax}	Evaluated according to DIN VDE V 0124-100:2020 Cl.5.4.2. See appended table	P
	In addition, when active power is less than PEmax, the reactive power control should fulfil below requirement:		P
	The minimum reactive power control area shoul cover the red triangle P/Q diagram in Fig-5 or Fig-6. In the free operation area, a		P

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Clause	Requirement + Test	result – Remark	Verdict
	reduction of active power to facilitate reactive power is permitted		
	The maximal deviation between setting value and actual value of the controlled reactive power should be 4.0% of S_{Emax}. In range of $0<P_{mom}/S_{Emax}<0.2$(or 0.1), the reactive power should be less than 10% of S_{Emax}.		P
5.7.2.4	Behavior/process of reactive power control		P
	The static voltage supporting with reactive power control should not imfluence dynamic grid supporting. The generation system should control the reactive power within range described in Fig-5 or Fig-6 using one of below process of controlling reactive power. The selection of process is informed during plan of grid connection		P
	a) Reactive power-Voltage Q(U)	Evaluated according to DIN VDE V 0124-100:2020 Cl.5.4.8.3. See appended table	P
	The reference voltage UQ0 is 400V/1.732 and calculation method could be arithmetic average of RMS value of three L-N voltage or positive sequence voltage. The voltage measurement tolerance should be less than 1% of rated voltage		P
	The Q(U) control is only applicable to 3 phase generation unit and the requirement is performed on generation unit terminals		P
	b) Displacement factor-Active power cos phi (P)	Evaluated according to DIN VDE V 0124-100:2020, cl 5.4.8.3, see below table	P
	The displacement power factor is dependent on the actual active power output according to Fig-8 and Fig-9		P
	c) Fixed displacement factor cos phi		P
	The discplacement power factor is set as fixed value with minimal setting step value 0.01 and the maximal deviation between setting value and actual value of the controlled reactive power should be 4.0% of S_{Emax}.	Evaluated according to DIN VDE V 0124-100:2020, cl 5.4.8.2, see below table	P
5.7.2.5	Requirement for the reactive power process of Type 2 system and Type 1 system	Evaluated according to DIN VDE V 0124-100:2020 Cl.5.4.8.2. See appended table	P
	The control process of reactive power (process a, b and c) during setting value adjustment should follow PT-1 process of Fig-10. The PT-1 proecess 3 Tau should be		P

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Clause	Requirement + Test	result – Remark	Verdict
	settable between 6s and 60s for Type 2 system with default setting as 10s.		
5.7.2.6	Particular requirement during extension of generation system	To be considered in final PGS	N/A
5.7.3	Dynamic grid supporting	Evaluated according to DIN VDE V 0124-100:2020 Cl.5.8. See appended table	P
5.7.3.1	General		P
	A grid fault starts if the voltage at generation unit terminals is under 0.85 Un or over 1.15Un.		P
	The grid fault ends when one of below two things happen in earlier: The voltage of generation unit recovers to range -15% Un to +10% Un or 5s after the start of the fault		P
	Generation unit in mode “Energy supply” and Energy storage in mode “Energy supply” and “Energy consumption” should have dynamic grid support function		N/A
	During grid fault, the generation unit and energy storage should fulfil below requirements in both balanced and unbalanced grid fault:		P
	- No disconnection from the grid		P
	- Overvoltage upto 1.2Un for period of 5s		P
	- Type 2 unit and energy storage should not feed-in active or reactive current into grid during fault.		P
	- Generation unit and energy storage should endure multiple grid faults followed		P
	The FRT-Limit-Curve according to Fig-11 and Fig-12 is applicable to 1-, 2- and 3-phases fault		P
5.7.3.2	Dynamic grid supporting for Type 1 unit		N/A
5.7.3.3	Dynamic grid supporting for Type 2 unit and energy storage		P
	The output current at all terminals should be limited less than 20% of rated current in 60ms and 10% of rated current in 100ms		P
	Behavior after end of fault: Active current should recover back to normal value before fault within 1s after end of fault		P

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Clause	Requirement + Test	result – Remark	Verdict
5.7.4	Active power output	Evaluated according to DIN VDE V 0124-100:2020 Cl.5.4.3. See appended table	P
5.7.4.1	During active power remote control required by grid security management, the change should fulfil power gradient requirement. The adjustment of power gradient direct on generation unit or energy storage is sufficient to fulfil the requirement: Not faster than 0.66% P_{Amax}/s; Not slower than 0.33% P_{Amax}/s. For genertation system not slower than 4% P_{Amax}/minute		P
	The generation system and energy storage shoul have a logic interface to receive active power order within 5s after sending by grid operator.	DRM comunication port provided	P
5.7.4.2	Grid security management		P
5.7.4.2.1	Generation system and energy storage		P
	For PV system less than 30kWp, the certified technical control limited to 70% of installed module power of grid connection point or PV system is equiped with remote active power control for limitation		P
	For PV system large than 30kWp and less than 100kWp, it should be equipped with remote active power control for limitation		N/A
	For PV system large than 100kWp, it should be equipped with remote active power control for limitation and report feed-in power in real time.		N/A
	For Energy storage used in EEG or KWK-G system, if the PAmax>100kW, it should be equipped with remote active power control for limitation and report feed-in power in real time.		N/A
5.7.4.2.2	Implementation of network security management		P
	The generation system and energy storage should control its active power without grid disconnection to 100%/60%/30%/0% of P_{Amax}.		P
5.7.4.3	Active power adjustment during over and under frequency		P
	If the network frequency falls out of tolerance band of +/-200mHz from rated frequency of 50.0Hz, all generation unit and energy storage connected to the grid shall	For overfrequency evaluated according to DIN VDE V 0124-100:2020, cl 5.4.4. For underfrequency evaluated	P

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Clause	Requirement + Test	result – Remark	Verdict
	support grid stability by frequency regulation.	according to DIN VDE V 0124-100:2020, cl 5.4.6.	
	The accuracy of frequency measurement must be <10mHz.		P
	For DC-coupling energy storage, type-2 unit is regarded.		N/A
	During frequency change, the active power output should fulfil Fig-13, Fig-14 and/or Fig-15		P
5.7.4.4	Active power reduction depend on voltage is not required in this technical requirement		N/A
5.7.5	Short circuit contribution		P
6	Construction of the power generation system/network and system protection (NS-protection)		P
6.1	General requirements	The PGU include integrated interface switch and is type-tested in report.	P
6.2	Central NS protection		N/A
6.3	Integrated NS protection		P
6.4	Interface switch		P
6.4.1	The disconnection switch is used for NS protection can be used as switch device in single generation unit (integratged interface switch)	Integrated power relay in the PGU. Each live conductor is constructed with two relays comply with A.6 requirement.	P
	The interface switch must be designed and rated for the conditional short-circuit current and taking into account the protective devices required by 6.5. The switching ability of the interface switch is to be measured according to the higher value from the rated current of the upstream fuse and maximum initial short-circuit current contribution of the generation plant. The function control of the interface switch is to be realized according to a) or b) or (c):		P
	a) Using a interface switch, that switch-on with control voltage and can automatic switch-off without voltage supply. The switch on-off state can be monitored		P
	b) Minimum once daily check of on-off switch with the NS protection and monitoring of normal functions of interface switch		P
	c) Using integrated interface switch and integrated NS protection for PV and ESS inverter according to DIN EN 62109	The interface switches fulfil DIN EN 62109.	P

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Clause	Requirement + Test	result – Remark	Verdict
	If a defect is detected, the generation system should not feed-in grid and not reconnect to grid		P
	The interface switch should switch all line conductors. In TT system, all pole disconnection should be realized. In this condition, the interface switch as grid disconnection device during islanding operation, it should comply with VDE-AR-E 2510-2	To be considered when installation	N/A
6.4.2	Central interface switch		N/A
6.4.3	Integrated interface switch		P
6.5	Protective devices for the interface switch		P
6.5.1	General		P
	The specification given in 6.5.2 do not refer to the short-circuit protection, overload protection, electric shock protection and all-phase separator. The protection function may have to be extended by the connection owner if applicable		P
	The protection function shall be implemented as follows: Voltage drop protection U< Rise-in-voltage protection U> Rise-in-voltage protection U>> Frequency decrease protection f< Frequency increase protection f> Islanding detection.		P
	Voltage protection devices should utilize the half-wave r.m.s value of 50Hz.		P
	The rise-in voltage protection U> shall be designed as 10 minute mean value as required in DIN EN 50160 (power quality). The formation of a new 10 minute mean value shall be at least every 3s.		P
	For PGS up to 30kVA, the voltage protection shall be measured between line and neutral	The voltage protection function in the PGU integrated NS protection is designed between all lines and neutral.	P
	For PGS more than 30kVA, the voltage protection shall be measured between line and neutral. The line to line voltage shall be determined or measured.		N/A
	Frequency protection may be designed as single-phase equipment		P
	The setting value of protection function and the last five dated failure report shall be readable at the NS protection. Interruption		P

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Clause	Requirement + Test	result – Remark	Verdict
	of supply shall not lead to loss of any failure report. Read-out shall be possible for central protection without any additional aid. For integrated NS protection read-out may use a data interface.		
6.5.2	The protection function setting should follow Table 2		P
	The rise-in-voltage protection U> can be 1.1 to 1.15 Un, if used for up to 30kVA with only integrated NS protection, 1.1Un setting shall not be changed.		P
	The tolerance of the setting value and trip value of voltage shall be maximum +/-1% and frequency +/-0.1%		P
6.5.3	Islanding detection	Evaluated according to DIN VDE V 0124-100:2020, cl 5.5.10, see below table	P
	The testing method is according to DIN EN 62116. Detection of an isolated network and disconnection of PGS shall be within 2s.		P
6.6	Other requirements for generation system		N/A
6.6.1	Ability to provide primary control power is not required in the technical requirement. If this function is included, reference to VDE-AR-N 4120, 10.5.3		N/A
6.6.2	Ability to provide secondary control and minute reserve is not required in the technical requirement. If this function is included, reference to VDE-AR-N 4120, 10.5.4		N/A
7	Metering for billing purpose		N/A
8	Operation of the system		P
8.1	General		P
8.2	Particular characteristics of the management of the network operator's network		N/A
8.3	Connection conditions and synchronisation	Evaluated according to DIN VDE V 0124-100:2020, cl 5.6, see below table	P
8.4	Particular requirement of plan, installation and in operation of generation system and energy storage with $P_{Amax} \geq 135kW$		N/A
9	Verification of electric features		P
Annex A	Explanation (informative)		P
Annex B	Measurement concepts (informative)		P
Annex C	Examples of meter panel configurations (informative)		P

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Clause	Requirement + Test	result – Remark	Verdict

Annex D	Example of connection assessment of generation plants – connection of a 20 kW photovoltaic plant (informative)	P
Annex E	Form (Normative)	P

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5.2.2	TABLE: Rapid voltage change	P

Test conditions:
Case A: Switch on at any power level of primary energy
Case B: Worst case of switching of generator level
Case C: Switch on at the nominal power
Case D: Switch off at the nominal power (not emergency, but normal operational switch off)

Nominal current of PGU I_n (A)	21.7	The k_{imax} value:	1.00
Test frequency (Hz)	50Hz	--	--

Switching action		Ia (A)			U(V)			ki
A	--	L1-N	L2-N	L3-N	L1-N	L2-N	L3-N	--
	#1	10.80	10.71	10.71	230.56	230.46	230.66	0.50
	#2	10.81	10.71	10.71	230.56	230.47	230.66	0.50
	#3	10.81	10.70	10.72	230.56	230.47	230.66	0.50
B	--	L1-N	L2-N	L3-N	L1-N	L2-N	L3-N	--
	#1	10.81	10.71	10.72	230.56	230.47	230.66	0.50
	#2	10.82	10.70	10.71	230.56	230.47	230.66	0.50
	#3	10.81	10.71	10.71	230.56	230.66	230.46	0.50
C	--	L1-N	L2-N	L3-N	L1-N	L2-N	L3-N	--
	#1	21.71	21.63	21.66	231.09	231.01	231.41	1.00
	#2	21.71	21.63	21.65	231.09	231.01	231.42	1.00
	#3	21.71	21.63	21.65	231.1	231.02	231.43	1.00
D	--	L1-N	L2-N	L3-N	L1-N	L2-N	L3-N	--
	#1	21.70	21.63	21.64	231.10	231.03	231.44	1.00
	#2	21.71	21.63	21.651	231.10	231.02	231.42	1.00
	#3	21.71	21.63	21.65	231.10	231.02	231.44	1.00

Supplementary information:
Choose the applicable case for the tested EZE.
Each case shall be measured for three times.

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5.2.3	TABLE: Flicker								P
Model		ASW10KH-T1							
		Starting			Stopping			Running	
		d_{max}(%)	d_c(%)	$d_{(t)}$ (%)	d_{max}(%)	d_c(%)	$d_{(t)}$ (%)	P_{st}	P_{lt} 2 hours
Measured Values	L1	0.187	0.110	0	0.168	0.107	0	0.078	0.068
	L2	0.140	0.027	0	0.133	0.025	0	0.154	0.148
	L3	0.000	0.000	0	0.000	0.000	0	0.066	0.059
Limits		4%	3.3%	3.3% 500ms	4%	3.3%	3.3% 500ms	1.0	0.65
Supplementary information: The table is applied to devices with rated current of ≤16A									

5.2.3	TABLE: Flicker				P
Model	ASW15KH-T1				
Simulated network voltage (V)	L1-N	230	Network impedance	L1	--
	L2-N	230		L2	--
	L3 -N	230		L3	--
	--	--		N	--
EZE operating current (A)	L1	21.7	EZE operating power (VA)	L1	5000
	L2	21.7		L2	5000
	L3	21.7		L3	5000
Simulated network frequency (Hz)	50		Short circuit power Sk (VA)	33 x 15000	
Plt (Maximum measured Pst)	L1	0.078	EZE nominal power Pn (W)	15000	
	L2	0.154			
	L3	0.067			
Maximum flicker coefficient Cφk	L1	2.574	--	--	
	L2	5.082			
	L3	2.211			

Pst	#1	#2	#3	#4	#5	#6
L1	0.075	0.076	0.078	0.078	0.070	0.064
L2	0.154	0.154	0.153	0.153	0.150	0.145
L3	0.064	0.065	0.066	0.067	0.061	0.054
Pst	#7	#8	#9	#10	#11	#12
L1	0.065	0.059	0.059	0.058	0.060	0.065
L2	0.147	0.143	0.143	0.141	0.143	0.148
L3	0.057	0.052	0.051	0.050	0.052	0.058
Supplementary information:						

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(1) The ratio of Sk,fic/Sn used for the analysis: 33;
(2) power factor PF=1.0 is set for test.
(3) grid angle φ=32° is set for test.
(4) The table is applied to devices with rated current of >16A and ≤75A

5.2.4 & 5.2.6	TABLE: Harmonics and inter-harmonics& Feed-in of direct currents										P
Model	ASW10KH-T1										
Phase L1											
Harmon. Nr.	P/PEmax										Limit (A)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	0.0239	0.0038	0.0060	0.0068	0.0067	0.0062	0.0053	0.0644	0.0513	0.0446	0.0336	0.072
1	0.5038	1.6536	2.9267	4.4431	5.9722	7.2822	8.8009	10.1076	11.6460	13.1659	14.4701	-
2	0.0278	0.0280	0.0141	0.0302	0.0455	0.0525	0.0590	0.0624	0.0666	0.0697	0.0737	1.08
3	0.0475	0.0431	0.0372	0.0394	0.0433	0.0398	0.0352	0.0366	0.0400	0.0357	0.0367	2.30
4	0.0063	0.0153	0.0384	0.0397	0.0249	0.0171	0.0144	0.0134	0.0142	0.0167	0.0183	0.43
5	0.0426	0.0433	0.0424	0.0391	0.0407	0.0450	0.0477	0.0442	0.0433	0.0479	0.0466	1.14
6	0.0056	0.0117	0.0102	0.0233	0.0227	0.0214	0.0176	0.0162	0.0160	0.0139	0.0127	0.30
7	0.0147	0.0260	0.0303	0.0301	0.0255	0.0256	0.0296	0.0343	0.0322	0.0300	0.0335	0.77
8	0.0030	0.0140	0.0093	0.0125	0.0188	0.0181	0.0163	0.0152	0.0137	0.0138	0.0130	0.23
9	0.0100	0.0142	0.0198	0.0217	0.0202	0.0177	0.0174	0.0198	0.0253	0.0249	0.0228	0.40
10	0.0048	0.0138	0.0118	0.0082	0.0116	0.0124	0.0122	0.0106	0.0106	0.0096	0.0104	0.18
11	0.0073	0.0127	0.0179	0.0216	0.0217	0.0197	0.0178	0.0163	0.0189	0.0242	0.0238	0.33
12	0.0074	0.0074	0.0128	0.0083	0.0116	0.0124	0.0124	0.0115	0.0091	0.0100	0.0104	0.15
13	0.0167	0.0268	0.0636	0.0288	0.0807	0.1169	0.1479	0.1643	0.1843	0.2067	0.2245	0.21
14	0.0065	0.0053	0.0087	0.0071	0.0068	0.0080	0.0075	0.0082	0.0076	0.0064	0.0070	0.13
15	0.0093	0.0209	0.0278	0.0187	0.0336	0.0589	0.0771	0.0908	0.0976	0.1052	0.1135	0.15
16	0.006	0.009	0.005	0.005	0.006	0.007	0.007	0.007	0.007	0.006	0.005	0.12

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	2	9	9	9	4	5	9	0	4	3	8	
17	0.0143	0.0237	0.0183	0.0153	0.0183	0.0380	0.0516	0.0634	0.0710	0.0714	0.0751	0.13
18	0.0053	0.0057	0.0036	0.0056	0.0053	0.0054	0.0051	0.0049	0.0047	0.0052	0.0046	0.10
19	0.0201	0.0193	0.0100	0.0093	0.0066	0.0192	0.0329	0.0390	0.0513	0.0549	0.0536	0.12
20	0.0042	0.0028	0.0036	0.0057	0.0038	0.0049	0.0056	0.0055	0.0052	0.0056	0.0061	0.09
21	0.0212	0.0138	0.0035	0.0098	0.0052	0.0138	0.0228	0.0286	0.0365	0.0464	0.0476	0.11
22	0.0032	0.0047	0.0042	0.0045	0.0044	0.0047	0.0041	0.0038	0.0035	0.0035	0.0039	0.08
23	0.0196	0.0178	0.0122	0.0105	0.0038	0.0115	0.0181	0.0239	0.0266	0.0347	0.0421	0.10
24	0.0026	0.0038	0.0049	0.0043	0.0033	0.0038	0.0043	0.0044	0.0041	0.0037	0.0044	0.08
25	0.0190	0.0194	0.0167	0.0105	0.0059	0.0106	0.0131	0.0164	0.0178	0.0189	0.0253	0.09
26	0.0022	0.0023	0.0037	0.0031	0.0032	0.0034	0.0034	0.0035	0.0035	0.0032	0.0035	0.07
27	0.0165	0.0121	0.0139	0.0094	0.0026	0.0084	0.0127	0.0155	0.0183	0.0185	0.0204	0.08
28	0.0017	0.0022	0.0028	0.0025	0.0029	0.0030	0.0034	0.0033	0.0036	0.0029	0.0027	0.07
29	0.0141	0.0126	0.0093	0.0083	0.0026	0.0084	0.0111	0.0126	0.0152	0.0159	0.0154	0.08
30	0.0017	0.0023	0.0020	0.0019	0.0029	0.0030	0.0033	0.0032	0.0031	0.0035	0.0028	0.06
31	0.0124	0.0137	0.0067	0.0080	0.0028	0.0084	0.0107	0.0115	0.0138	0.0133	0.0131	0.07
32	0.0016	0.0026	0.0023	0.0018	0.0025	0.0025	0.0026	0.0029	0.0027	0.0033	0.0032	0.06
33	0.0100	0.0087	0.0083	0.0075	0.0032	0.0061	0.0097	0.0114	0.0127	0.0142	0.0143	0.07
34	0.0015	0.0018	0.0029	0.0021	0.0025	0.0023	0.0029	0.0028	0.0029	0.0026	0.0033	0.05
35	0.0079	0.0063	0.0088	0.0069	0.0035	0.0053	0.0090	0.0105	0.0096	0.0128	0.0124	0.06
36	0.0016	0.0017	0.0025	0.0024	0.0026	0.0022	0.0024	0.0026	0.0027	0.0020	0.0026	0.05
37	0.0073	0.0085	0.0089	0.0079	0.0051	0.0052	0.0092	0.0107	0.0102	0.0113	0.0128	0.06
38	0.0016	0.0024	0.0019	0.0022	0.0024	0.0021	0.0021	0.0020	0.0022	0.0022	0.0019	0.05

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39	0.0057	0.0058	0.0061	0.0074	0.0053	0.0033	0.0073	0.0091	0.0106	0.0088	0.0116	0.06
40	0.0013	0.0015	0.0014	0.0024	0.0026	0.0017	0.0023	0.0025	0.0027	0.0028	0.0022	0.05
THD	2.360 %	0.699 %	0.801 %	0.715 %	0.907 %	1.176 %	1.432 %	1.067 %	1.769 %	1.933 %	2.072 %	5%
Phase L2												
Harmon. Nr.	P/PEmax											Limit (A)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	0.0696	0.0120	0.0189	0.0217	0.0232	0.0242	0.0251	0.0172	0.0262	0.0267	0.0271	0.072
1	0.2577	1.4779	2.7720	4.3107	5.8618	7.1901	8.7268	10.0517	0.8005	13.1430	14.4615	-
2	0.0360	0.0965	0.1353	0.1389	0.1334	0.1321	0.1332	0.1368	0.0096	0.1416	0.1429	1.08
3	0.0944	0.0936	0.0883	0.0925	0.0974	0.0944	0.0887	0.0918	0.0065	0.0881	0.0910	2.30
4	0.0120	0.0600	0.0273	0.0354	0.0290	0.0228	0.0196	0.0164	0.0011	0.0153	0.0164	0.43
5	0.0635	0.0688	0.0689	0.0664	0.0692	0.0736	0.0751	0.0696	0.0048	0.0762	0.0726	1.14
6	0.0076	0.0105	0.0056	0.0241	0.0305	0.0315	0.0298	0.0285	0.0018	0.0253	0.0249	0.30
7	0.0260	0.0350	0.0423	0.0445	0.0446	0.0454	0.0513	0.0561	0.0037	0.0503	0.0554	0.77
8	0.0146	0.0294	0.0142	0.0079	0.0179	0.0209	0.0227	0.0221	0.0015	0.0227	0.0232	0.23
9	0.0187	0.0208	0.0302	0.0358	0.0367	0.0363	0.0343	0.0370	0.0029	0.0418	0.0397	0.40
10	0.0181	0.0195	0.0176	0.0064	0.0123	0.0161	0.0189	0.0185	0.0012	0.0161	0.0165	0.18
11	0.0127	0.0125	0.0156	0.0207	0.0255	0.0249	0.0250	0.0233	0.0017	0.0302	0.0304	0.33
12	0.0158	0.0060	0.0168	0.0113	0.0080	0.0134	0.0155	0.0208	0.0016	0.0222	0.0215	0.15
13	0.0194	0.0150	0.0706	0.0252	0.0440	0.0881	0.1261	0.1464	0.0119	0.1958	0.2130	0.21
14	0.0134	0.0162	0.0086	0.0097	0.0060	0.0080	0.0108	0.0096	0.0009	0.0142	0.0139	0.13
15	0.0335	0.0335	0.0420	0.0214	0.0101	0.0349	0.0597	0.0745	0.0058	0.0964	0.1056	0.15
16	0.0101	0.0151	0.0035	0.0102	0.0046	0.0072	0.0099	0.0103	0.0007	0.0131	0.0150	0.12
17	0.037	0.047	0.017	0.027	0.005	0.024	0.040	0.055	0.004	0.066	0.073	0.13

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	9	7	7	5	6	6	1	4	2	4	6	
18	0.0068	0.0028	0.0039	0.0076	0.0055	0.0053	0.0062	0.0074	0.0004	0.0065	0.0087	0.10
19	0.0357	0.0329	0.0096	0.0270	0.0035	0.0142	0.0249	0.0337	0.0031	0.0469	0.0491	0.12
20	0.0049	0.0064	0.0060	0.0066	0.0055	0.0043	0.0057	0.0075	0.0006	0.0072	0.0073	0.09
21	0.0309	0.0250	0.0233	0.0261	0.0026	0.0112	0.0181	0.0225	0.0022	0.0380	0.0385	0.11
22	0.0035	0.0043	0.0065	0.0051	0.0051	0.0046	0.0050	0.0060	0.0004	0.0065	0.0057	0.08
23	0.0225	0.0271	0.0245	0.0209	0.0071	0.0077	0.0164	0.0205	0.0018	0.0334	0.0370	0.10
24	0.0034	0.0049	0.0043	0.0028	0.0052	0.0037	0.0046	0.0045	0.0004	0.0064	0.0067	0.08
25	0.0196	0.0194	0.0202	0.0183	0.0085	0.0090	0.0149	0.0170	0.0012	0.0210	0.0247	0.09
26	0.0034	0.0043	0.0027	0.0022	0.0051	0.0039	0.0037	0.0038	0.0004	0.0056	0.0061	0.07
27	0.0152	0.0106	0.0092	0.0128	0.0111	0.0042	0.0115	0.0157	0.0011	0.0185	0.0216	0.08
28	0.0029	0.0033	0.0027	0.0027	0.0046	0.0036	0.0037	0.0047	0.0003	0.0062	0.0053	0.07
29	0.0121	0.0124	0.0102	0.0126	0.0126	0.0035	0.0110	0.0145	0.0010	0.0158	0.0178	0.08
30	0.0029	0.0051	0.0031	0.0033	0.0041	0.0037	0.0030	0.0038	0.0002	0.0050	0.0059	0.06
31	0.0106	0.0088	0.0142	0.0141	0.0139	0.0041	0.0107	0.0138	0.0012	0.0139	0.0155	0.07
32	0.0023	0.0020	0.0033	0.0036	0.0037	0.0036	0.0032	0.0033	0.0003	0.0034	0.0056	0.06
33	0.0094	0.0042	0.0114	0.0131	0.0126	0.0046	0.0073	0.0107	0.0010	0.0136	0.0126	0.07
34	0.0022	0.0032	0.0026	0.0035	0.0031	0.0033	0.0031	0.0032	0.0003	0.0028	0.0039	0.05
35	0.0071	0.0062	0.0068	0.0118	0.0116	0.0057	0.0058	0.0100	0.0008	0.0148	0.0120	0.06
36	0.0021	0.0025	0.0023	0.0026	0.0022	0.0033	0.0026	0.0024	0.0002	0.0036	0.0027	0.05
37	0.0067	0.0056	0.0060	0.0105	0.0112	0.0077	0.0058	0.0106	0.0008	0.0157	0.0144	0.06
38	0.0019	0.0017	0.0018	0.0023	0.0020	0.0032	0.0029	0.0026	0.0002	0.0041	0.0027	0.05
39	0.0055	0.0034	0.0071	0.0077	0.0091	0.0078	0.0036	0.0079	0.0007	0.0116	0.0138	0.06

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40	0.0017	0.0032	0.0021	0.0015	0.0015	0.0032	0.0024	0.0027	0.0002	0.0042	0.0044	0.05
THD	1.383 %		1.463 %	1.438 %	1.410 %	1.522 %	1.710 %	1.248 %	2.036 %	2.186 %	2.309 %	5%
Phase L3												
Harmon. Nr.	P/P_{Emax}											Limit (A)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	0.0627	0.0147	0.0226	0.0268	0.0286	0.0295	0.0299	0.0200	0.0300	0.0303	0.0299	0.072
1	0.2019	1.4238	2.7221	4.2646	5.8170	7.1462	8.6874	10.0127	11.5691	13.1088	14.4264	-
2	0.0256	0.1642	0.2213	0.2229	0.2054	0.1923	0.1795	0.1725	0.1633	0.1586	0.1605	1.08
3	0.2096	0.2090	0.2047	0.2072	0.2110	0.2074	0.2043	0.2077	0.2106	0.2108	0.2136	2.30
4	0.0399	0.0648	0.0206	0.0546	0.0659	0.0685	0.0660	0.0638	0.0663	0.0675	0.0668	0.43
5	0.1002	0.1092	0.1069	0.1079	0.1115	0.1158	0.1176	0.1141	0.1141	0.1168	0.1146	1.14
6	0.0042	0.0176	0.0396	0.0284	0.0316	0.0332	0.0347	0.0333	0.0288	0.0279	0.0254	0.30
7	0.0491	0.0588	0.0681	0.0728	0.0735	0.0751	0.0778	0.0814	0.0790	0.0787	0.0816	0.77
8	0.0055	0.0435	0.0227	0.0220	0.0273	0.0274	0.0266	0.0242	0.0232	0.0209	0.0196	0.23
9	0.0366	0.0345	0.0460	0.0522	0.0565	0.0557	0.0559	0.0565	0.0608	0.0603	0.0596	0.40
10	0.0047	0.0236	0.0273	0.0212	0.0164	0.0174	0.0176	0.0202	0.0190	0.0201	0.0182	0.18
11	0.0224	0.0196	0.0240	0.0285	0.0347	0.0369	0.0368	0.0355	0.0354	0.0389	0.0392	0.33
12	0.0041	0.0139	0.0337	0.0232	0.0168	0.0197	0.0200	0.0205	0.0238	0.0236	0.0219	0.15
13	0.0188	0.0167	0.0741	0.0311	0.0190	0.0619	0.1072	0.1341	0.1621	0.1888	0.2090	0.21
14	0.0025	0.0189	0.0145	0.0179	0.0125	0.0113	0.0133	0.0114	0.0116	0.0133	0.0132	0.13
15	0.0344	0.0312	0.0430	0.0282	0.0050	0.0191	0.0440	0.0657	0.0781	0.0900	0.1004	0.15
16	0.0034	0.0124	0.0129	0.0137	0.0123	0.0105	0.0097	0.0096	0.0081	0.0085	0.0094	0.12
17	0.0403	0.0496	0.0168	0.0370	0.0062	0.0140	0.0316	0.0458	0.0590	0.0627	0.0678	0.13
18	0.003	0.008	0.012	0.012	0.010	0.008	0.008	0.009	0.009	0.008	0.007	0.10

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	0	7	7	6	6	0	5	7	5	8	9	
19	0.0370	0.0445	0.0203	0.0343	0.0071	0.0084	0.0188	0.0266	0.0402	0.0473	0.0488	0.12
20	0.0026	0.0067	0.0083	0.0100	0.0089	0.0087	0.0070	0.0079	0.0074	0.0072	0.0063	0.09
21	0.0309	0.0298	0.0310	0.0293	0.0118	0.0059	0.0138	0.0187	0.0255	0.0355	0.0395	0.11
22	0.0024	0.0048	0.0090	0.0062	0.0095	0.0071	0.0064	0.0057	0.0076	0.0080	0.0082	0.08
23	0.0217	0.0290	0.0250	0.0213	0.0164	0.0028	0.0114	0.0180	0.0222	0.0289	0.0359	0.10
24	0.0020	0.0072	0.0084	0.0053	0.0075	0.0067	0.0067	0.0056	0.0068	0.0059	0.0060	0.08
25	0.0188	0.0239	0.0176	0.0189	0.0178	0.0034	0.0117	0.0161	0.0168	0.0189	0.0220	0.09
26	0.0018	0.0044	0.0052	0.0052	0.0066	0.0064	0.0053	0.0061	0.0048	0.0064	0.0052	0.07
27	0.0156	0.0141	0.0107	0.0150	0.0173	0.0054	0.0077	0.0124	0.0153	0.0170	0.0187	0.08
28	0.0016	0.0032	0.0055	0.0052	0.0053	0.0059	0.0050	0.0049	0.0036	0.0053	0.0057	0.07
29	0.0143	0.0140	0.0111	0.0140	0.0162	0.0074	0.0059	0.0112	0.0155	0.0152	0.0167	0.08
30	0.0015	0.0044	0.0056	0.0050	0.0046	0.0054	0.0049	0.0046	0.0054	0.0039	0.0057	0.06
31	0.0142	0.0096	0.0114	0.0139	0.0159	0.0097	0.0053	0.0112	0.0155	0.0152	0.0150	0.07
32	0.0015	0.0034	0.0044	0.0045	0.0038	0.0050	0.0045	0.0040	0.0051	0.0032	0.0036	0.06
33	0.0130	0.0061	0.0083	0.0113	0.0128	0.0099	0.0032	0.0080	0.0112	0.0146	0.0133	0.07
34	0.0015	0.0024	0.0042	0.0039	0.0033	0.0042	0.0042	0.0038	0.0036	0.0042	0.0028	0.05
35	0.0113	0.0083	0.0060	0.0099	0.0111	0.0102	0.0030	0.0066	0.0098	0.0139	0.0140	0.06
36	0.0013	0.0025	0.0036	0.0031	0.0028	0.0041	0.0041	0.0040	0.0035	0.0047	0.0033	0.05
37	0.0111	0.0071	0.0054	0.0089	0.0108	0.0112	0.0047	0.0063	0.0109	0.0129	0.0157	0.06
38	0.0013	0.0020	0.0028	0.0025	0.0026	0.0038	0.0036	0.0033	0.0033	0.0044	0.0047	0.05
39	0.0091	0.0040	0.0053	0.0065	0.0086	0.0095	0.0046	0.0042	0.0088	0.0091	0.0119	0.06
40	0.0012	0.0018	0.0032	0.0018	0.0024	0.0027	0.0037	0.0037	0.0029	0.0029	0.0032	0.05

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THD	1.520 %	2.226 %	2.442 %	2.451 %	2.378 %	2.354 %	2.403 %	1.667 %	2.604 %	2.721 %	2.834 %	5%
Supplementary information: Harmonics of PGU test according to IEC 61000-3-2; This table is applied to devices with rated current of ≤16A												

5.2.4 & 5.2.6	TABLE: Harmonics and inter-harmonics& Feed-in of direct currents										P
Model	ASW15KH-T1										
Phase L1											
Harmon. Nr.	P/P_{Emax}										Limit (%)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	-	0.143 %	0.111 %	0.097 %	0.112 %	0.111 %	0.112 %	0.119 %	0.134 %	0.125 %	0.127%	10.85
1	1.825 %	10.562 %	20.576 %	30.673 %	40.700 %	50.806 %	59.857 %	69.935 %	80.000 %	89.991 %	100.074 %	-
2	0.037 %	0.194 %	0.244 %	0.267 %	0.318 %	0.323 %	0.346 %	0.364 %	0.415 %	0.373 %	0.401%	8.0
3	0.097 %	0.166 %	0.194 %	0.212 %	0.194 %	0.212 %	0.203 %	0.212 %	0.221 %	0.226 %	0.249%	-
4	0.018 %	0.060 %	0.041 %	0.041 %	0.060 %	0.083 %	0.097 %	0.106 %	0.134 %	0.106 %	0.138%	4.0
5	0.092 %	0.111 %	0.124 %	0.157 %	0.189 %	0.166 %	0.189 %	0.184 %	0.212 %	0.221 %	0.235%	10.7
6	0.014 %	0.018 %	0.032 %	0.028 %	0.051 %	0.018 %	0.028 %	0.037 %	0.051 %	0.051 %	0.065%	2.67
7	0.028 %	0.074 %	0.097 %	0.088 %	0.115 %	0.129 %	0.115 %	0.129 %	0.124 %	0.129 %	0.129%	7.2
8	0.014 %	0.009 %	0.014 %	0.018 %	0.018 %	0.041 %	0.028 %	0.018 %	0.028 %	0.041 %	0.041%	2.0
9	0.018 %	0.051 %	0.074 %	0.074 %	0.083 %	0.106 %	0.106 %	0.097 %	0.115 %	0.106 %	0.115%	-
10	0.009 %	0.009 %	0.018 %	0.018 %	0.018 %	0.028 %	0.023 %	0.023 %	0.018 %	0.018 %	0.023%	1.6
11	0.018 %	0.051 %	0.074 %	0.078 %	0.078 %	0.074 %	0.101 %	0.092 %	0.088 %	0.101 %	0.088%	3.1
12	0.009 %	0.009 %	0.014 %	0.014 %	0.023 %	0.018 %	0.028 %	0.023 %	0.028 %	0.023 %	0.023%	1.33
13	0.180 %	0.171 %	0.166 %	0.364 %	0.498 %	0.562 %	0.724 %	0.839 %	0.848 %	0.857 %	0.903%	2.0
14	0.009 %	0.009 %	0.009 %	0.009 %	0.018 %	0.014 %	0.023 %	0.023 %	0.018 %	0.028 %	0.018%	-
15	0.120 %	0.157 %	0.083 %	0.203 %	0.263 %	0.304 %	0.295 %	0.373 %	0.424 %	0.406 %	0.355%	-
16	0.005 %	0.009 %	0.009 %	0.009 %	0.009 %	0.014 %	0.009 %	0.014 %	0.018 %	0.023 %	0.023%	-

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Huangpu Ave. West, Guangzhou 510656, P. R. China

17	0.129 %	0.124 %	0.051 %	0.138 %	0.194 %	0.240 %	0.240 %	0.258 %	0.323 %	0.373 %	0.359%	-
18	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.014 %	0.009 %	0.009 %	0.018 %	0.018 %	0.018%	-
19	0.051 %	0.074 %	0.037 %	0.097 %	0.138 %	0.171 %	0.194 %	0.194 %	0.221 %	0.272 %	0.300%	-
20	0.005 %	0.005 %	0.005 %	0.009 %	0.014 %	0.009 %	0.009 %	0.009 %	0.009 %	0.018 %	0.014%	-
21	0.051 %	0.046 %	0.023 %	0.074 %	0.101 %	0.124 %	0.143 %	0.152 %	0.161 %	0.184 %	0.217%	-
22	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.005 %	0.009 %	0.009 %	0.009 %	0.014 %	0.018%	-
23	0.023 %	0.060 %	0.014 %	0.065 %	0.078 %	0.097 %	0.115 %	0.129 %	0.143 %	0.157 %	0.180%	-
24	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.005 %	0.009 %	0.009 %	0.009 %	0.009 %	0.014%	-
25	0.023 %	0.069 %	0.018 %	0.055 %	0.069 %	0.078 %	0.088 %	0.101 %	0.120 %	0.129 %	0.138%	-
26	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.005 %	0.009 %	0.009 %	0.009 %	0.009%	-
27	0.018 %	0.055 %	0.028 %	0.051 %	0.055 %	0.065 %	0.069 %	0.083 %	0.097 %	0.111 %	0.115%	-
28	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.009%	-
29	0.023 %	0.032 %	0.032 %	0.046 %	0.051 %	0.055 %	0.060 %	0.065 %	0.083 %	0.097 %	0.106%	-
30	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.009%	-
31	0.018 %	0.018 %	0.037 %	0.037 %	0.051 %	0.046 %	0.051 %	0.055 %	0.065 %	0.083 %	0.092%	-
32	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009%	-
33	0.023 %	0.028 %	0.041 %	0.032 %	0.046 %	0.046 %	0.046 %	0.046 %	0.051 %	0.069 %	0.078%	-
34	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
35	0.023 %	0.028 %	0.041 %	0.028 %	0.041 %	0.041 %	0.037 %	0.041 %	0.046 %	0.055 %	0.074%	-
36	0.000 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.005 %	0.009%	-
37	0.018 %	0.018 %	0.037 %	0.023 %	0.041 %	0.037 %	0.037 %	0.037 %	0.041 %	0.046 %	0.060%	-
38	0.000 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.005 %	0.005%	-
39	0.018	0.009	0.032	0.018	0.037	0.037	0.032	0.032	0.037	0.046	0.051%	-

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	%	%	%	%	%	%	%	%	%	%		
40	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.005%	-
THD	0.307 %	0.429 %	0.430 %	0.623 %	0.787 %	0.873 %	1.004 %	1.131 %	1.211 %	1.235 %	1.286%	13
PWHD	0.201 %	0.251 %	0.146 %	0.303 %	0.404 %	0.476 %	0.491 %	0.561 %	0.651 %	0.704 %	0.705%	22
Phase L2												
Harmon. Nr.	P/P_{Emax}											Limit (%)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	-	0.447 %	0.529 %	0.559 %	0.580 %	0.607 %	0.617 %	0.625 %	0.628 %	0.541 %	0.537%	10.85
1	0.198 %	9.945 %	19.949 %	30.083 %	40.124 %	50.249 %	59.304 %	69.392 %	79.433 %	89.424 %	99.507 %	-
2	0.046 %	0.309 %	0.309 %	0.318 %	0.350 %	0.332 %	0.350 %	0.364 %	0.387 %	0.369 %	0.387%	8.0
3	0.157 %	0.309 %	0.355 %	0.382 %	0.355 %	0.382 %	0.369 %	0.387 %	0.406 %	0.406 %	0.429%	-
4	0.051 %	0.065 %	0.041 %	0.037 %	0.074 %	0.065 %	0.060 %	0.083 %	0.129 %	0.157 %	0.194%	4.0
5	0.074 %	0.189 %	0.207 %	0.249 %	0.276 %	0.249 %	0.281 %	0.263 %	0.281 %	0.281 %	0.276%	10.7
6	0.009 %	0.014 %	0.028 %	0.032 %	0.023 %	0.060 %	0.092 %	0.092 %	0.083 %	0.051 %	0.037%	2.67
7	0.092 %	0.088 %	0.129 %	0.138 %	0.175 %	0.194 %	0.175 %	0.203 %	0.194 %	0.207 %	0.203%	7.2
8	0.009 %	0.014 %	0.014 %	0.018 %	0.023 %	0.028 %	0.018 %	0.051 %	0.074 %	0.083 %	0.069%	2.0
9	0.078 %	0.069 %	0.111 %	0.120 %	0.120 %	0.152 %	0.161 %	0.152 %	0.171 %	0.157 %	0.161%	-
10	0.009 %	0.018 %	0.014 %	0.018 %	0.028 %	0.014 %	0.037 %	0.023 %	0.023 %	0.041 %	0.055%	1.6
11	0.157 %	0.041 %	0.065 %	0.078 %	0.083 %	0.078 %	0.106 %	0.101 %	0.106 %	0.124 %	0.106%	3.1
12	0.005 %	0.018 %	0.009 %	0.014 %	0.018 %	0.032 %	0.018 %	0.028 %	0.028 %	0.028 %	0.046%	1.33
13	0.078 %	0.286 %	0.152 %	0.304 %	0.442 %	0.539 %	0.687 %	0.774 %	0.797 %	0.834 %	0.917%	2.0
14	0.009 %	0.014 %	0.005 %	0.009 %	0.014 %	0.009 %	0.023 %	0.014 %	0.023 %	0.023 %	0.018%	-
15	0.060 %	0.217 %	0.088 %	0.171 %	0.235 %	0.267 %	0.295 %	0.359 %	0.387 %	0.369 %	0.346%	-
16	0.009 %	0.009 %	0.005 %	0.009 %	0.009 %	0.009 %	0.009 %	0.018 %	0.014 %	0.014 %	0.018%	-

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17	0.028 %	0.124 %	0.051 %	0.124 %	0.175 %	0.217 %	0.230 %	0.263 %	0.318 %	0.346 %	0.336%	-
18	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.009 %	0.009 %	0.018 %	0.009 %	0.014%	-
19	0.028 %	0.055 %	0.032 %	0.097 %	0.124 %	0.157 %	0.175 %	0.189 %	0.221 %	0.258 %	0.281%	-
20	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.005 %	0.009 %	0.009 %	0.014 %	0.009 %	0.009%	-
21	0.032 %	0.074 %	0.046 %	0.078 %	0.097 %	0.115 %	0.129 %	0.143 %	0.157 %	0.180 %	0.207%	-
22	0.005 %	0.009 %	0.005 %	0.005 %	0.009 %	0.005 %	0.005 %	0.009 %	0.009 %	0.014 %	0.014%	-
23	0.028 %	0.078 %	0.060 %	0.069 %	0.083 %	0.097 %	0.106 %	0.120 %	0.134 %	0.152 %	0.175%	-
24	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.009%	-
25	0.028 %	0.046 %	0.069 %	0.055 %	0.074 %	0.074 %	0.088 %	0.092 %	0.111 %	0.120 %	0.138%	-
26	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009%	-
27	0.028 %	0.014 %	0.074 %	0.041 %	0.065 %	0.065 %	0.069 %	0.078 %	0.088 %	0.097 %	0.106%	-
28	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
29	0.028 %	0.023 %	0.065 %	0.032 %	0.060 %	0.065 %	0.060 %	0.065 %	0.074 %	0.088 %	0.101%	-
30	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
31	0.023 %	0.028 %	0.055 %	0.023 %	0.055 %	0.055 %	0.055 %	0.051 %	0.060 %	0.074 %	0.088%	-
32	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005%	-
33	0.023 %	0.018 %	0.041 %	0.018 %	0.051 %	0.051 %	0.051 %	0.046 %	0.046 %	0.060 %	0.074%	-
34	0.000 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005%	-
35	0.018 %	0.014 %	0.032 %	0.018 %	0.046 %	0.051 %	0.046 %	0.041 %	0.037 %	0.051 %	0.069%	-
36	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005%	-
37	0.018 %	0.023 %	0.023 %	0.018 %	0.041 %	0.051 %	0.041 %	0.041 %	0.032 %	0.037 %	0.055%	-
38	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005%	-
39	0.198	0.023	0.018	0.023	0.037	0.046	0.041	0.037	0.032	0.032	0.046%	-

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	%	%	%	%	%	%	%	%	%	%		
40	0.046 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
THD	0.365 %	0.640 %	0.601 %	0.720 %	0.850 %	0.937 %	1.057 %	1.159 %	1.231 %	1.272 %	1.352%	13
PWHD	0.230 %	0.288 %	0.196 %	0.270 %	0.377 %	0.439 %	0.476 %	0.546 %	0.615 %	0.651 %	0.671%	22
Phase L3												
Harmon. Nr.	P/P_{Emax}											Limit (%)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	-	0.335 %	0.445 %	0.506 %	0.525 %	0.566 %	0.593 %	0.599 %	0.612 %	0.782 %	0.806%	10.85
1	1.028 %	9.788 %	19.857 %	30.051 %	40.157 %	50.336 %	59.433 %	69.571 %	79.650 %	89.659 %	99.751 %	-
2	0.055 %	0.318 %	0.359 %	0.355 %	0.387 %	0.419 %	0.452 %	0.484 %	0.516 %	0.558 %	0.576%	8.0
3	0.507 %	0.594 %	0.659 %	0.696 %	0.687 %	0.719 %	0.714 %	0.747 %	0.779 %	0.806 %	0.839%	-
4	0.023 %	0.037 %	0.069 %	0.088 %	0.088 %	0.106 %	0.092 %	0.078 %	0.111 %	0.143 %	0.180%	4.0
5	0.253 %	0.281 %	0.313 %	0.359 %	0.396 %	0.369 %	0.401 %	0.378 %	0.401 %	0.401 %	0.396%	10.7
6	0.028 %	0.055 %	0.037 %	0.023 %	0.023 %	0.023 %	0.065 %	0.092 %	0.078 %	0.060 %	0.028%	2.67
7	0.147 %	0.161 %	0.207 %	0.221 %	0.253 %	0.272 %	0.258 %	0.281 %	0.263 %	0.276 %	0.267%	7.2
8	0.018 %	0.037 %	0.032 %	0.028 %	0.037 %	0.014 %	0.032 %	0.023 %	0.065 %	0.083 %	0.092%	2.0
9	0.157 %	0.120 %	0.152 %	0.166 %	0.171 %	0.198 %	0.203 %	0.198 %	0.212 %	0.198 %	0.203%	-
10	0.009 %	0.032 %	0.018 %	0.014 %	0.014 %	0.037 %	0.028 %	0.041 %	0.023 %	0.032 %	0.055%	1.6
11	0.106 %	0.088 %	0.088 %	0.106 %	0.111 %	0.111 %	0.138 %	0.129 %	0.138 %	0.147 %	0.124%	3.1
12	0.009 %	0.028 %	0.023 %	0.018 %	0.018 %	0.018 %	0.041 %	0.014 %	0.041 %	0.032 %	0.028%	1.33
13	0.157 %	0.323 %	0.175 %	0.281 %	0.424 %	0.498 %	0.645 %	0.797 %	0.834 %	0.848 %	0.899%	2.0
14	0.005 %	0.018 %	0.018 %	0.014 %	0.014 %	0.009 %	0.014 %	0.023 %	0.014 %	0.028 %	0.032%	-
15	0.055 %	0.240 %	0.097 %	0.161 %	0.217 %	0.267 %	0.272 %	0.332 %	0.401 %	0.396 %	0.364%	-
16	0.005 %	0.018 %	0.014 %	0.009 %	0.014 %	0.009 %	0.014 %	0.018 %	0.023 %	0.018 %	0.018%	-

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17	0.037 %	0.124 %	0.051 %	0.120 %	0.161 %	0.207 %	0.226 %	0.240 %	0.300 %	0.350 %	0.355%	-
18	0.005 %	0.014 %	0.014 %	0.009 %	0.009 %	0.009 %	0.009 %	0.014 %	0.014 %	0.023 %	0.014%	-
19	0.041 %	0.055 %	0.041 %	0.097 %	0.120 %	0.152 %	0.175 %	0.184 %	0.203 %	0.249 %	0.290%	-
20	0.005 %	0.014 %	0.014 %	0.009 %	0.009 %	0.005 %	0.009 %	0.009 %	0.014 %	0.018 %	0.018%	-
21	0.037 %	0.069 %	0.060 %	0.078 %	0.097 %	0.111 %	0.124 %	0.143 %	0.147 %	0.166 %	0.203%	-
22	0.005 %	0.009 %	0.009 %	0.009 %	0.009 %	0.005 %	0.009 %	0.005 %	0.014 %	0.014 %	0.014%	-
23	0.041 %	0.065 %	0.074 %	0.065 %	0.083 %	0.088 %	0.106 %	0.120 %	0.134 %	0.143 %	0.161%	-
24	0.005 %	0.009 %	0.009 %	0.009 %	0.009 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009 %	0.009%	-
25	0.032 %	0.032 %	0.083 %	0.046 %	0.074 %	0.074 %	0.083 %	0.092 %	0.111 %	0.120 %	0.129%	-
26	0.005 %	0.009 %	0.009 %	0.009 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.005 %	0.009%	-
27	0.032 %	0.009 %	0.078 %	0.032 %	0.065 %	0.069 %	0.065 %	0.074 %	0.083 %	0.097 %	0.106%	-
28	0.005 %	0.009 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
29	0.023 %	0.028 %	0.069 %	0.023 %	0.060 %	0.060 %	0.060 %	0.060 %	0.074 %	0.088 %	0.101%	-
30	0.005 %	0.009 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009%	-
31	0.023 %	0.028 %	0.051 %	0.018 %	0.051 %	0.055 %	0.055 %	0.055 %	0.055 %	0.069 %	0.088%	-
32	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009 %	0.009%	-
33	0.018 %	0.014 %	0.037 %	0.018 %	0.046 %	0.055 %	0.051 %	0.046 %	0.046 %	0.055 %	0.069%	-
34	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
35	0.023 %	0.023 %	0.023 %	0.023 %	0.041 %	0.051 %	0.046 %	0.046 %	0.041 %	0.046 %	0.060%	-
36	0.000 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.009%	-
37	0.018 %	0.028 %	0.014 %	0.028 %	0.032 %	0.046 %	0.046 %	0.041 %	0.037 %	0.037 %	0.051%	-
38	0.000 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005%	-
39	0.023	0.023	0.014	0.032	0.028	0.046	0.041	0.037	0.032	0.032	0.041%	-

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	%	%	%	%	%	%	%	%	%	%		
40	0.000 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005 %	0.005%	-
THD	0.650 %	0.886 %	0.906 %	0.992 %	1.095 %	1.183 %	1.282 %	1.410 %	1.501 %	1.564 %	1.626%	13
PWHD	0.120 %	0.302 %	0.216 %	0.260 %	0.355 %	0.430 %	0.458 %	0.515 %	0.606 %	0.660 %	0.686%	22
Supplementary information: Harmonics of PGU test according to IEC 61000-3-12; This table is applied to devices with rated current of >16A and ≤75A.												

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5.3.2	TABLE: Calculation of the asymmetry of three-phase inverters						P
Simulated network voltage (V)		L1 (P-N)	230 Va.c.	Frequency (Hz)	50.0Hz		
		L2(P-N)	230 Va.c.				
		L3(P-N)	230 Va.c.				
The maximum unbalance under all condition: (VA)							
a)	Number	1	2	3	4	5	
	L1	5000.3	5001.0	5001.4	5002.3	5001.5	
	L2	4964.0	4965.3	4964.0	4965.6	4964.6	
	L3	4957.4	4957.7	4956.6	4956.9	4954.5	
	Calculation						
	|L1-L2|	36.3	35.7	37.4	36.7	36.9	
	|L2-L3|	6.6	7.6	7.4	8.7	10.1	
	|L3-L1|	42.9	43.3	44.8	45.4	47.0	
	Unbalance	42.9	43.3	44.8	45.4	47.0	
	Maximum unbalance	47.0					
b)	Number	1	2	3	4	5	
	L1	5533.4	5531.4	5532.4	5532.6	5533.3	
	L2	5471.3	5472.6	5471.3	5472.0	5473.6	
	L3	5465.3	5465.3	5466.5	5466.9	5468.3	
	Calculation						
	|L1-L2|	62.1	58.8	61.1	60.6	59.7	
	|L2-L3|	6.0	7.3	4.8	5.1	5.3	
	|L3-L1|	68.1	66.1	65.9	65.7	65.0	
	Unbalance	68.1	66.1	65.9	65.7	65.0	
	Maximum unbalance	68.1					
c)	Number	1	2	3	4	5	
	L1	5491.9	5493.2	5492.9	5493.6	5493.8	
	L2	5485.8	5483.4	5483.1	5480.6	5480.6	
	L3	5467.6	5466.6	5466.7	5466.9	5468.7	
	Calculation						
	|L1-L2|	6.1	9.8	9.8	13.0	13.2	
	|L2-L3|	18.2	16.8	16.4	13.7	11.9	
	|L3-L1|	24.3	26.6	26.2	26.7	25.1	
	Unbalance	24.3	26.6	26.2	26.7	25.1	
	Maximum unbalance	26.7					
d)	Number	1	2	3	4	5	

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	L1	2529.7	2530.3	2529.1	2533.5	2535.6
	L2	2507.1	2509.4	2510	2506.9	2508.6
	L3	2498.2	2496	2494.9	2495.2	2493.9
	Calculation					
	|L1-L2|	22.6	20.9	19.1	26.6	27.0
	|L2-L3|	8.9	13.4	15.1	11.7	14.7
	|L3-L1|	31.5	34.3	34.2	38.3	41.7
	Unbalance	31.5	34.3	34.2	38.3	41.7
	Maximum unbalance	38.3				
e)	Number	1	2	3	4	5
	L1	3519.4	3518.8	3521.4	3521.1	3521.1
	L2	3459.6	3459.9	3460.7	3460.2	3460.2
	L3	3452.2	3450.5	3449.8	3449.0	3449.0
	Calculation					
	|L1-L2|	59.8	58.9	60.7	60.9	60.9
	|L2-L3|	7.4	9.4	10.9	11.2	11.2
	|L3-L1|	67.2	68.3	71.6	72.1	72.1
	Unbalance	67.2	68.3	71.6	72.1	72.1
	Maximum unbalance	72.1				
f)	Number	1	2	3	4	5
	L1	3492.9	3493.5	3492.7	3492.2	3490.9
	L2	3509.0	3507.7	3507.4	3508.6	3508.7
	L3	3500.2	3502.2	3501.1	3502.4	3501.5
	Calculation					
	|L1-L2|	16.1	14.2	14.7	16.4	17.8
	|L2-L3|	8.8	5.5	6.3	6.2	7.2
	|L3-L1|	7.3	8.7	8.4	10.2	10.6
	Unbalance	16.1	14.2	14.7	16.4	17.8
	Maximum unbalance	17.8				
Supplementary information:N/A						

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5.4.2 & 5.4.8.2	TABLE: Measurement of reactive and active power range	P

Model	$S_{Emax600}$ (VA)	$P_{Emax600}$(W)
ASW06KH-T1	6614.0	5999.1

5.4.2 Reactive and active power range, For S_{Emax}>4.6kVA Cosφ =0.90, test 10min

Test voltage	Cos φ setting	P_{600} [W]	Q_{600} [Var]	S_{600} [VA]	Cos φ 600	U_{600} [V]		
						L1	L2	L3
0.90 Un*	1.00	5972.5	-168.5	5981.6	0.9985 ov	207.0	207.0	207.1
1.00 Un	1.00	5999.1	205.1	6002.8	0.9994 ov	230.0	230.0	230.1
1.09 Un	1.00	5990.6	274.9	5997.1	0.9989 ov	250.8	250.8	250.9
0.95 Un	0.90 un	5639.7	-2710.2	6257.5	0.9013 un	218.5	218.5	218.6
1.00 Un	0.90 un	5943.0	-2819.3	6578.2	0.9034 un	230.1	230.1	230.2
1.09 Un	0.90 un	5921.7	-2883.7	6587.2	0.8990 un	250.8	250.8	250.9
0.90 Un*	0.90 ov	5303.9	2587.5	5901.5	0.8987 ov	207.0	207.0	207.2
1.00 Un	0.90 ov	5907.1	2942.5	6599.5	0.8951 ov	230.1	230.1	230.3
1.05 Un	0.90 ov	5972.4	2841.3	6614.0	0.9030 ov	241.6	241.6	241.7

Model	$S_{Emax600}$ (VA)	$P_{Emax600}$(W)
ASW08KH-T1	8837.8	7980.2

Test voltage	Cos φ setting	P_{600} [W]	Q_{600} [Var]	S_{600} [VA]	Cos φ 600	U_{600} [V]		
						L1	L2	L3
0.90 Un*	1.00	7980.2	-179.4	7987.6	0.9991 un	207.0	207.0	207.2
1.00 Un	1.00	7915.3	127.2	7918.0	0.9997 ov	230.2	230.2	230.4
1.09 Un	1.00	7898.1	251.2	7902.3	0.9995 ov	250.6	250.6	250.8
0.95 Un	0.90 un	7500.8	-3668.1	8349.9	0.8983 un	218.5	218.5	218.7
1.00 Un	0.90 un	7904.4	-3829.4	8783.5	0.8999 un	230.2	230.2	230.4
1.09 Un	0.90 un	7905.4	-3743.1	8747.2	0.9038 un	250.8	250.8	251.0
0.90 Un*	0.90 ov	7124.0	3408.9	7897.6	0.9020 ov	207.0	207.0	207.2
1.00 Un	0.90 ov	7932.3	3856.0	8819.9	0.8994 ov	230.2	230.2	230.4
1.05 Un	0.90 ov	7930.2	3900.8	8837.8	0.8973 ov	241.7	241.7	241.9

Model	$S_{Emax600}$ (VA)	$P_{Emax600}$(W)
ASW10KH-T1	11003.5	9987.6

Test voltage	Cos φ setting	P_{600} [W]	Q_{600} [Var]	S_{600} [VA]	Cos φ 600	U_{600} [V]		
						L1	L2	L3
0.90 Un*	1.00	9987.6	-266.1	9994.4	0.9993 un	207.0	206.9	207.3
1.00 Un	1.00	9937.3	-71.0	9939.7	0.9998 un	230.2	230.2	230.5
1.09 Un	1.00	9921.6	252.7	9924.9	0.9997 ov	250.8	250.8	251.1
0.95 Un	0.90 un	9327.6	-4604.5	10402.4	0.8967 un	218.5	218.5	218.8
1.00 Un	0.90 un	9831.5	-4818.5	10949.0	0.8979 un	230.3	230.3	230.6
1.09 Un	0.90 un	9913.1	-4774.8	11003.5	0.9009 un	250.8	250.8	251.0

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0.90 Un*	0.90 ov	8866.3	4197.7	9809.8	0.9038 ov	207.0	207.0	207.3
1.00 Un	0.90 ov	9870.9	4732.8	10946.9	0.9017 ov	230.2	230.2	230.5
1.05 Un	0.90 ov	9869.1	4777.1	10964.5	0.9001 ov	241.5	241.5	241.8
Model		$S_{Emax600}$ (VA)		$P_{Emax600}$(W)				
ASW12KH-T1		13192.0		11992.4				
Test voltage	Cos φ setting	P_{600} [W]	Q_{600} [Var]	S_{600} [VA]	Cos φ 600	U 600 [V]		
						L1	L2	L3
0.90 Un*	1.00	11992.4	-390.2	11999.1	0.9994 un	206.9	206.9	207.3
1.00 Un	1.00	11965.2	246.2	11967.8	0.9998 ov	230.5	230.5	230.9
1.09 Un	1.00	11950.3	58.6	11953.1	0.9998 ov	250.6	250.6	251.0
0.95 Un	0.90 un	11224.3	-5581.7	12535.6	0.8954 un	218.4	218.4	218.8
1.00 Un	0.90 un	11826.0	-5845.7	13192.0	0.8964 un	230.0	230.0	230.4
1.09 Un	0.90 un	11817.4	-5755.1	13144.5	0.8990 un	250.6	250.6	251.0
0.90 Un*	0.90 ov	10559.2	5260.2	11796.9	0.8951 ov	207.0	206.9	207.4
1.00 Un	0.90 ov	11881.2	5635.6	13150.0	0.9035 ov	230.1	230.0	230.5
1.05 Un	0.90 ov	11882.3	5682.0	13171.0	0.9022 ov	241.4	241.4	241.8
Model		$S_{Emax600}$ (VA)		$P_{Emax600}$(W)				
ASW15KH-T1		16540.9		15004.9				
Test voltage	Cos φ setting	P_{600} [W]	Q_{600} [Var]	S_{600} [VA]	Cos φ 600	U 600 [V]		
						L1	L2	L3
0.90 Un*	1.00	14830.0	387.1	14835.2	0.9999 ov	206.8	206.8	207.4
1.00 Un	1.00	15004.9	171.3	15007.1	0.9999 ov	230.3	230.3	230.9
1.09 Un	1.00	14988.8	-119.8	14991.4	0.9998 un	250.7	250.7	251.3
0.95 Un	0.90 un	14094.9	-6661.5	15589.8	0.9041 un	218.3	218.3	218.9
1.00 Un	0.90 un	14681.1	-7311.6	16401.1	0.8951 un	230.2	230.2	230.7
1.09 Un	0.90 un	14837.1	-7311.6	16540.9	0.8970 un	250.6	250.7	251.2
0.90 Un*	0.90 ov	13252.3	6546.4	14781.0	0.8966 ov	206.8	206.8	207.4
1.00 Un	0.90 ov	14759.1	7353.3	16489.4	0.8951 ov	230.3	230.3	230.9
1.05 Un	0.90 ov	14917.9	7046.3	16498.3	0.9042 ov	241.4	241.4	241.9
Remark "*": Low voltage cannot reach full power due to maximum current limit								

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5.4.8.2 Checking reactive power / displacement factor setting accuracy			
Case a) Tested at Nominal voltage 0.90 Un*, test 1min			
P/S_{Emax} (%)		50	100
Cosφ setting		0.90 un	0.90 un
Cosφ $_{60}$		0.9026 un	0.9033 un
P_{60} (W)		7566.9	13352.8
Q_{60} (Var)		-3607.5	-6342.9
S_{60} (VA)		8383.2	14782.8*
U_{60} [V]	L1	207.1	207.0
	L2	207.1	207.2
	L3	207.2	207.1
Percentage of max Q (%P_{Emax})		0.38%	0.83%
Tolerance with 4% S_{Emax}		Yes	Yes
P/S_{Emax} (%)		50	100
Cosφ setting		0.90 ov	0.90 ov
Cosφ $_{60}$		0.9041 ov	0.8966 ov
P_{60} (W)		7614.4	13252.6
Q_{60} (Var)		3599.8	6547.0
S_{60} (VA)		8422.5	14781.6*
U $_{60}$ [V]	L1	207.1	207.2
	L2	207.2	207.2
	L3	207.1	207.2
Percentage of max Q (%P_{Emax})		0.59%	0.86%
Tolerance with 4% S_{Emax}		Yes	Yes
Case b): Tested at Nominal voltage 1.0Un, test 1min			
P/S_{Emax} (%)		50	100
Cosφ setting		0.90 un	0.90 un
Cosφ $_{60}$		0.8965 un	0.9049 un
P_{60} (W)		7560.6	14870.4
Q_{60} (Var)		-3734.5	-6994.9
S_{60} (VA)		8433.2	16433.5
U $_{60}$ [V]	L1	230.2	230.1
	L2	230.1	230.0
	L3	230.2	230.1
Percentage of max Q (%P_{Emax})		0.48%	1.38%
Tolerance with 4% S_{Emax}		Yes	Yes
P/S_{Emax} (%)		50	100
Cosφ setting		0.90 ov	0.90 ov
Cosφ $_{60}$		0.9003 ov	0.8950 ov
P_{60} (W)		7607.4	14749.8
Q_{60} (Var)		3677.2	7351.2
S_{60} (VA)		8449.6	16480.2
U $_{60}$ [V]	L1	230.1	230.2
	L2	230.1	230.0

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	L3	230.2	230.1
Percentage of max Q ($\%P_{Emax}$)		0.05%	1.38%
Tolerance with 4% S_{Emax}		Yes	Yes
Case c): Tested at Nominal voltage 1.1Un, test 1min			
P/S_{Emax} (%)		50	100
Cosφ setting		0.90 un	0.90 un
Cosφ $_{60}$		0.9008 un	0.8973 un
P_{60} (W)		7545.7	14831.5
Q_{60} (Var)		-3635.5	-7294.9
S_{60} (VA)		8376.6	16528.6
U_{60} [V]	L1	253.1	253.1
	L2	253.2	253.2
	L3	253.1	253.0
Percentage of max Q ($\%P_{Emax}$)		0.13%	0.74%
Tolerance with 4% S_{Emax}		Yes	Yes
P/S_{Emax} (%)		50	100
Cosφ setting		0.90 ov	0.90 ov
Cosφ $_{60}$		0.8957 ov	0.9028 ov
P_{60} (W)		7592.8	14895.7
Q_{60} (Var)		3768.3	7093.7
S_{60} (VA)		8476.6	16498.6
U_{60} [V]	L1	253.2	253.1
	L2	253.1	253.0
	L3	253.2	253.1
Percentage of max Q ($\%P_{Emax}$)		0.61%	0.80%
Tolerance with 4% S_{Emax}		Yes	Yes
Case a) Tested at Nominal voltage 0.90 Un, test 1min			
P/S_{Emax} (%)		50	100
Cosφ setting		0.95 un	0.95 un
Cosφ $_{60}$		0.9525 un	0.9527 un
P_{60} (W)		7450.7	13487.0
Q_{60} (Var)		-2382.2	-4301.2
S_{60} (VA)		7822.6	14156.3*
U_{60}[V]	L1	207.0	206.9
	L2	207.0	206.9
	L3	207.2	207.4
Percentage of max Q ($\%P_{Emax}$)		0.44%	0.88%
Tolerance with 4% S_{Emax}		Yes	Yes
P/S_{Emax} (%)		50	100
Cosφ setting		0.95 ov	0.95 ov
Cosφ $_{60}$		0.9550 ov	0.9472 ov
P_{60} (W)		7482.1	13510.1
Q_{60} (Var)		2322.8	4573.0
S_{60} (VA)		7834.4	14263.1*

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U_{60} [V]	L1	207.0	206.9
	L2	207.0	206.9
	L3	207.2	207.4
Percentage of max Q ($\%P_{Emax}$)		0.91%	0.88%
Tolerance with 4% S_{Emax}		Yes	Yes
Case b): Tested at Nominal voltage 1.0Un, test 1min			
P/S_{Emax} (%)		50	100
Cosφ setting		0.95 un	0.95 un
Cosφ $_{60}$		0.9554 un	0.9539 un
P_{60} (W)		7446.3	15014.3
Q_{60} (Var)		-2299.6	-4721.0
S_{60} (VA)		7793.8	15739.1
U_{60} [V]	L1	230.2	230.3
	L2	230.2	230.3
	L3	230.4	230.8
Percentage of max Q ($\%P_{Emax}$)		0.99%	1.43%
Tolerance with 4% S_{Emax}		Yes	Yes
P/S_{Emax} (%)		50	100
Cosφ setting		0.95 ov	0.95 ov
Cosφ $_{60}$		0.9520 ov	0.9460 ov
P_{60} (W)		7476.0	15029.9
Q_{60} (Var)		2404.2	5152.5
S_{60} (VA)		7853.2	15888.6
U_{60} [V]	L1	230.2	230.3
	L2	230.2	230.3
	L3	230.4	230.9
Percentage of max Q ($\%P_{Emax}$)		0.35%	1.42%
Tolerance with 4% S_{Emax}		Yes	Yes
Case c): Tested at Nominal voltage 1.1Un, test 1min			
P/S_{Emax} (%)		50	100
Cosφ setting		0.95 un	0.95 un
Cosφ $_{60}$		0.9492 un	0.9461 un
P_{60} (W)		7425.0	15002.2
Q_{60} (Var)		-2458.5	-5135.5
S_{60} (VA)		7822.3	15857.0
U_{60} [V]	L1	253.0	253.2
	L2	253.0	253.2
	L3	253.2	253.6
Percentage of max Q ($\%P_{Emax}$)		0.12%	1.36%
Tolerance with 4% S_{Emax}		Yes	Yes
P/S_{Emax} (%)		50	100
Cosφ setting		0.95 ov	0.95 ov
Cosφ $_{60}$		0.9482 ov	0.9545 ov
P_{60} (W)		7455.5	15010.2

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Q_{60} (Var)		2497.2	4691.3
S_{60} (VA)		7862.8	15726.3
U_{60} [V]	L1	253.1	253.2
	L2	253.1	253.2
	L3	253.2	253.6
Percentage of max Q ($\%P_{Emax}$)		0.31%	1.62%
Tolerance with 4% S_{Emax}		Yes	Yes
Remark "*": Low voltage cannot reach full power due to maximum current limit			

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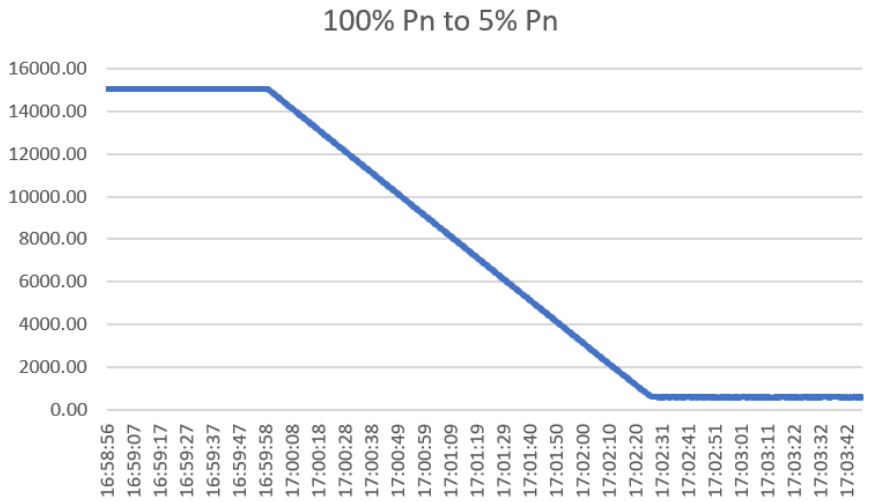
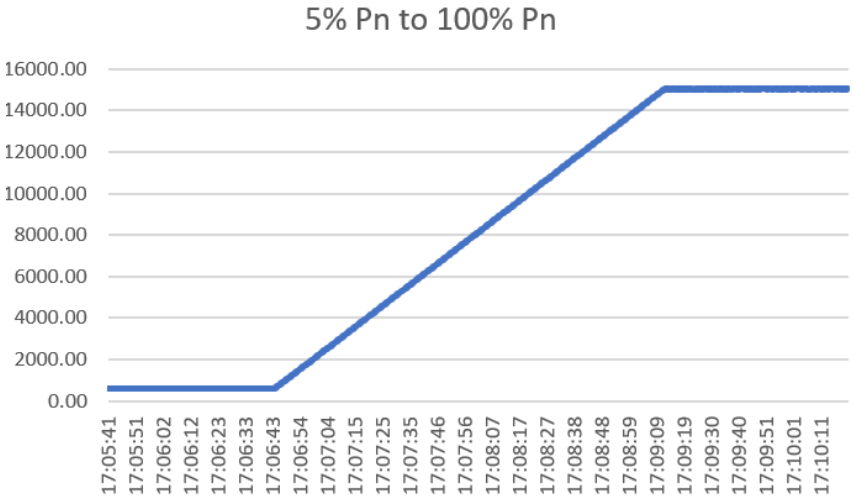
5.4.3	TABLE: Reduction of active power by setpoint specification									P
Test 1										
P/P_{Emax} (%)	100	90	80	70	60	50	40	30	20	10
Setting value(W)	15000	13500	12000	10500	9000	7500	6000	4500	3000	1500
Measured value(W)	15014	13492	11973	10457	8936	7418	5896	4347	2860	1360
Deviation(W)	0.1%	0.1%	0.2%	0.3%	0.4%	0.5%	0.7%	1.0%	0.9%	0.9%
Maximum active power gradient (0.66% Pn inst (or P controllable) per second)										
Sample test from 100% P_n to 5% P_n, settling time [s], (see the graphic below):	152s									
Sample test from 5% P_n to 100% P_n, settling time [s], (see the graphic below):	152s									
Sample test from 100% P_n to 5% P_n Gradient [%/s], (see the graphic below):	0.65%Pn									
Sample test from 5% P_n to 100% P_n Gradient [%/s], (see the graphic below):	0.65%Pn									

Response curve:



Response curve:



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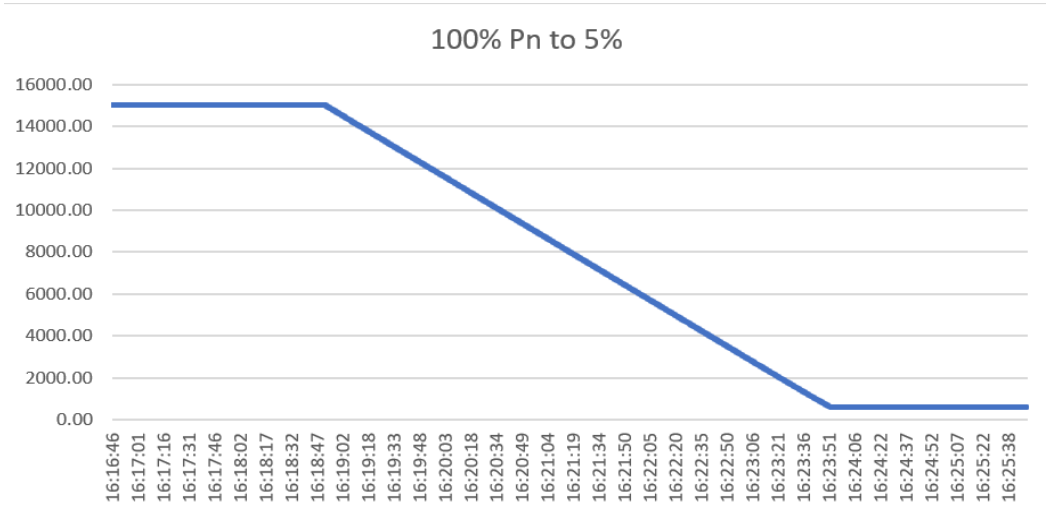
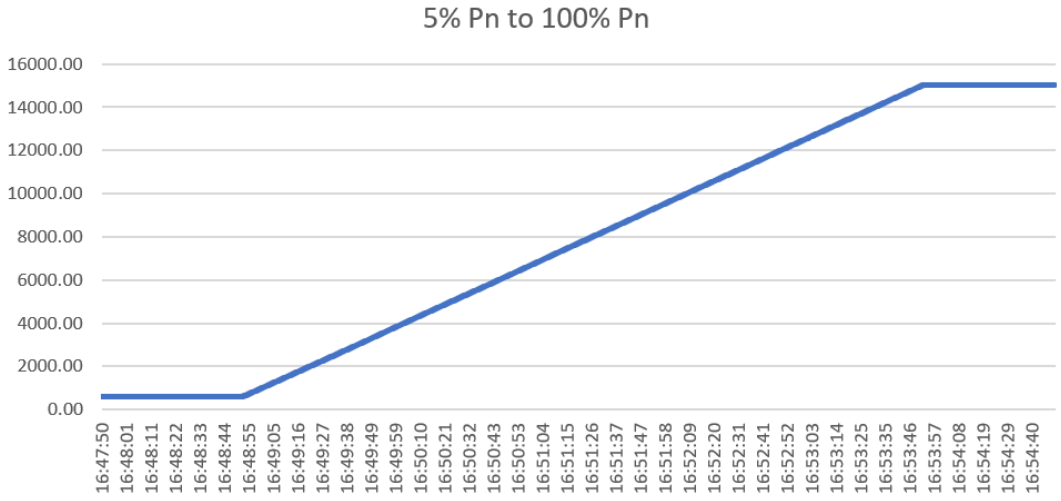
Minimum active power gradient(0.33% Pn inst (or P controllable) per second)	
Sample test from 100% P_n to 5% P_n, settling time [s], (see the graphic below):	290s
Sample test from 5% P_n to 100% P_n, settling time [s], (see the graphic below):	292s
Sample test from 100% P_n to 5% P_n Gradient [%/s], (see the graphic below):	0.35%Pn
Sample test from 5% P_n to 100% P_n Gradient [%/s], (see the graphic below):	0.34%Pn

Response curve:



Response curve:



During the active power regulation, the PGU disconnect from the grid or not?	No	
	Disconnection power level	N/A

Logical interface	
Interface type	DRM
Expected signal type (e.g. AC, DC);	Differential signal
“High” and “Low” state	“High”

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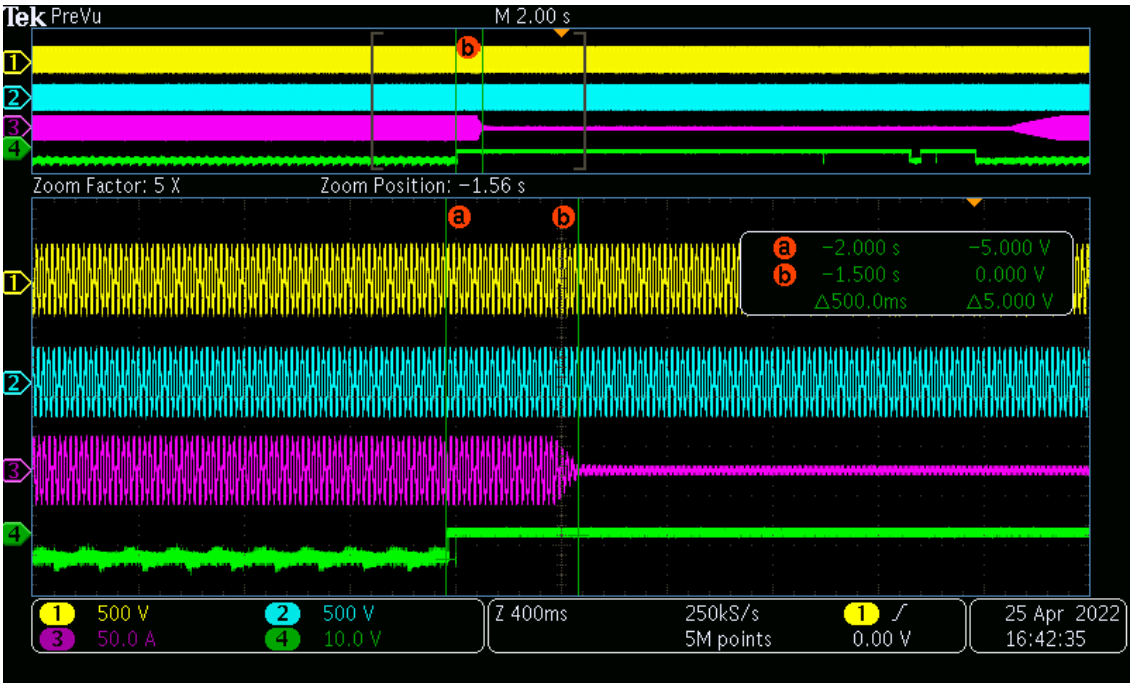
	state for shut down
Confirm that an input port is provided and can be used to shut down the module within 5s	Yes

Supplementary information:



CH1: A phase voltage
CH2: B phase voltage
CH3: A phase current
CH4: Signal

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5.4.4	TABLE: Active power feed-in from EZE at overfrequency	P

Test 1: generation unit (PV and ESS), over-frequency regulation, with active power reduction frequency start point=50.2Hz, gradient s=5% (40 % P_{ref}/Hz)

TYPE 2 inverter DC input power is set to 100% of maximum active output power till the end of the test. The active power value shall not be deviated from the required value calculated from the feature curve (a gradient of 40% of P_M per hertz) for more than 10% P_{Emax}.

P_M = 14996.4W , 10% P_{Emax}= 1500W .

Test sequence	Freq (Hz)	Measured active output power $P_{measure}$ (W)	The calculated active output power as per feature curve P_{shall} (W)	Deviation of $P_{measure}$ and P_{shall} (W)	Deviation within 10% P_{Emax} (Yes/No)
a)	50.00	14996.4	--	--	--
b)	50.25	14544.7	14696.5(98% P_M)	151.8	Yes
c)	50.70	11799.6	11997.1(80%P_M)	197.5	Yes
d)	51.40	7556.6	7798.1(52% P_M)	241.5	Yes
e)	50.70	11799.5	11997.1(80%P_M)	197.6	Yes
f)	50.25	14549.1	14696.5 (98% P_M)	147.4	Yes
g)	50.00	15005.5	15000(100%)	--	--
h)	51.65	Protection	Protection	--	--
i)	50.15	No reconnection	Maintain 149.0 s	--	--
j)	50.00	See below table	100% PM(waiting for 60s, than power rise up with gradient of <10 P_{Emax})	--	--

Test sequence	Frequency (Hz)	Time after step bac from 50.00 Hz t (min)	Measured active output power P_{10} (W)	Arised active power ΔP during next 0,5 minute (W)	Gradient of arising active power ΔP/t (W/1 min.)	Gradient of arising active power ΔP/ P_n/t (%/1 min.)	Limit within 10% of P_n/min (Yes/No)
6	50.00	0.0 min	0.0	--	--	--	--
6	50.00	0.0 min	The time that the active power start increases after the frequency change to 50.00Hz (s)				83.0
After reconnection							
7	50.00	0.0 min	40.1	--	--	--	--
8	50.00	0.5 min	785.3	618.8	1251.9	8.35%	Yes
9	50.00	1.0 min	1404.1	633.1	1262.8	8.42%	Yes
10	50.00	1.5 min	2037.2	629.7	1271.4	8.48%	Yes
11	50.00	2.0 min	2666.9	641.7	1279.9	8.53%	Yes
12	50.00	2.5 min	3308.6	638.2	1274.8	8.50%	Yes

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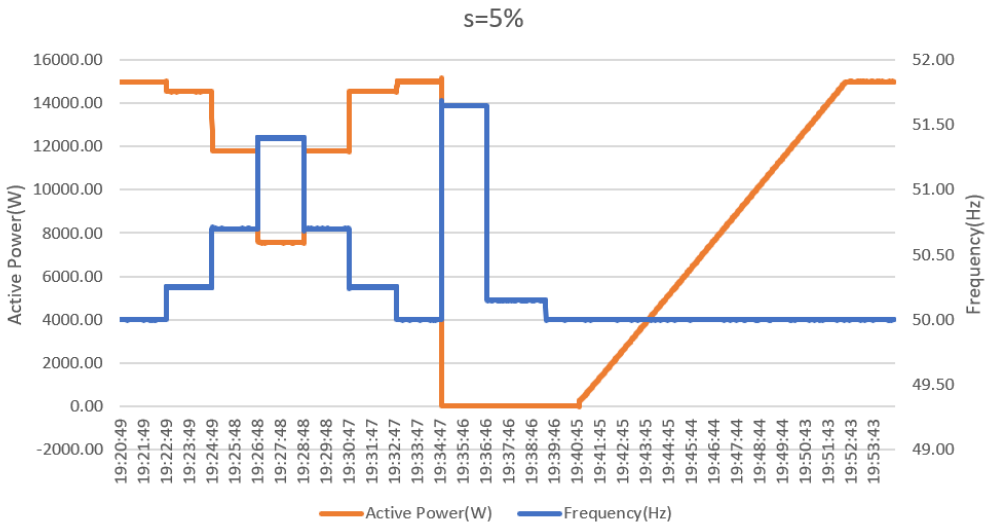
13	50.00	3.0 min	3946.8	636.6	1272.7	8.48%	Yes
14	50.00	3.5 min	4583.4	636.1	1270.2	8.47%	Yes
15	50.00	4.0 min	5219.5	634.1	1274.2	8.49%	Yes
16	50.00	4.5 min	5853.6	640.1	1277.8	8.52%	Yes
17	50.00	5.0 min	6493.7	637.7	1274.3	8.50%	Yes
18	50.00	5.5 min	7131.4	636.6	1275.2	8.50%	Yes
19	50.00	6.0 min	7768.0	638.6	1274.5	8.50%	Yes
20	50.00	6.5 min	8406.6	635.9	1274.8	8.50%	Yes
21	50.00	7.0 min	9042.5	638.9	1280.1	8.53%	Yes
22	50.00	7.5 min	9681.4	641.2	1275.8	8.51%	Yes
23	50.00	8.0 min	10322.6	634.6	1273.4	8.49%	Yes
24	50.00	8.5 min	10957.2	638.8	1272.1	8.48%	Yes
25	50.00	9.0 min	11596.0	633.3	1273.7	8.49%	Yes
26	50.00	9.5 min	12229.3	640.4	1273.7	8.49%	Yes
27	50.00	10.0 min	12869.7	633.3	1270.2	8.47%	Yes
28	50.00	10.5 min	13503.0	636.9	1289.3	8.60%	Yes
29	50.00	11.0 min	14139.9	652.4	866.5	5.78%	Yes
30	50.00	11.5 min	14792.3	214.1	208.7	1.39%	Yes
31	50.00	12.0 min	15006.4	-	-	-	-
32	50.00	12.5 min	15001.0	-	-	-	-

Graphic of the active power change:



Max. and Mean active power gradient after returning from an overfrequency	
Max. active power gradient	8.60% Pn/min

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Mean active power gradient	8.06% Pn/min
Defined active power gradient	10.0% Pn/min

Test 2: generation unit (PV and ESS), over-frequency regulation, with active power reduction frequency start point=50.5Hz, gradient s=12% (16.67 % P_{ref}/Hz)

inverter DC input power is set to 60% of maximum active output power till the end of the test. The active power value shall not be deviated from the required value calculated from the feature curve (a gradient of 16.7% of P_M per hertz) for more than 10% P_{Emax}., once the frequency rise above 50.5Hz, the DC input power shall immediately be set to a point to support 100% active output power.

P_M = 8930.4W , 10% P_{Emax}= 1500W

Test sequence	Freq (Hz)	Measured active output power $P_{measure}$ (W)	The calculated active output power as per feature curve P_{shall} (W)	Deviation of $P_{measure}$ and P_{shall} (W)	Deviation within 10% P_{Emax} (Yes/No)
a)	50.00	8930.4	--	--	--
b)	50.40	8920.1	--	--	--
c)	50.70	8458.9	8632.6(58%P_n)	173.7	Yes
d)	51.40	7496.2	7590.3(51%P_n)	94.1	Yes
e)	50.70	8457.5	8632.6(58%P_n)	175.1	Yes
f)	50.40	See below table	From 60% rise to 100%	--	Yes
g)	50.00	14991.9	100%	--	Yes

Test sequence	Frequency (Hz)	Time after step bac from 50.40 Hz t (min)	Measured active output power P_{10} (W)	Raised active power ΔP during next 0,5 minute (W)	Gradient of arising active power ΔP/t (W/1 min.)	Gradient of arising active power ΔP/ P_n/t (%/1 min.)	Limit within 10% of P_n/min (Yes/No)
6	50.40	0.0 min	8920.1	--	--	--	--
7	50.40	0.5 min	9489.7	740.4	1437.6	9.58%	Yes
8	50.40	1.0 min	10230.1	697.2	1429.9	9.53%	Yes
9	50.40	1.5 min	10927.3	732.7	1446.3	9.64%	Yes
10	50.40	2.0 min	11660.0	713.6	1441.4	9.61%	Yes
11	50.40	2.5 min	12373.6	727.8	1444.2	9.63%	Yes
12	50.40	3.0 min	13101.4	716.4	1448.8	9.66%	Yes
13	50.40	3.5 min	13817.8	732.4	1174.7	7.83%	Yes
14	50.40	4.0 min	14550.2	442.3	441.7	2.94%	Yes
15	50.40	4.5 min	14992.5	-	-	-	Yes
16	50.40	5.0 min	14991.9	-	-	-	-

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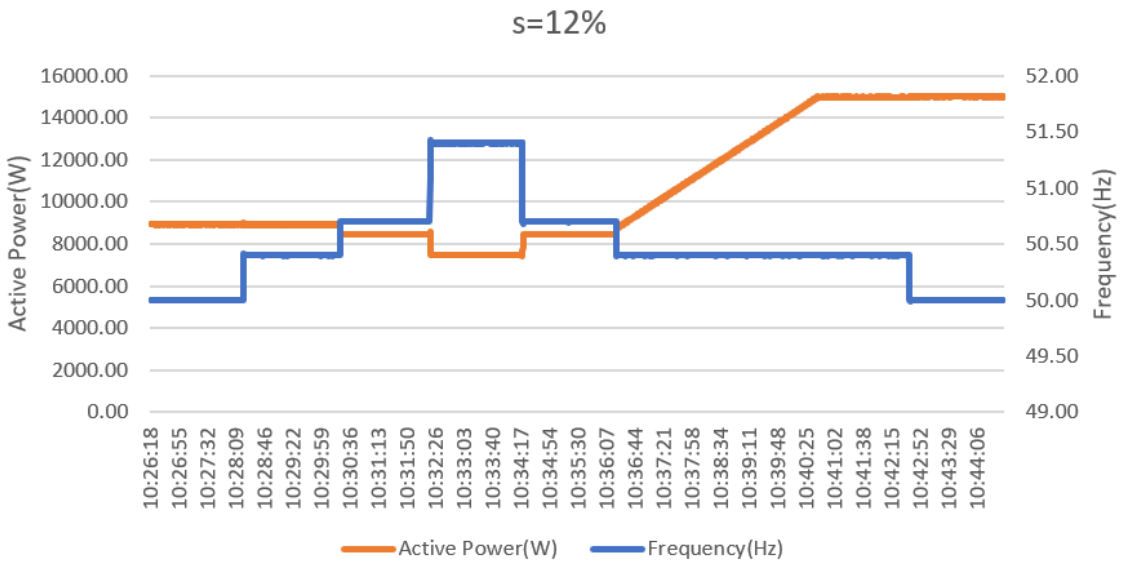
Graphic of the active power change:



Max. and Mean active power gradient after returning from an overfrequency	
Max. active power gradient	9.66% Pn/min
Mean active power gradient	8.55% Pn/min
Defined active power gradient	10.0% Pn/min

Active power reaction time

With active power reduction frequency start point=50.2Hz, gradient s=5%

Test Point	Frequency (Hz)	Measured active output power P_{10} (W)	Settling time (s)	Rise time (s)	--
1	50.00	15009.4	--	--	--
2	50.20	14831.9	--	--	--
3	51.40	7788.7	0.4	1.0	--

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5.4.6	TABLE: Active power supply for EZE at underfrequency	P

Below test applies only to generator without storage

Inverter DC input power is set to 10% of maximum active output power first. After the TYPE 2 inverter step into frequency range under 49.8Hz, the TYPE 2 inverter available input power is set to 100% of maximum active output. The output active power should regulate the active power with gradient of 40% P_{Emax}/Hz till technical maximum power.

Test sequence	Freq (Hz)	Measured active output power $P_{measure}$ (W)	The calculated active output power as per feature curve P_{shall} (W)	Deviation of $P_{measure}$ and P_{shall} (W)	Deviation within 10% P_{Emax} (Yes/No)
1	50.00	1505.2	1500(10%)	5.2	Yes
2	49.75	1688.8	1800(12%)	111.2	Yes
4	48.80	7428.8	7500(50%)	71.2	Yes
6	47.60	14731.0	14700(98%)	31.0	Yes
7	48.80	7426.7	7500(50%)	73.3	Yes
8	49.75	1509.6	1800(12%)	290.4	Yes
9	50.00	1505.4	1500(10%)	5.4	Yes
10	47.35	Protection	Disconnection	--	--
11	47.45	No reconnection	Maintain 140.0 s	--	--
12	50.00	See below table	Wait for 60s without connection	--	--

Test sequence	Frequency (Hz)	Time after step bac from 50.00 Hz t (min)	Measured active output power P_{10} (W)	Arised active power ΔP during next 0,5 minute (W)	Gradient of arising active power ΔP/t (W/1 min.)	Gradient of arising active power ΔP/ P_n/t (%/1 min.)	Limit within 10% of P_n/min (Yes/No)
13	50.00	0.0 min	0	--	--	--	--
13	50.00	0.0 min	The time that the active power start increases after the frequency change to 50.00Hz (s)				72.2s
After reconnection							
13	50.00	0.0 min	12.4	--	--	--	--
13	50.00	0.5 min	273.5	261.1	522.2	5.83%	Yes
13	50.00	1.0 min	887.2	613.7	1236.0	8.24%	Yes
13	50.00	1.5 min	1509.5	622.3	--	--	Yes

Max. and Mean active power gradient after returning from an underfrequency

Max. active power gradient	8.24% Pn/min
Mean active power gradient	7.04% Pn/min
Defined active power gradient	10% Pn/min

Graphic of the active power change:

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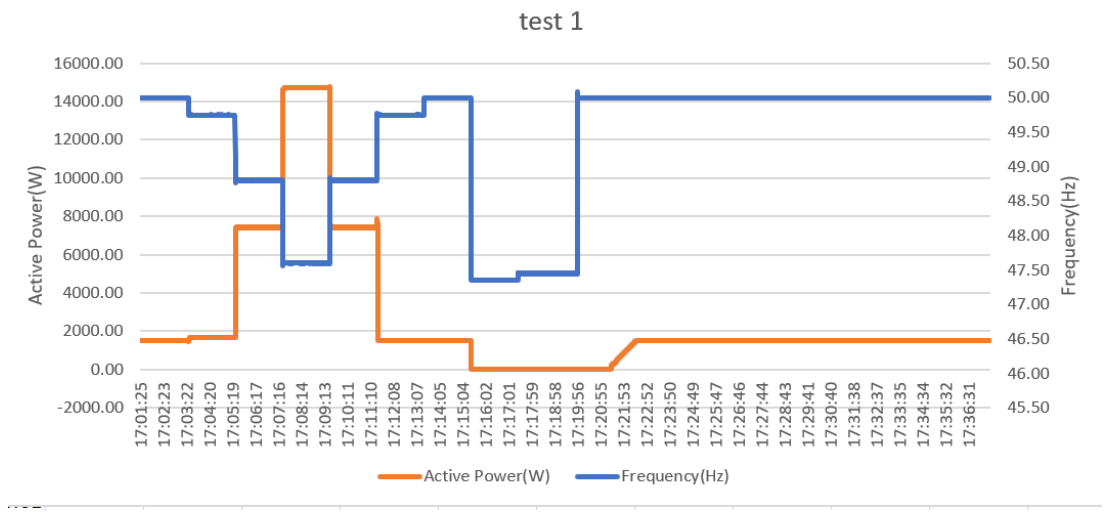
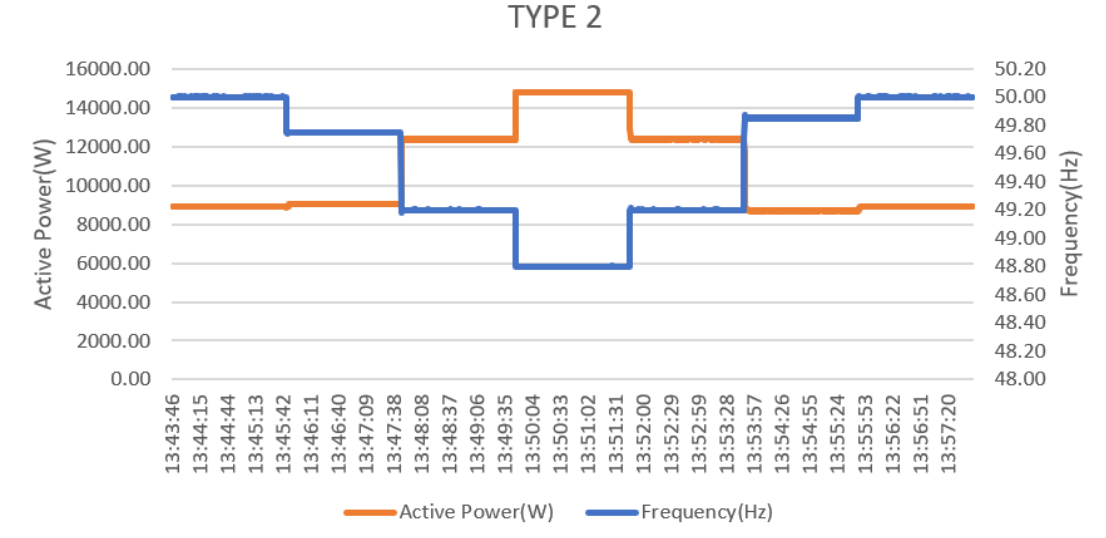


TYPE 2 inverter DC input power is set to 60% of maximum active output power or minimum opera table active power first. After the TYPE 2 inverter step into frequency range under 49.8Hz, the TYPE 2 inverter available input power is set to 100% of maximum active output. The output active power should regulate the active power with gradient of 40% P_{Emax}/Hz till technical maximum power.

Test sequence	Freq (Hz)	Measured active output power $P_{measure}$ (W)	The calculated active output power as per feature curve P_{shall} (W)	Deviation of $P_{measure}$ and P_{shall} (W)	Deviation within 10% P_{Emax} (Yes/No)
1	50.00	8919.3	9000(60%)	80.7	--
2	49.75	9033.6	9300(62%)	266.4	Yes
3	49.20	12369.2	12600(84%)	230.8	Yes
4	48.80	14782.8	15000(100%)	217.2	Yes
5	49.20	12367.3	12600(84%)	232.7	Yes
6	49.85	8711.2	9000(60%)	288.8	--
7	50.00	8925.4	9000(60%)	74.6	--



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Active power reaction time					
Test Point	Frequency (Hz)	Measured active output power P_{10} (W)	Settling time (s)	Rise time (s)	--
1	50.00	1486.8	--	--	--
2	49.80	1371.3	--	--	--
3	47.60	14716.5	0.4	1.0	--

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5.4.8.3	**TABLE: Testing of the displacement factor/active power characteristic cos φ (P)**	P
Maximal active power P_{Emax} with the tested displacement factor (W)		14850

1) Test steps for guided EZE accuracy (characteristic)

a) Working point $P \leq 20\ \%\ P_{rE}$ or minimum technical service with activated cos φ (P) -control.

b) Start measurement.

c) set the active power setpoint to 100% P_{rE}, wait until the stationary end values for P and Q are set.

d) Set active power setpoint to P ≤ 20 % PrE or minimum technical power, wait until the stationary end values for P and Q are set.

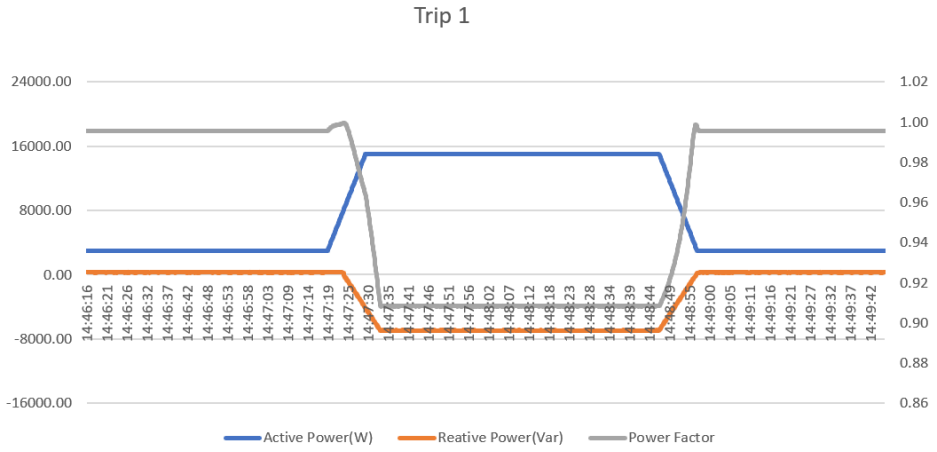
e) Stop measurement.

During the test, the active power gradient setting at 0.5% Pn/s

Response of the reactive power set 3-Tau=10s

Trip #1

Percentage of output active power P/P_{Emax} (%)	Measured active power P (W)	Measured apparent power S (VA)	Measured displacement factor cosφ	Measured reactive power Q(Var)	Displacement factor as to feature curve	Deviation of displacement reactive power
20%	3011.7	3025.0	0.9956 ov	277.9	1.000	277.9
100%	14681.1	16401.1	0.8950 un	-7311.6	0.900 un	201.2
20%	3014.9	3025.5	0.9956 ov	277.5	1.000	277.5



Trip #2- the active power gradient setting at 100% Pn/s

Percentage of output active power P/P_{Emax} (%)	Measured active power P (W)	Measured apparent power S (VA)	Measured displacement factor cosφ	Measured reactive power Q(Var)	Displacement factor as to feature curve	Deviation of displacement reactive power
20%	3011.5	3024.8	0.9956 ov	278.2	1.000	278.2
100%	14695.7	16530.7	0.9084 un	-7302.4	0.900 un	128.8
20%	3012.3	3025.5	0.9956 ov	277.1	1.000	277.1

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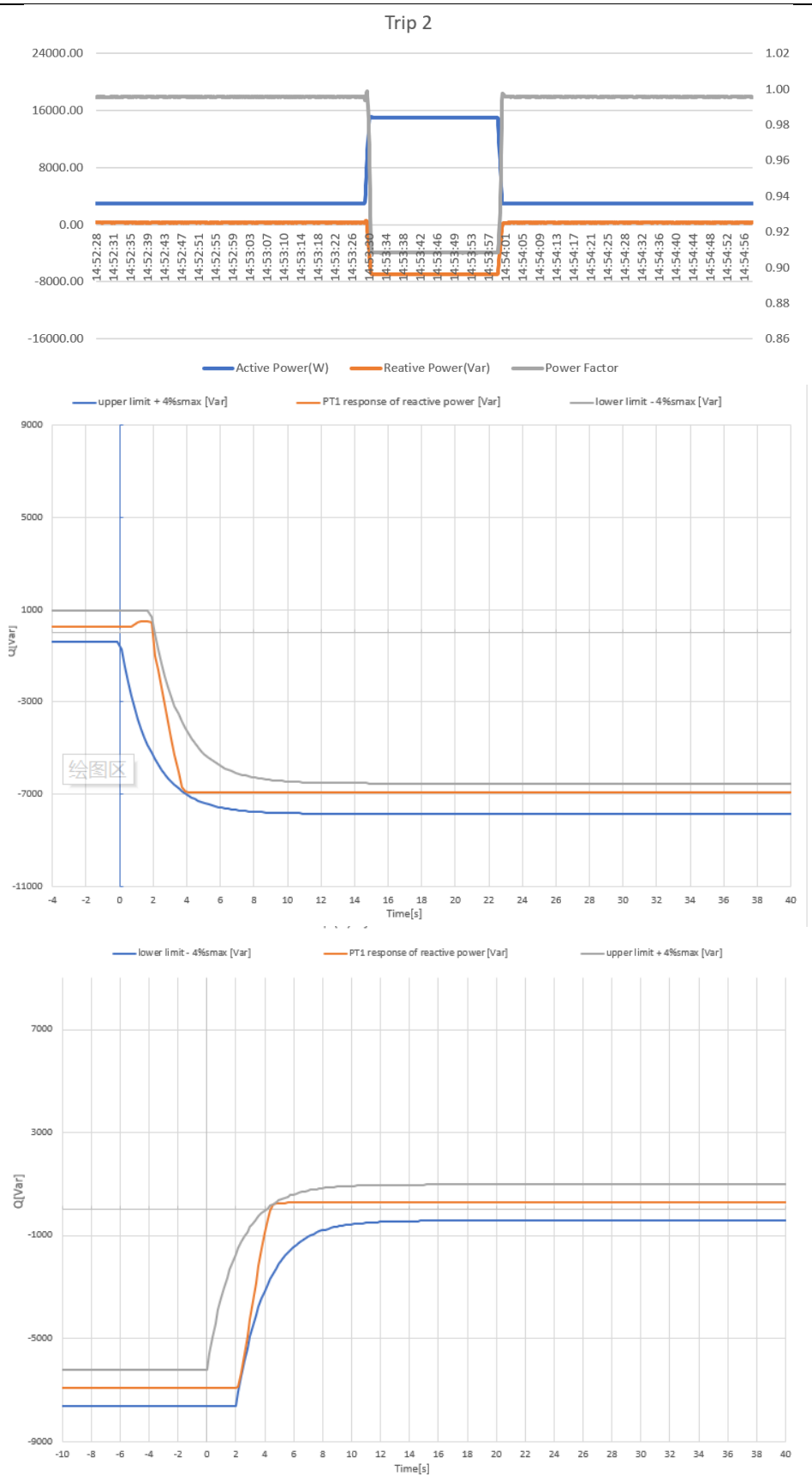

Supplementary information: N/A

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5.4.8.4	TABLE: Testing the reactive power-voltage characteristic curve Q(U)	P

5.4.8.4.1 Test of the accuracy of the Q (U) control

Set fixed P=0.5 SEmax and set 3-Tau=10s, Change the voltage by steps:

Percentage of output Voltage U_{pos}/Un (%)	Measured Voltage $U_{pos-0.2}$ [V]	Measured active power $P_{0.2}$ (W)	Measured apparent power $S_{0.2}$ (VA)	Measured reactive power $Q_{0.2}$ (Var)	Calculated reactive power with setting displacement factor (Var)	Deviation reactive power ΔQ
100%	230.3	7570.4	7578.5	349.3	0	349.3
	230.3					
	230.2					
99%	227.8	7571.1	7578.9	342.5	0	342.5
	227.6					
	227.8					
98%	225.5	7572.0	7579.5	337.0	0	337.0
	225.4					
	225.5					
97%	223.2	7574.6	7588.8	447.6	0	447.6
	223.2					
	223.2					
96%	220.8	7590.8	7876.1	2086.3	1798.0	288.3
	220.8					
	220.7					
95%	218.5	7609.9	8524.4	3834.6	3596.0	238.6
	218.6					
	218.5					
94%	216.3	7631.8	9467.3	5599.3	5393.9	205.4
	216.3					
	216.3					
93%	214.0	7654.7	10511.2	7202.8	7191.9	11.9
	214.0					
	214.0					
92%	211.7	7655.8	10550.4	7259.4	7191.9	67.5
	211.7					
	211.6					
91%	209.3	7656.8	10547.0	7253.5	7191.9	61.6
	209.2					
	209.3					

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90%	207.0	7657.4	10543.2	7247.3	7191.9	55.4
	207.0					
	207.0					
91%	209.3	7656.9	10547.4	7253.8	7191.9	61.9
	209.3					
	209.3					
92%	211.7	7656.8	10552.1	7260.8	7191.9	68.9
	211.7					
	211.7					
93%	214.0	7656.5	10536.8	7238.7	7191.9	46.8
	214.0					
	214.1					
94%	216.3	7634.3	9507.6	5663.9	5393.9	270.0
	216.3					
	216.2					
95%	218.5	7612.1	8558.1	3905.2	3596.0	309.2
	218.5					
	218.6					
96%	220.8	7593.3	7899.0	2161.6	1798.0	363.6
	220.8					
	220.6					
97%	223.2	7576.1	7592.9	474.9	0	474.9
	223.2					
	223.1					
98%	225.5	7573.7	7581.4	338.9	0	338.9
	225.5					
	225.4					
99%	227.8	7573.1	7580.9	342.6	0	342.6
	227.7					
	227.7					
100%	230.3	7572.0	7580.1	349.5	0	349.5
	230.3					
	230.3					
101%	232.4	7571.6	7580.0	355.4	0	355.4
	232.4					
	232.2					
102%	234.8	7571.2	7579.9	362.3	0	362.3

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	234.8					
	234.7					
103%	237.0	7570.7	7579.1	311.5	0	311.5
	237.0					
	237.0					
104%	239.3	7560.8	7738.6	-1622.1	-1798.0	175.9
	239.3					
	239.3					
105%	241.7	7554.9	8366.4	-3581.0	-3596.0	15.0
	241.7					
	241.7					
106%	243.8	7550.9	9243.6	-5324.6	-5393.9	69.3
	243.8					
	243.8					
107%	246.2	7550.8	10465.0	-7242.2	-7191.9	50.3
	246.2					
	246.3					
108%	248.7	7547.7	10609.7	-7455.7	-7191.9	263.8
	248.7					
	248.6					
109%	250.9	7545.1	10601.8	-7447.2	-7191.9	255.3
	250.9					
	250.8					
110%	253.2	7542.0	10591.0	-7434.8	-7191.9	242.9
	253.2					
	253.1					
109%	250.9	7545.1	10601.9	-7447.2	-7191.9	255.3
	250.9					
	250.9					
108%	248.7	7547.6	10611.8	-7458.9	-7191.9	267.0
	248.7					
	248.7					
107%	246.2	7550.8	10494.6	-7286.0	-7191.9	94.1
	246.1					
	246.2					
106%	243.8	7550.8	9280.0	-5387.4	-5393.9	6.5
	243.8					

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	243.8					
105%	241.7	7554.2	8395.4	-3651.0	-3596.0	55.0
	241.6					
	241.6					
104%	239.3	7560.2	7752.4	-1686.7	-1798.0	111.3
	239.3					
	239.3					
103%	237.0	7570.2	7579.3	244.4	0	244.4
	237.0					
	237.0					
102%	234.8	7571.3	7580.0	361.4	0	361.4
	234.8					
	234.8					
101%	232.4	7571.6	7580.0	354.8	0	354.8
	232.4					
	232.4					
100%	230.3	7571.6	7579.7	348.9	0	348.9
	230.3					
	230.3					

5.4.8.4.2 Checking the dynamics of the Q(U) control

Set fixed P=0.5 S_{Emax} and set 3-Tau=10s, Change the voltage by steps:

Test frequency $F_{n,y}$ (Hz)	50Hz	$U_{n,y}$(V)	230	Q_{max} (Var)	7192
X_{netz} (Ω)	0.566	$k_{RR} = 3 + \frac{\lvert Q_{max} \rvert * Xnetz}{0.04 \cdot U_{N,Y}2}$	4.924	Setting time T (3 Tau)	10

Test number	1a
$U_{EZE, start}$ (V)	230.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	298.8
Maintain 10 seconds, change to 1.064 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value at last)	244.8
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	-5814.4
Measured value of	-2947.8

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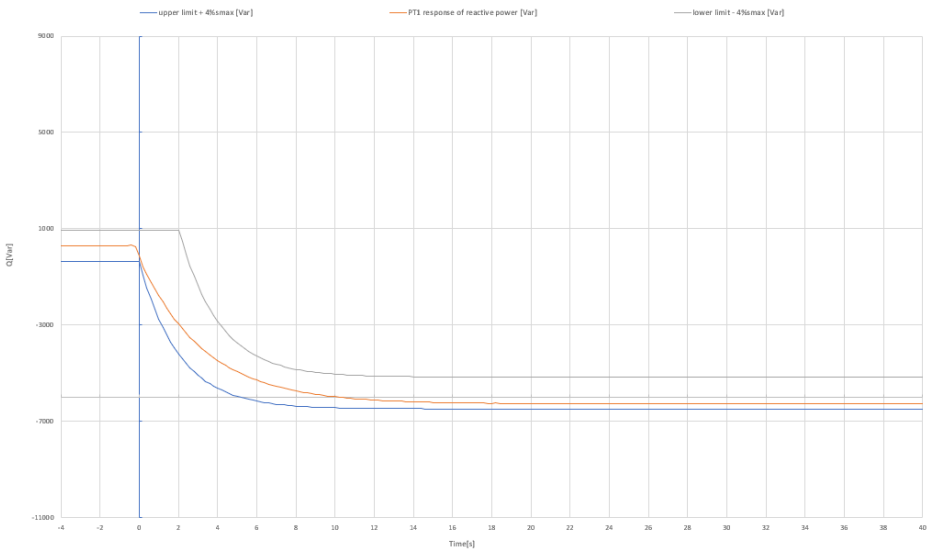
reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	-6271.5
Tolerance band	
The measured and converted setting time $T_{measurement}$ ($t*K_{RR}/3$, t is the time reach $Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start})$)	8.4s
Test number	1b
$U_{EZE, start}$ (V)	244.8
Start reactive power Q_{start} (Var) (10 seconds mean value)	-6276.3
Maintain 10 seconds, change to 1.0 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	230.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	-163.1
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	-3443.8
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	304.0

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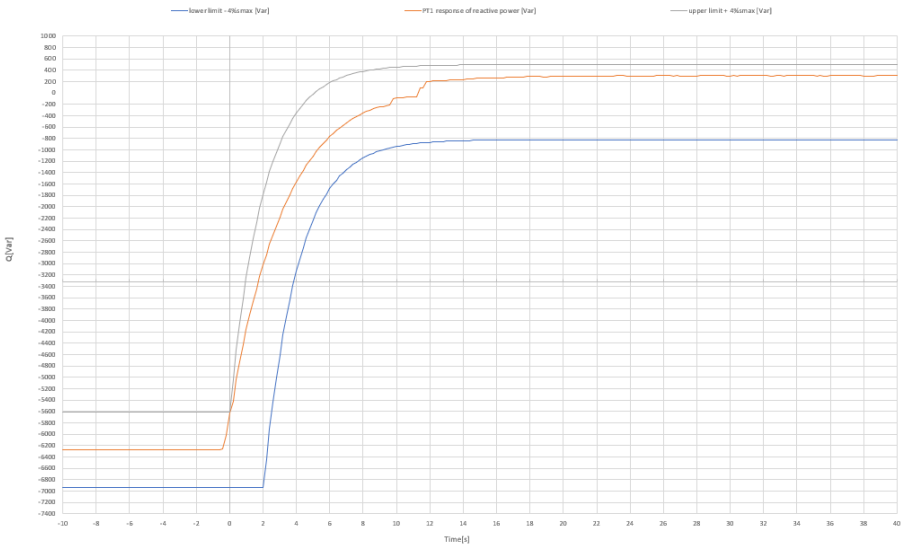
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	6.4s
Test number	2a
$U_{EZE, start}$ (V)	230.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	303.4
Maintain 10 seconds, change to 1.064 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	244.8
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	-5809.8
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	-2774.8
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	-6271.7

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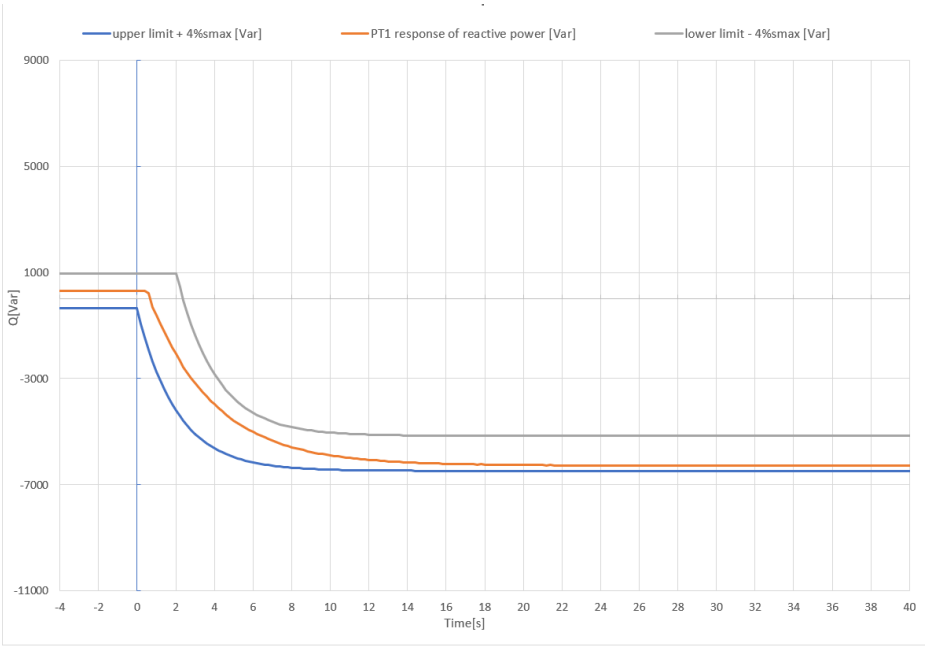
Tolerance band	
The measured and converted setting time $T_{measurement}$ ($t*K_{RR}/3$, t is the time reach $Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start})$)	9.1s
Test number	2b
$U_{EZE, start}$ (V)	244.8
Start reactive power Q_{start} (Var) (10 seconds mean value)	-6278.6
Maintain 10 seconds, change to 1.0 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	230.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	-165.4
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	-3273.5
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	304.4

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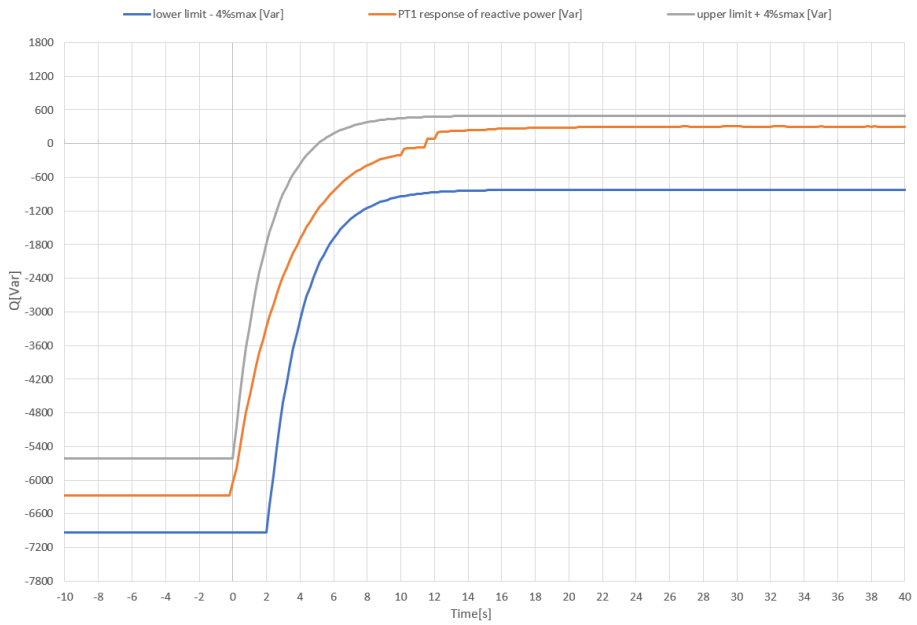
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	7.3s
Test number	3a
$U_{EZE, start}$ (V)	230.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	304.2
Maintain 10 seconds, change to 1.064 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	244.8
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	-5809.0
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	-2785.7
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	-6265.2

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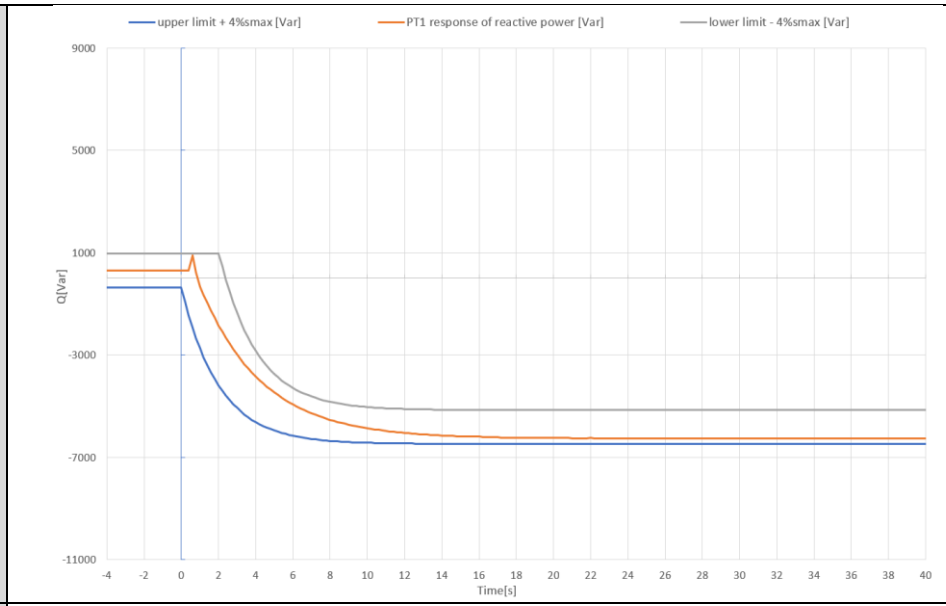
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	9.0s
Test number	3b
$U_{EZE, start}$ (V)	244.8
Start reactive power Q_{start} (Var) (10 seconds mean value)	-6259.3
Maintain 10 seconds, change to 1.0 Un and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	230.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	-146.1
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	-3375.5
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	299.4

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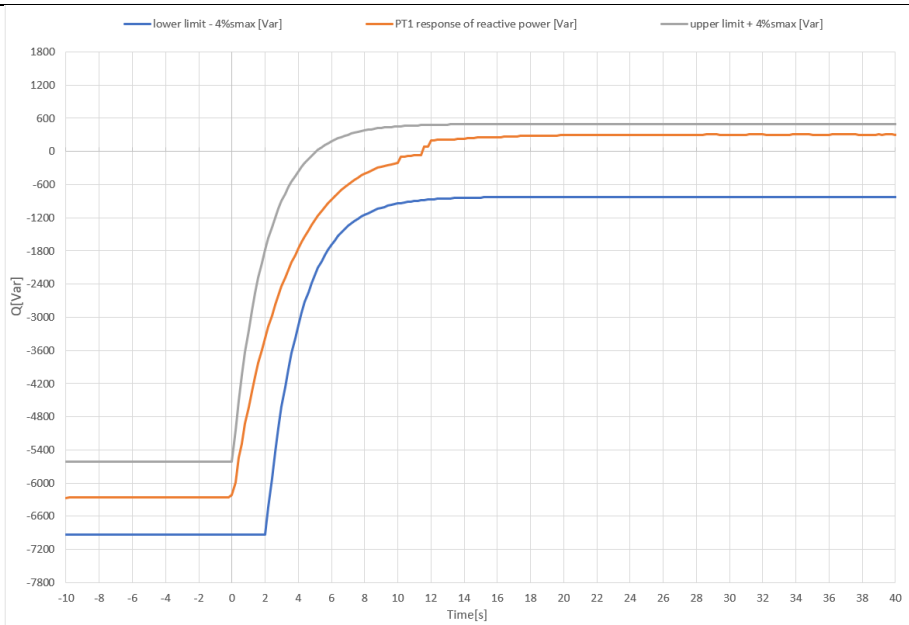
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	8.2s
Test number	4a
$U_{EZE, start}$ (V)	230.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	299.0
Maintain 10 seconds, change to 0.936 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	215.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	5814.2
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	3548.0
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	6224.4

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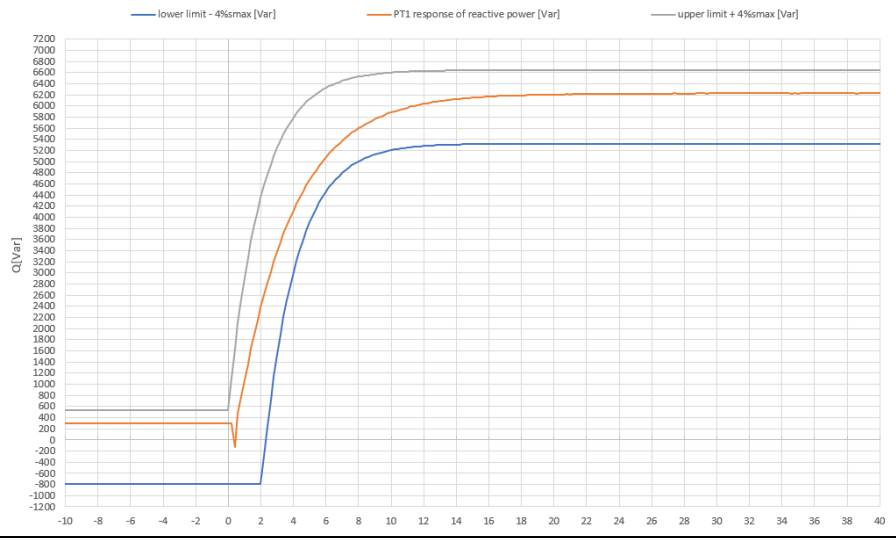
Tolerance band	
The measured and converted setting time $T_{measurement}$ ($t*K_{RR}/3$, t is the time reach $Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start})$)	9.1s
Test number	4b
$U_{EZE, start}$ (V)	215.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	6224.2
Maintain 10 seconds, change to 1.0 Un and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	230.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	111.0
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	3542.7
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	298.4

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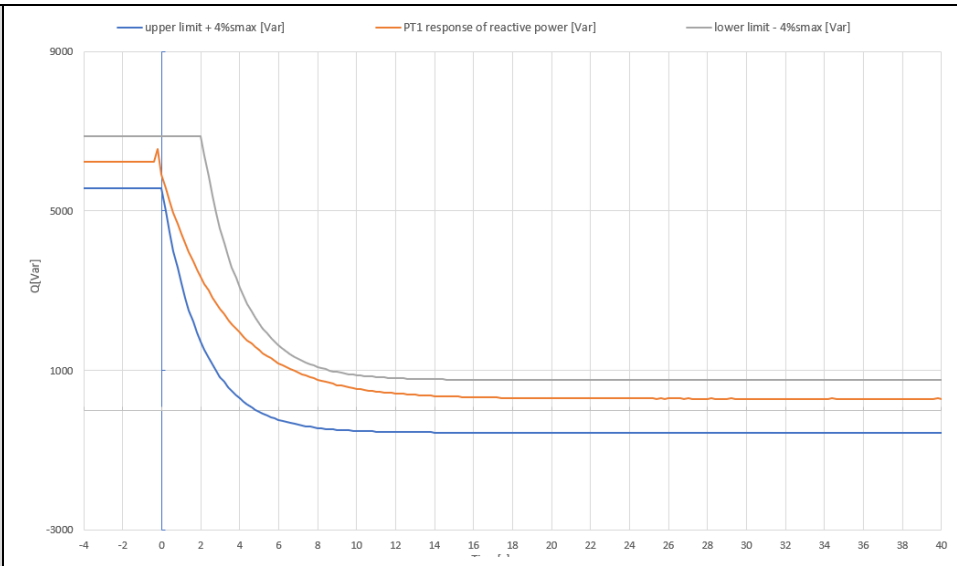
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	8.9s
Test number	5a
$U_{EZE, start}$ (V)	230.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	297.8
Maintain 10 seconds, change to 0.936 Un and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	215.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	5815.4
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	3085.2
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	6221.1

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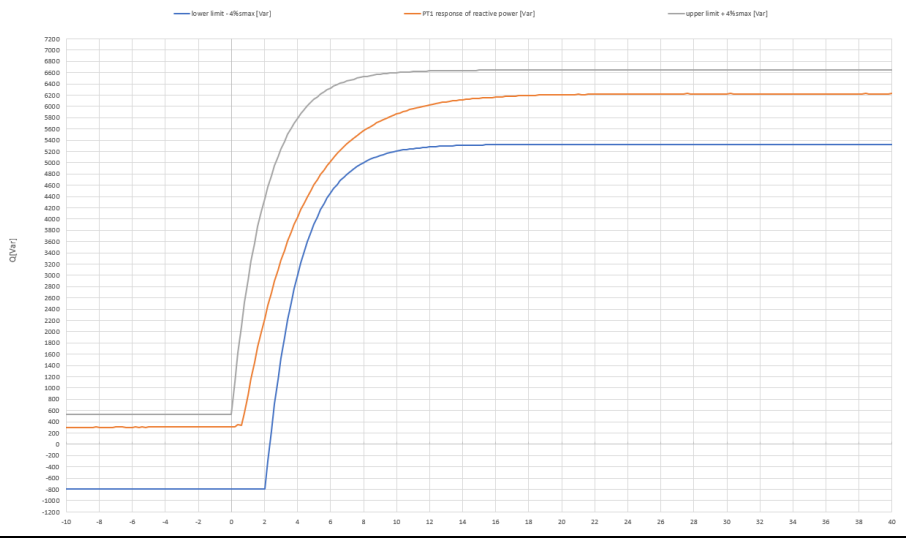
Tolerance band	
The measured and converted setting time $T_{measurement}$ ($t*K_{RR}/3$, t is the time reach $Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start})$)	8.1s
Test number	5b
$U_{EZE, start}$ (V)	215.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	6228.7
Maintain 10 seconds, change to 1.0 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	230.3
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	115.5
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	3257.7
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	299.9

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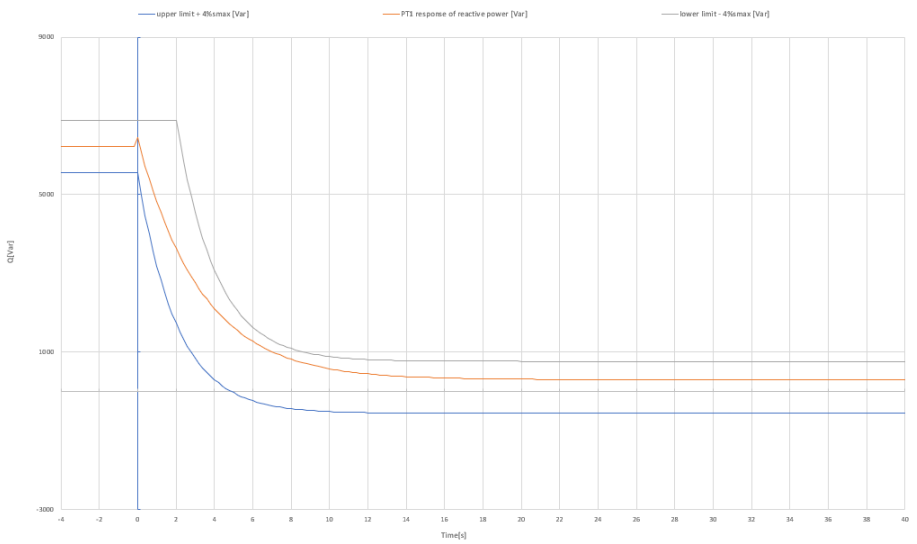
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	8.2s
Test number	6a
$U_{EZE, start}$ (V)	230.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	298.0
Maintain 10 seconds, change to 0.936 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	215.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	5815.2
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	2760.5
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	6215.6

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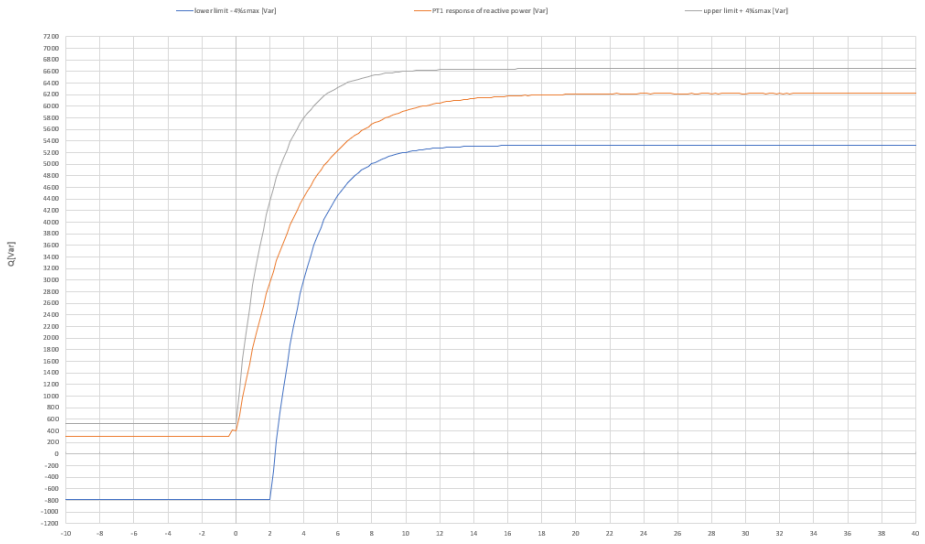
Tolerance band	
The measured and converted setting time $T_{measurement}$ (t*K_{RR}/3, t is the time reach Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start}))	9.0s
Test number	6b
$U_{EZE, start}$ (V)	215.2
Start reactive power Q_{start} (Var) (10 seconds mean value)	6221.4
Maintain 10 seconds, change to 1.0 Un, and maintain at least 50s	
$U_{EZE, target}$ (V) (10s mean value)	230.2
Target reactive power Q_{shall} (Var) (According to the Upos calculate from Figure 7)	108.2
Measured value of reactive power after 0.6-Tau (2s) $Q_{0.6t}$ (Var)	3377.8
Measured value of reactive power after 18-Tau (60s) Q_{18t} (Var)	300.1

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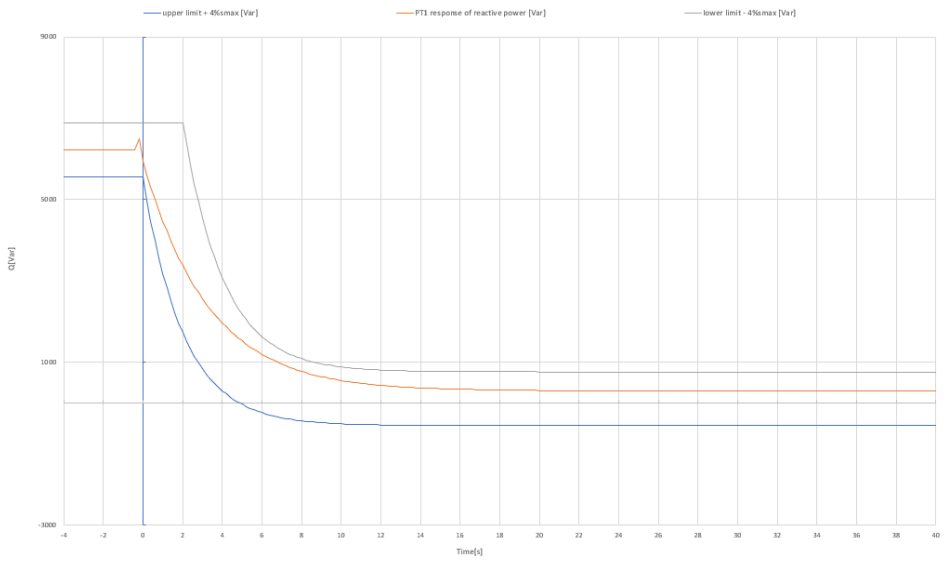
Tolerance band	
The measured and converted setting time $T_{measurement}$ ($t*K_{RR}/3$, t is the time reach $Q=Q_{Start} + 0.95(Q_{Should}-Q_{Start})$)	8.2s

5.5.7.2	**TABLE: Voltage monitoring (integrated protection and interface switch)-setting check**				P
AC Relay information		Manufacture: Zettler relay(xiamen) Co. Ltd. Model: azsr143 Max current: 50 A, Release time: 10ms			
Description	Parameter name	Setting value in pu	Setting value L- N	Setting value L- L	Check match (yes or not)
Excitation threshold U>>	AU>>	1.25	287.5 V	500 V	yes
Delay time U>>	tU>>	–	100 ms	100 ms	yes
Excitation threshold U>	AU>	1.10	253 V	440 V	yes
Delay time U>	tU>	–	100 ms[a]	100 ms[a]	yes
Excitation threshold U<	AU<	0.8	184 V	320 V	yes
Delay time U<.	tU<	–	3 s	3 s	yes
Excitation threshold U<<	AU<<	0.45	103.5 V	180 V	yes
Delay time U<<	tU<<	–	300 ms	300 ms	yes
Excitation threshold f>	Af>	1.03	51.5 Hz	51.5 Hz	yes
Delay time f>	tf>	–	100 ms	100 ms	yes
Excitation threshold f<	Af<	0.95	47.5 Hz	47.5 Hz	yes
Delay time ss<	tf<	–	100 ms	100 ms	yes
Supplementary information: Remark “[a]”: moving 10 min mean protection					

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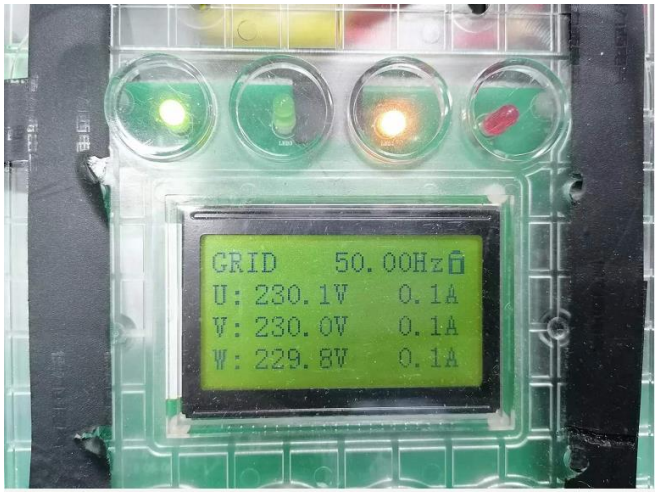
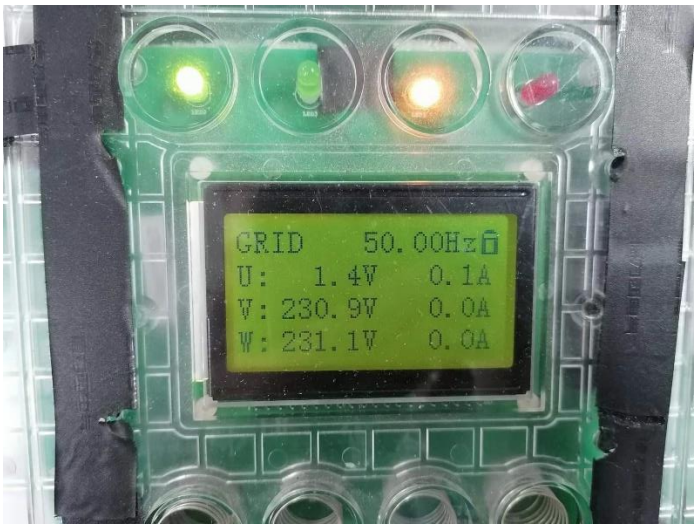
ID	R/W	ADDR	Signal Name	Real Value	Unit
00	R/W	0x2226	1level-ov-hv0	1100	%
01	R/W	0x2227	1level-uv-lv0	800	%
02	R/W	0x2219	1level-ovt-hv1t	1	0.1s
03	R/W	0x221A	1level-uvt-lv1t	30	0.1s
04	R/W	0x2216	2level-ov-hv1	1250	%
05	R/W	0x2217	2level-uv-lv1	450	%
06	R/W	0x222A	2level-ovt-hv2t	1	0.1s
07	R/W	0x221B	2level-uvt-lv2t	3	0.1s
08	R/W	0x220F	1level-of-hf1	5150	-
09	R/W	0x2210	1level-uf-lf1	4750	-
10	R/W	0x2213	1level-oft-hf1t	1	0.1s
11	R/W	0x2214	1level-uft-lf1t	1	0.1s

The NS prectection setting is shown by the computer APP Version: ARM: V1.03.08, DSP: V1.02.11 provided by manufacturer.

5.5.7.3	**TABLE: Wiring test**	P

Table 38 – Checking Voltage Reference	Voltage Value (V)			Frequency Frequency (Hz)
	Phase L1-N	Phase L2-N	Phase L3-N	
Setting	230.0 V (0°)	230.0 V (-120°)	230.0 V (120°)	50 Hz
Read at NA protection				
Setting	0.0 V (0°)	230.9 V (150°)	230.9 V (-150°)	50 Hz
Read at NA protection				

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5.5.4 and 5.5.7.4	TABLE: Integrated NA Protection and Protective devices and settings				P	
Manufacture: Zettler relay(xiamen) Co., Ltd. Model: azsr143, Rated/Max current: 50 A					Release time: 10ms	
For 3.1 and 3.2 and 3.3, Test should test each phase respectively						
Test step	Size	Apply to	Jump height △U, △f	Step length △t	Measured value	Limit
1.1	U>>	All-N	< 1.15 V	>400ms	288.0 V	287.5±2.3 V
1.2	U>>	L1-N	< 1.15 V	>400ms	287.8 V	287.5±2.3 V
1.3	U>>	L2-N	< 1.15 V	>400ms	287.7 V	287.5±2.3 V
1.4	U>>	L3-N	< 1.15 V	>400ms	287.8 V	287.5±2.3 V
2.1	U>>	All-N	>9.2 V	>400 ms	129.0 ms	100-200ms
2.2	U>>	L1-N	>9.2 V	>400 ms	121.2 ms	100-200ms
2.3	U>>	L2-N	>9.2 V	>400 ms	129.2 ms	100-200ms
2.4	U>>	L3-N	>9.2 V	>400 ms	110.4 ms	100-200ms
3.1	U>	All-N	27.6 V	> 600.2 s	498 s	450-550 s
3.2	U>	All-N	18.4 V	> 600.2 s	No disconnection	No disconnection
3.3	U>	All-N	18.4 V	> 600.2 s	299 s	225-375s
4.1	U<	All-N	< 1.15 V	>3.2 s	183.0 V	184±2.3 V
4.2	U<	L1-N	< 1.15 V	>3.2 s	183.1 V	184±2.3 V
/230/4.3	U<	L2-N	< 1.15 V	>3.2 s	183.0 V	184±2.3 V
4.4	U<	L3-N	< 1.15 V	>3.2 s	183.0 V	184±2.3 V
5.1	U<	All-N	> 9.2 V	>3.2 s	3.030 s	3.0-3.1s
5.2	U<	L1-N	> 9.2 V	>3.2 s	3.024 s	3.0-3.1s
5.3	U<	L2-N	> 9.2 V	>3.2 s	3.028 s	3.0-3.1s
5.4	U<	L3-N	> 9.2 V	>3.2 s	3.048 s	3.0-3.1s
6.1	U<<	All-N	<1.15 V	>500 ms	101.0 V	103±2.3 V
6.2	U<<	L1-N	<1.15 V	>500 ms	101.0 V	103±2.3 V
6.3	U<<	L2-N	< 1.15 V	>500 ms	101.1 V	103±2.3 V
6.4	U<<	L3-N	< 1.15 V	>500 ms	101.0 V	103±2.3 V
7.1	U<<	All-N	> 9.2 V	>500 ms	354.0 ms	300-400ms
7.2	U<<	L1-N	> 9.2 V	>500 ms	312.0 ms	300-400ms
7.3	U<<	L1-N	> 9.2 V	>500 ms	310.0 ms	300-400ms
7.4	U<<	L1-N	> 9.2 V	>500 ms	384.0 ms	300-400ms
8.1	f>	f	< 25 mHz	> 400 ms	51.51 Hz	51.5±0.05Hz
9.1	f>	f	> 0.2 Hz	> 400 ms	159.0 ms	100-200ms

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9.1	f>	f	> 0.2 Hz	> 400 ms	149.0 ms	100-200ms
9.1	f>	f	> 0.2 Hz	> 400 ms	147.0 ms	100-200ms
10.1	f<	f	< 25 mHz	> 400 ms	47.50 Hz	47.5±0.05Hz
11.1	f<	f	> 0.2 Hz	> 400 ms	173.0 ms	100-200ms
11.1	f<	f	> 0.2 Hz	> 400 ms	151.0 ms	100-200ms
11.1	f<	f	> 0.2 Hz	> 400 ms	150.0 ms	100-200ms

5.5.7.5	**TABLE: Reading the fault messages**	P

5.5.7.5.1 test

At least the last 5 fault messages can be read at the EZE or the external NA protection. The supply voltage must then be interrupted for 3 s. The fault messages must then be read out again.

5.5.7.5.2 Evaluation criteria

The test is passed if at least the last 5 fault messages are readable, and the chronological sequence is traceable by a time stamp. After the voltage interruption, there must be no loss of fault messages.

5.5.7.5.3 Evaluation criteria

At least the last 5 fault messages, including timestamps, which were recorded before the voltage interruption and at least 5 fault messages including time stamps, which were recorded after the voltage interruption, must be documented.

	Pass	Fail	N/A
The last five date failure report readable	Pass	--	--
Interruptions of supply with duration of 3s or longer shall not lead to loss of any of the failure report	Pass	--	--
Read our shall be possible at the central NA protection irrespective of the operational state of the power generation system and without any additional aids	Pass	--	--
For a integrated NA protection, a read out may be carried out using data interface.	Pass	--	--

5.5.9	**TABLE: Structural features of NA protection**	P

5.5.9.1 General

These tests are designed to comply with the requirements of VDE-AR-N 4100:2019-04, 6.5.2.

5.5.9.2 Test method

Check that NA protection is protected against unauthorized access, e.g.:

– NA protection, sealable: by visual inspection, or
– NA protection, password protected: check, based on manufacturer's specifications, or
– other appropriate measures.

The adjustability of the protective functions must also be checked. For integrated NA protection, the following test must be carried out:

– Check whether U> or, in the case of directly coupled synchronous and asynchronous machines with Pn > 50 kW, the time delay for U< and U<< can also be set.
– It is necessary to verify that all other protection features described in VDE-AR-N 4105:2018-11, 6.5 are either fixed or protected from unauthorized access.

For central NA protection, the following test must be carried out:

– Check whether U> and the time delay for U< and U<< are adjustable.
– It is necessary to verify that all other protection features described in VDE-AR-N 4105:2018-11, 6.5 are either fixed or protected from unauthorized access.

Note Since it is not clear which EZE is protected when testing an external NA protection, it must be possible to set U> and the time delay for U< and U<<.

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5.5.9.3 Documentation

At a minimum, it should be noted that:

– the nature and form of protection (central/integrated);
– Adjustability U> and the time delays for U < and U <<
– whether all other protection features are either fixed or protected from unauthorized access by additional, separate protection.

Protection setting visible	Display software provided by manufacturer
Protection setting adjustable	Adjustable, password required to change setting
Password required to change setting	Password protection

5.5.2 & 5.5.6.3	**TABLE: NA protection safety fault test**					P
Ambient temperature (°C) .....:						25.4°C
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
AC module						
Relay, K7 for grid relay-L1	S-C	230 Va.c.	10 min	--	--	The fault applied before the unit operation. The unit cannot start up normally and alarmed “AC electric control switch short circuit”.
Relay, K10 for grid relay-L1						
Relay, K11 for grid relay-L2						
Relay, K12 for grid relay-L2						
Relay, K13 for grid relay-L3						
Relay, K14 for grid relay-L3						
Relay, K15 for grid relay-N						
Relay, K16 for grid relay-N						
Check that the relays fulfil the basic insulation or simple separation based on the PV circuit working voltage.				Yes L distance: 2.3mm*2=4.6mm N distance: 2.3mm*2=4.6mm		
Each active phase can be switched. (L and N)				Yes		
Supplementary information: S-C: short circuit						

5.5.10	**TABLE: Islanding detection**									P
No.	P_{EUT} (% of EUT rating)	Reactive load (% of normial)	P_{AC}	Q_{AC}	Run-on time (ms)	P_{EUT} (kW)	Actual Q_f (L1)	Actual Q_f (L2)	Actual Q_f (L3)	V_{DC}
Test condition A										
1.	100	100	0	0	163.2	14.9	0.999	0.999	1.000	700
2.	100	100	-5	-5	108.0	14.9	1.029	1.028	1.025	700
3.	100	100	-5	0	161.6	14.9	1.052	1.048	1.050	700

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4.	100	100	-5	+5	162.5	14.9	1.081	1.075	1.075	700
5.	100	100	0	-5	101.8	14.9	0.990	0.985	0.979	700
6.	100	100	0	+5	152.5	14.9	1.030	1.021	1.023	700
7.	100	100	+5	-5	104.5	14.9	0.940	0.935	0.928	700
8.	100	100	+5	0	154.8	14.9	0.958	0.951	0.953	700
9.	100	100	+5	+5	162.2	14.9	0.984	0.976	0.979	700
Test condition B										
10.	66	66	0	0	159.9	9.8	1.001	0.999	1.001	515
11.	66	66	0	-5	106.0	9.8	0.969	0.974	0.970	515
12.	66	66	0	-4	156.4	9.8	0.981	0.987	0.984	515
13.	66	66	0	-3	126.5	9.8	0.974	0.982	0.978	515
14.	66	66	0	-2	146.7	9.8	0.986	0.993	0.990	515
15.	66	66	0	-1	150.1	9.8	0.995	0.991	0.996	515
16.	66	66	0	1	157.4	9.8	0.996	0.993	0.996	515
17.	66	66	0	2	181.4	9.8	0.985	0.990	0.990	515
18.	66	66	0	3	178.4	9.8	0.977	0.980	0.974	515
19.	66	66	0	4	165.9	9.8	0.980	0.988	0.984	515
20.	66	66	0	5	163.7	9.8	0.970	0.974	0.972	515
Test condition C										
21.	33	33	0	0	111.2	4.94	1.001	1.000	0.999	300
22.	33	33	0	-5	78.5	4.94	0.975	0.975	0.974	300
23.	33	33	0	-4	85.4	4.94	0.975	0.979	0.981	300
24.	33	33	0	-3	75.6	4.94	0.981	0.982	0.981	300
25.	33	33	0	-2	106.0	4.94	0.983	0.984	0.984	300
26.	33	33	0	-1	108.1	4.94	0.995	0.995	0.996	300
27.	33	33	0	1	119.1	4.94	1.004	1.003	1.005	300
28.	33	33	0	2	131.3	4.94	1.007	1.006	1.007	300
29.	33	33	0	3	134.7	4.94	1.014	1.014	1.012	300
30.	33	33	0	4	125.4	4.94	1.014	1.016	1.014	300
31.	33	33	0	5	122.8	4.94	1.021	1.022	1.020	300

5.6	**TABLE: Connection conditions and synchronization**	P
Test procedure	a) f=47.45Hz, no reconnection allowed	Pass
	b) f=47.55Hz, reconnection allowed	Pass
	c) f=50.15Hz, no reconnection allowed	Pass
	d) f=50.05Hz, reconnection allowed	Pass
	e) U=84% Un, no reconnection allowed	Pass
	f) U=86% Un, reconnection allowed	Pass
	g) U=111% Un, no reconnection allowed	Pass
	h) U=109% Un, reconnection allowed	Pass

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5.8	Proof of dynamic grid support					P
Test	Voltage during fault	Phase fault type	Fault duration (ms)	Load	Cosφ setting	Test Number
1	0.15-0.25	3 phase	At 0.15pu> 150 At 0.25pu> 500	Full load	1	1.1
				Partial load		1.2
		2 phase D1		Full load		1.3
				Partial load		1.4
		2 phase D2		Full load		1.5
2	0.50-0.60	3 phase	at 0.50pu ≥1500 at 0.60pu ≥2000	Full load	maximum over-excited	2.1
				Partial load	maximum over-excited	2.2
		2 phase D1		Full load	maximum over-excited	2.3
				Partial load	maximum over-excited	2.4
3	0.50-0.60	3 phase	at 0.50pu ≥1500 at 0.60pu ≥2000	Full load	maximum under-excited	3.1
				Partial load	maximum under-excited	3.2
		2 phase D1		Full load	maximum under-excited	3.3
				Partial load	maximum under-excited	3.4
4	0.85-0.90	3 phase	≥ 60000	Full load	1	4.1
				Partial load		4.2
		2 phase D1		Full load		4.3
				Partial load		4.4
5	1.20 to 1.25	3 phase	≥ 100	Full load	1	5.1
				Partial load		5.2
		2 phase D1		Full load		5.3
				Partial load		5.4
		2 phase D2		Full load		5.5
6	1.15 to 1.20	3 phase	≥ 5000	Full load	1	6.1
				Partial load		6.2
		2 phase D1		Full load		6.3
				Partial load		6.4

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7	1.10-1.15	3 phase	≥ 60000	Full load	1	7.1
				Partial load		7.2
		2 phase D1		Full load		7.3
				Partial load		7.4

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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	1.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	10:49:42 to 10:51:35
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	13822
	7	Fault clearance(t2)	Fault Phase	-	[ms]	13998
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	156
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.849
	10		L2-N		[p.u.]	0.849
	11		L3-N		[p.u.]	0.849
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.839
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.998
	20		L2	t1-10s to t1	[p.u.]	1.007
	21		L3	t1-10s to t1	[p.u.]	1.004
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.003
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.016
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.006

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.998
	27	Active power	Total	t1-10s to t1	[p.u.]	0.999
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.999
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.007
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.151
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.151
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.151
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.164
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.095
	41		L2	t1+60ms	[p.u.]	0.170
	42		L3	t1+60ms	[p.u.]	0.180
	43		L1	t1+100ms	[p.u.]	0.063
	44		L2	t1+100ms	[p.u.]	0.074
	45		L3	t1+100ms	[p.u.]	0.071
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.080
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.094
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.098
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	-0.002
	52		Pos	t1+100ms to t2-20ms	[p.u.]	-0.010
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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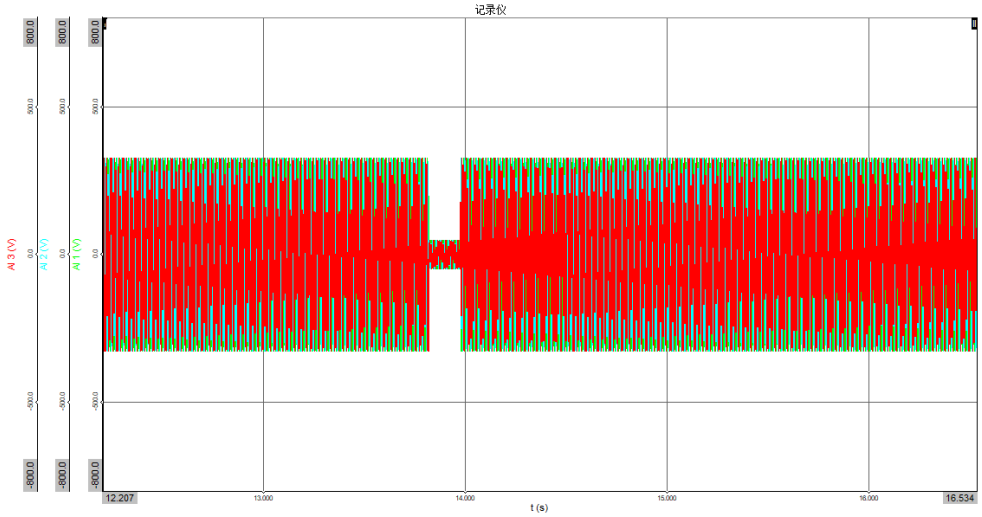
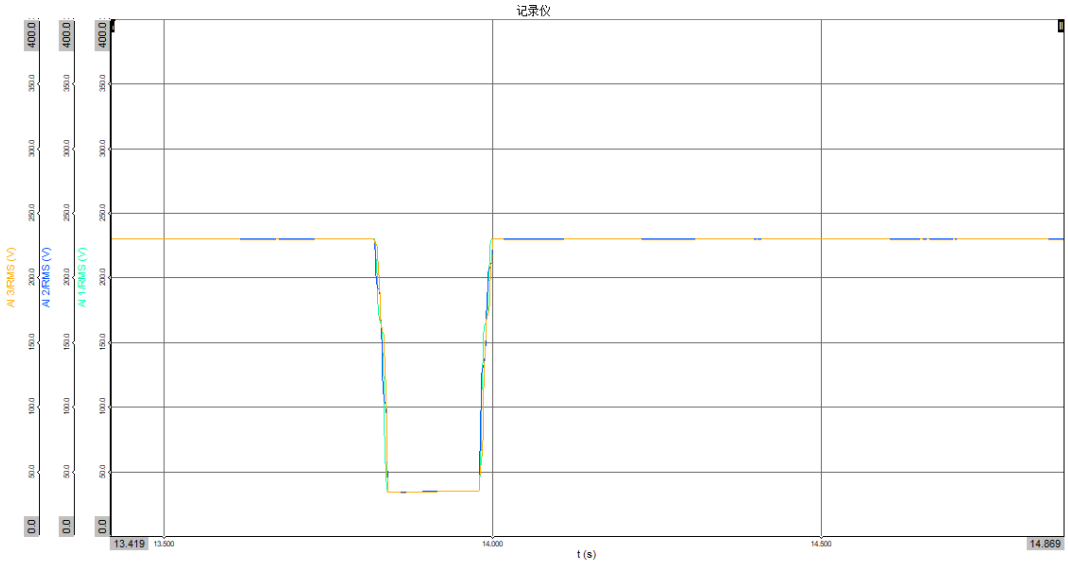
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.000
	58		Pos	t2+3s to t2+10s	[p.u.]	1.000
	59	Active power recover time	Total	-	[ms]	178
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.019
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.015
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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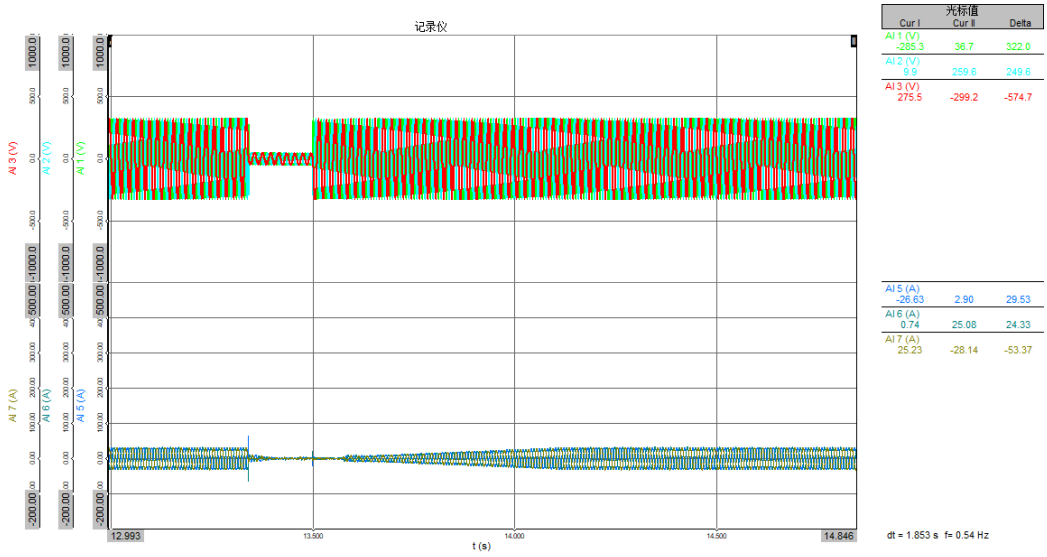
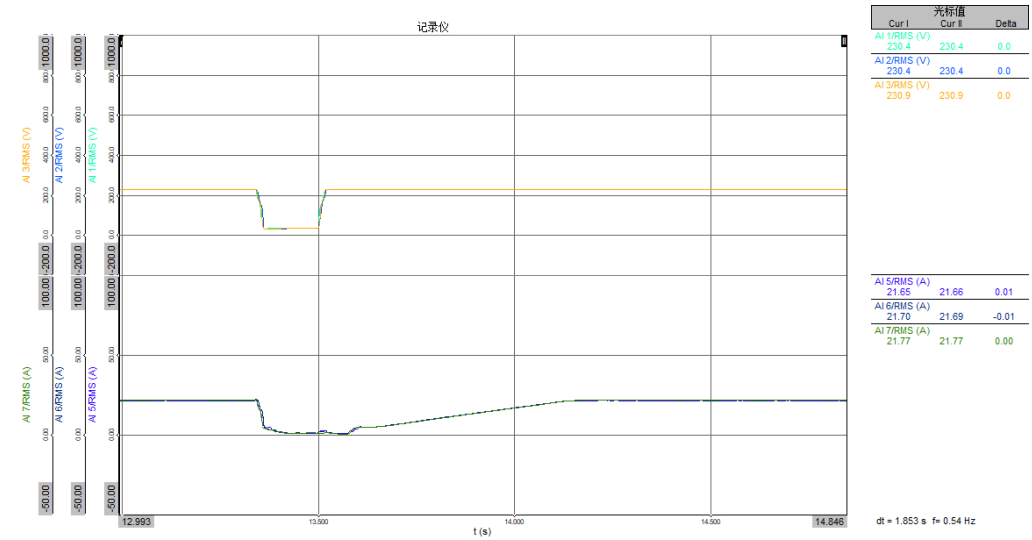
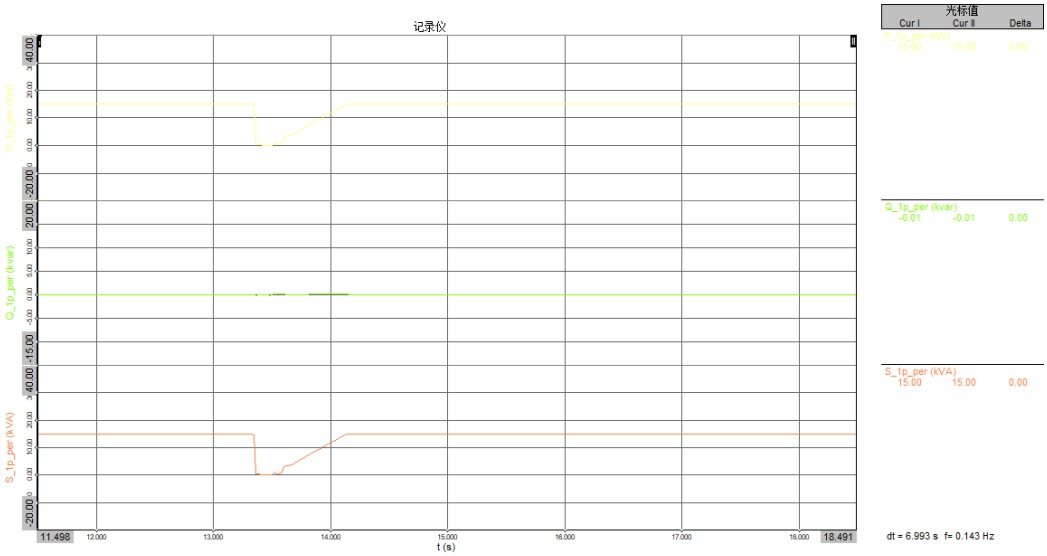
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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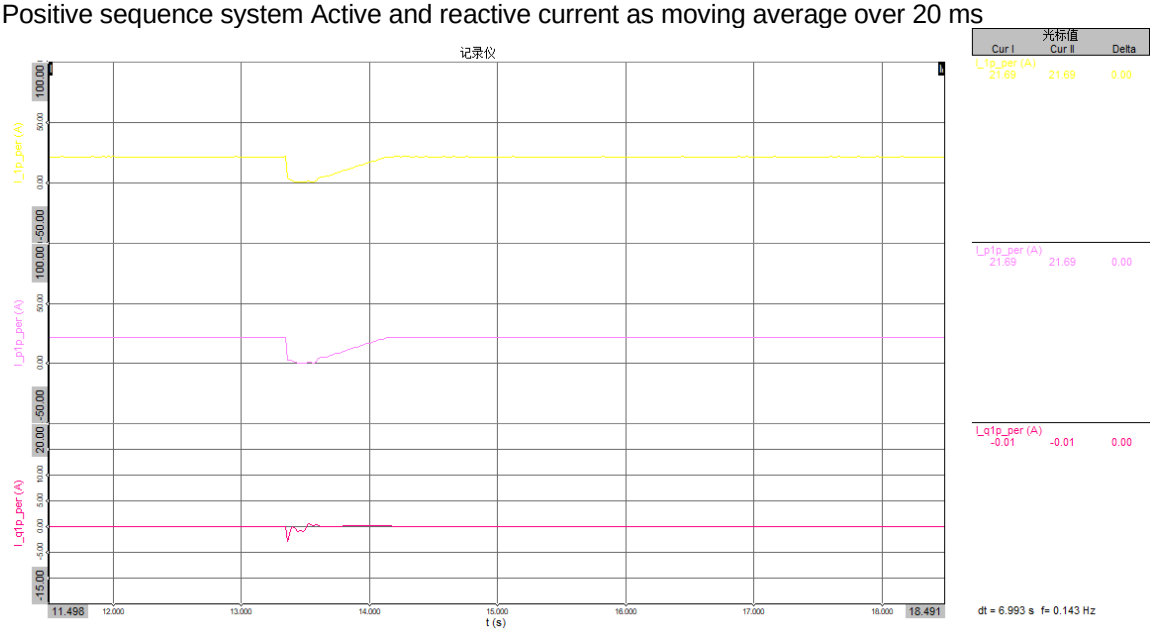
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	1.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	10:59:42 to 11:02:35
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	13822
	7	Fault clearance(t2)	Fault Phase	-	[ms]	13998
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	156
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.849
	10		L2-N		[p.u.]	0.849
	11		L3-N		[p.u.]	0.849
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.833
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.208
	20		L2	t1-10s to t1	[p.u.]	0.202
	21		L3	t1-10s to t1	[p.u.]	0.200
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.202
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	0.005
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.005

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.202
	27	Active power	Total	t1-10s to t1	[p.u.]	0.202
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.202
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	0.005
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.150
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.150
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.150
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.168
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.074
	41		L2	t1+60ms	[p.u.]	0.035
	42		L3	t1+60ms	[p.u.]	0.091
	43		L1	t1+100ms	[p.u.]	0.034
	44		L2	t1+100ms	[p.u.]	0.025
	45		L3	t1+100ms	[p.u.]	0.055
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.041
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.033
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.072
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.010
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.004
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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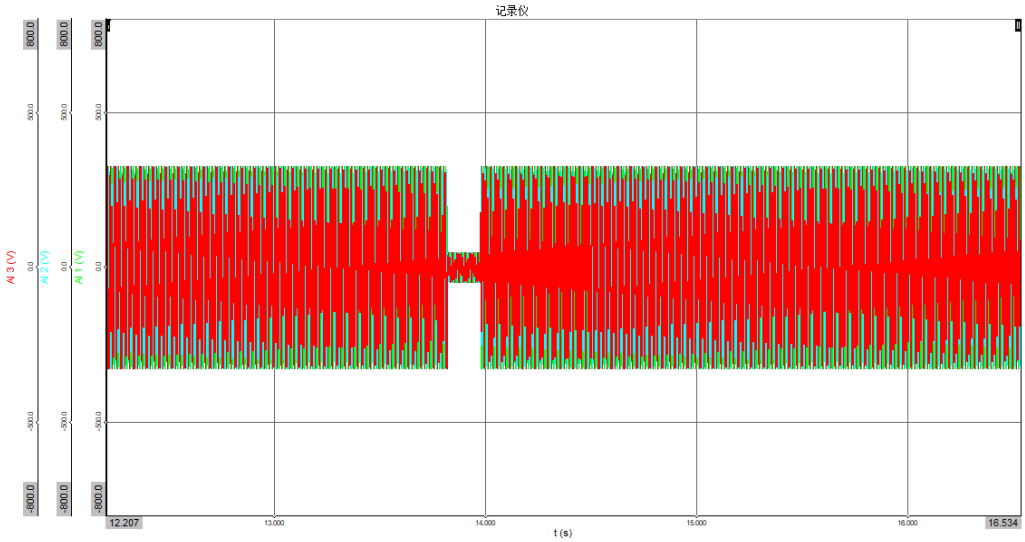
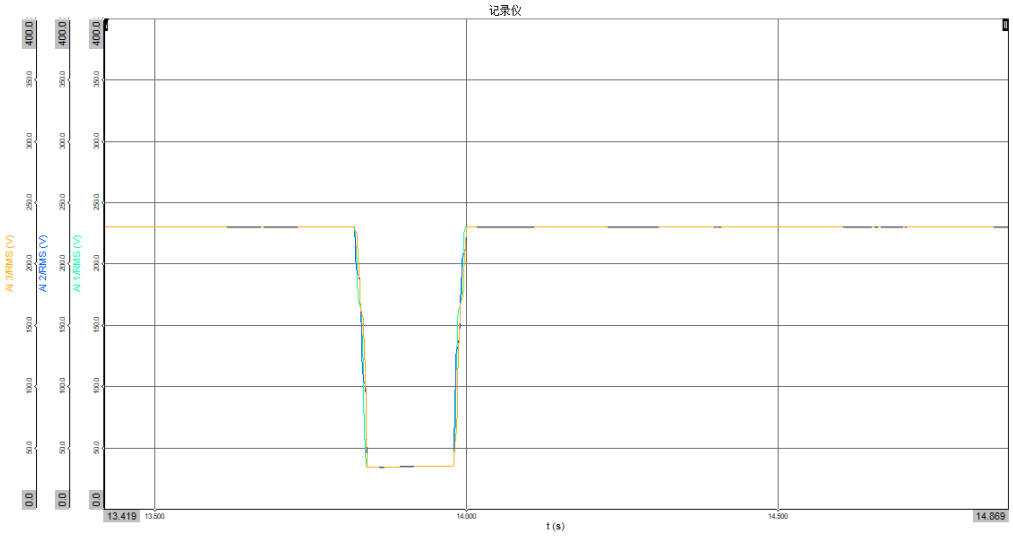
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.202
	58		Pos	t2+3s to t2+10s	[p.u.]	0.202
	59	Active power recover time	Total	-	[ms]	125
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.026
	61		Pos	t2+3s to t2+10s	[p.u.]	0.005
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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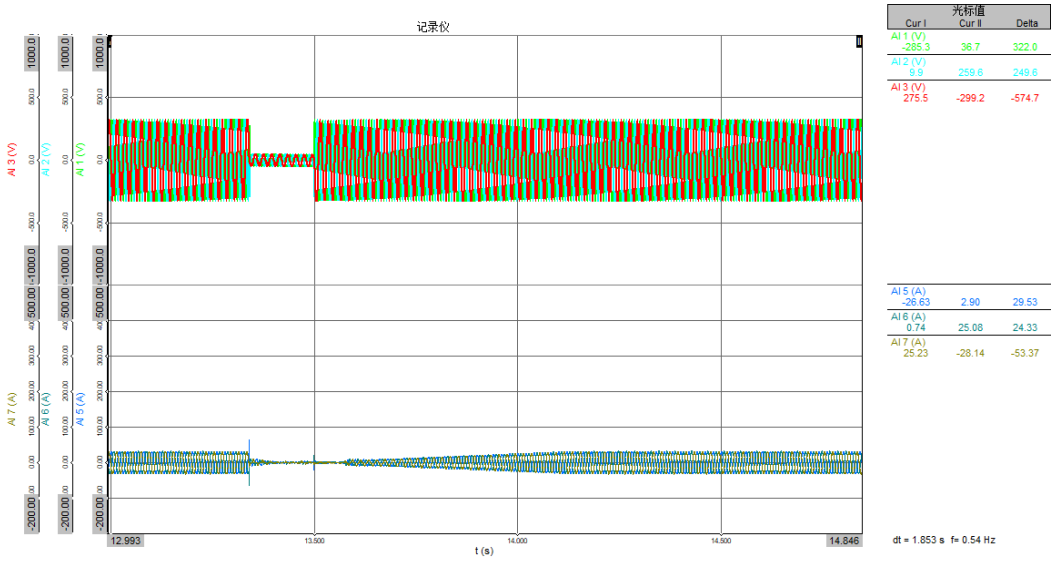
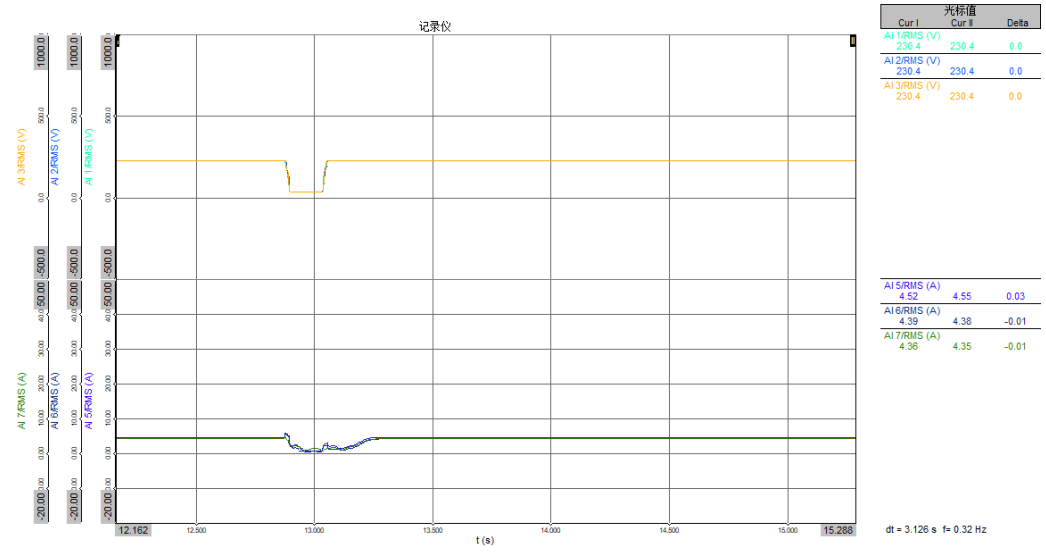
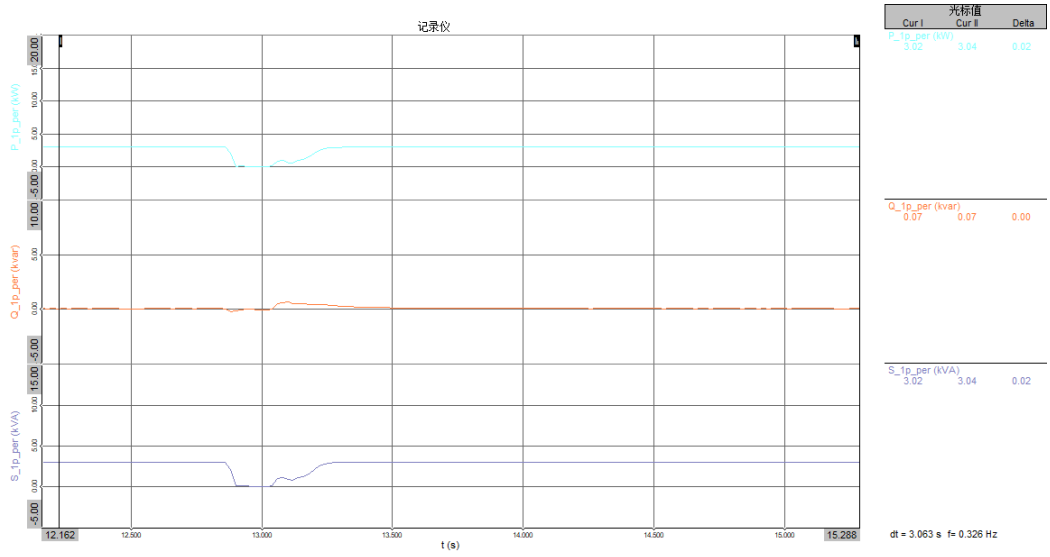
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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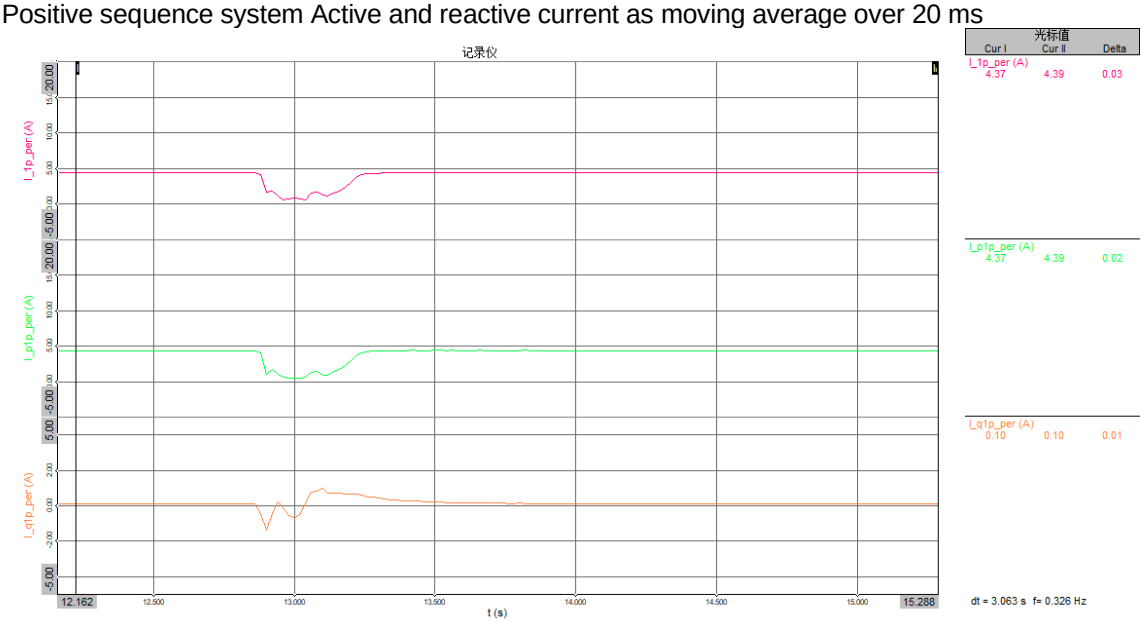
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	1.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:05:42 to 11:08:35
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14177
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14348
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	151
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.131
	10		L2-N		[p.u.]	0.849
	11		L3-N		[p.u.]	0.130
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.417
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	1.000
	20		L2	t1-10s to t1	[p.u.]	0.998
	21		L3	t1-10s to t1	[p.u.]	0.995
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.997
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.001
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.001

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.997
	27	Active power	Total	t1-10s to t1	[p.u.]	1.000
	29		Pos. seq.	t1-10s to t1	[p.u.]	1.000
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.032
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.001
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.869
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.150
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.870
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.585
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.071
	41		L2	t1+60ms	[p.u.]	0.110
	42		L3	t1+60ms	[p.u.]	0.117
	43		L1	t1+100ms	[p.u.]	0.059
	44		L2	t1+100ms	[p.u.]	0.066
	45		L3	t1+100ms	[p.u.]	0.092
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.059
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.066
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.092
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.041
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.031
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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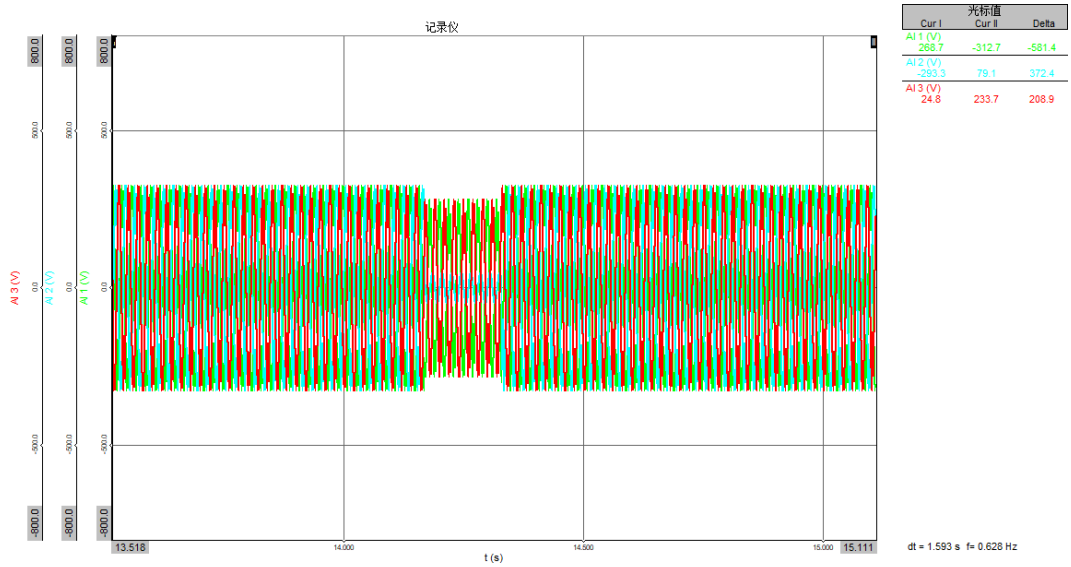
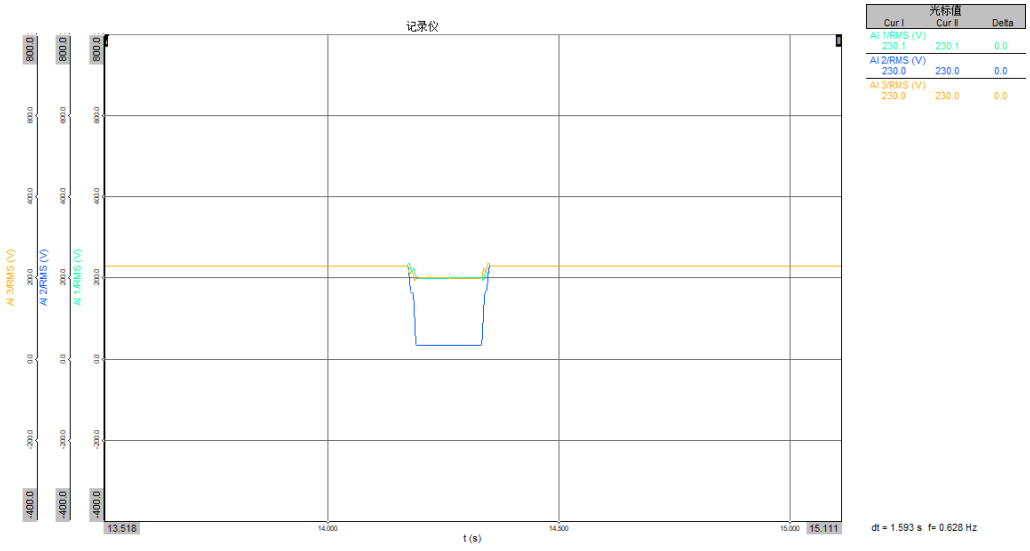
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.000
	58		Pos	t2+3s to t2+10s	[p.u.]	1.000
	59	Active power recover time	Total	-	[ms]	117
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.032
	61		Pos	t2+3s to t2+10s	[p.u.]	0.000
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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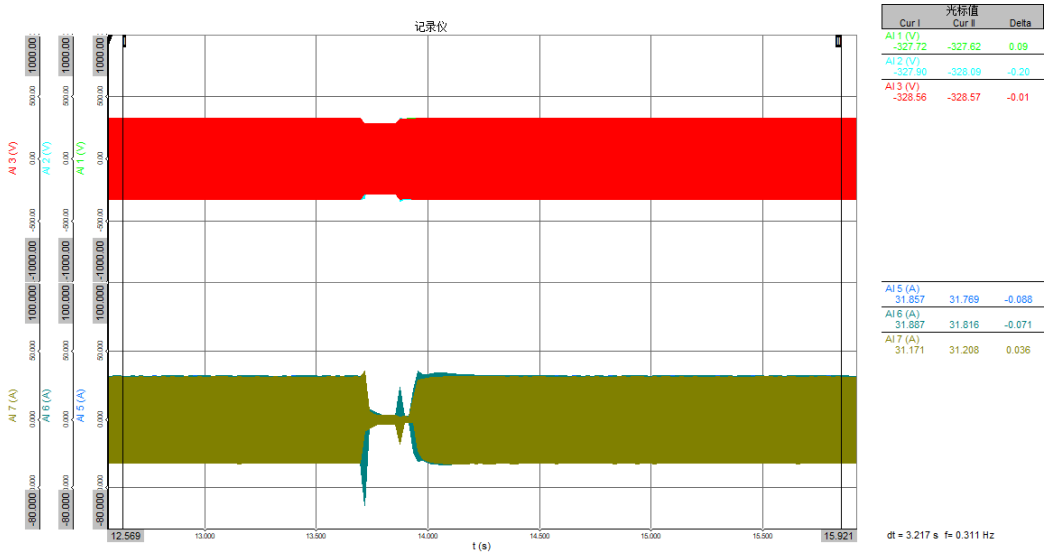
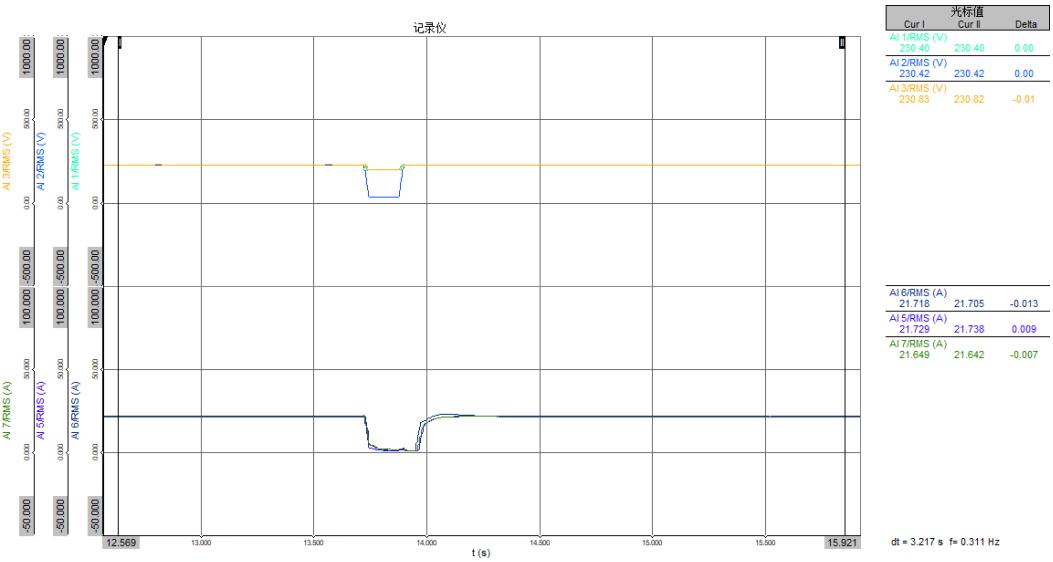
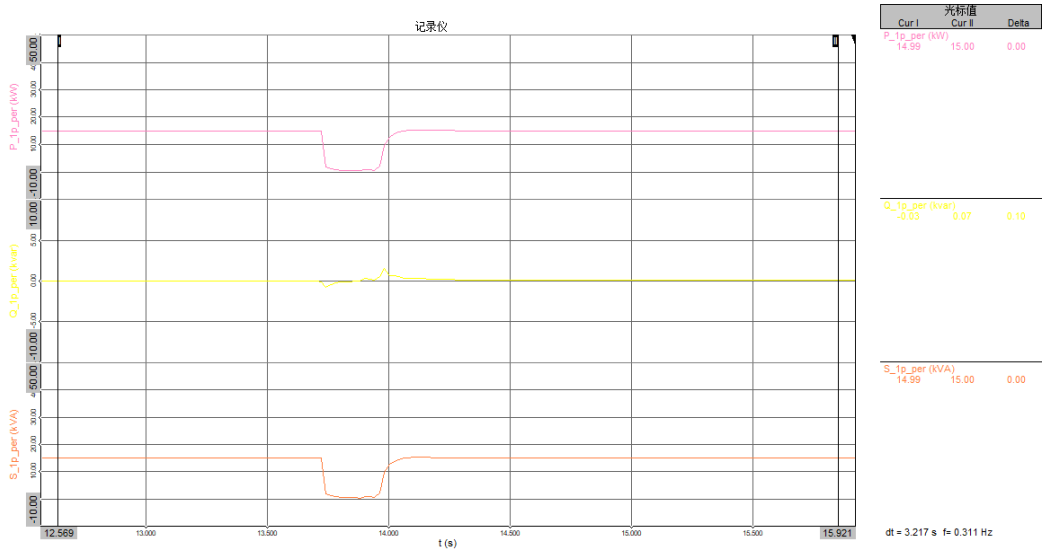
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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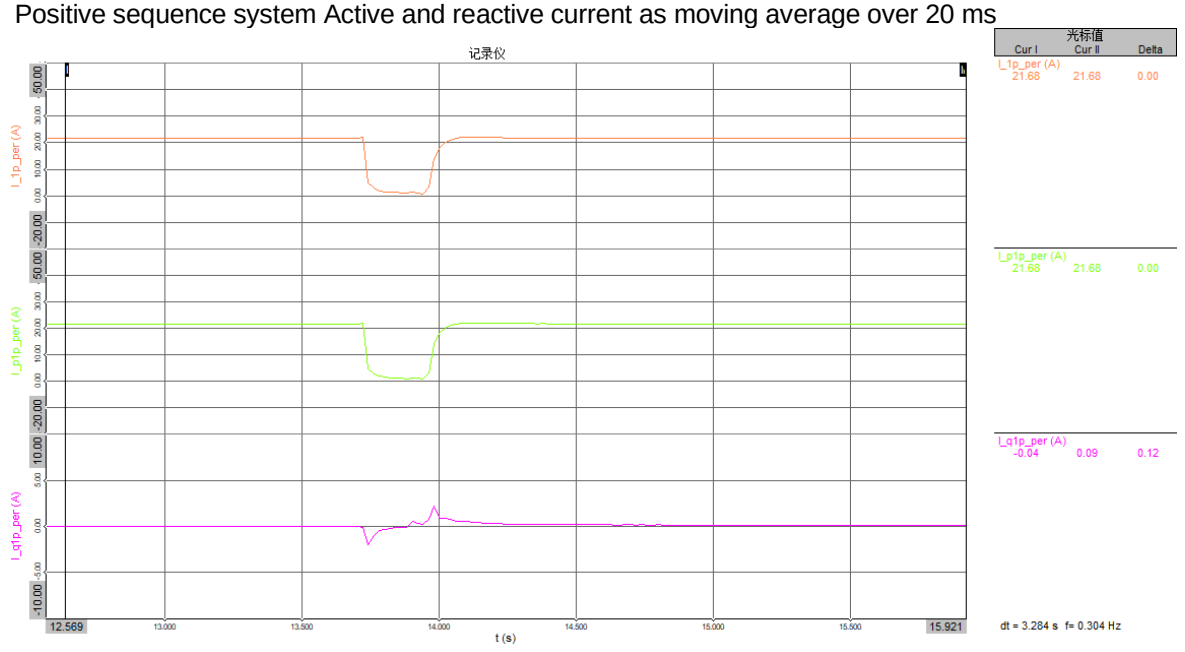
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	1.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:09:42 to 11:12:35
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14177
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14348
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	151
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.131
	10		L2-N		[p.u.]	0.849
	11		L3-N		[p.u.]	0.130
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.414
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.205
	20		L2	t1-10s to t1	[p.u.]	0.196
	21		L3	t1-10s to t1	[p.u.]	0.195
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.197
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	0.004
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.004

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.197
	27	Active power	Total	t1-10s to t1	[p.u.]	0.198
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.025
	32		Pos. seq.	t1-10s to t1	[p.u.]	0.004
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.869
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.150
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.869
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.588
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.055
	41		L2	t1+60ms	[p.u.]	0.082
	42		L3	t1+60ms	[p.u.]	0.086
	43		L1	t1+100ms	[p.u.]	0.048
	44		L2	t1+100ms	[p.u.]	0.066
	45		L3	t1+100ms	[p.u.]	0.080
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.048
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.066
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.080
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.035
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.027
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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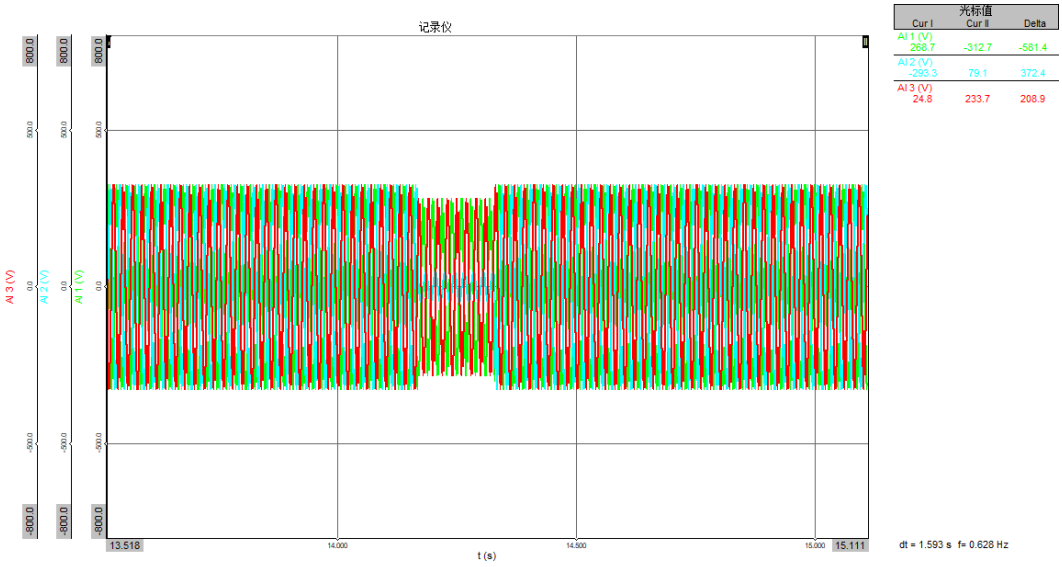
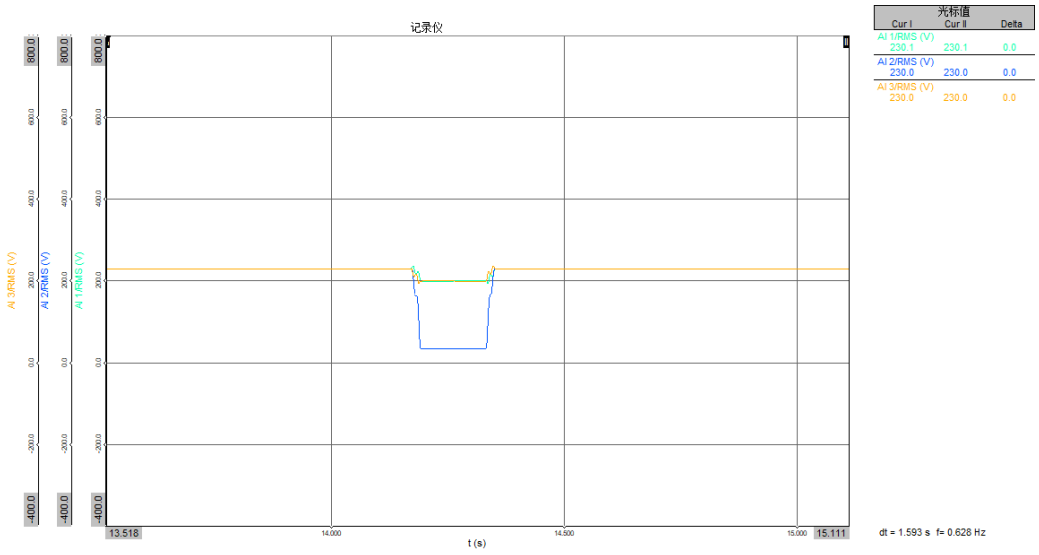
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.198
	58		Pos	t2+3s to t2+10s	[p.u.]	0.198
	59	Active power recover time	Total	-	[ms]	151
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.025
	61		Pos	t2+3s to t2+10s	[p.u.]	0.006
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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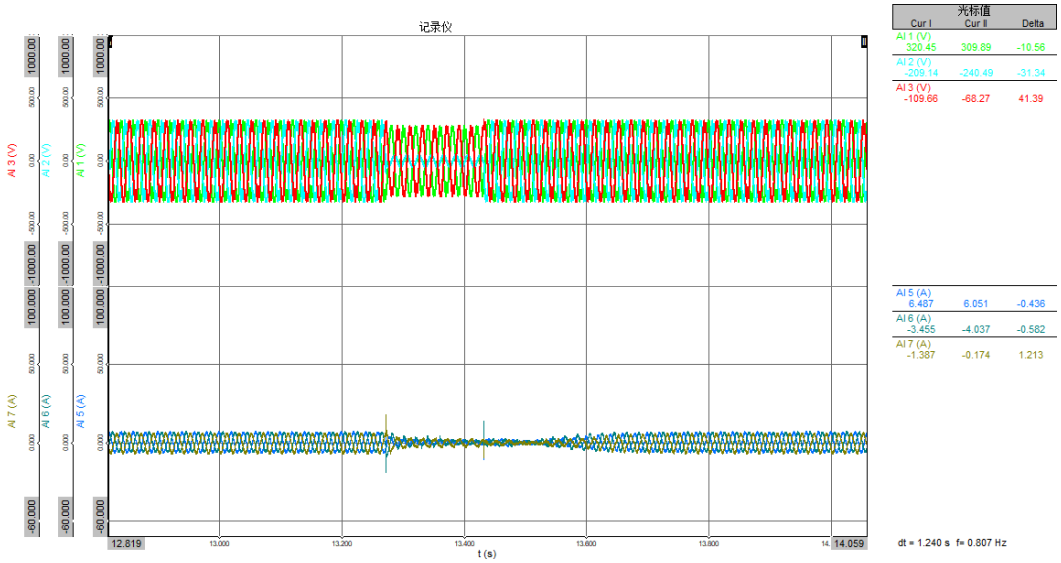
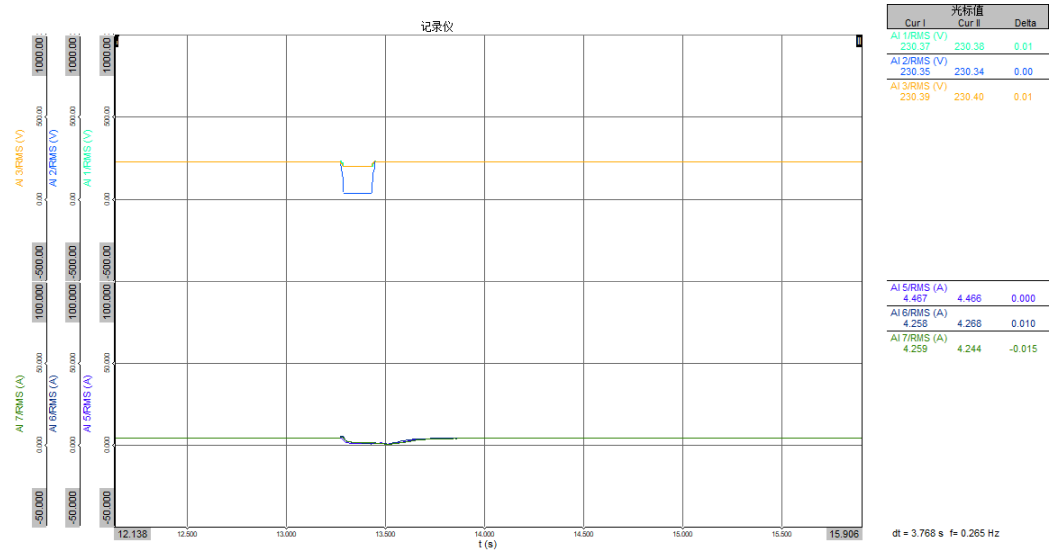
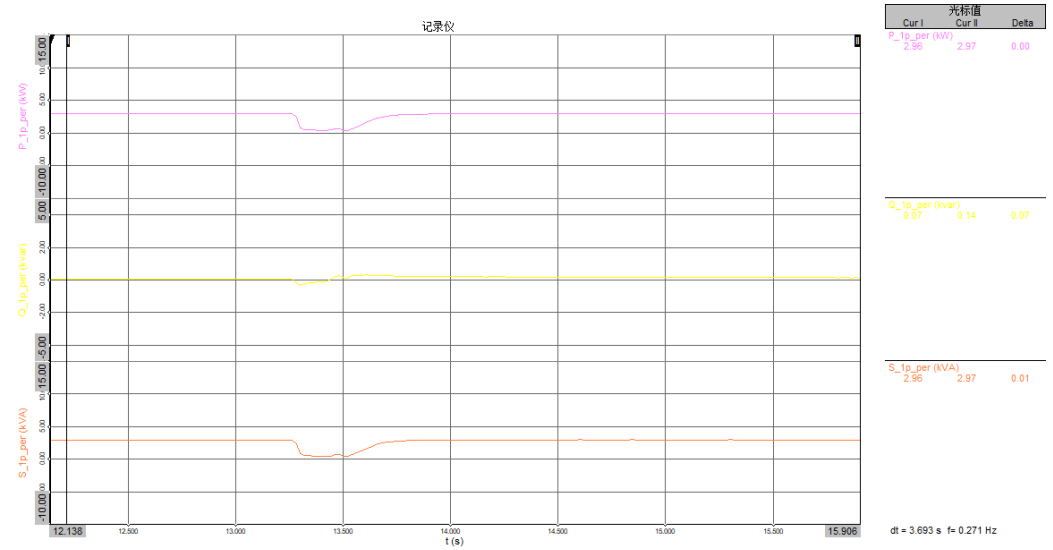
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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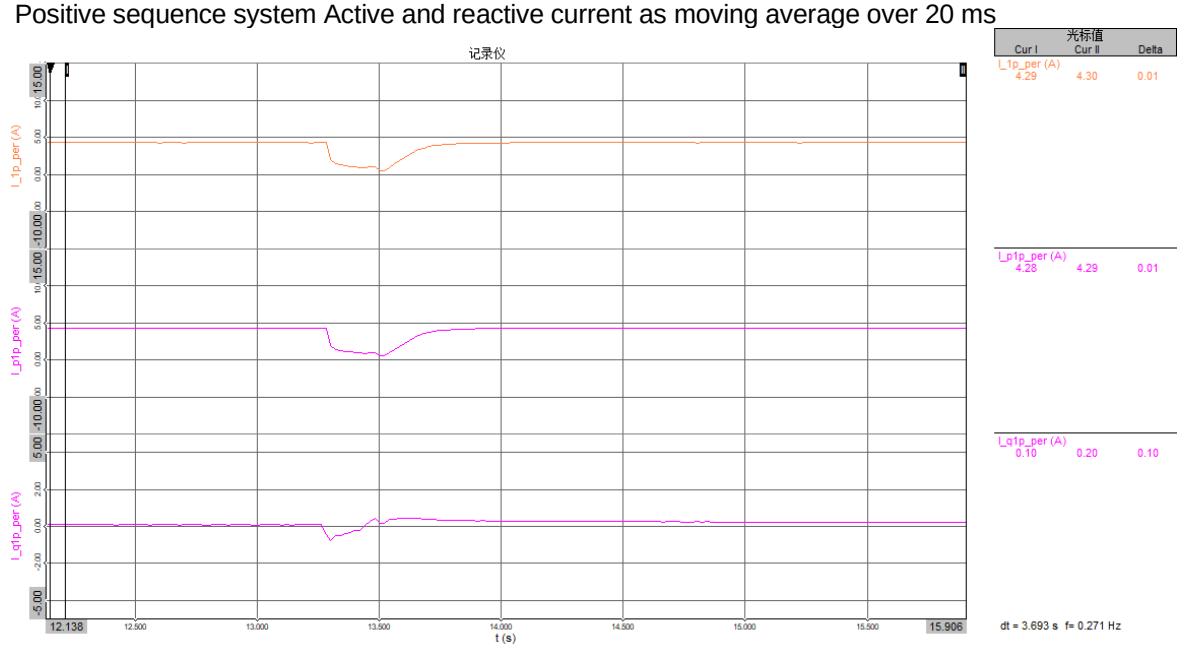
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	1.5
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:13:42 to 11:16:35
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	13616
	7	Fault clearance(t2)	Fault Phase	-	[ms]	15231
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1595
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.127
	10		L2-N		[p.u.]	0.127
	11		L3-N		[p.u.]	0.846
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.424
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.006
	15		L2-N	t1-10s to t1	[p.u.]	1.006
	16		L3-N	t1-10s to t1	[p.u.]	1.008
	19	Current	L1	t1-10s to t1	[p.u.]	0.989
	20		L2	t1-10s to t1	[p.u.]	0.986
	21		L3	t1-10s to t1	[p.u.]	0.996
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.990
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.001
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.001

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.990
	27	Active power	Total	t1-10s to t1	[p.u.]	0.997
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.997
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.030
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.001
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.869
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.869
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.150
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.582
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.056
	41		L2	t1+60ms	[p.u.]	0.107
	42		L3	t1+60ms	[p.u.]	0.108
	43		L1	t1+100ms	[p.u.]	0.060
	44		L2	t1+100ms	[p.u.]	0.048
	45		L3	t1+100ms	[p.u.]	0.077
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.060
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.048
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.077
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.017
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.005
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.006
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.006

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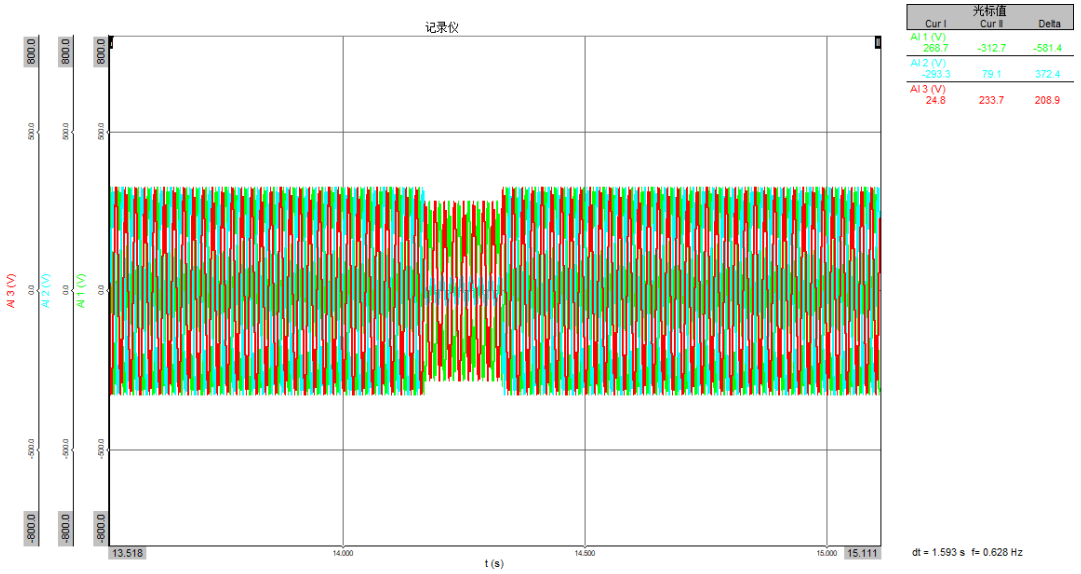
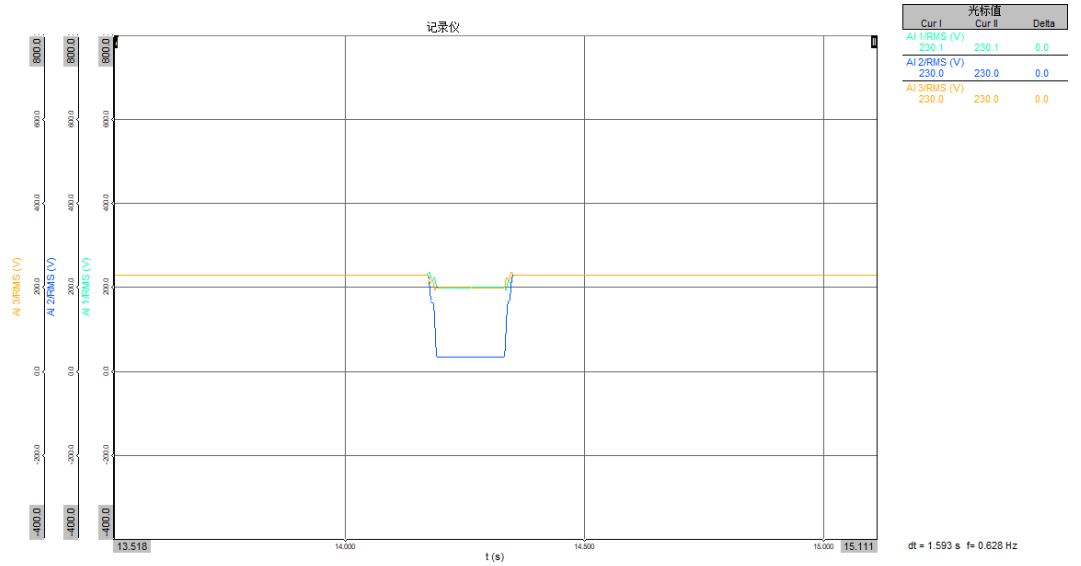
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.008
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.997
	58		Pos	t2+3s to t2+10s	[p.u.]	0.997
	59	Active power recover time	Total	-	[ms]	655
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.030
	61		Pos	t2+3s to t2+10s	[p.u.]	0.001
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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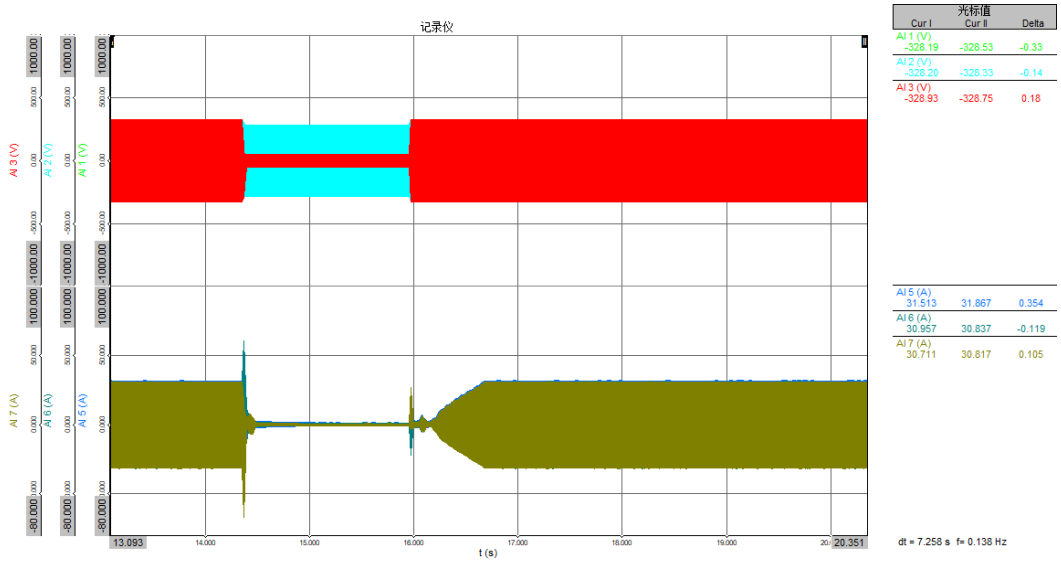
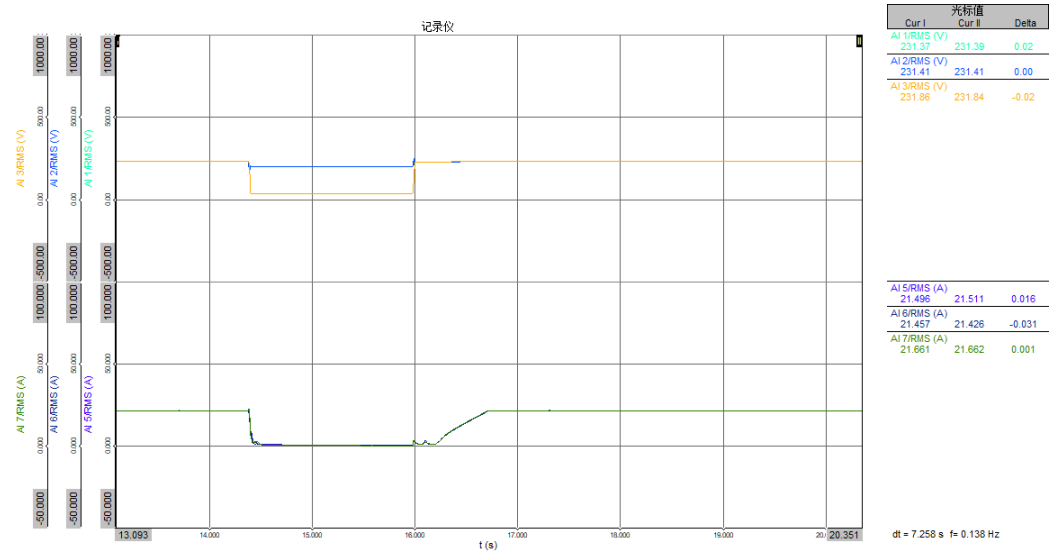
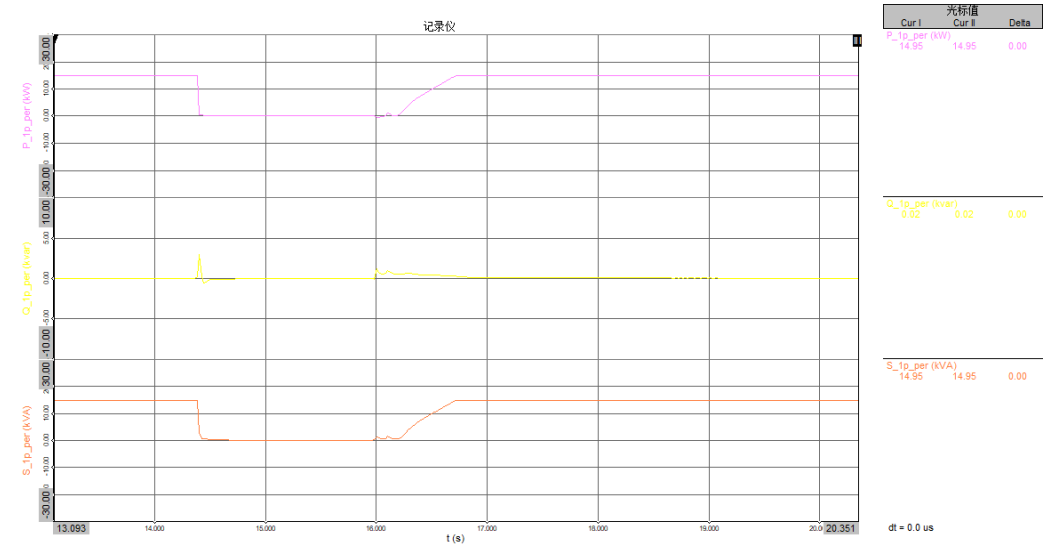
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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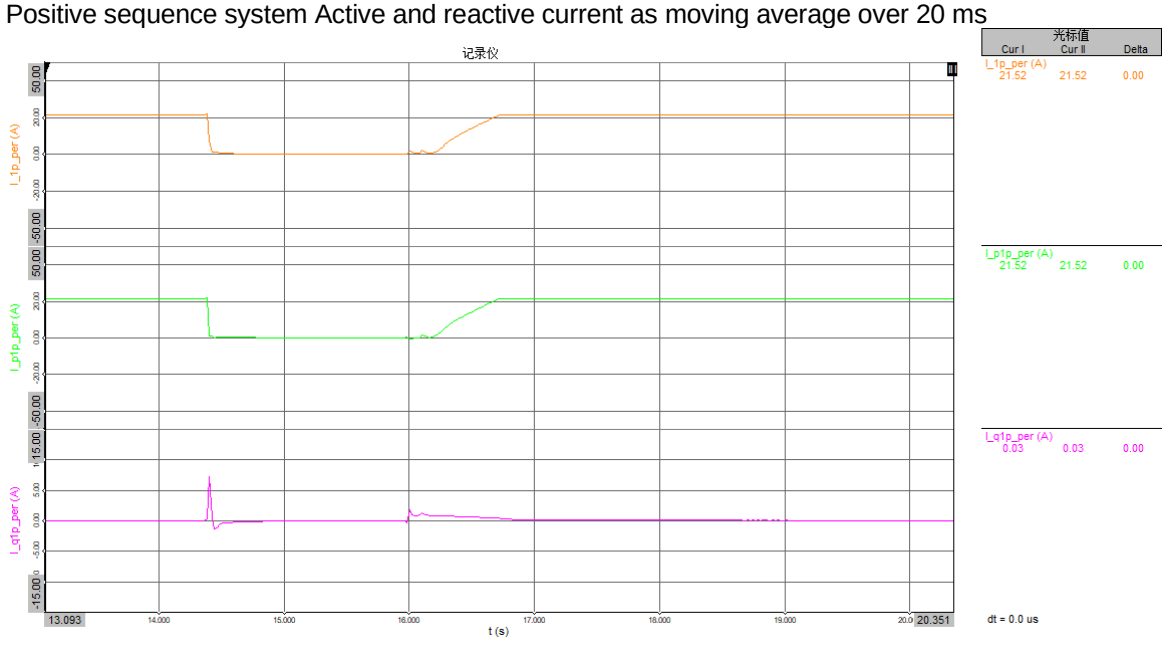
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	2.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:14:42 to 11:18:35
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14708
	7	Fault clearance(t2)	Fault Phase	-	[ms]	16322
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1594
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.499
	10		L2-N		[p.u.]	0.499
	11		L3-N		[p.u.]	0.499
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.502
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	1.094
	20		L2	t1-10s to t1	[p.u.]	1.096
	21		L3	t1-10s to t1	[p.u.]	1.096
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.094
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	0.478
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.477

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.983
	27	Active power	Total	t1-10s to t1	[p.u.]	0.987
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.987
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.480
	32		Pos. seq.	t1-10s to t1	[p.u.]	0.479
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.500
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.500
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.500
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.500
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.065
	41		L2	t1+60ms	[p.u.]	0.066
	42		L3	t1+60ms	[p.u.]	0.071
	43		L1	t1+100ms	[p.u.]	0.058
	44		L2	t1+100ms	[p.u.]	0.060
	45		L3	t1+100ms	[p.u.]	0.061
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.058
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.060
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.061
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.028
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.003
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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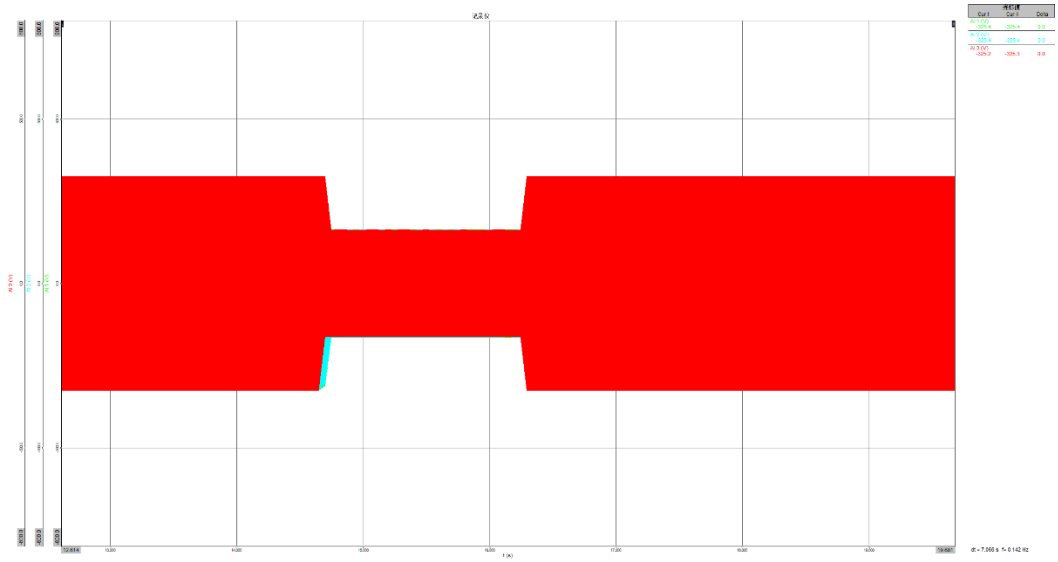
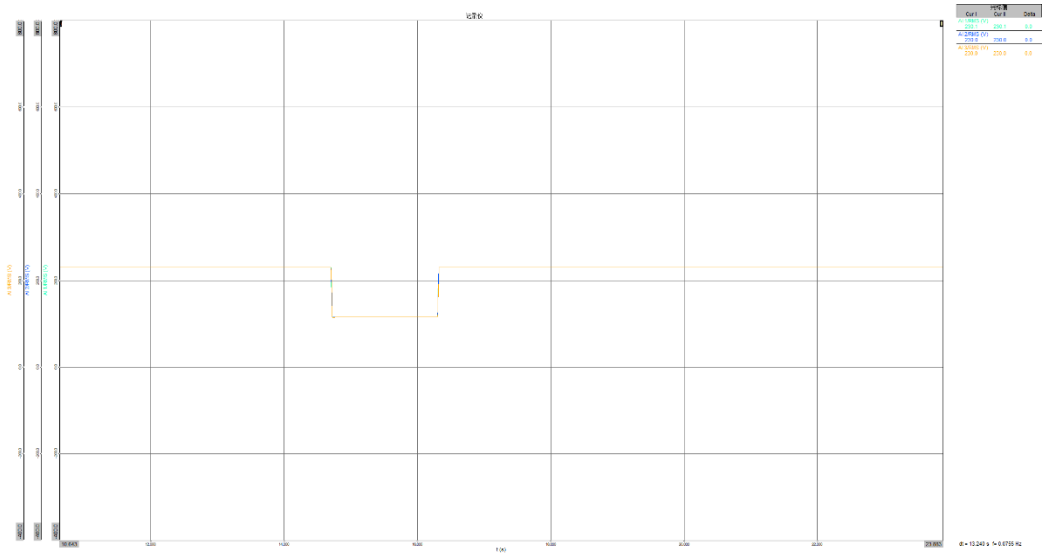
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.011
	58		Pos	t2+3s to t2+10s	[p.u.]	1.014
	59	Active power recover time	Total	-	[ms]	595
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.412
	61		Pos	t2+3s to t2+10s	[p.u.]	0.411
	62	Reactive power recover time	Total	-	[ms]	8921

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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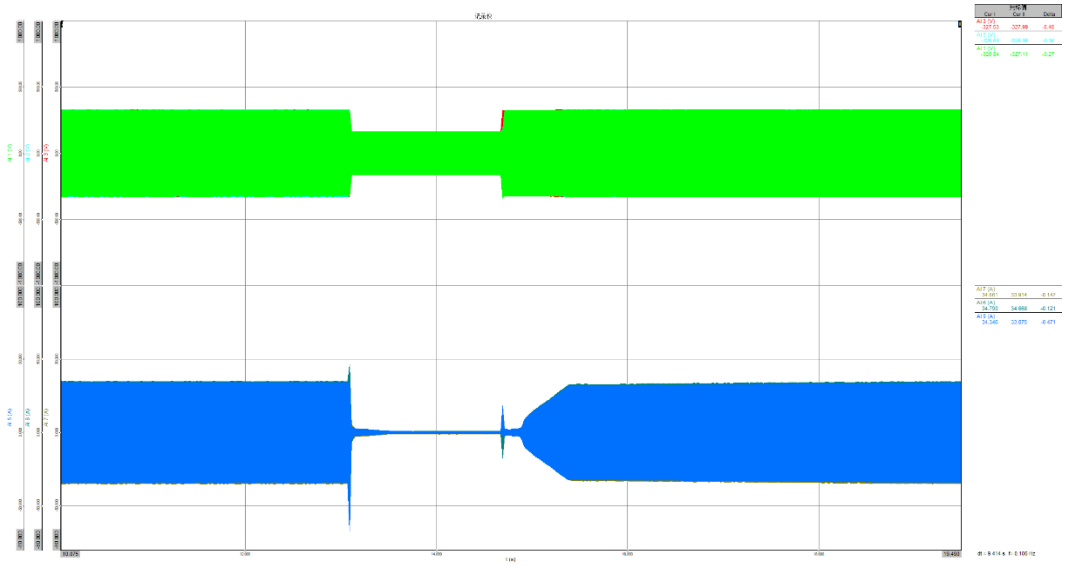
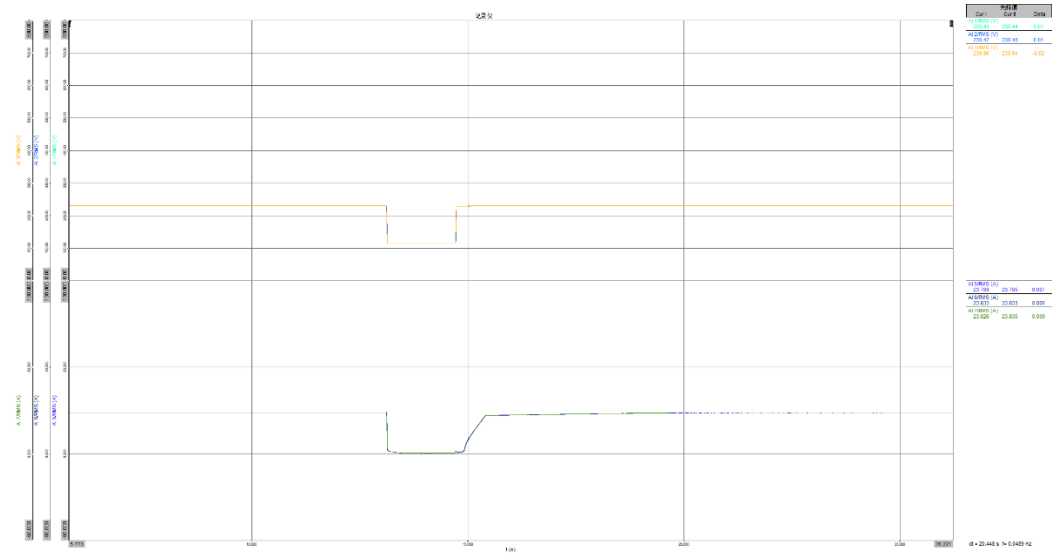
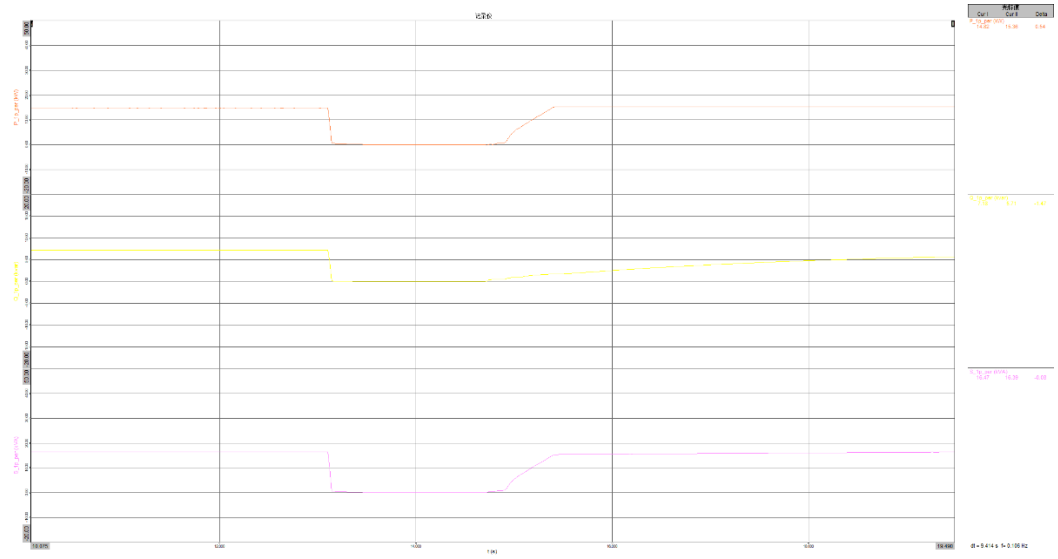
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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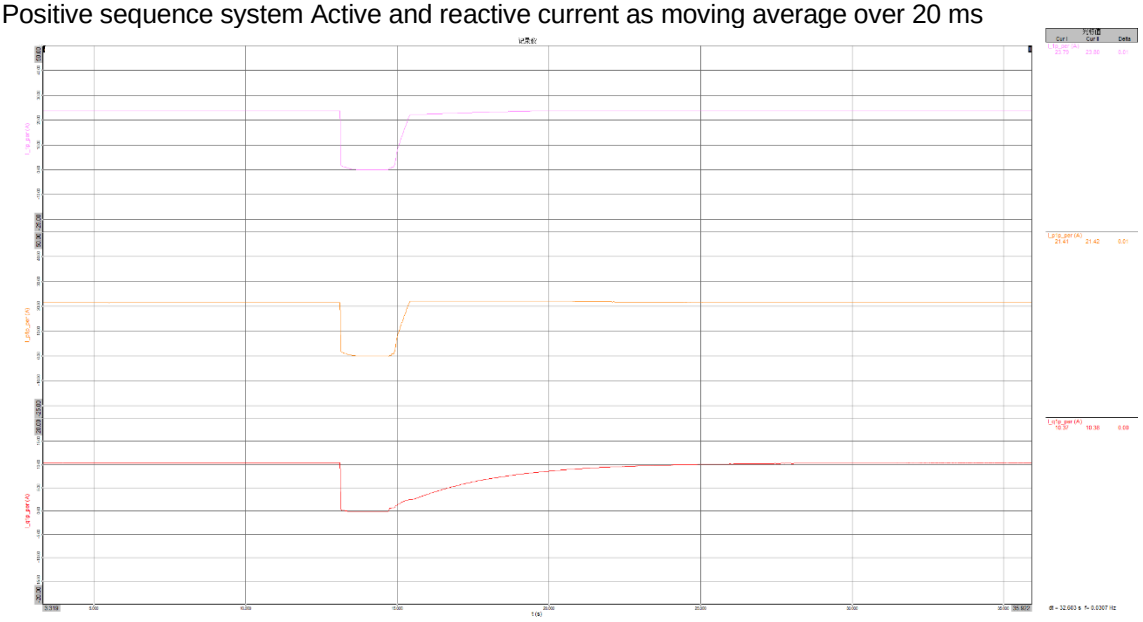
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	2.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:19:42 to 11:21:35
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14708
	7	Fault clearance(t2)	Fault Phase	-	[ms]	16322
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1594
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.499
	10		L2-N		[p.u.]	0.499
	11		L3-N		[p.u.]	0.499
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.501
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.238
	20		L2	t1-10s to t1	[p.u.]	0.227
	21		L3	t1-10s to t1	[p.u.]	0.226
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.229
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	0.099
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.099

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.206
	27	Active power	Total	t1-10s to t1	[p.u.]	0.207
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.207
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.103
	32		Pos. seq.	t1-10s to t1	[p.u.]	0.099
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.500
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.500
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.500
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.500
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.056
	41		L2	t1+60ms	[p.u.]	0.057
	42		L3	t1+60ms	[p.u.]	0.063
	43		L1	t1+100ms	[p.u.]	0.052
	44		L2	t1+100ms	[p.u.]	0.052
	45		L3	t1+100ms	[p.u.]	0.057
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.052
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.052
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.057
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.025
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.002
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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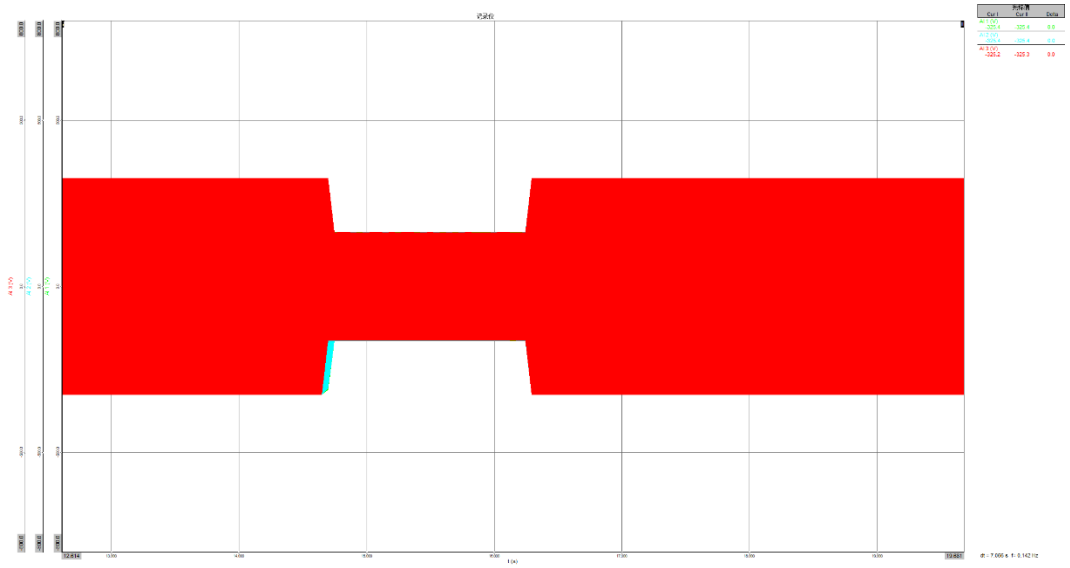
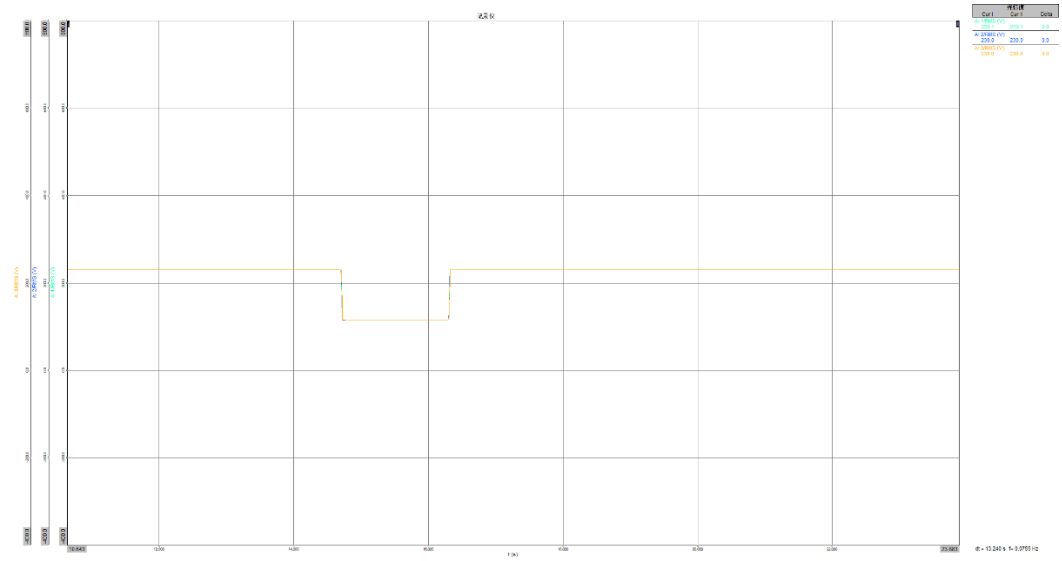
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.206
	58		Pos	t2+3s to t2+10s	[p.u.]	0.206
	59	Active power recover time	Total	-	[ms]	206
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.090
	61		Pos	t2+3s to t2+10s	[p.u.]	0.087
	62	Reactive power recover time	Total	-	[ms]	8901

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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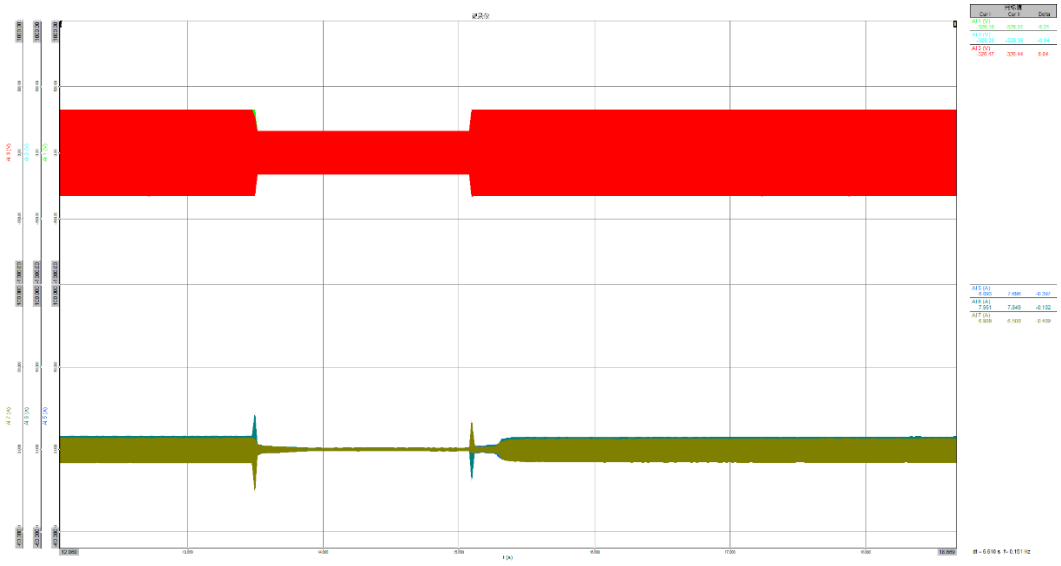
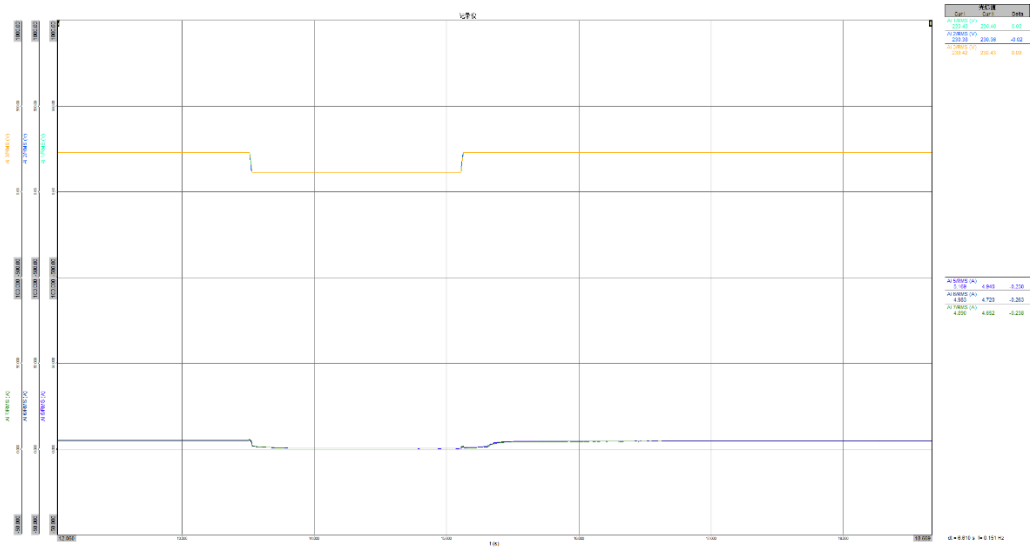
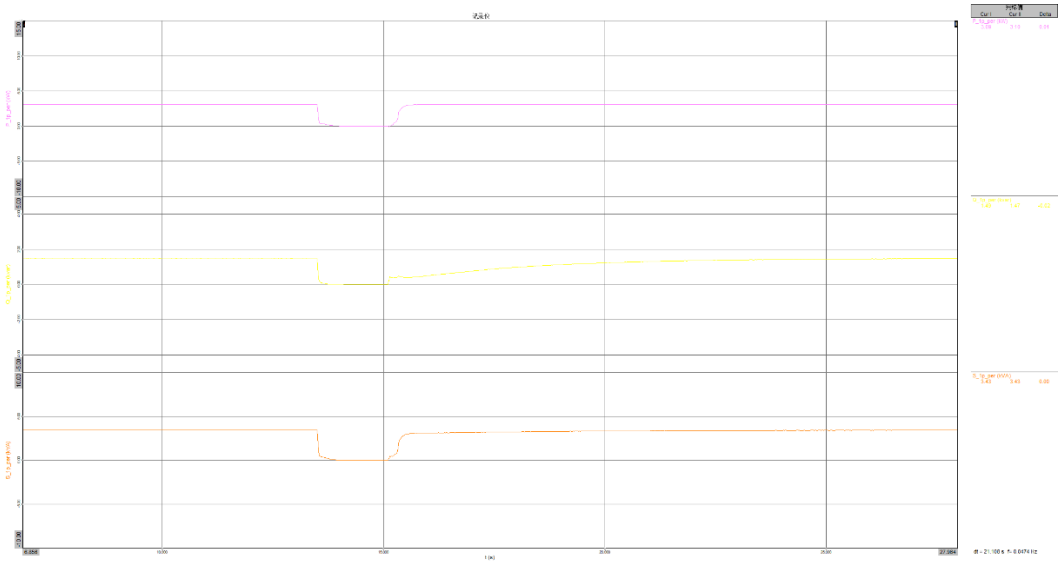
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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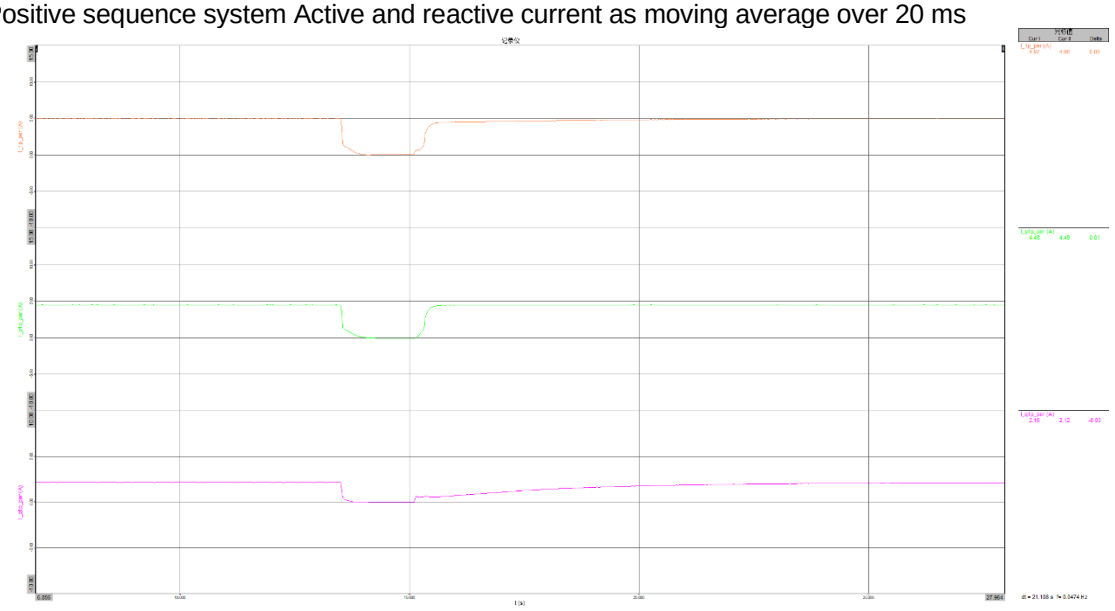
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	2.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:22:42 to 11:24:35
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	12736
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14346
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1590
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.090
	10		L2-N		[p.u.]	0.449
	11		L3-N		[p.u.]	0.090
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.224
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	1.091
	20		L2	t1-10s to t1	[p.u.]	1.098
	21		L3	t1-10s to t1	[p.u.]	1.094
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.094
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	0.470
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.470

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.987
	27	Active power	Total	t1-10s to t1	[p.u.]	0.990
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.990
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.473
	32		Pos. seq.	t1-10s to t1	[p.u.]	0.471
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.909
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.550
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.909
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.778
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.087
	41		L2	t1+60ms	[p.u.]	0.079
	42		L3	t1+60ms	[p.u.]	0.104
	43		L1	t1+100ms	[p.u.]	0.079
	44		L2	t1+100ms	[p.u.]	0.072
	45		L3	t1+100ms	[p.u.]	0.088
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.079
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.072
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.088
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.055
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.008
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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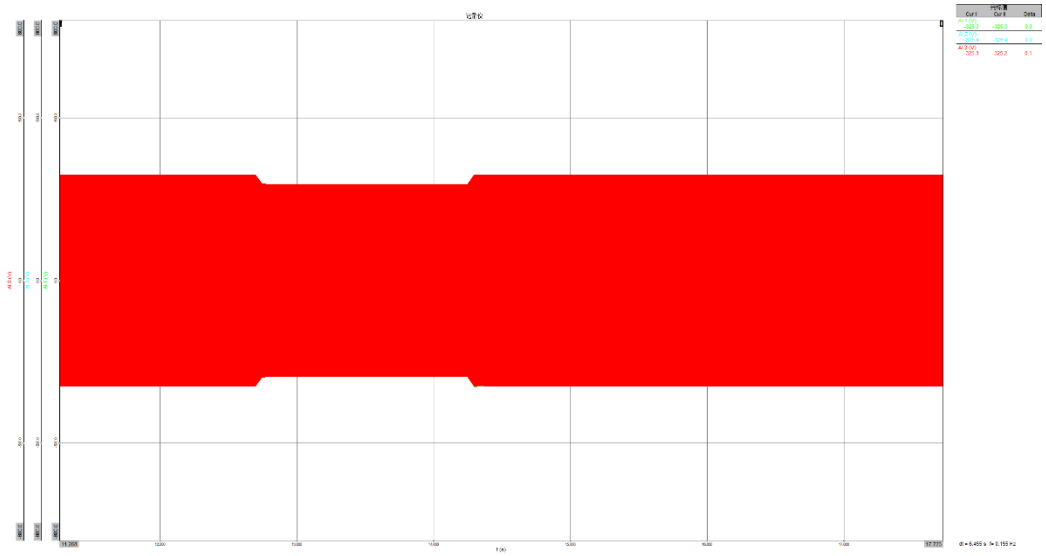
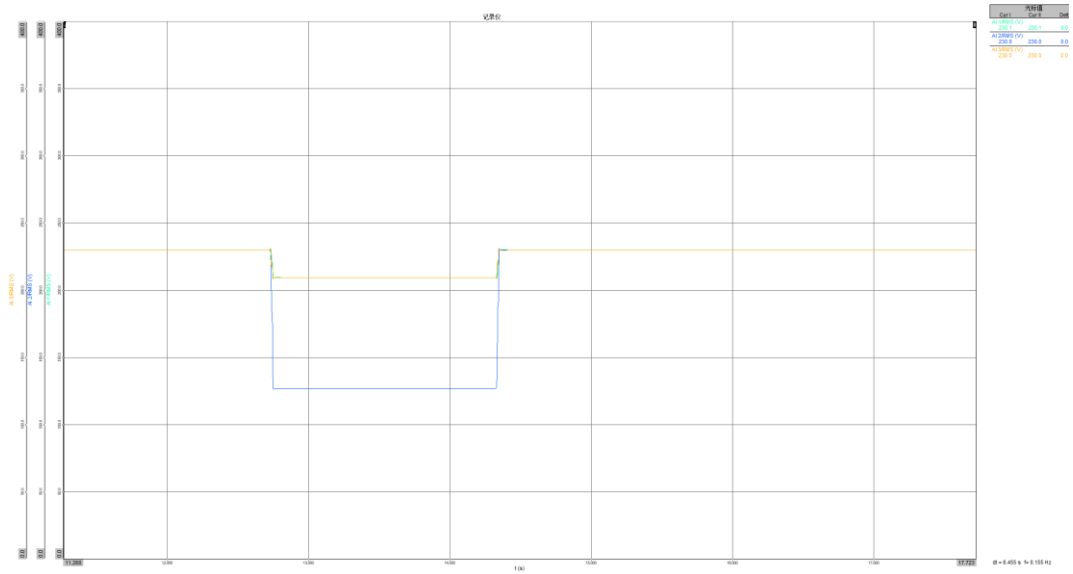
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.989
	58		Pos	t2+3s to t2+10s	[p.u.]	0.989
	59	Active power recover time	Total	-	[ms]	128
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.406
	61		Pos	t2+3s to t2+10s	[p.u.]	0.405
	62	Reactive power recover time	Total	-	[ms]	8632

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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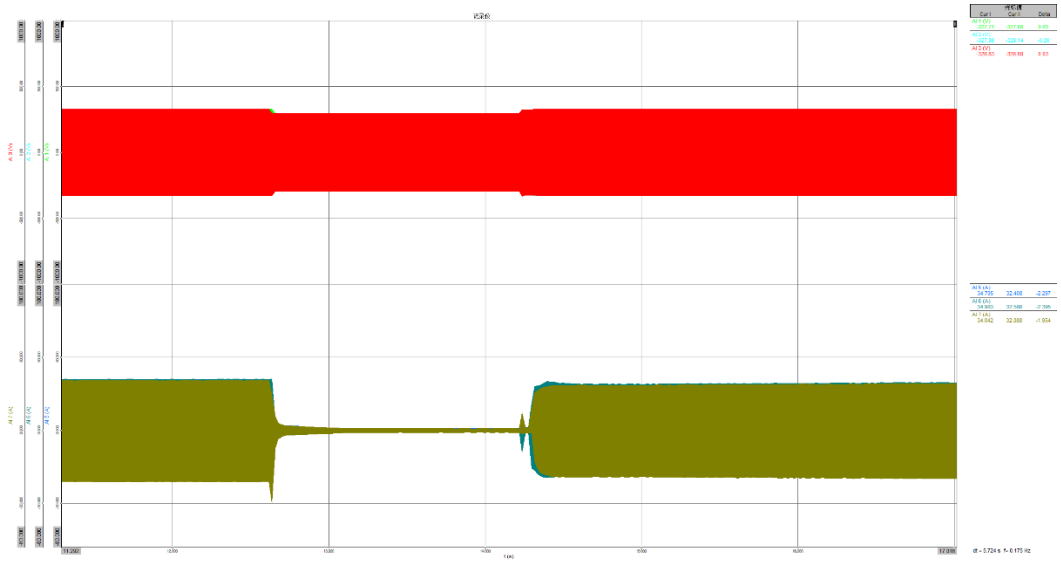
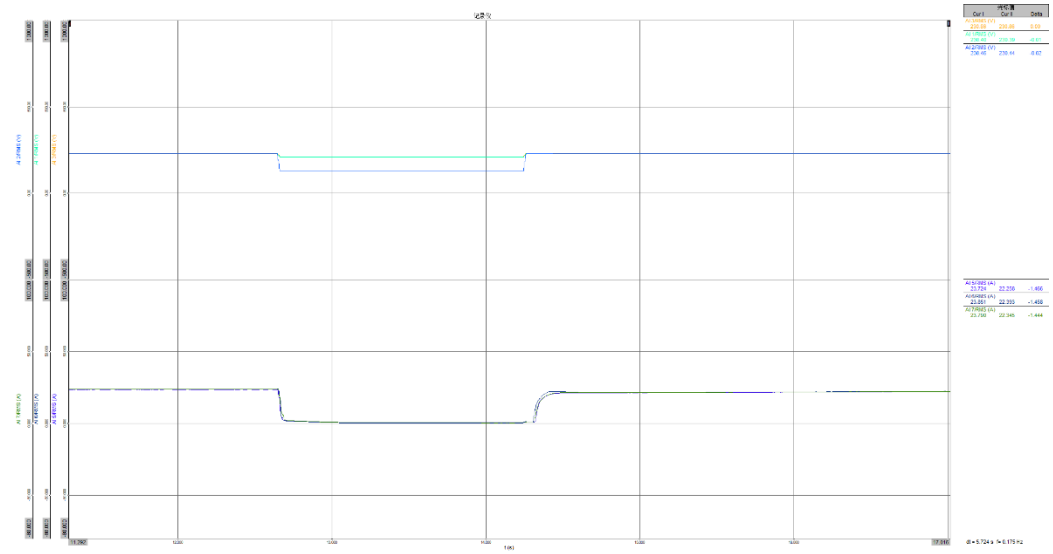
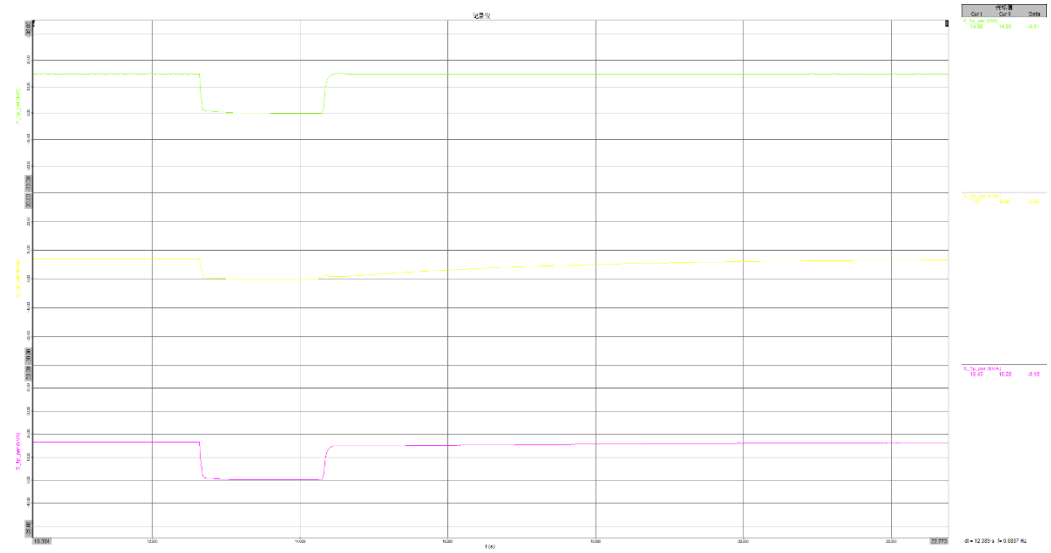
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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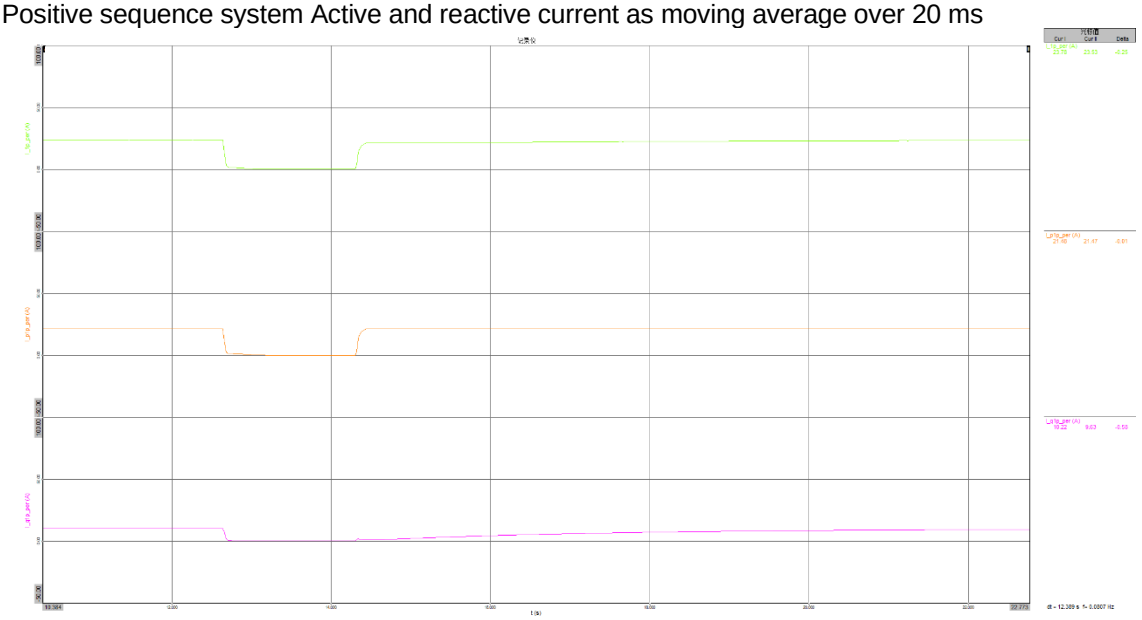
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	2.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:25:42 to 11:28:35
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	12736
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14346
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1590
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.090
	10		L2-N		[p.u.]	0.449
	11		L3-N		[p.u.]	0.090
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.223
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.227
	20		L2	t1-10s to t1	[p.u.]	0.215
	21		L3	t1-10s to t1	[p.u.]	0.215
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.218
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	0.089
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.089

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.198
	27	Active power	Total	t1-10s to t1	[p.u.]	0.199
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.199
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.092
	32		Pos. seq.	t1-10s to t1	[p.u.]	0.089
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.909
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.550
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.909
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.778
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.075
	41		L2	t1+60ms	[p.u.]	0.068
	42		L3	t1+60ms	[p.u.]	0.085
	43		L1	t1+100ms	[p.u.]	0.068
	44		L2	t1+100ms	[p.u.]	0.061
	45		L3	t1+100ms	[p.u.]	0.078
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.068
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.061
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.078
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.048
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.006
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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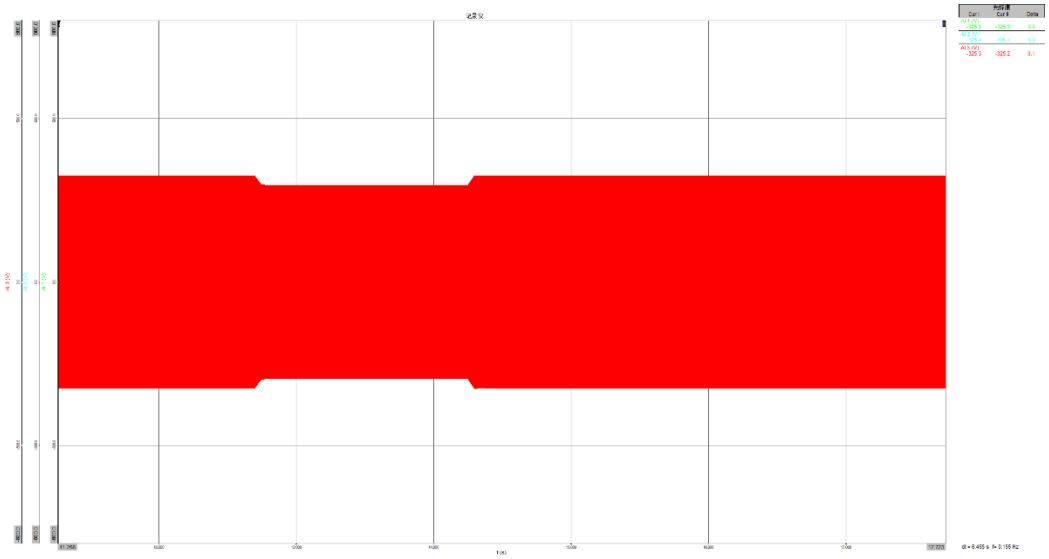
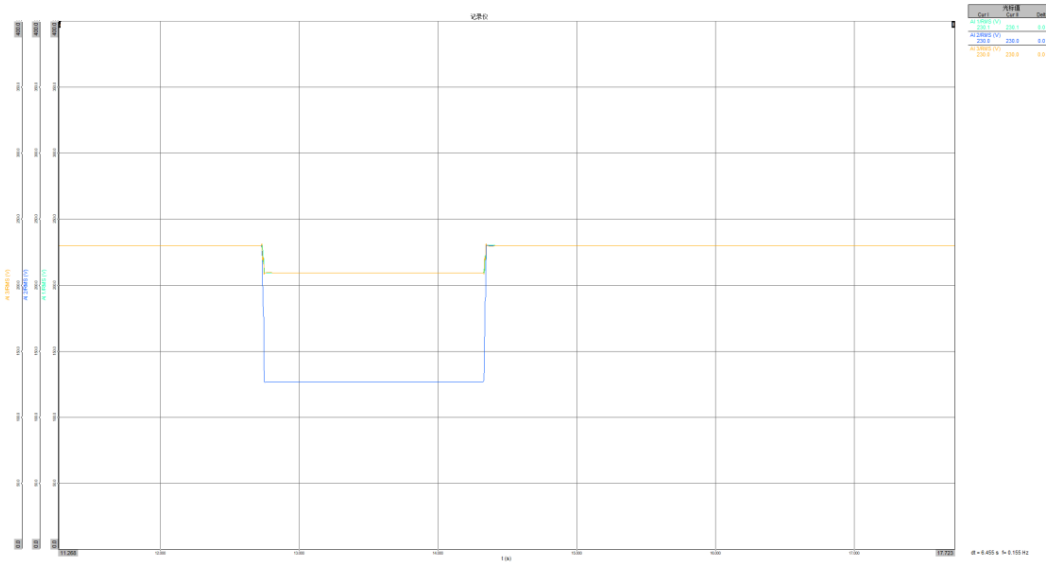
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.199
	58		Pos	t2+3s to t2+10s	[p.u.]	0.199
	59	Active power recover time	Total	-	[ms]	136
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.082
	61		Pos	t2+3s to t2+10s	[p.u.]	0.078
	62	Reactive power recover time	Total	-	[ms]	8762

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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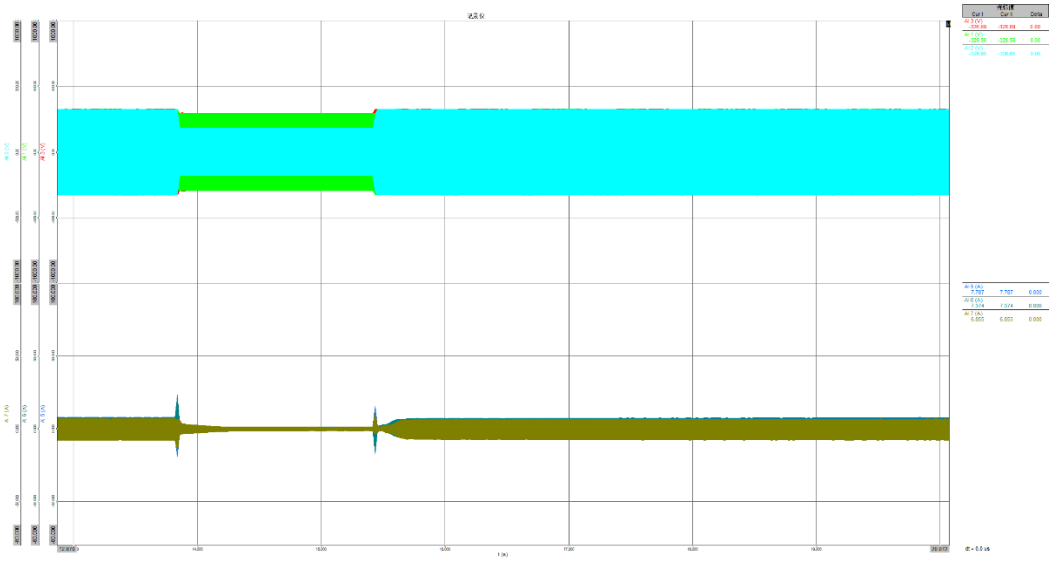
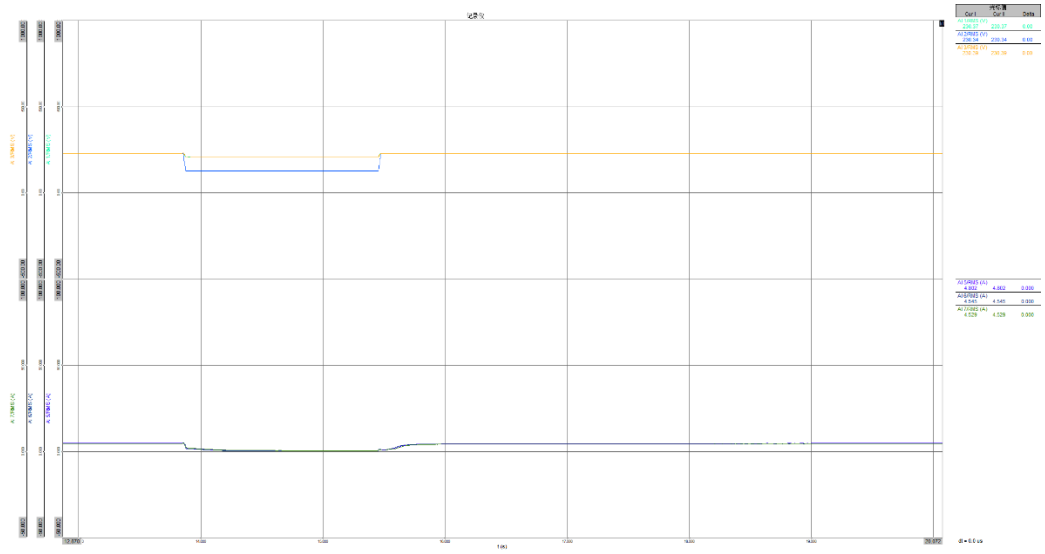
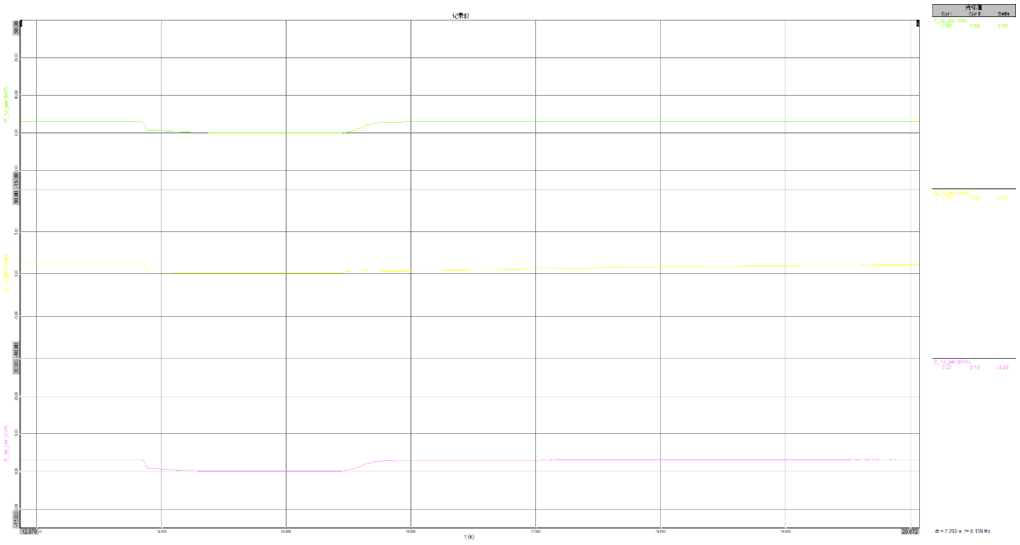
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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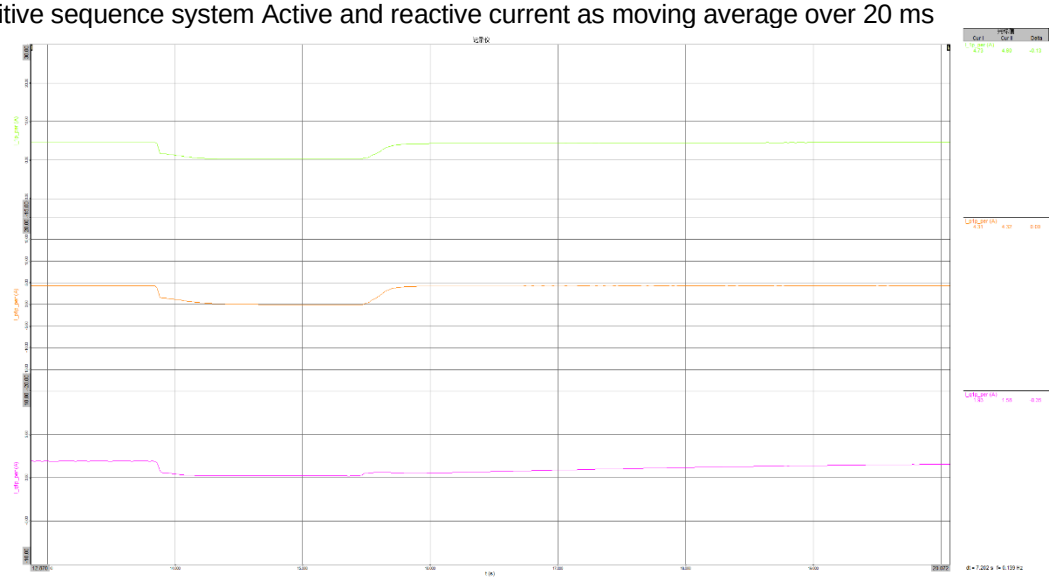
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	3.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:28:42 to 11:31:35
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14708
	7	Fault clearance(t2)	Fault Phase	-	[ms]	16322
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1594
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.499
	10		L2-N		[p.u.]	0.499
	11		L3-N		[p.u.]	0.499
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.506
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.006
	15		L2-N	t1-10s to t1	[p.u.]	1.006
	16		L3-N	t1-10s to t1	[p.u.]	1.008
	19	Current	L1	t1-10s to t1	[p.u.]	1.088
	20		L2	t1-10s to t1	[p.u.]	1.092
	21		L3	t1-10s to t1	[p.u.]	1.094
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.091
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.474
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.474

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.982
	27	Active power	Total	t1-10s to t1	[p.u.]	0.989
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.989
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.478
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.477
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.500
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.500
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.500
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.501
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.091
	41		L2	t1+60ms	[p.u.]	0.126
	42		L3	t1+60ms	[p.u.]	0.098
	43		L1	t1+100ms	[p.u.]	0.053
	44		L2	t1+100ms	[p.u.]	0.075
	45		L3	t1+100ms	[p.u.]	0.065
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.053
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.075
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.065
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.013
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.000
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.006
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.006

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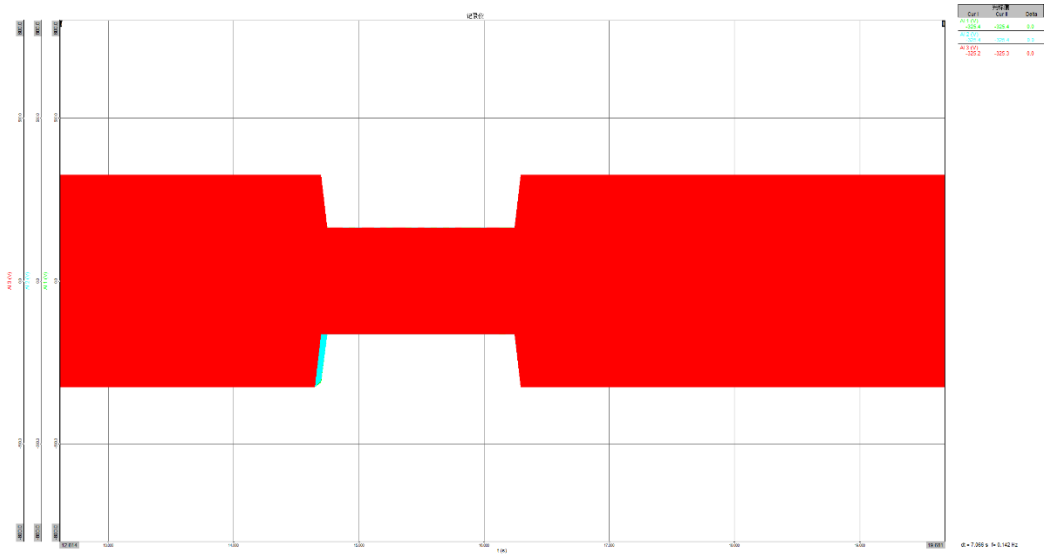
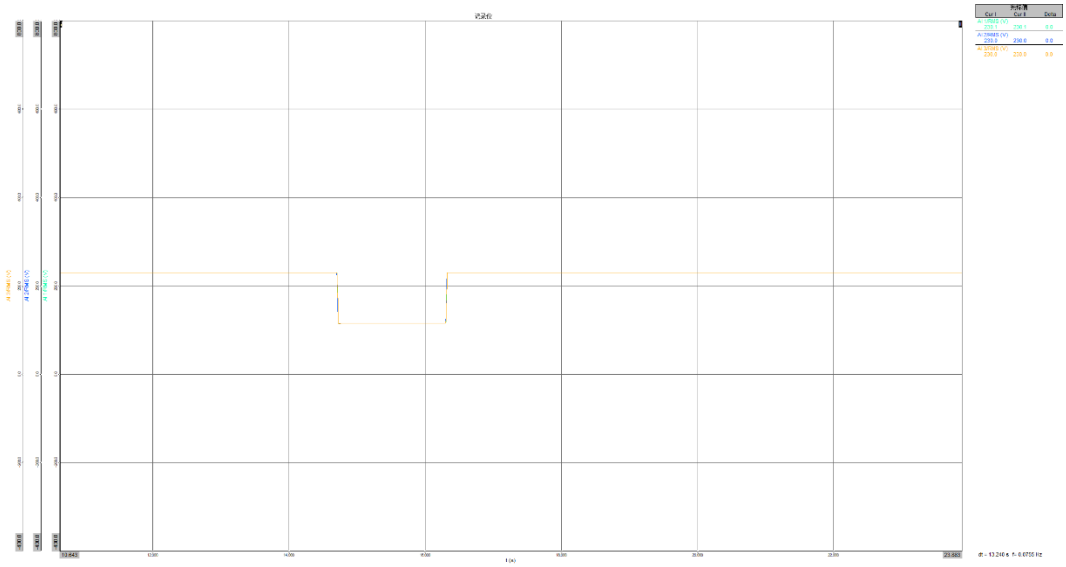
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.008
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.990
	58		Pos	t2+3s to t2+10s	[p.u.]	0.990
	59	Active power recover time	Total	-	[ms]	625
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.408
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.406
	62	Reactive power recover time	Total	-	[ms]	8796

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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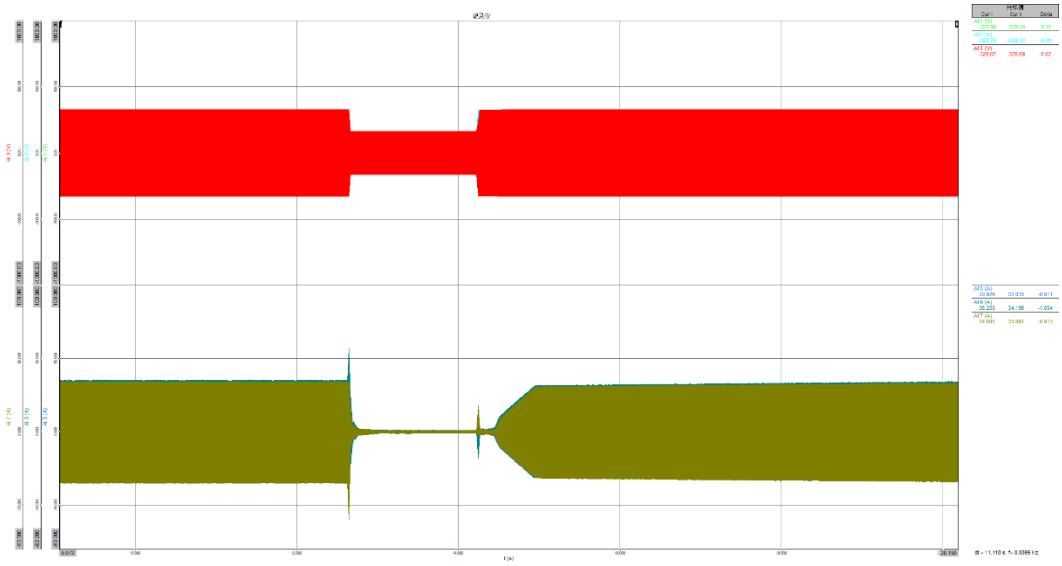
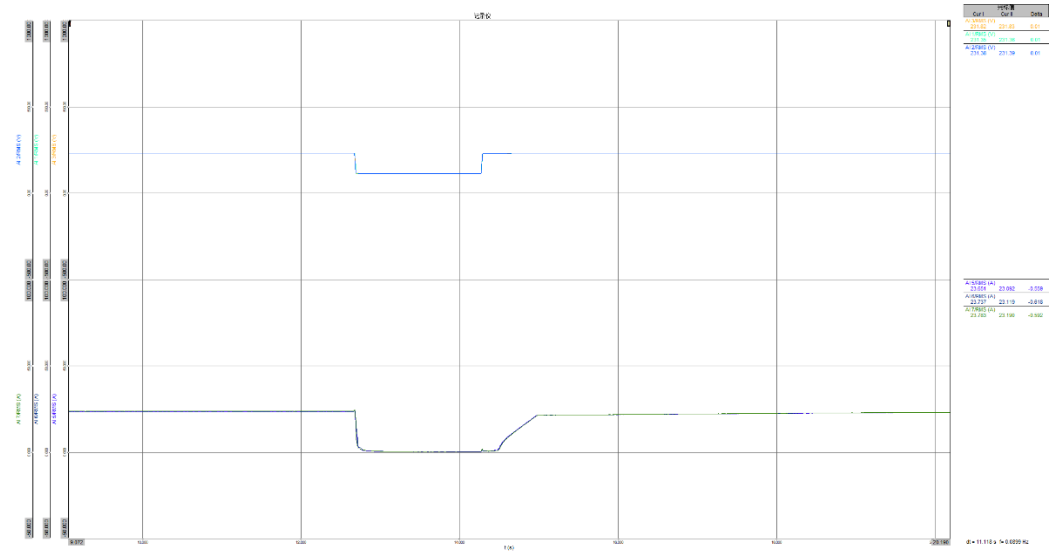
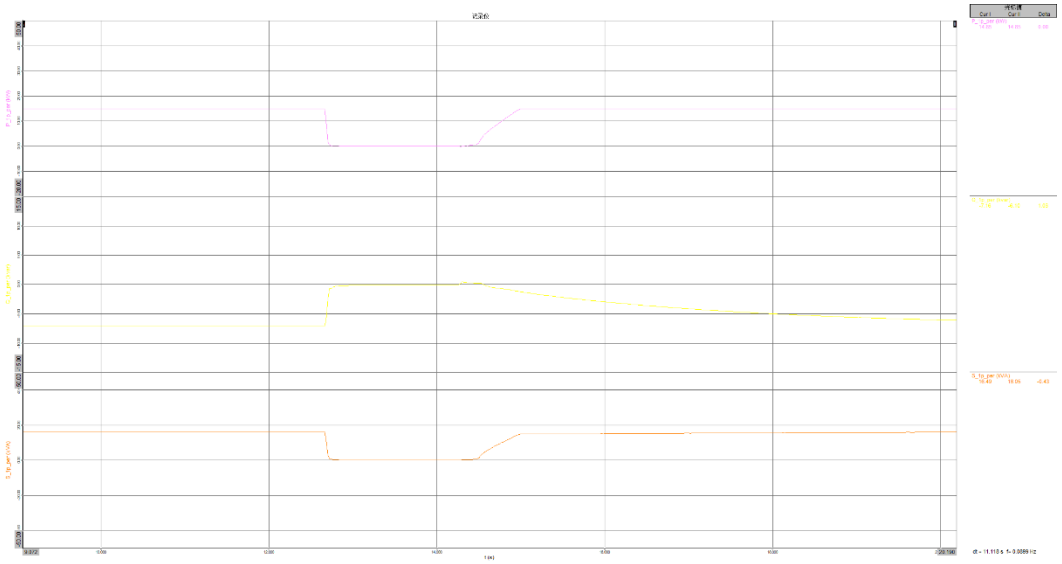
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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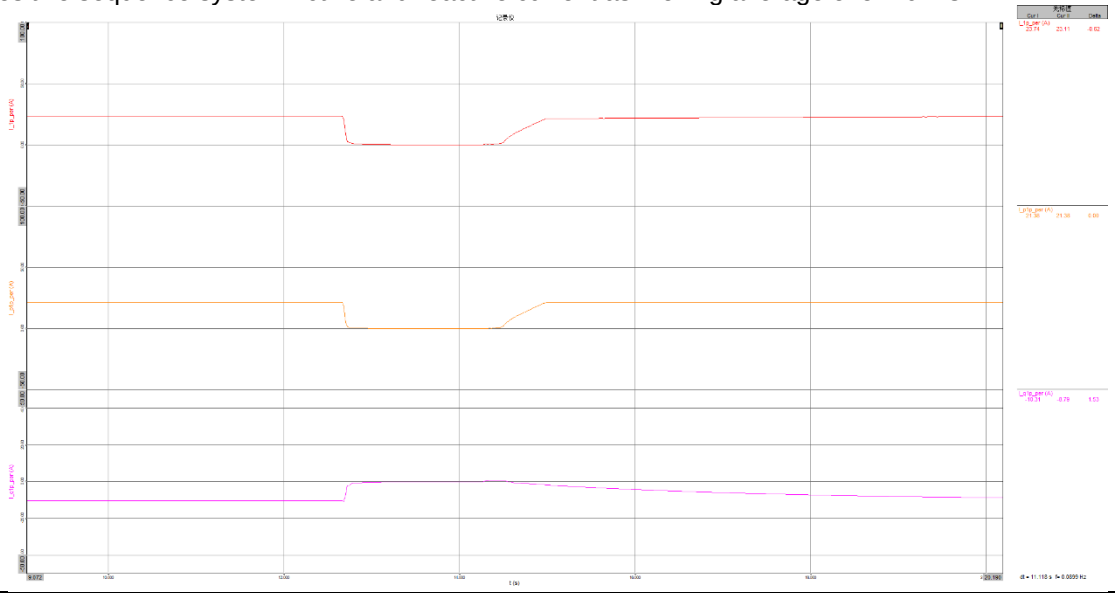
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	3.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:32:40 to 11:33:00
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14708
	7	Fault clearance(t2)	Fault Phase	-	[ms]	16322
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1594
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.499
	10		L2-N		[p.u.]	0.499
	11		L3-N		[p.u.]	0.499
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.501
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.229
	20		L2	t1-10s to t1	[p.u.]	0.228
	21		L3	t1-10s to t1	[p.u.]	0.226
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.226
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.095
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.095

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.205
	27	Active power	Total	t1-10s to t1	[p.u.]	0.205
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.205
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.099
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.095
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.500
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.500
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.500
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.500
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.059
	41		L2	t1+60ms	[p.u.]	0.075
	42		L3	t1+60ms	[p.u.]	0.064
	43		L1	t1+100ms	[p.u.]	0.045
	44		L2	t1+100ms	[p.u.]	0.061
	45		L3	t1+100ms	[p.u.]	0.059
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.045
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.061
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.059
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.020
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.001
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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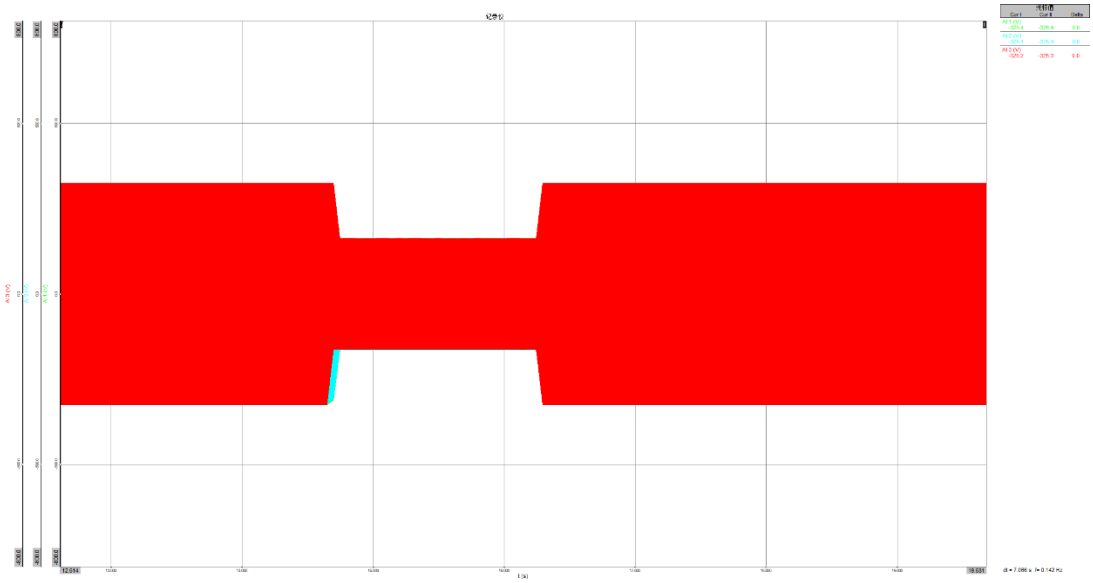
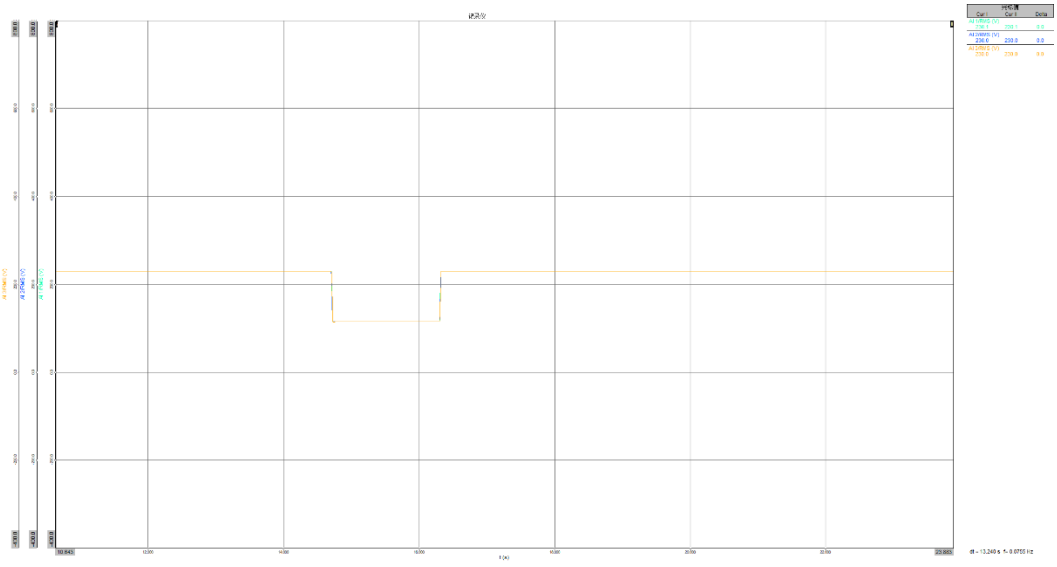
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.206
	58		Pos	t2+3s to t2+10s	[p.u.]	0.206
	59	Active power recover time	Total	-	[ms]	253
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.083
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.079
	62	Reactive power recover time	Total	-	[ms]	8532

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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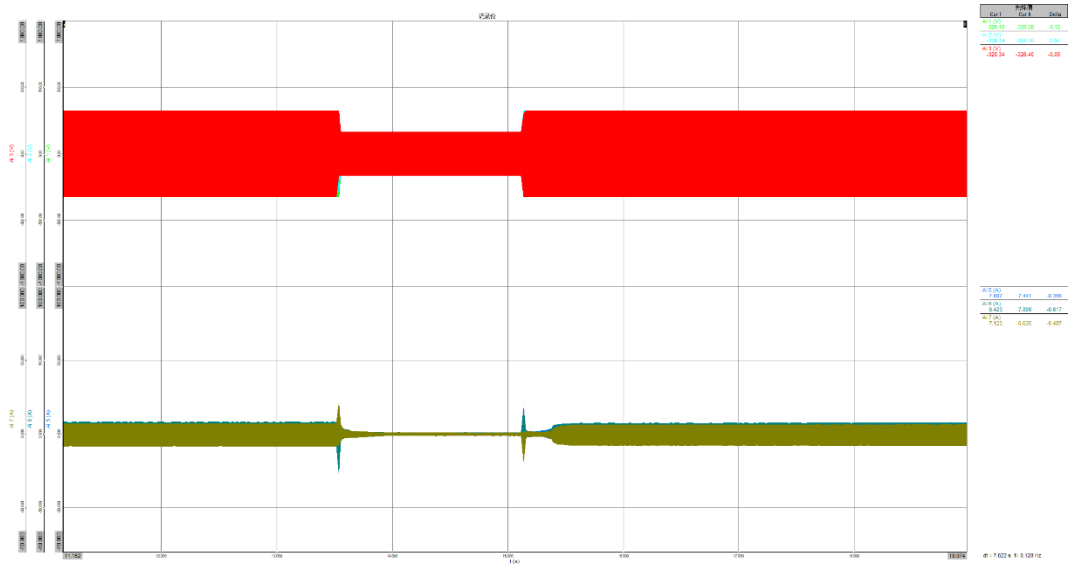
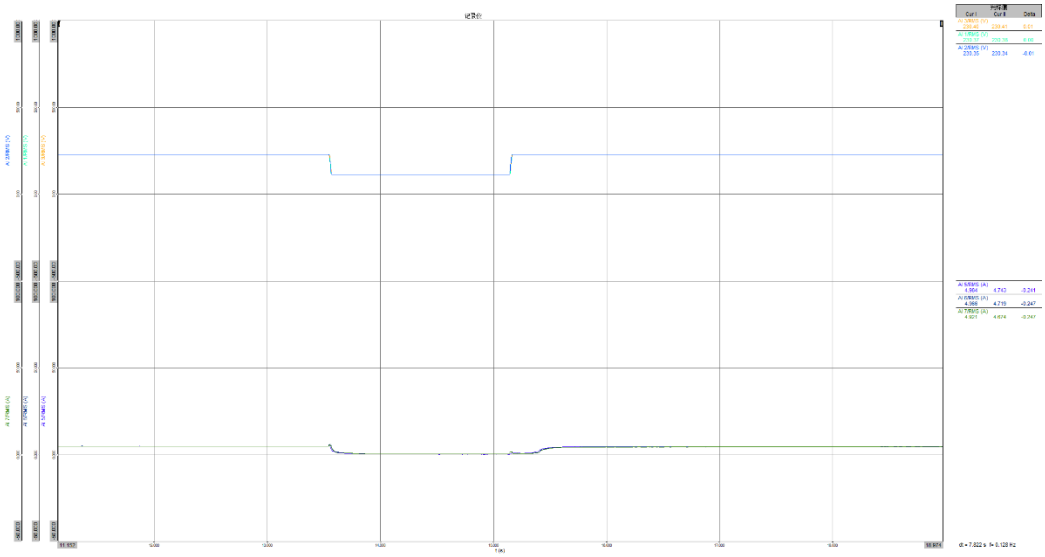
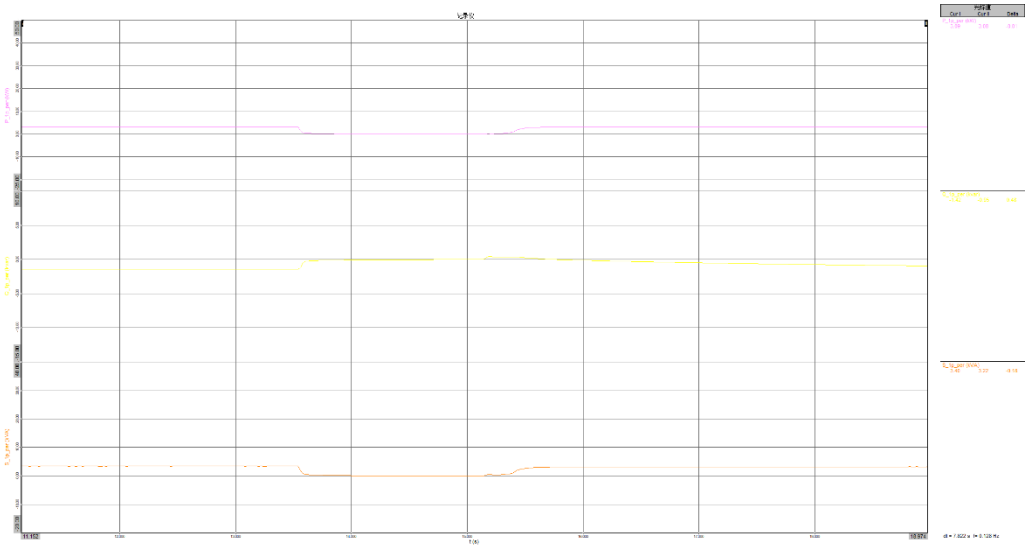
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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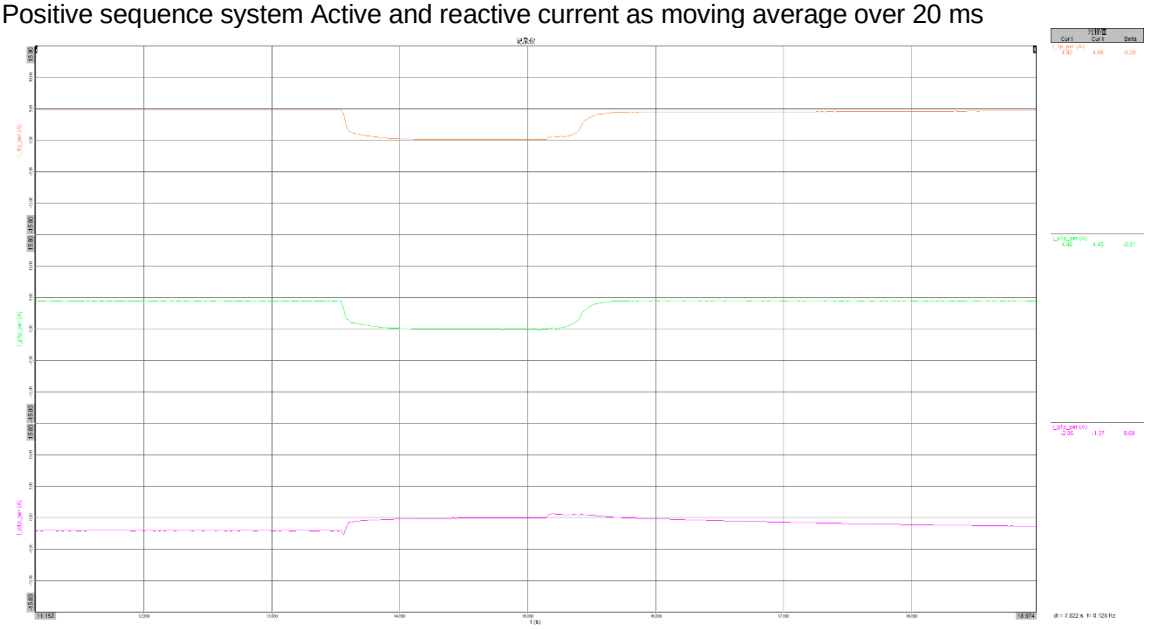
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	3.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:34:40 to 11:37:00
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	12736
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14346
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1590
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.090
	10		L2-N		[p.u.]	0.449
	11		L3-N		[p.u.]	0.090
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.210
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	1.093
	20		L2	t1-10s to t1	[p.u.]	1.097
	21		L3	t1-10s to t1	[p.u.]	1.099
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.089
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.474
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.450

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.913
	27	Active power	Total	t1-10s to t1	[p.u.]	0.982
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.982
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.476
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.475
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.909
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.550
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.909
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.790
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.052
	41		L2	t1+60ms	[p.u.]	0.114
	42		L3	t1+60ms	[p.u.]	0.088
	43		L1	t1+100ms	[p.u.]	0.039
	44		L2	t1+100ms	[p.u.]	0.067
	45		L3	t1+100ms	[p.u.]	0.054
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.039
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.067
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.054
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.022
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.004
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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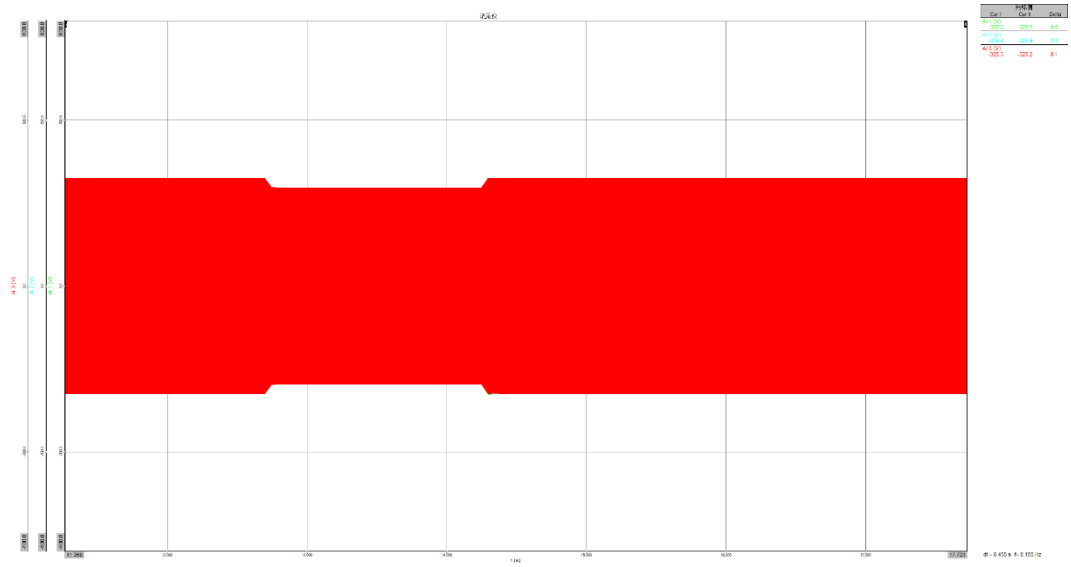
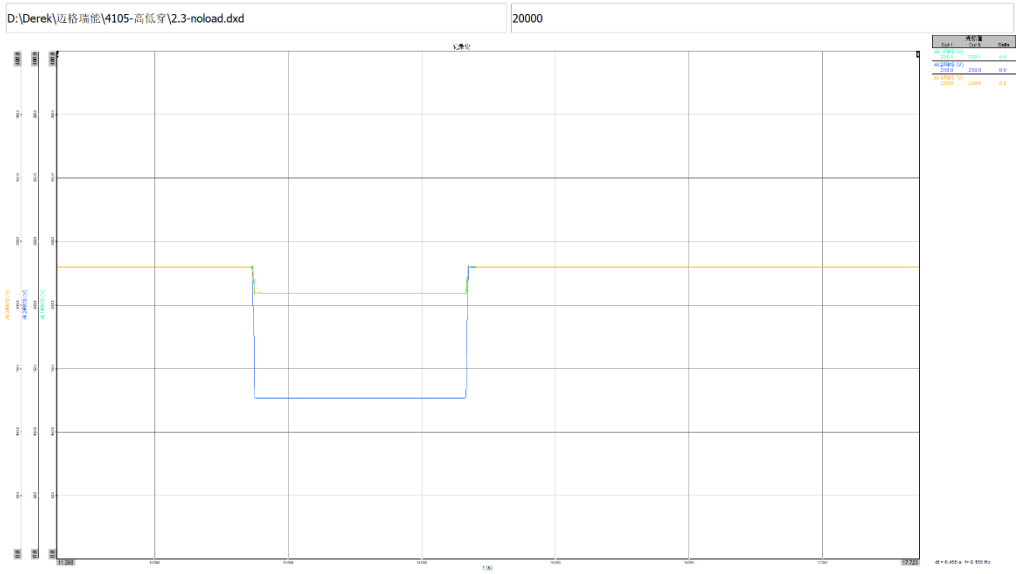
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.990
	58		Pos	t2+3s to t2+10s	[p.u.]	0.990
	59	Active power recover time	Total	-	[ms]	495
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.411
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.409
	62	Reactive power recover time	Total	-	[ms]	8602

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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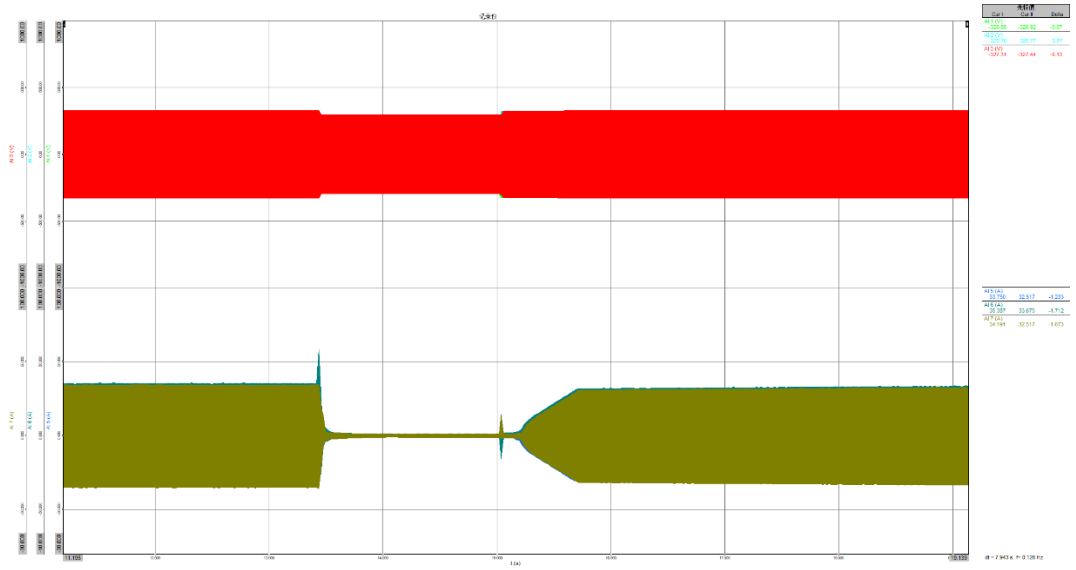
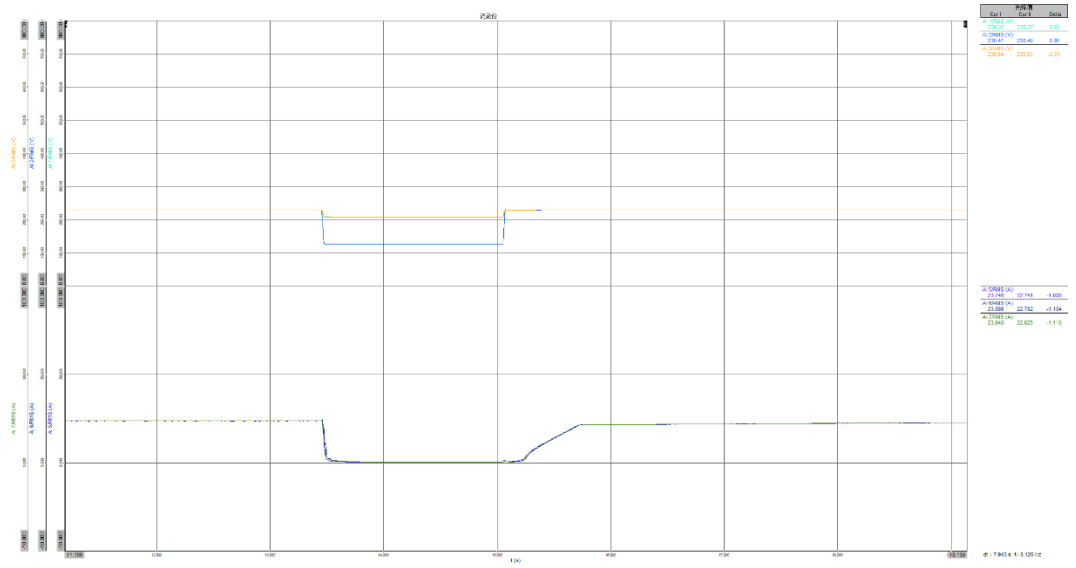
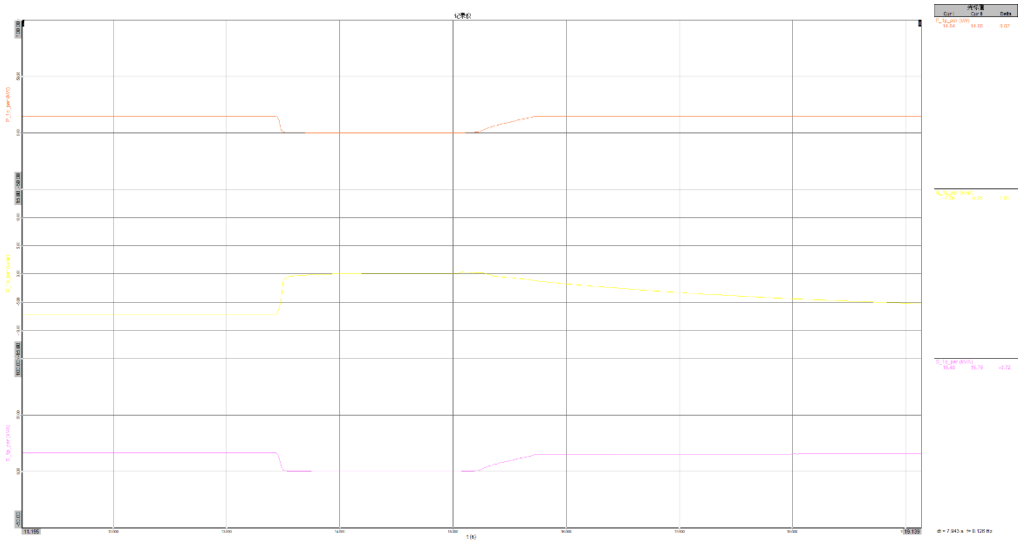
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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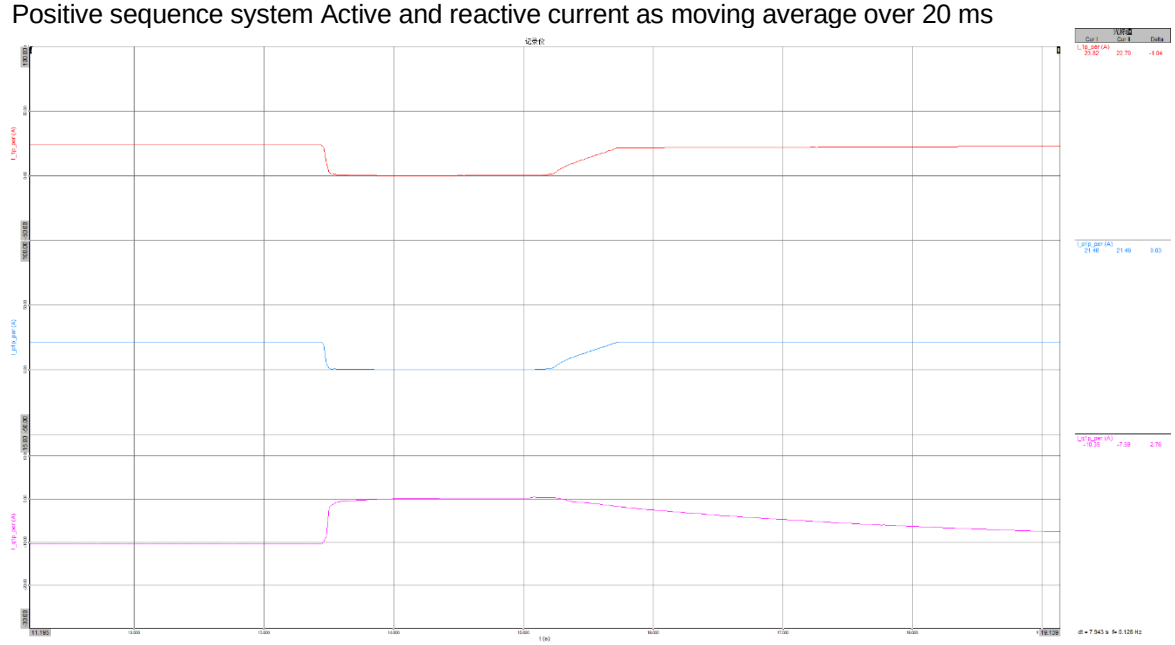
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	3.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	11:38:40 to 11:40:00
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	12736
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14346
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	1590
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.090
	10		L2-N		[p.u.]	0.449
	11		L3-N		[p.u.]	0.090
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.223
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.224
	20		L2	t1-10s to t1	[p.u.]	0.222
	21		L3	t1-10s to t1	[p.u.]	0.220
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.221
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.095
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.095

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.199
	27	Active power	Total	t1-10s to t1	[p.u.]	0.199
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.199
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.099
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.095
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.909
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.550
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.909
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.778
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.036
	41		L2	t1+60ms	[p.u.]	0.071
	42		L3	t1+60ms	[p.u.]	0.054
	43		L1	t1+100ms	[p.u.]	0.034
	44		L2	t1+100ms	[p.u.]	0.053
	45		L3	t1+100ms	[p.u.]	0.048
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.034
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.053
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.048
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.024
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.004
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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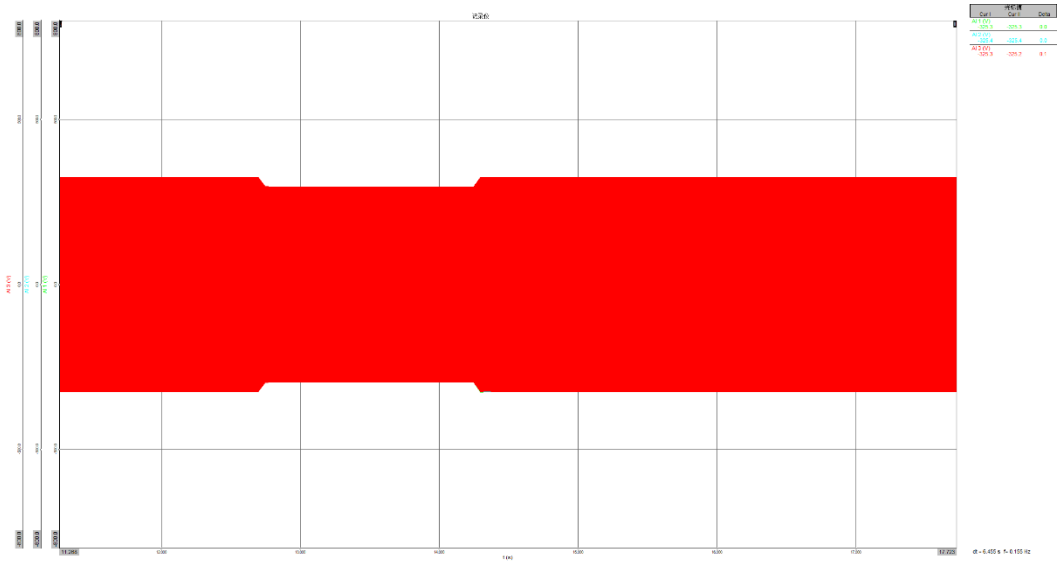
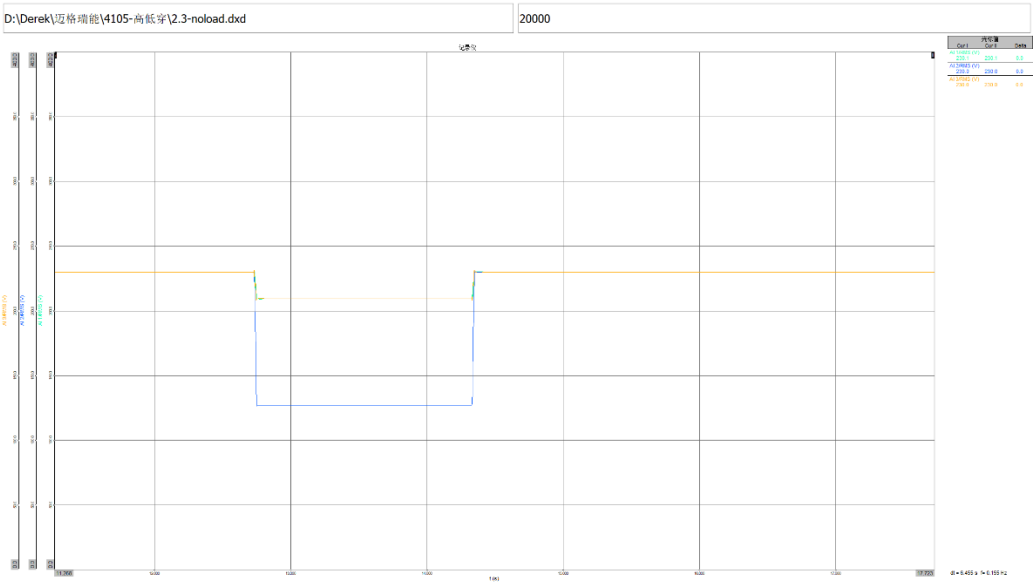
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.200
	58		Pos	t2+3s to t2+10s	[p.u.]	0.200
	59	Active power recover time	Total	-	[ms]	175
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.083
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.079
	62	Reactive power recover time	Total	-	[ms]	8854

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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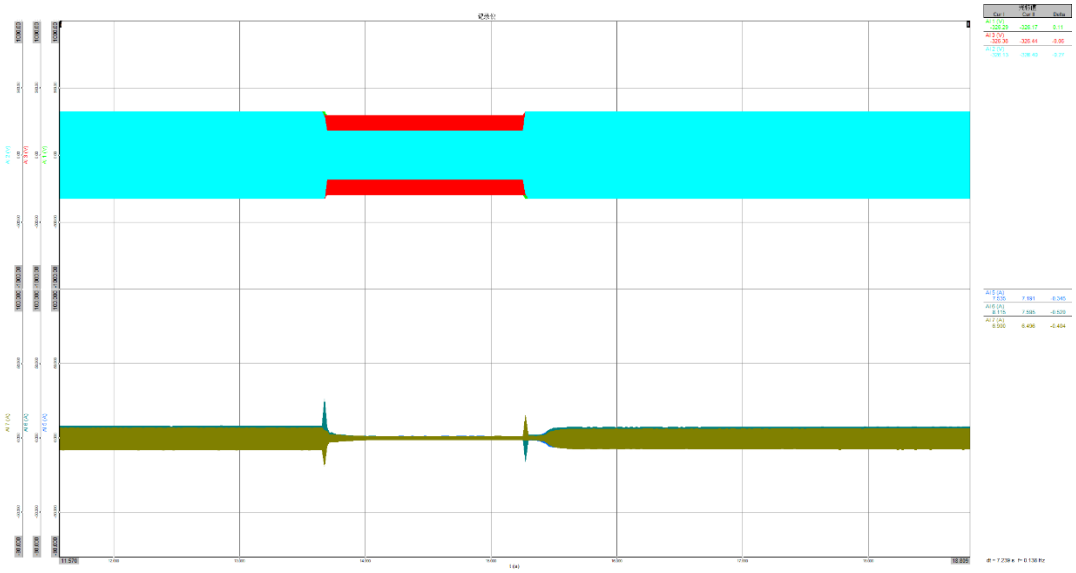
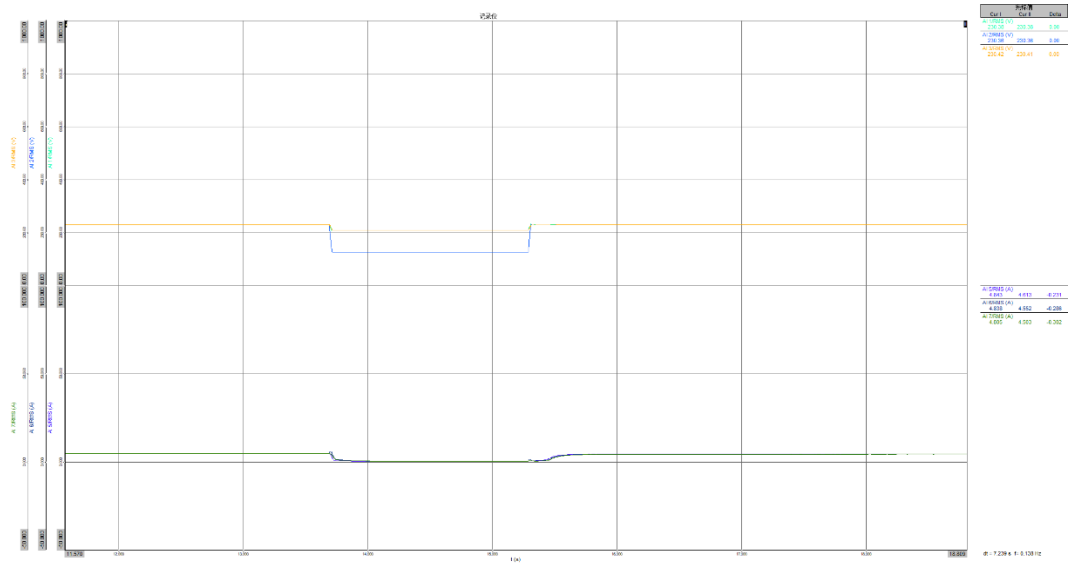
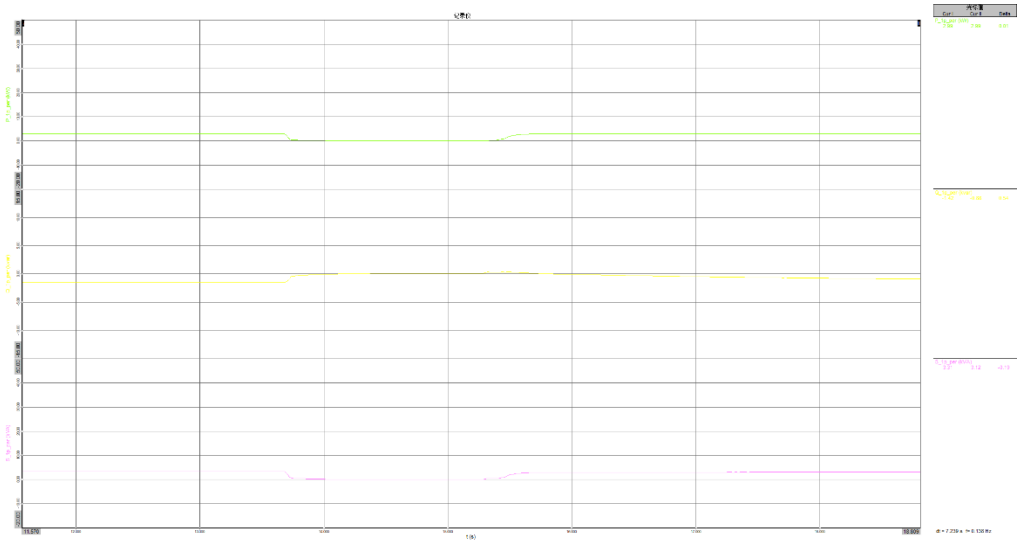
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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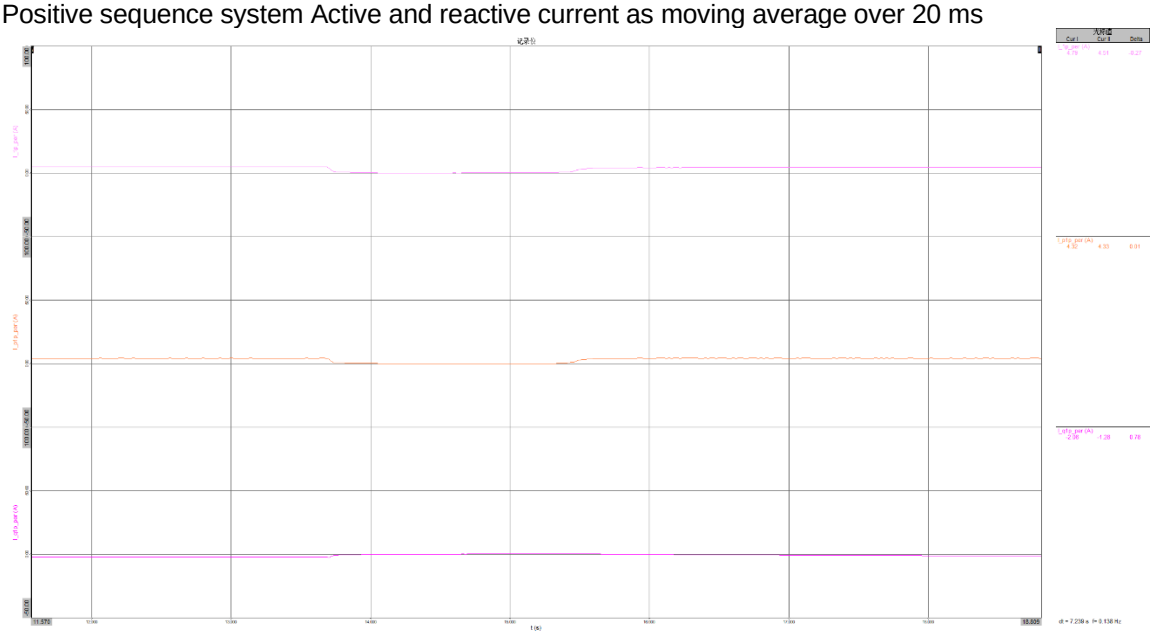
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	4.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:11:40 to 12:15:00
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	15250
	7	Fault clearance(t2)	Fault Phase	-	[ms]	76250
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.149
	10		L2-N		[p.u.]	0.149
	11		L3-N		[p.u.]	0.149
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.145
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.998
	20		L2	t1-10s to t1	[p.u.]	1.007
	21		L3	t1-10s to t1	[p.u.]	1.004
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.003
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.016
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.016

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.998
	27	Active power	Total	t1-10s to t1	[p.u.]	0.999
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.999
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.016
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.857
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.857
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.859
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.858
	40	Momentary Current	L1	t1+60ms	[p.u.]	1.004
	41		L2	t1+60ms	[p.u.]	1.000
	42		L3	t1+60ms	[p.u.]	1.032
	43		L1	t1+100ms	[p.u.]	1.079
	44		L2	t1+100ms	[p.u.]	1.083
	45		L3	t1+100ms	[p.u.]	1.085
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	1.103
	47		L2	t1+100ms to t2-20ms	[p.u.]	1.112
	48		L3	t1+100ms to t2-20ms	[p.u.]	1.109
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.943
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.940
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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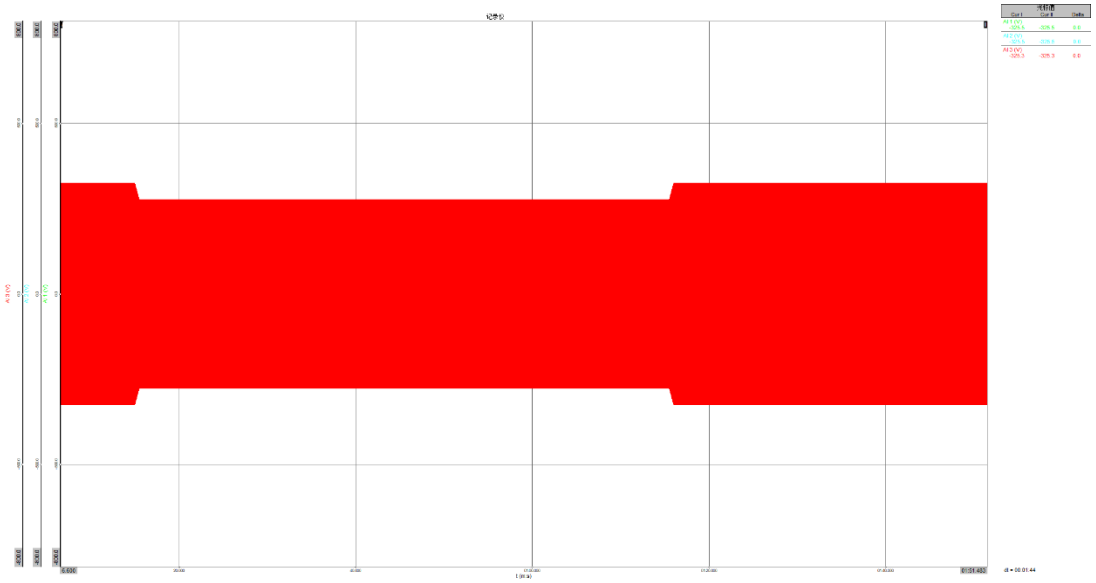
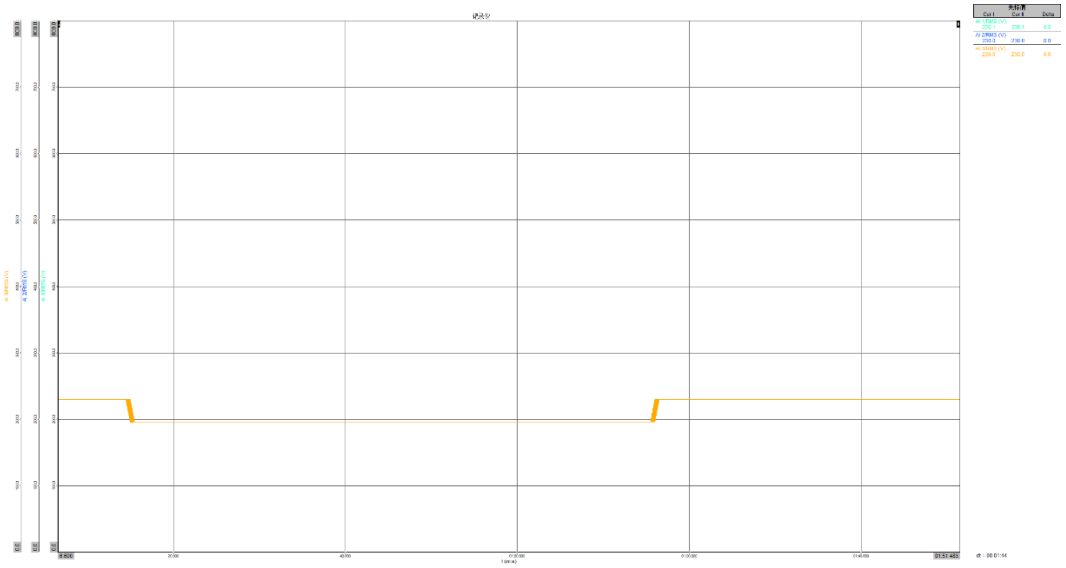
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.999
	58		Pos	t2+3s to t2+10s	[p.u.]	1.000
	59	Active power recover time	Total	-	[ms]	7
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.011
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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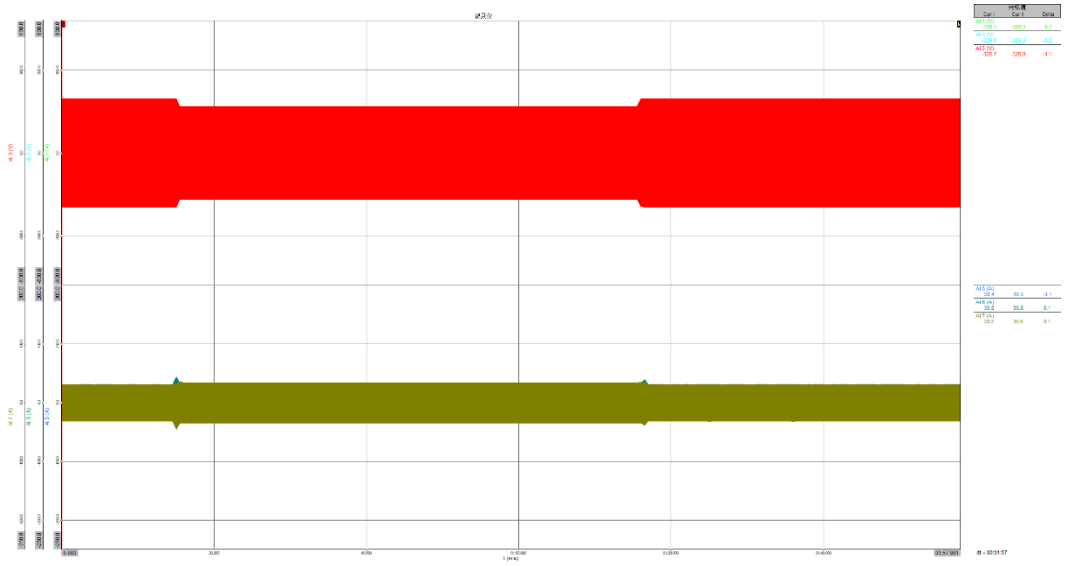
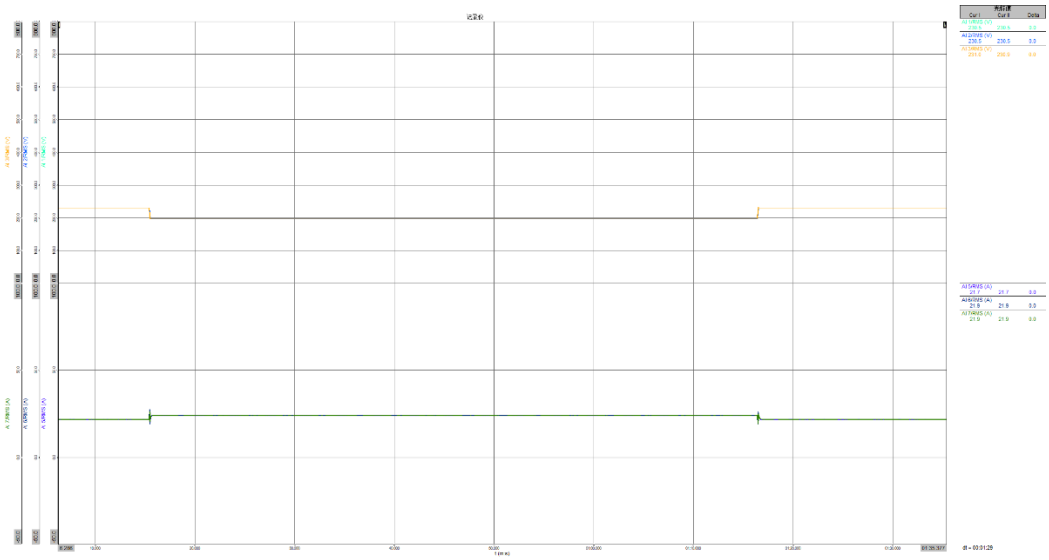
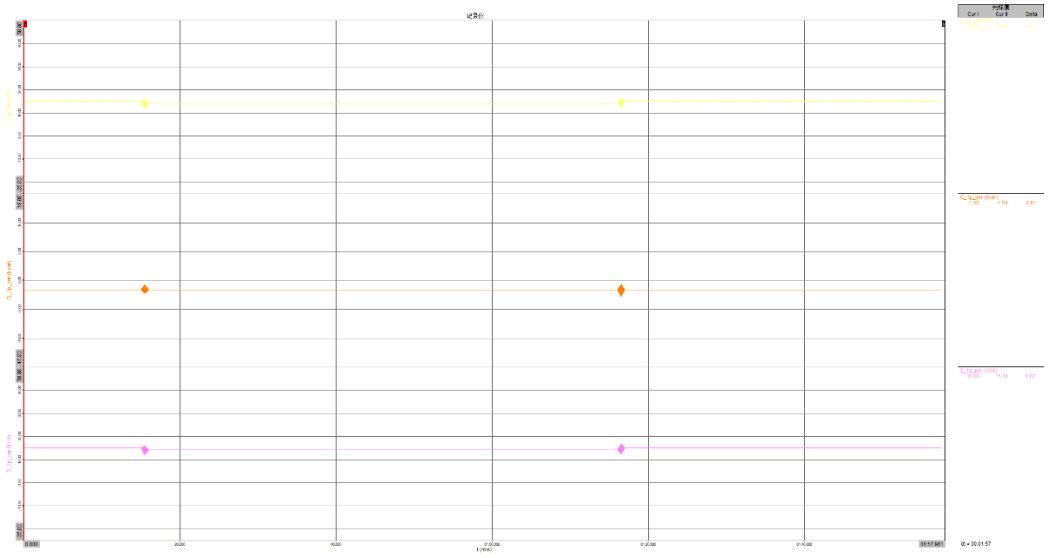
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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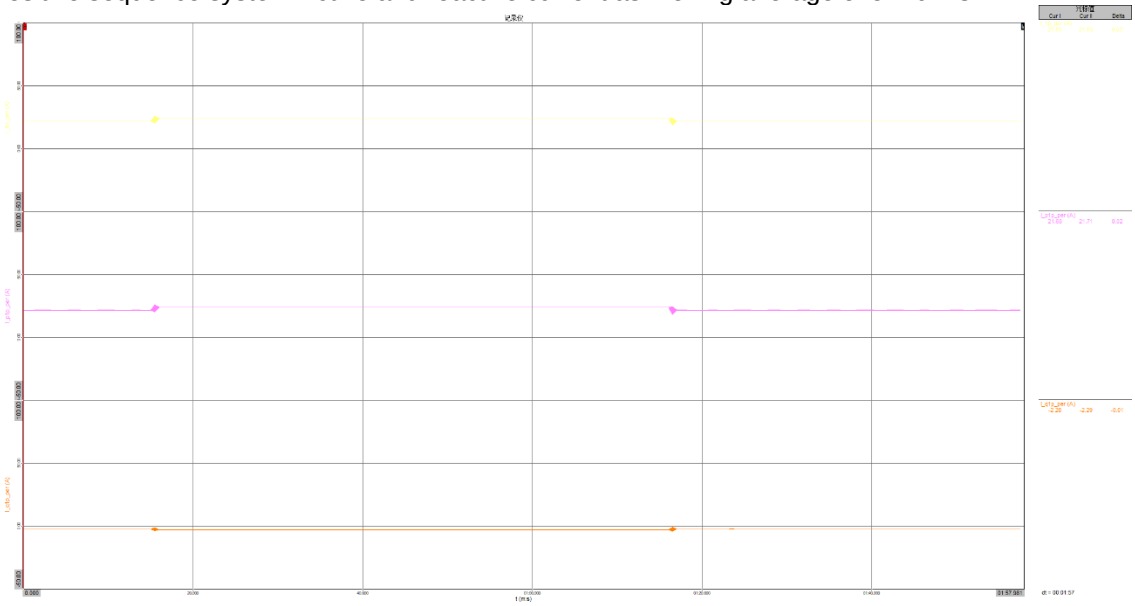
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	4.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:16:40 to 12:19:00
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	15250
	7	Fault clearance(t2)	Fault Phase	-	[ms]	76250
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.149
	10		L2-N		[p.u.]	0.149
	11		L3-N		[p.u.]	0.149
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.143
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.001
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.196
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.200
	27	Active power	Total	t1-10s to t1	[p.u.]	0.198
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.858
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.858
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.858
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.858
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.164
	41		L2	t1+60ms	[p.u.]	0.154
	42		L3	t1+60ms	[p.u.]	0.182
	43		L1	t1+100ms	[p.u.]	0.200
	44		L2	t1+100ms	[p.u.]	0.189
	45		L3	t1+100ms	[p.u.]	0.191
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.239
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.236
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.232
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.200
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.198
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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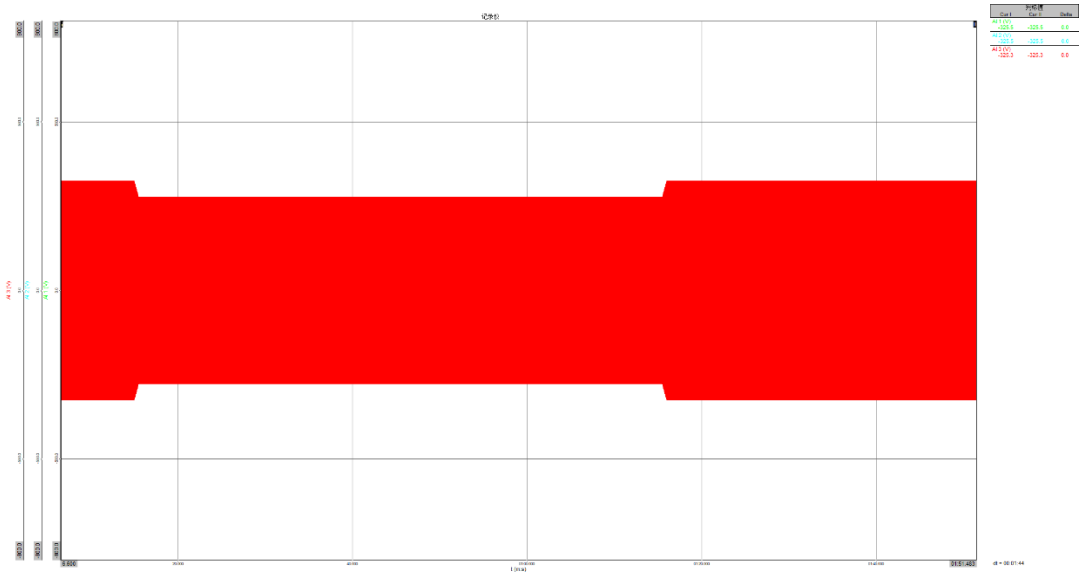
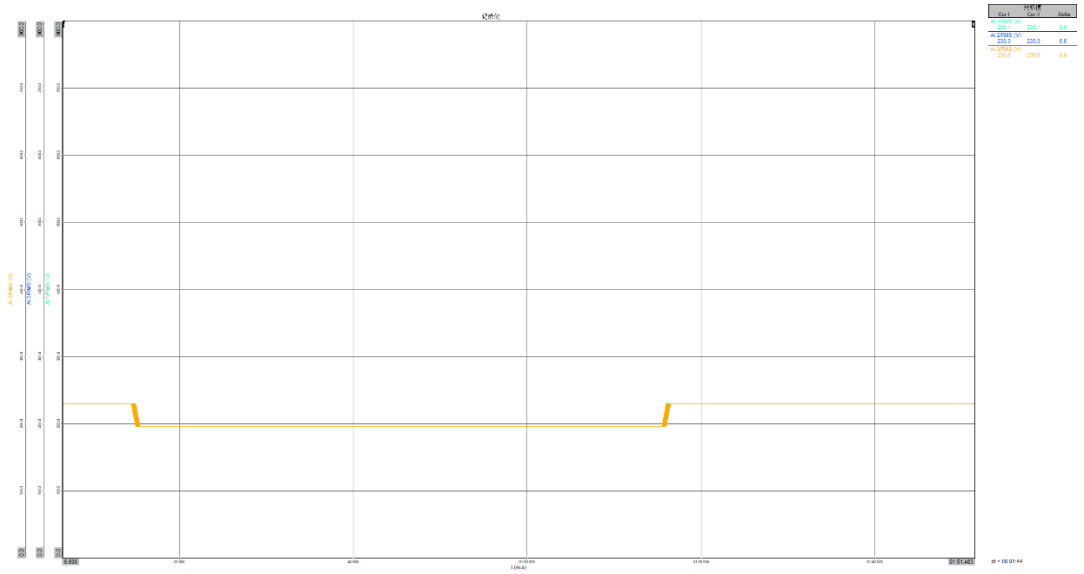
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.001
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.198
	58		Pos	t2+3s to t2+10s	[p.u.]	0.198
	59	Active power recover time	Total	-	[ms]	8
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.026
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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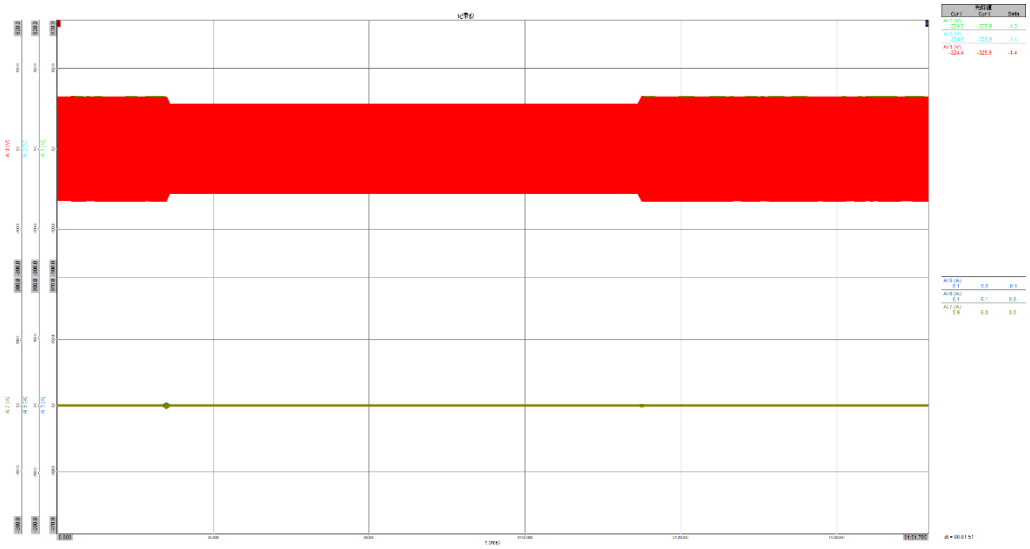
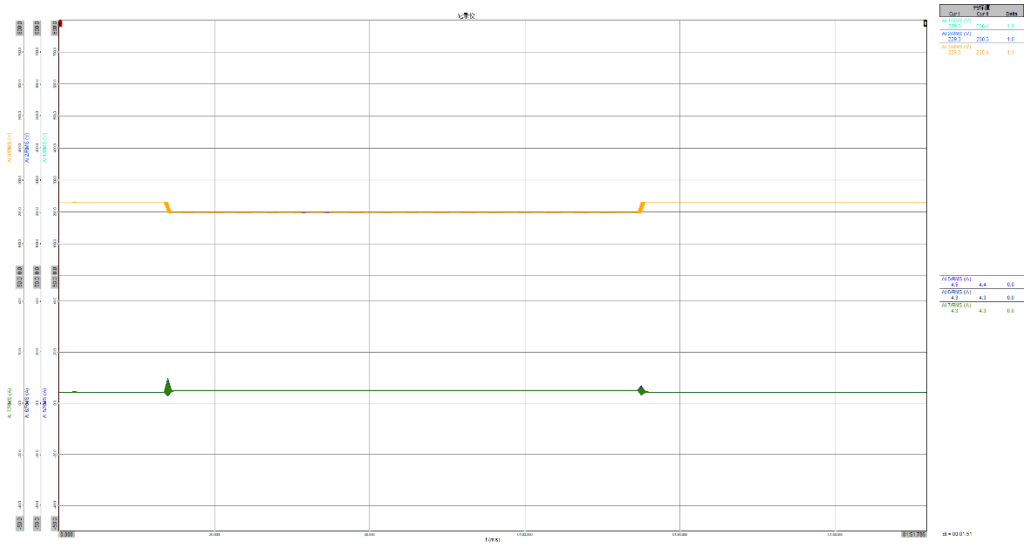
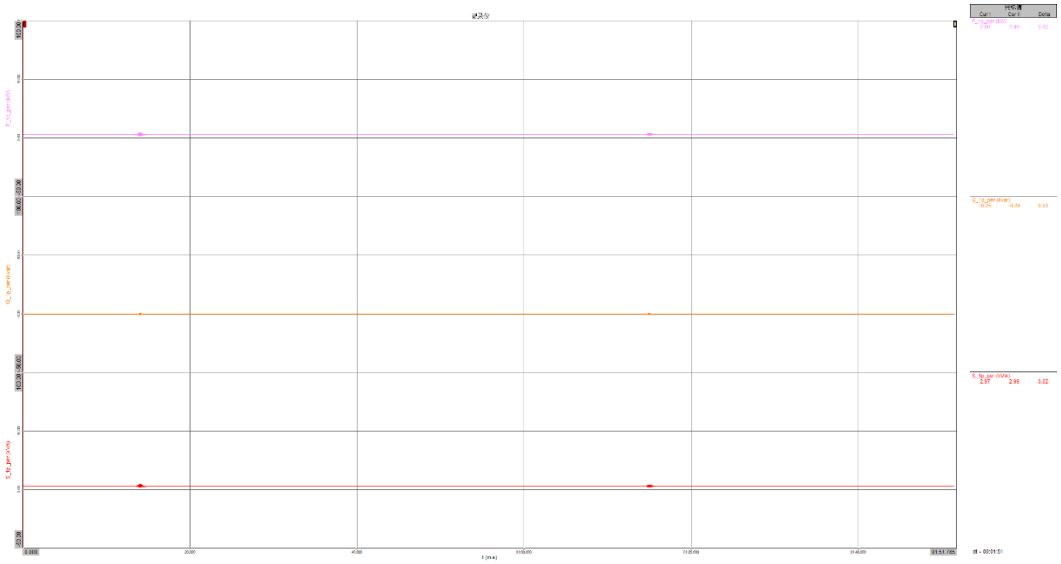
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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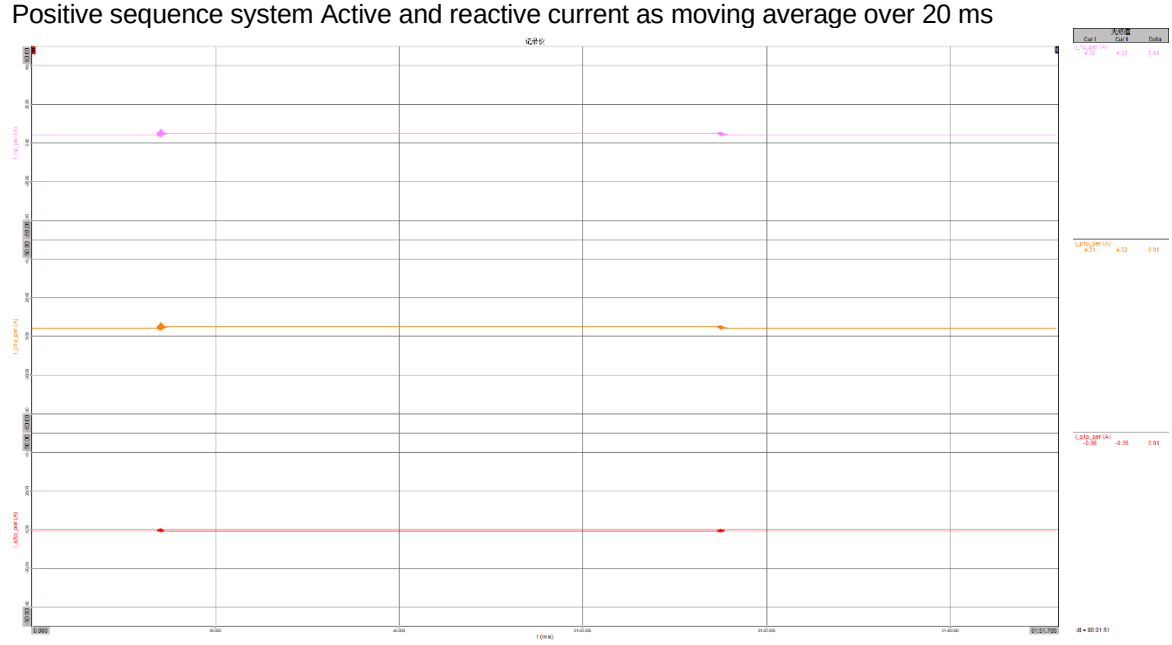
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	4.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:20:40 to 12:23:00
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	13208
	7	Fault clearance(t2)	Fault Phase	-	[ms]	74208
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.034
	10		L2-N		[p.u.]	0.150
	11		L3-N		[p.u.]	0.034
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.069
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.997
	20		L2	t1-10s to t1	[p.u.]	1.010
	21		L3	t1-10s to t1	[p.u.]	1.007
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.010
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.018
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	1.053
	27	Active power	Total	t1-10s to t1	[p.u.]	1.001
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.999
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.963
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.850
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.963
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.926
	40	Momentary Current	L1	t1+60ms	[p.u.]	1.014
	41		L2	t1+60ms	[p.u.]	1.041
	42		L3	t1+60ms	[p.u.]	1.052
	43		L1	t1+100ms	[p.u.]	1.024
	44		L2	t1+100ms	[p.u.]	1.091
	45		L3	t1+100ms	[p.u.]	1.037
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	1.039
	47		L2	t1+100ms to t2-20ms	[p.u.]	1.115
	48		L3	t1+100ms to t2-20ms	[p.u.]	1.056
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.981
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.980
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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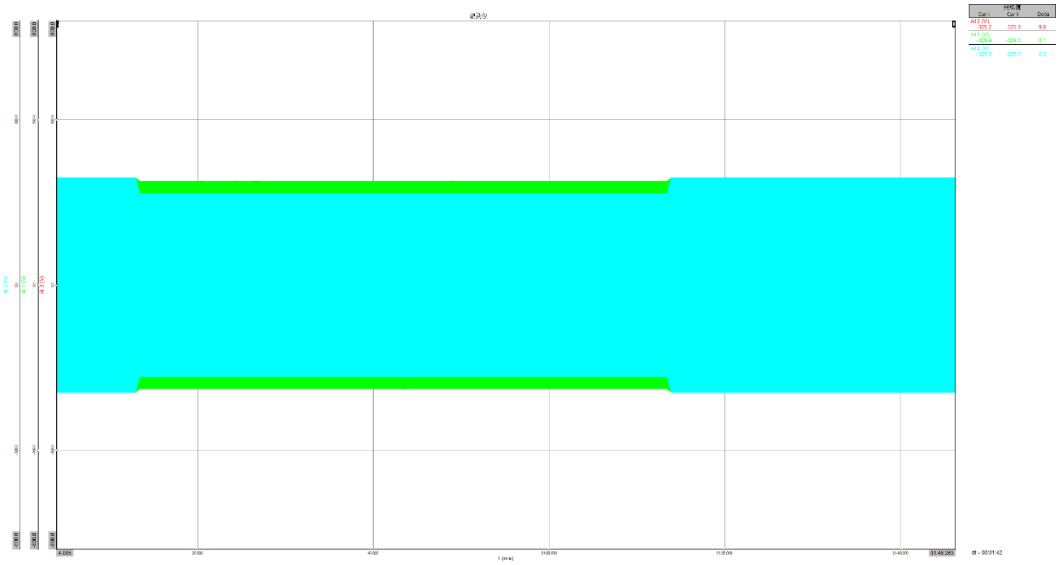
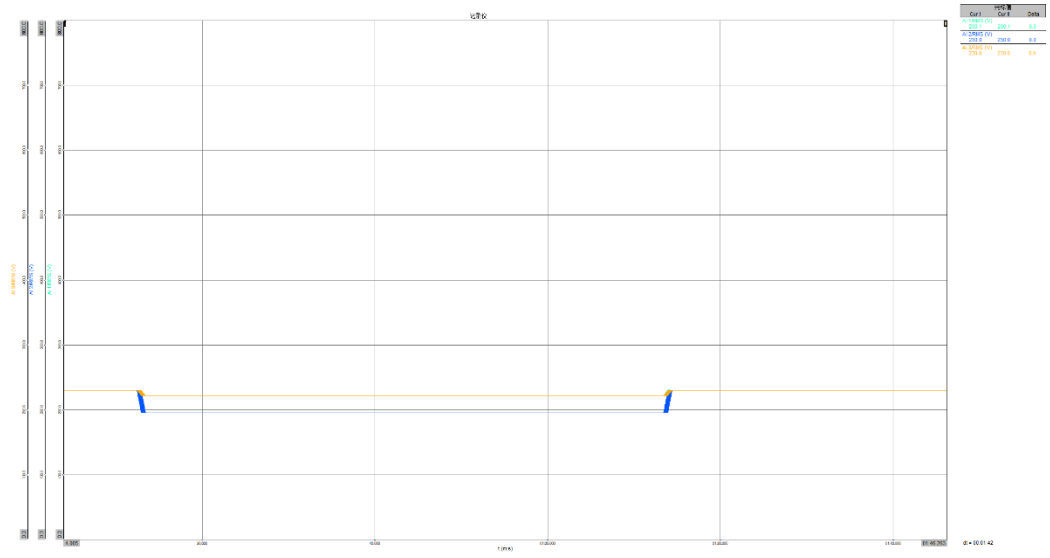
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.001
	58		Pos	t2+3s to t2+10s	[p.u.]	1.001
	59	Active power recover time	Total	-	[ms]	20
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.111
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.107
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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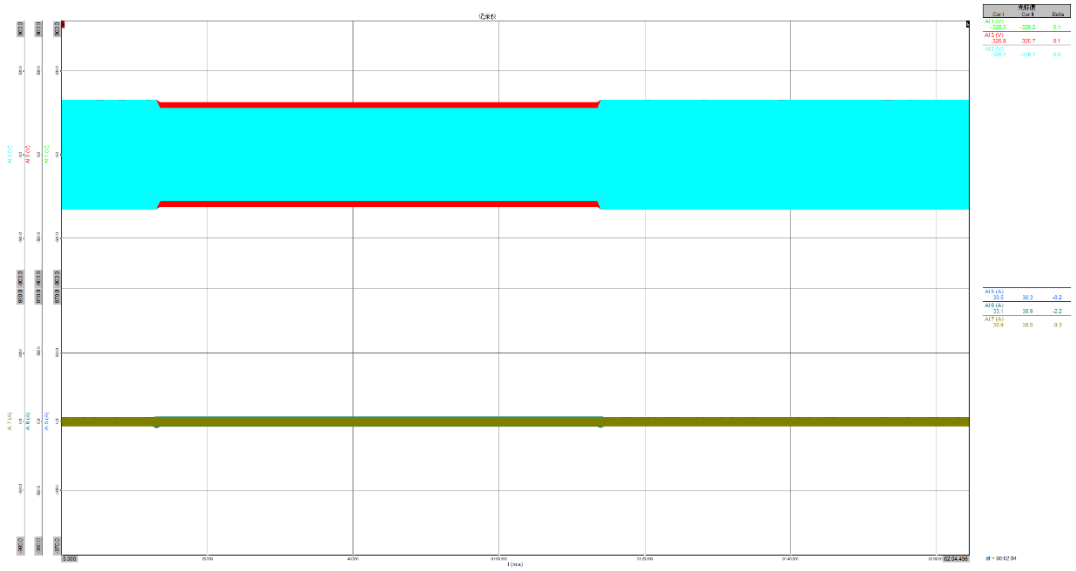
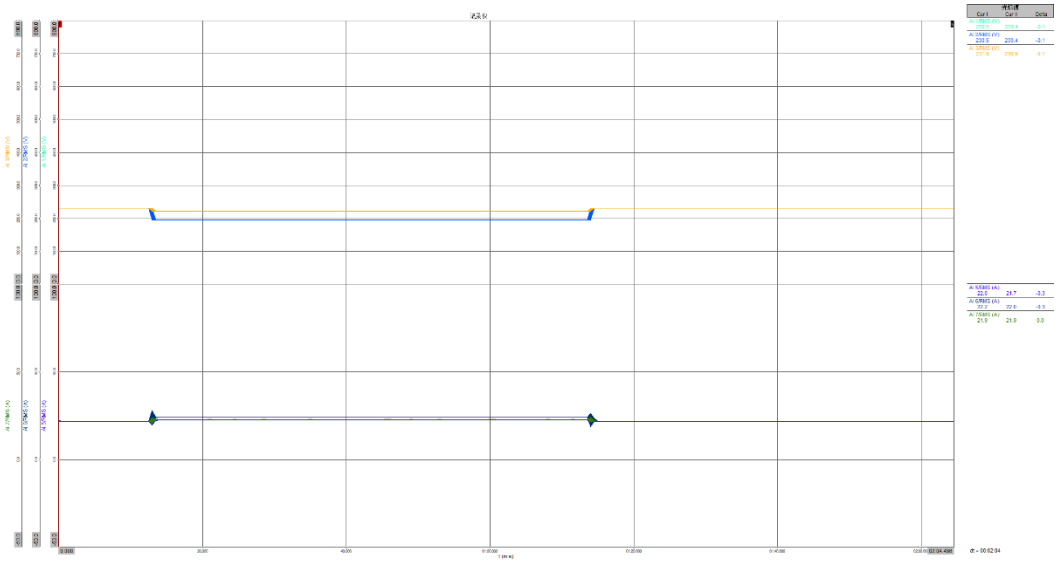
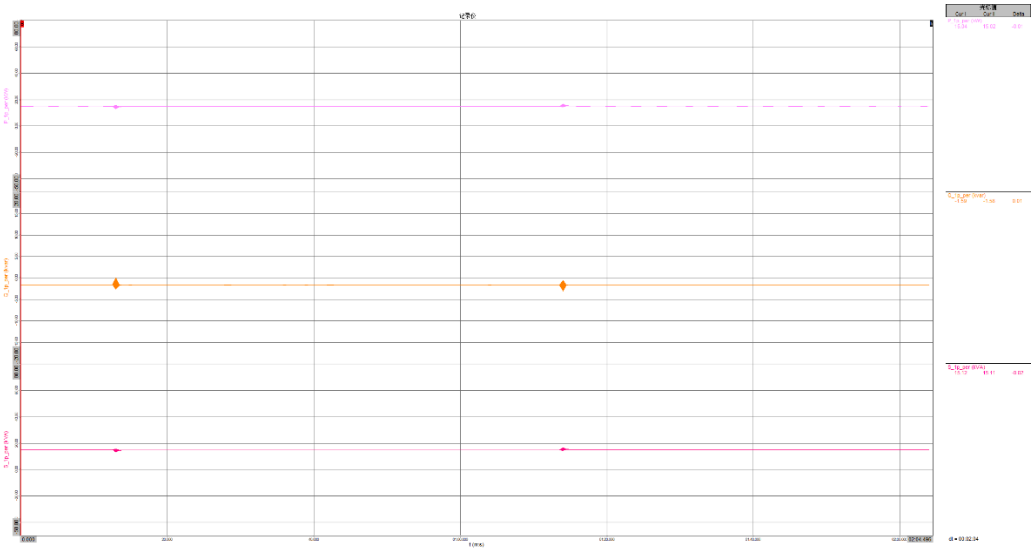
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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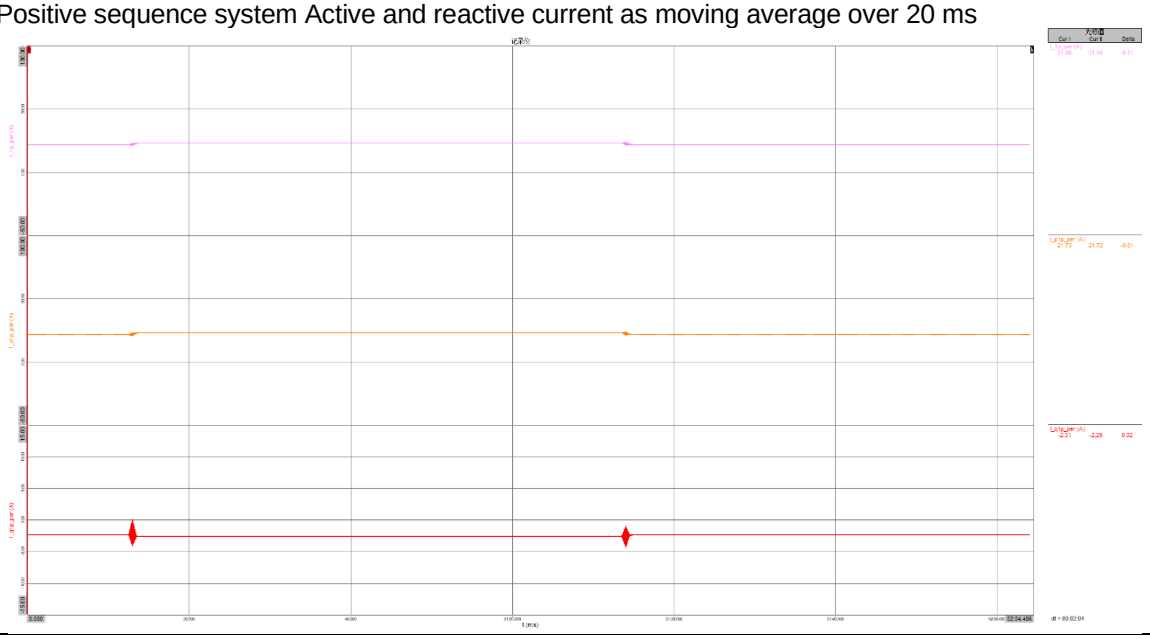
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	4.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:24:40 to 12:27:00
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	13208
	7	Fault clearance(t2)	Fault Phase	-	[ms]	74208
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.034
	10		L2-N		[p.u.]	0.150
	11		L3-N		[p.u.]	0.034
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.074
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.001
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.001
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.196
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.199
	27	Active power	Total	t1-10s to t1	[p.u.]	0.198
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	0.966
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	0.852
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	0.966
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	0.927
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.194
	41		L2	t1+60ms	[p.u.]	0.160
	42		L3	t1+60ms	[p.u.]	0.212
	43		L1	t1+100ms	[p.u.]	0.200
	44		L2	t1+100ms	[p.u.]	0.196
	45		L3	t1+100ms	[p.u.]	0.197
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.211
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.239
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.208
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.200
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.199
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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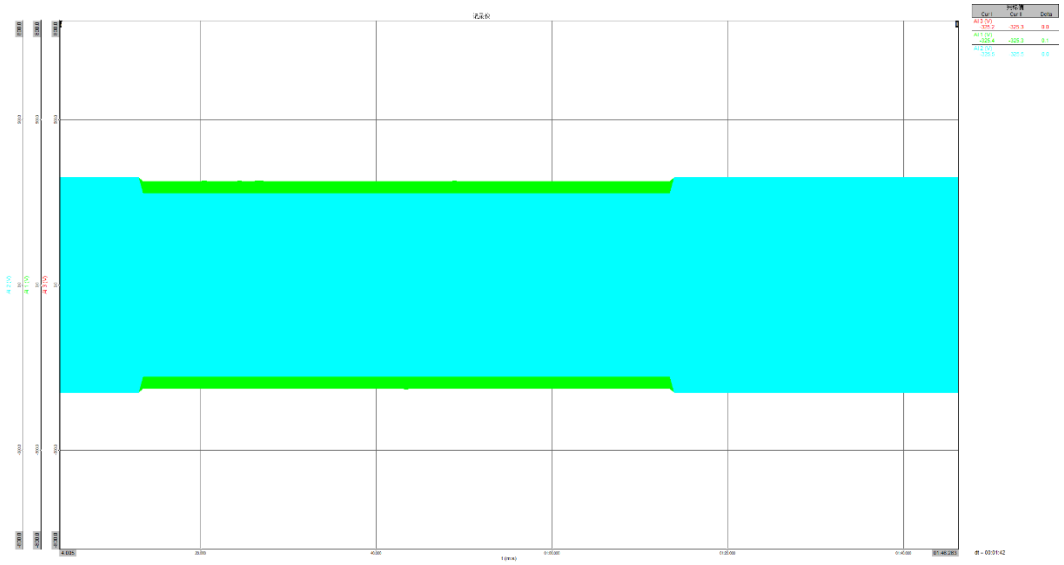
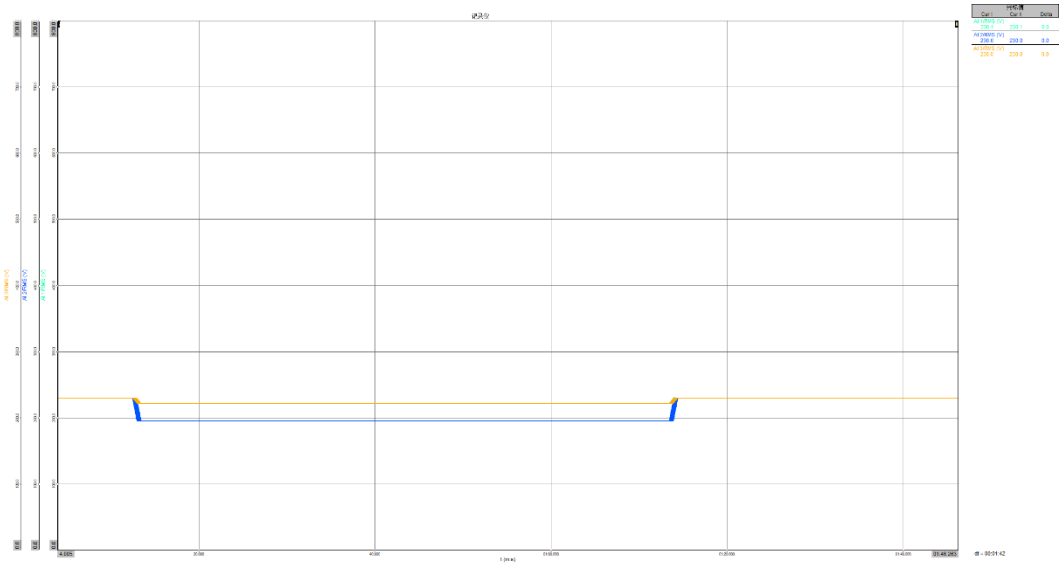
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.001
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.198
	58		Pos	t2+3s to t2+10s	[p.u.]	0.198
	59	Active power recover time	Total	-	[ms]	21
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.026
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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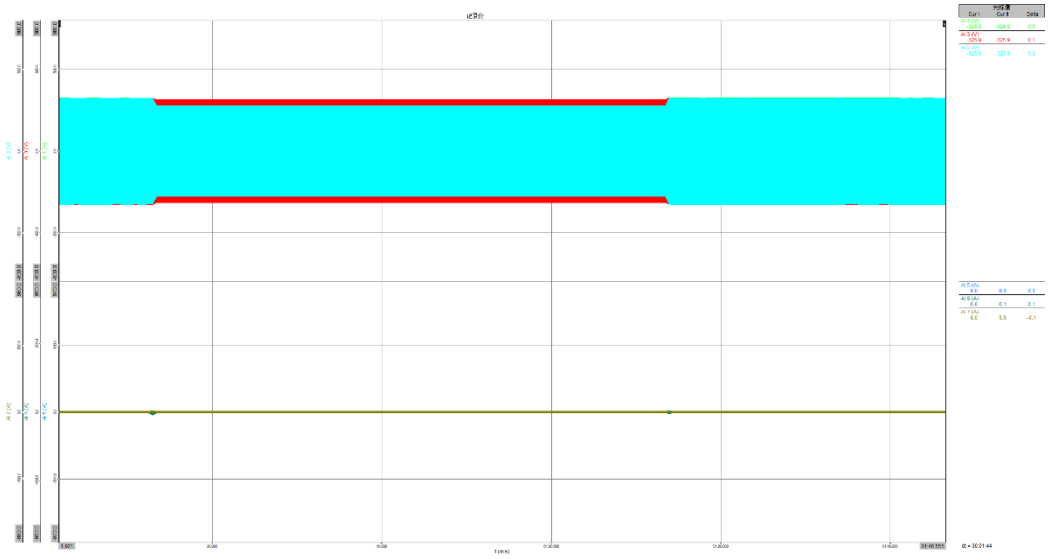
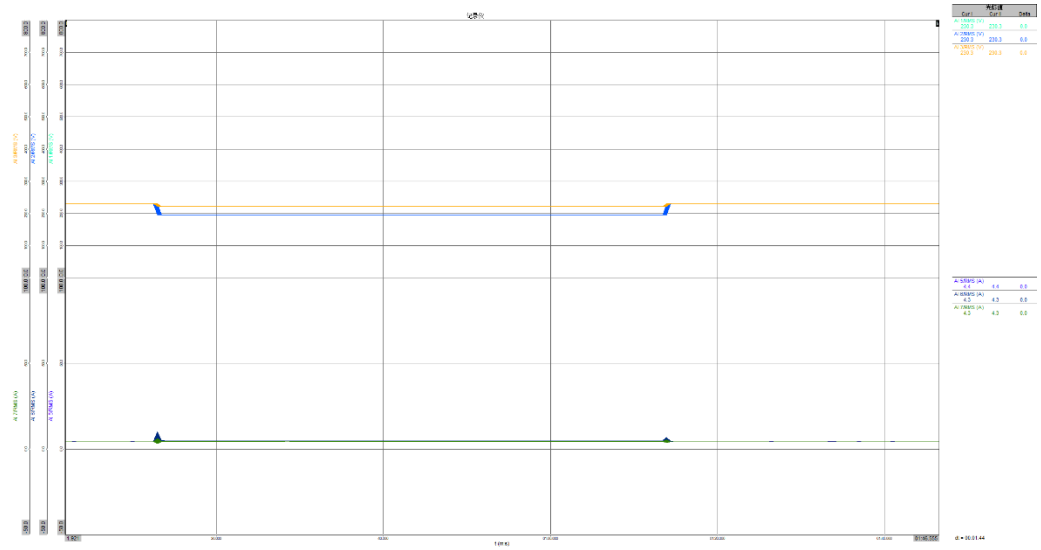
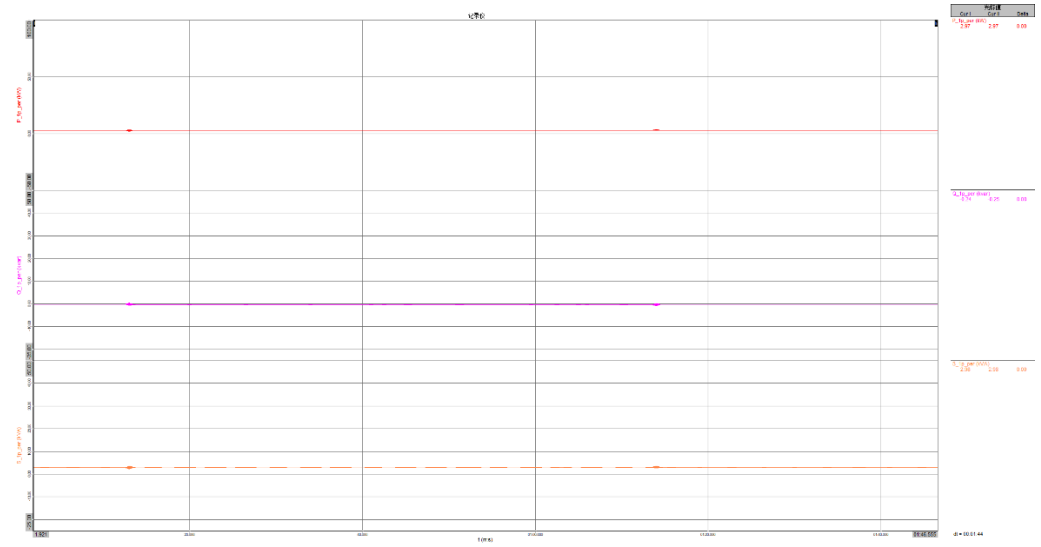
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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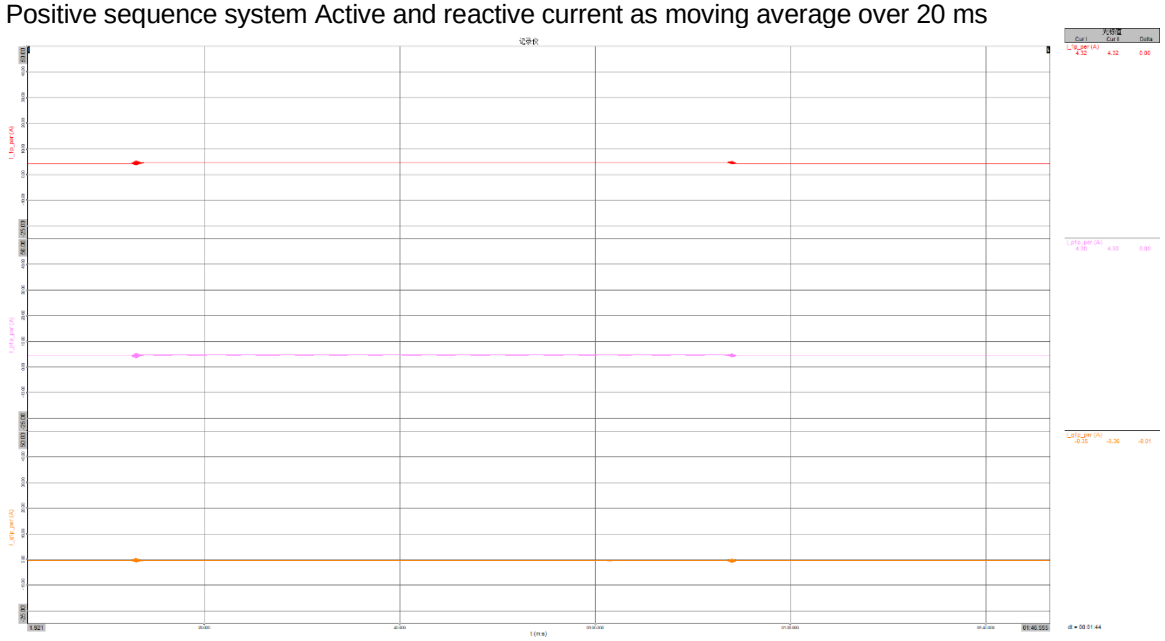
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	5.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:30:33 to 12:33:47
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14618
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14742
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	104
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.201
	10		L2-N		[p.u.]	0.201
	11		L3-N		[p.u.]	0.201
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.240
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.999
	20		L2	t1-10s to t1	[p.u.]	1.009
	21		L3	t1-10s to t1	[p.u.]	1.007
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.004
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.997
	27	Active power	Total	t1-10s to t1	[p.u.]	1.001
	29		Pos. seq.	t1-10s to t1	[p.u.]	1.001
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.244
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.244
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.244
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.242
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.122
	41		L2	t1+60ms	[p.u.]	0.096
	42		L3	t1+60ms	[p.u.]	0.103
	43		L1	t1+100ms	[p.u.]	0.050
	44		L2	t1+100ms	[p.u.]	0.038
	45		L3	t1+100ms	[p.u.]	0.046
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.050
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.040
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.048
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.075
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.048
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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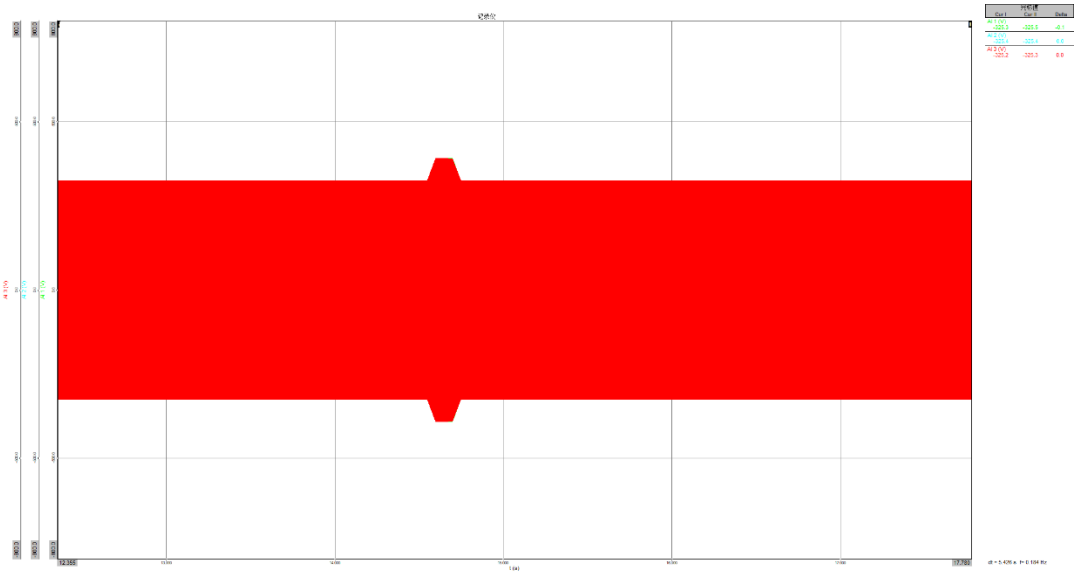
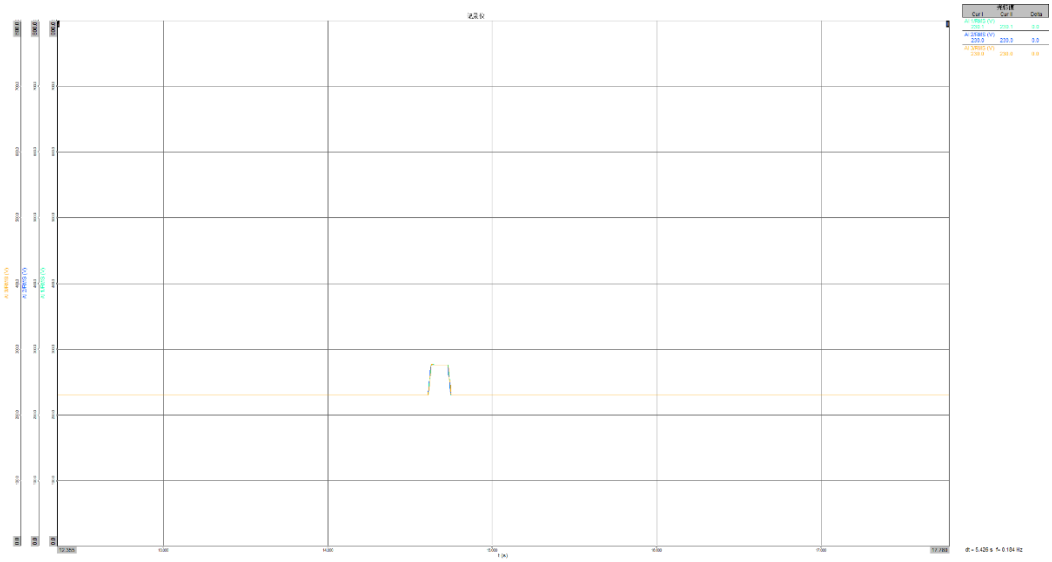
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.001
	58		Pos	t2+3s to t2+10s	[p.u.]	1.001
	59	Active power recover time	Total	-	[ms]	174
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.019
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.015
	62	Reactive power recover time	Total	-	[ms]	17

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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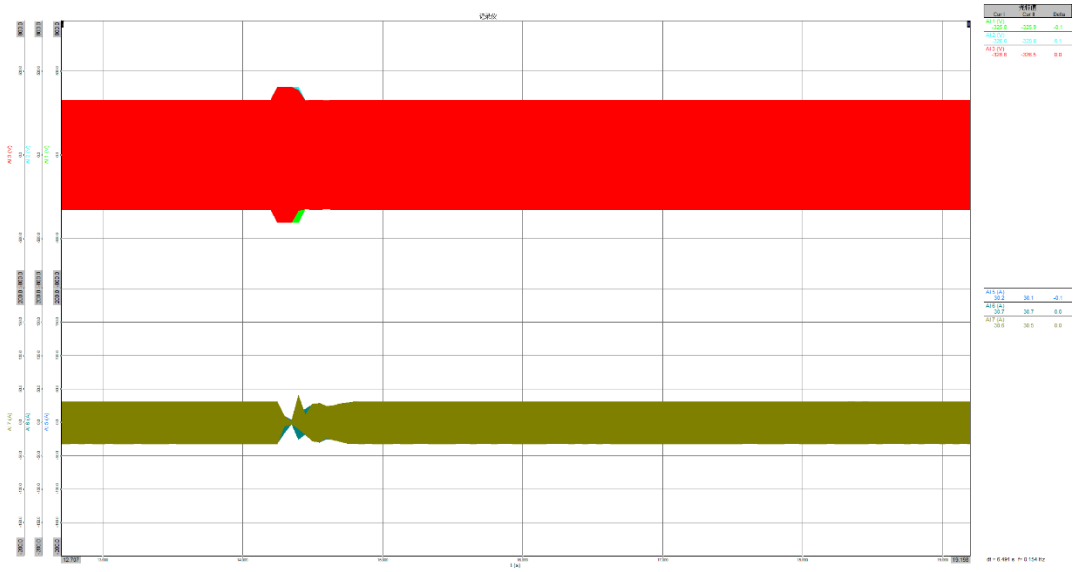
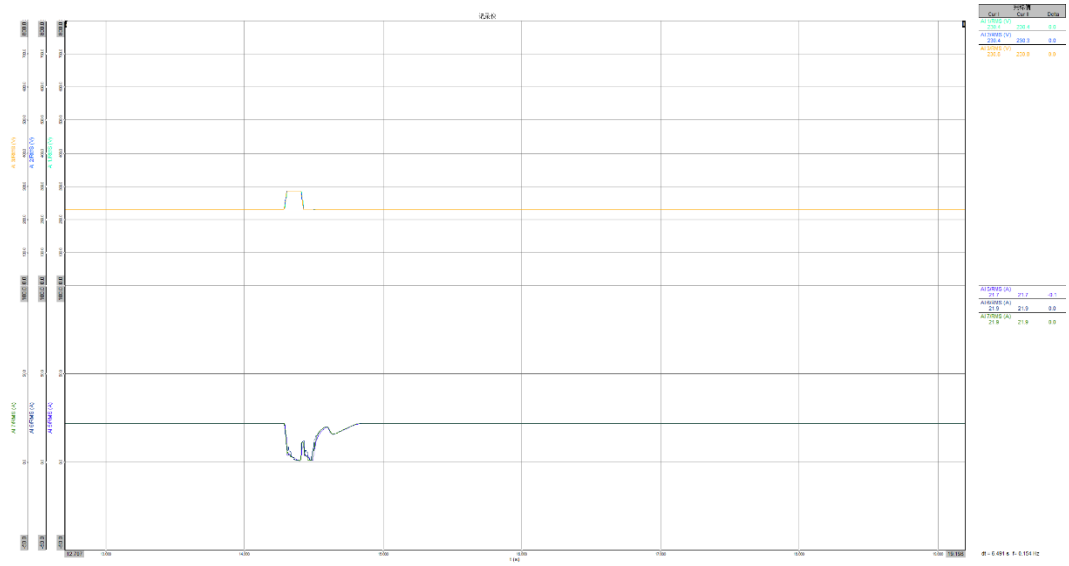
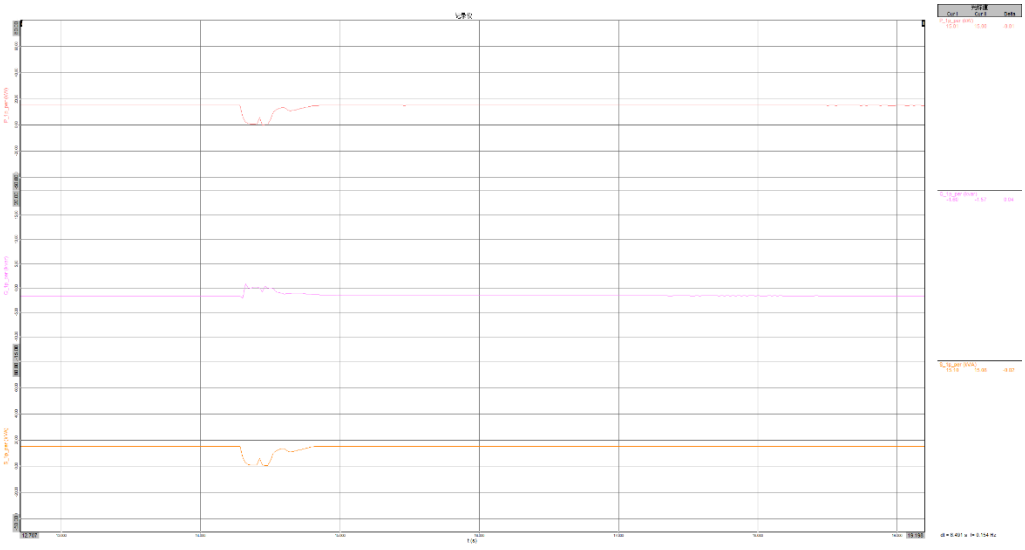
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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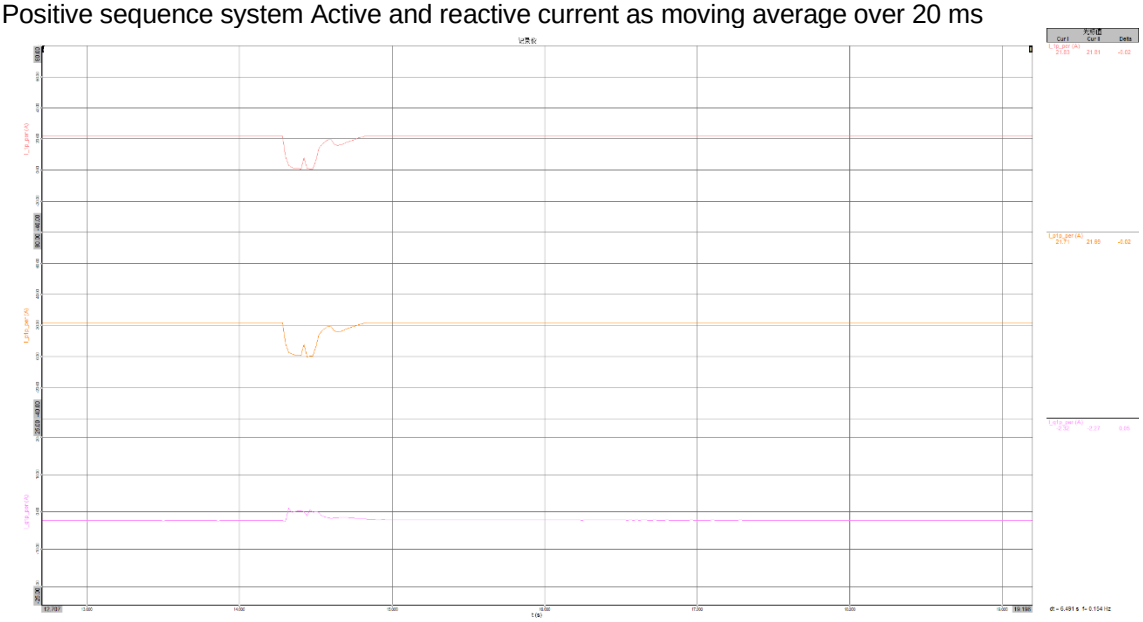
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	5.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:35:33 to 12:38:47
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14618
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14742
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	104
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.201
	10		L2-N		[p.u.]	0.201
	11		L3-N		[p.u.]	0.201
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.228
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.001
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.001
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.196
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.199
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.197
	27	Active power	Total	t1-10s to t1	[p.u.]	0.198
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.244
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.244
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.243
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.230
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.113
	41		L2	t1+60ms	[p.u.]	0.082
	42		L3	t1+60ms	[p.u.]	0.079
	43		L1	t1+100ms	[p.u.]	0.045
	44		L2	t1+100ms	[p.u.]	0.033
	45		L3	t1+100ms	[p.u.]	0.034
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.053
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.038
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.037
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.111
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.066
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.001
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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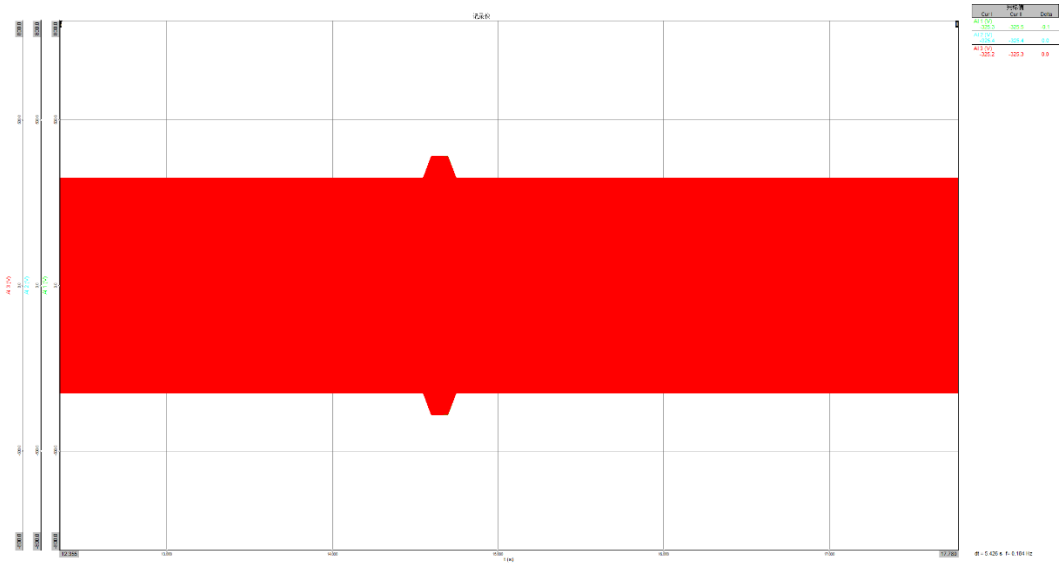
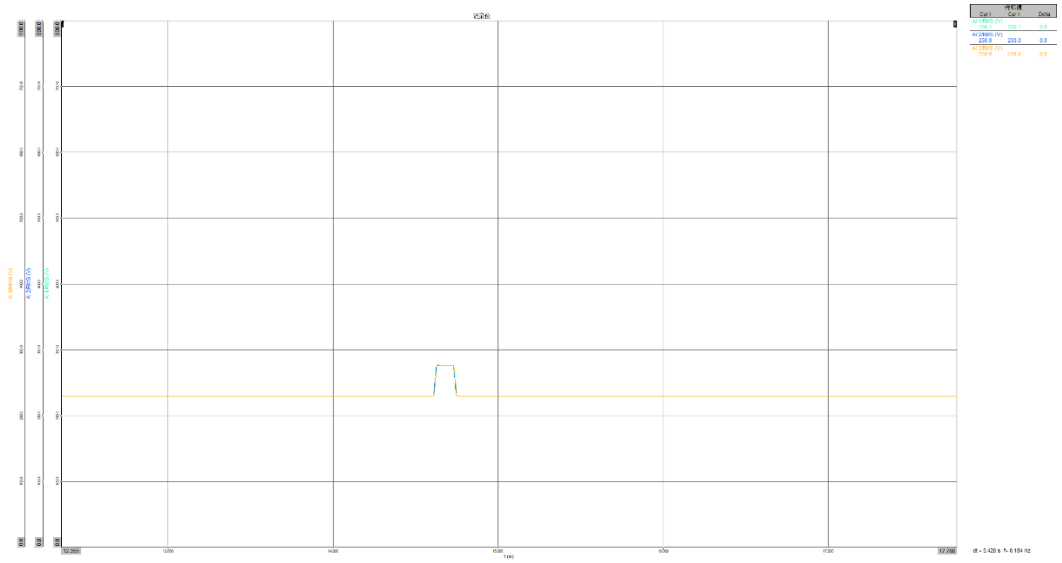
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.001
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.198
	58		Pos	t2+3s to t2+10s	[p.u.]	0.199
	59	Active power recover time	Total	-	[ms]	175
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.024
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.015
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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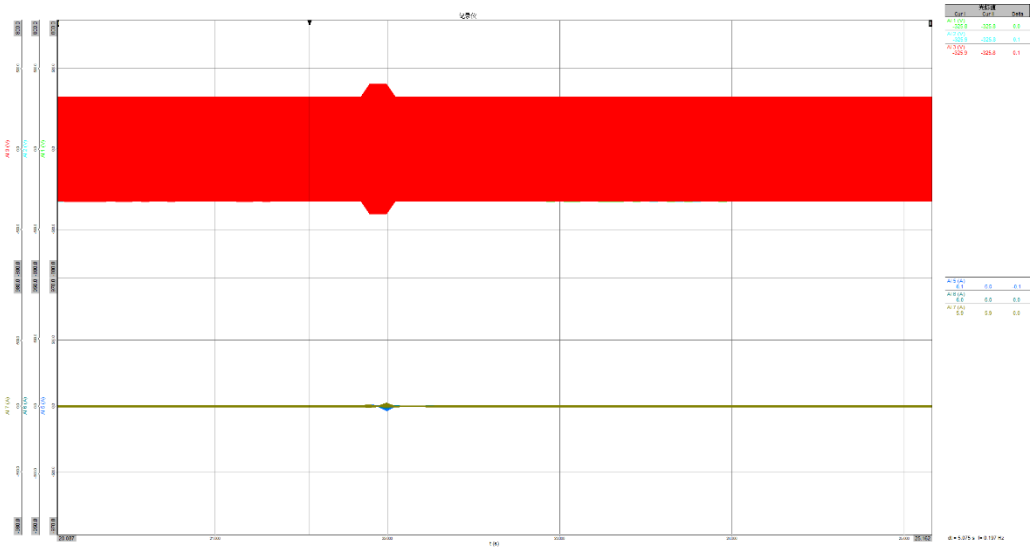
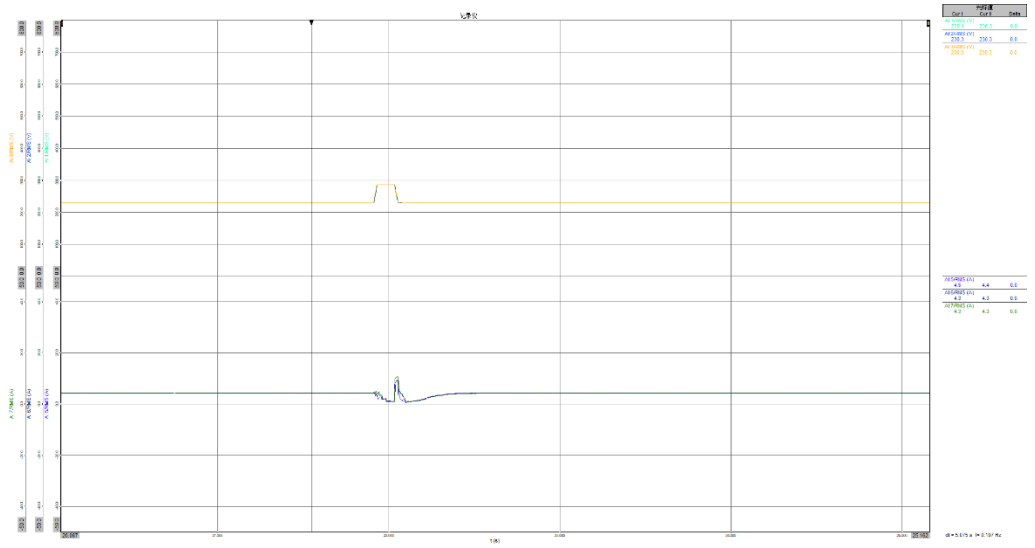
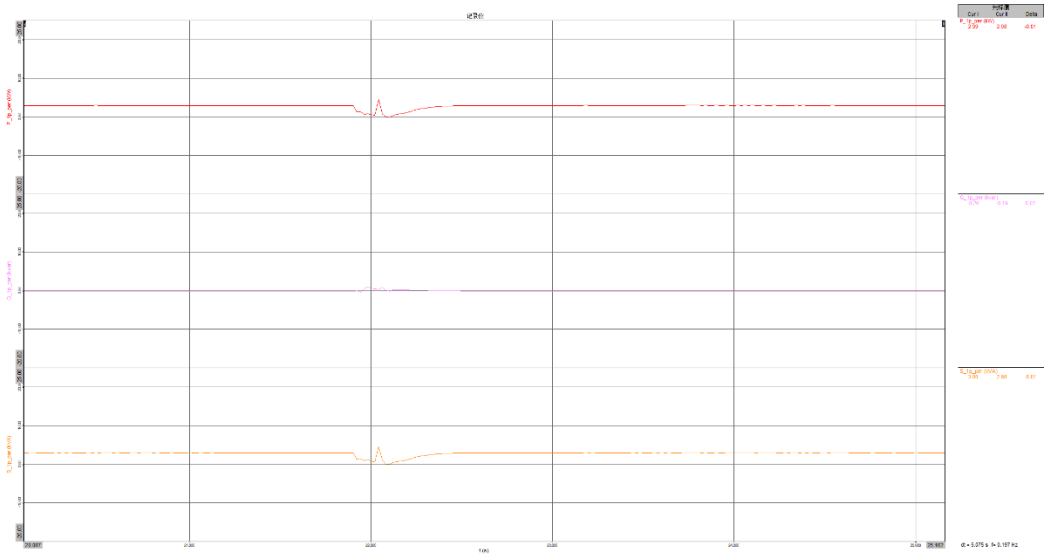
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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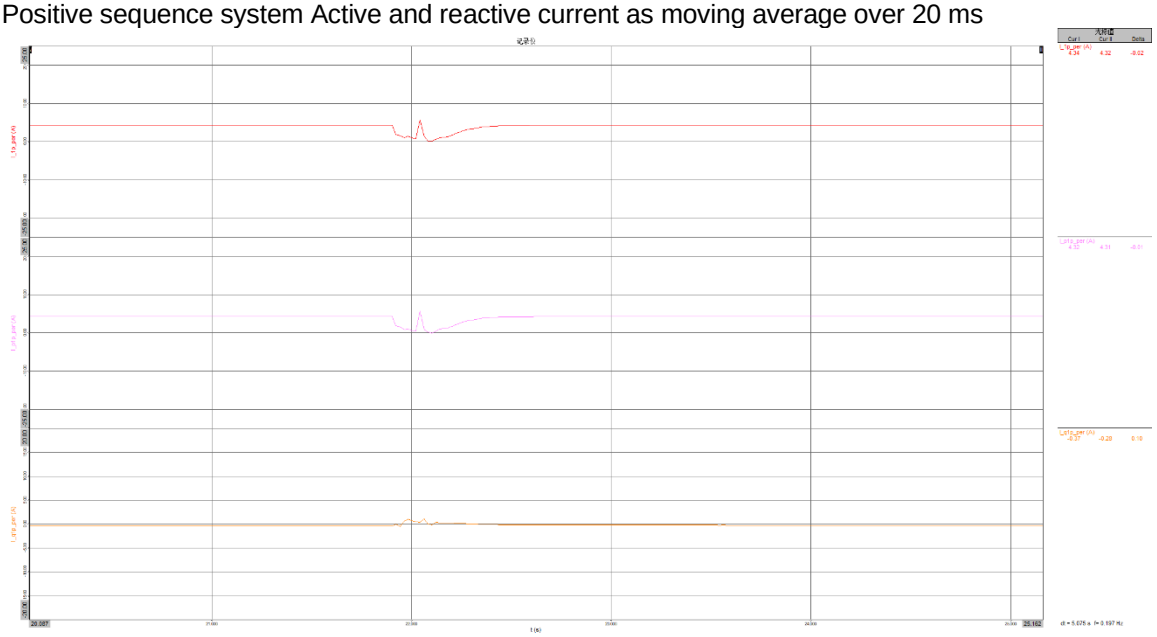
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	5.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:39:33 to 12:43:47
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14375
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14502
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	107
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.069
	10		L2-N		[p.u.]	0.250
	11		L3-N		[p.u.]	0.069
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.113
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.999
	20		L2	t1-10s to t1	[p.u.]	1.009
	21		L3	t1-10s to t1	[p.u.]	1.007
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.004
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.016

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.996
	27	Active power	Total	t1-10s to t1	[p.u.]	1.001
	29		Pos. seq.	t1-10s to t1	[p.u.]	1.001
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.068
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.249
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.068
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.115
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.128
	41		L2	t1+60ms	[p.u.]	0.121
	42		L3	t1+60ms	[p.u.]	0.078
	43		L1	t1+100ms	[p.u.]	0.074
	44		L2	t1+100ms	[p.u.]	0.072
	45		L3	t1+100ms	[p.u.]	0.060
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.074
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.072
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.062
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.115
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.094
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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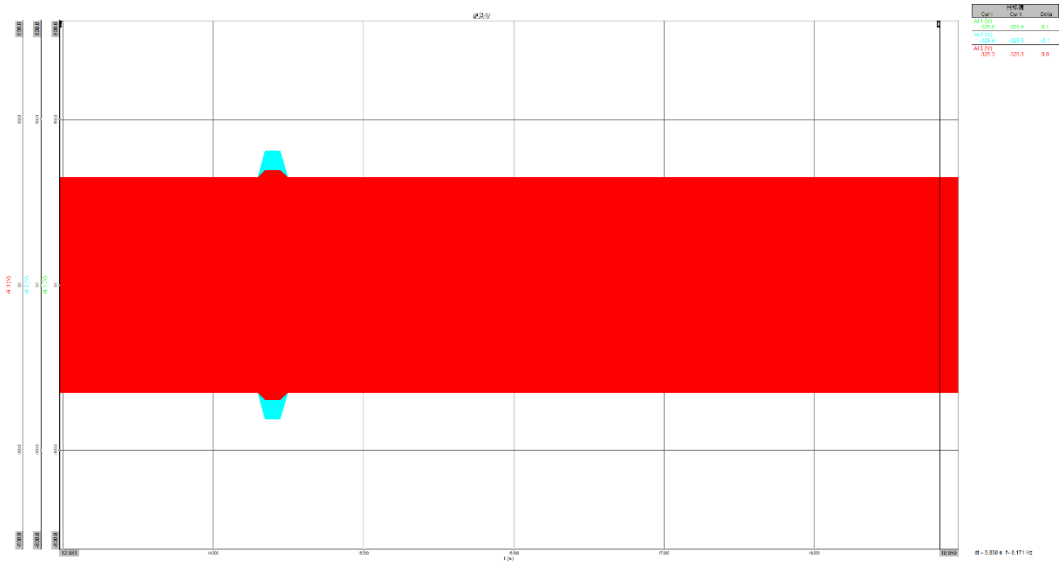
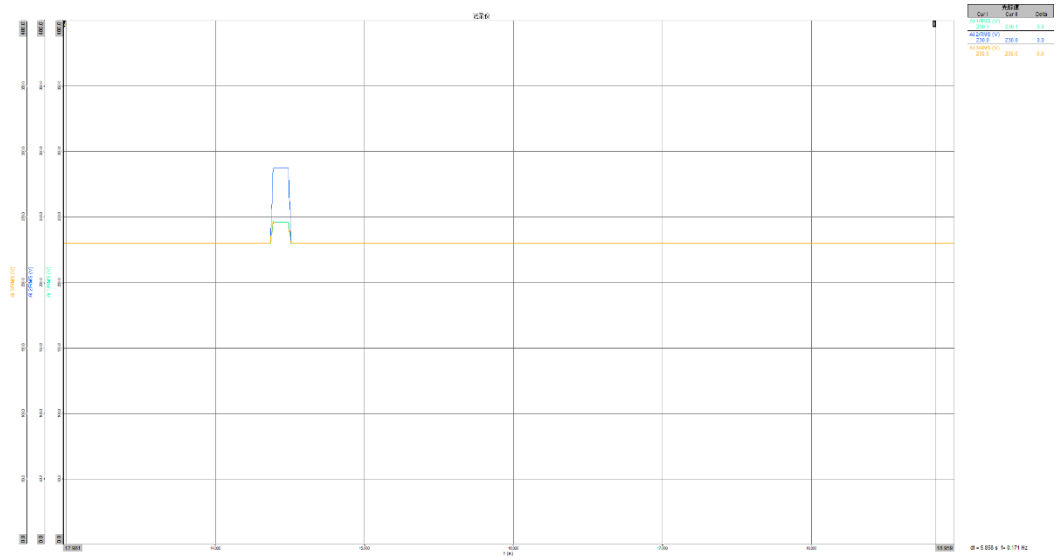
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.001
	58		Pos	t2+3s to t2+10s	[p.u.]	1.001
	59	Active power recover time	Total	-	[ms]	141
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.010
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.016
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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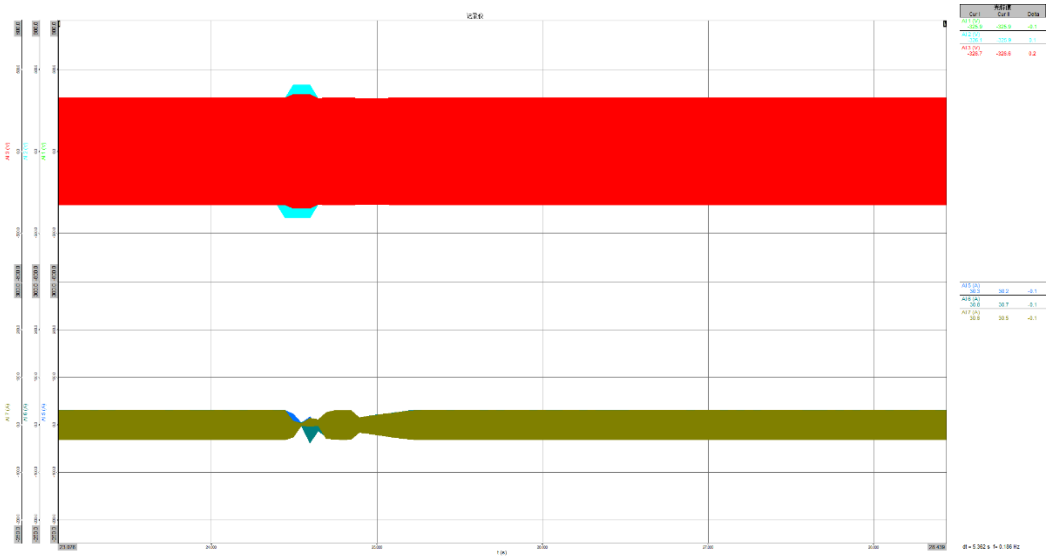
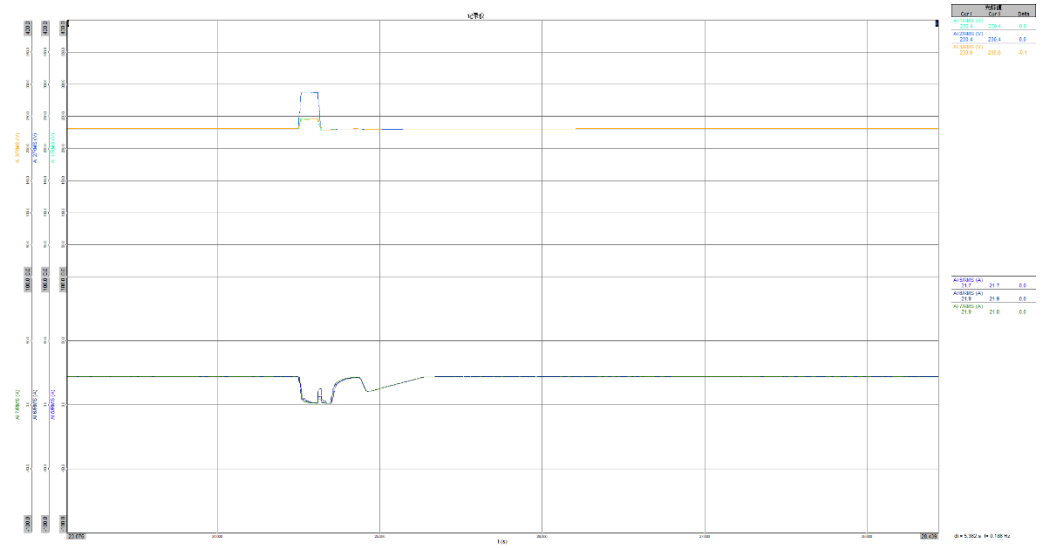
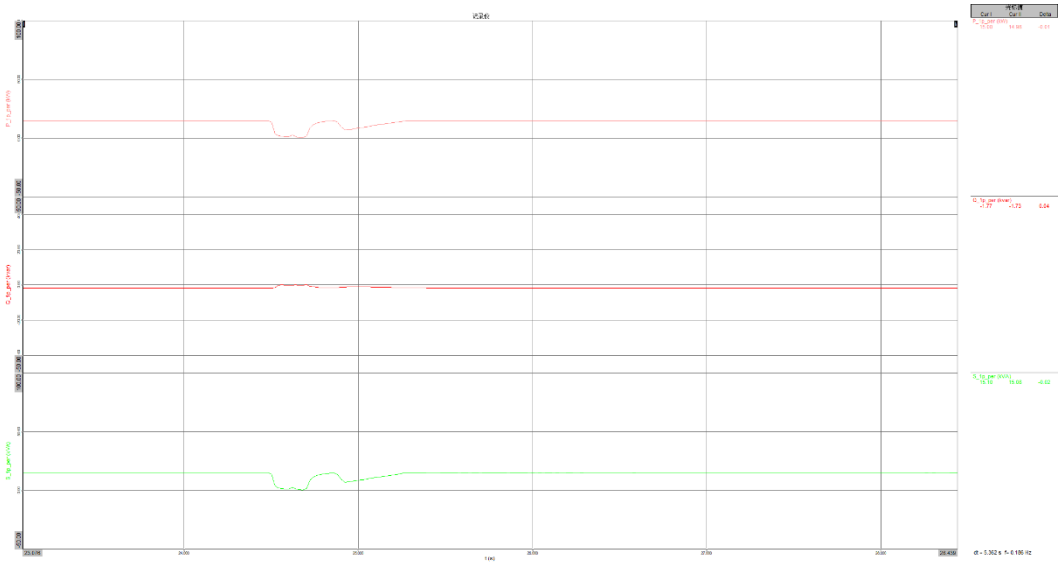
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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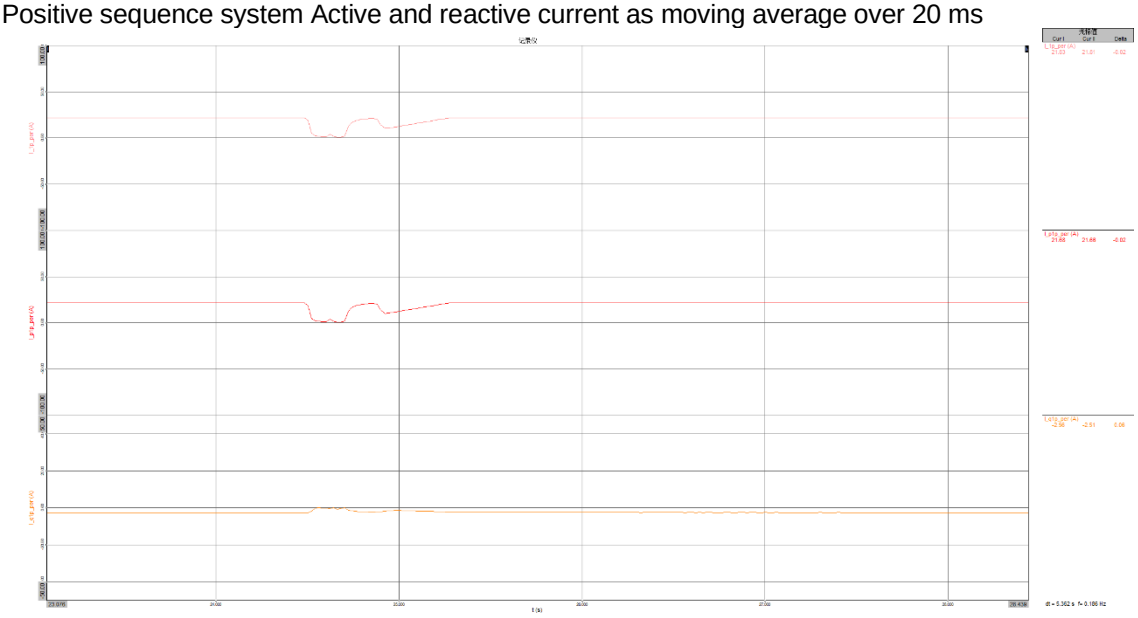
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	5.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:44:33 to 12:47:47
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14375
	7	Fault clearance(t2)	Fault Phase	-	[ms]	14502
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	107
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.069
	10		L2-N		[p.u.]	0.250
	11		L3-N		[p.u.]	0.069
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.124
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.001
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.001
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.196
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.028
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.028

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.196
	27	Active power	Total	t1-10s to t1	[p.u.]	0.196
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.196
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.035
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.028
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.069
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.252
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.069
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.126
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.069
	41		L2	t1+60ms	[p.u.]	0.076
	42		L3	t1+60ms	[p.u.]	0.054
	43		L1	t1+100ms	[p.u.]	0.063
	44		L2	t1+100ms	[p.u.]	0.057
	45		L3	t1+100ms	[p.u.]	0.043
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.063
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.058
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.043
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.061
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.056
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.001
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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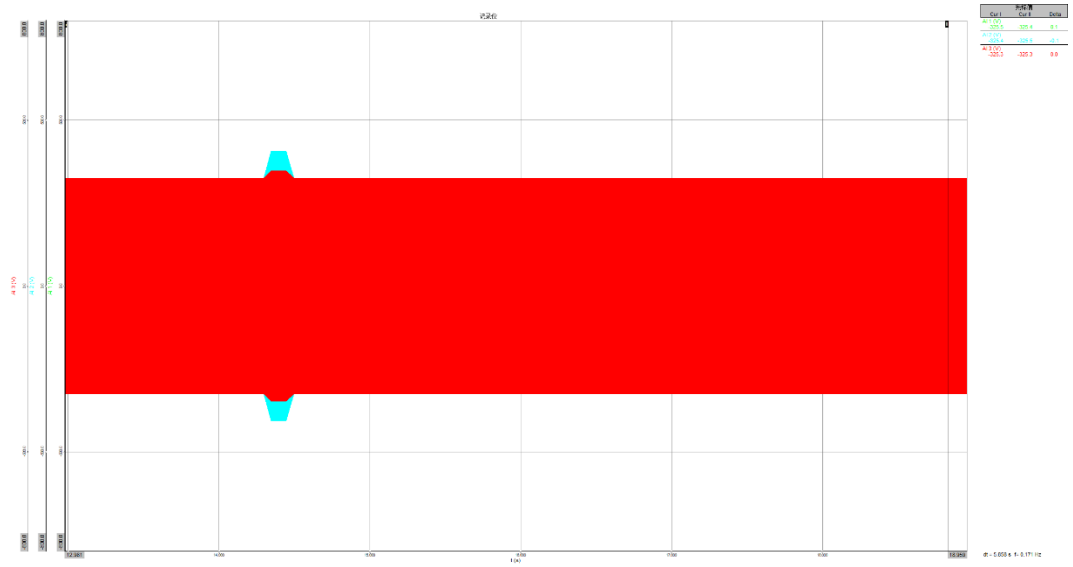
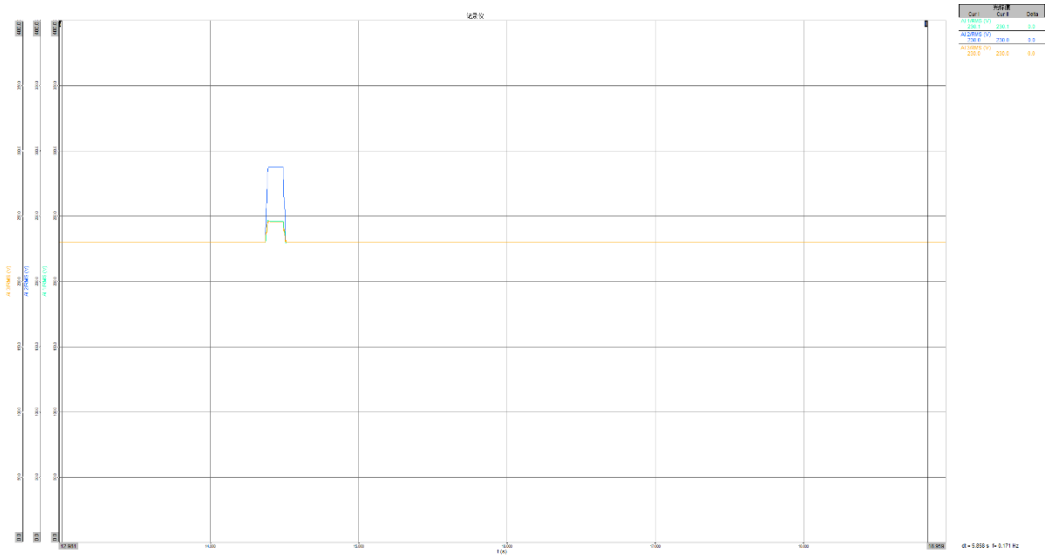
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.001
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.197
	58		Pos	t2+3s to t2+10s	[p.u.]	0.197
	59	Active power recover time	Total	-	[ms]	34
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.033
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.027
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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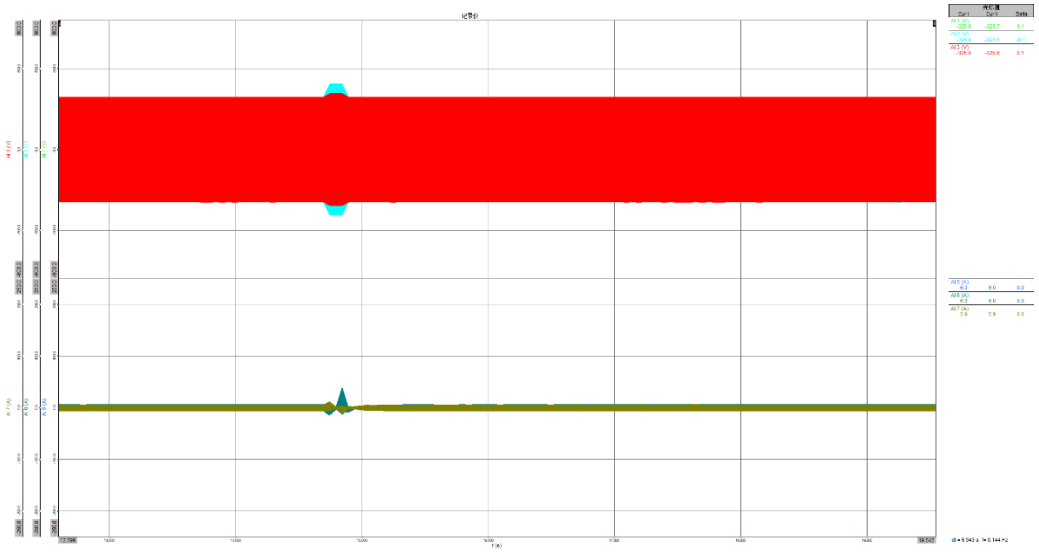
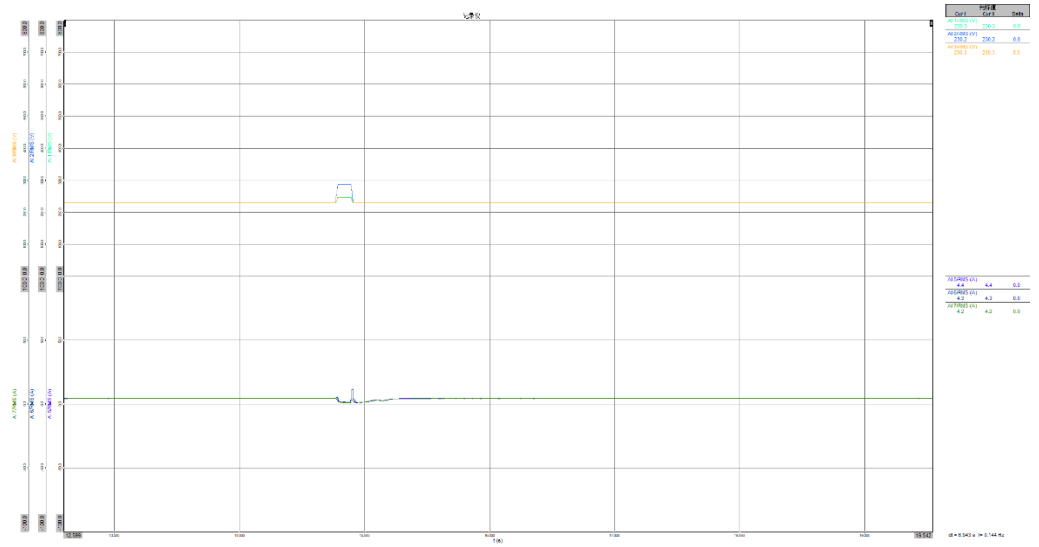
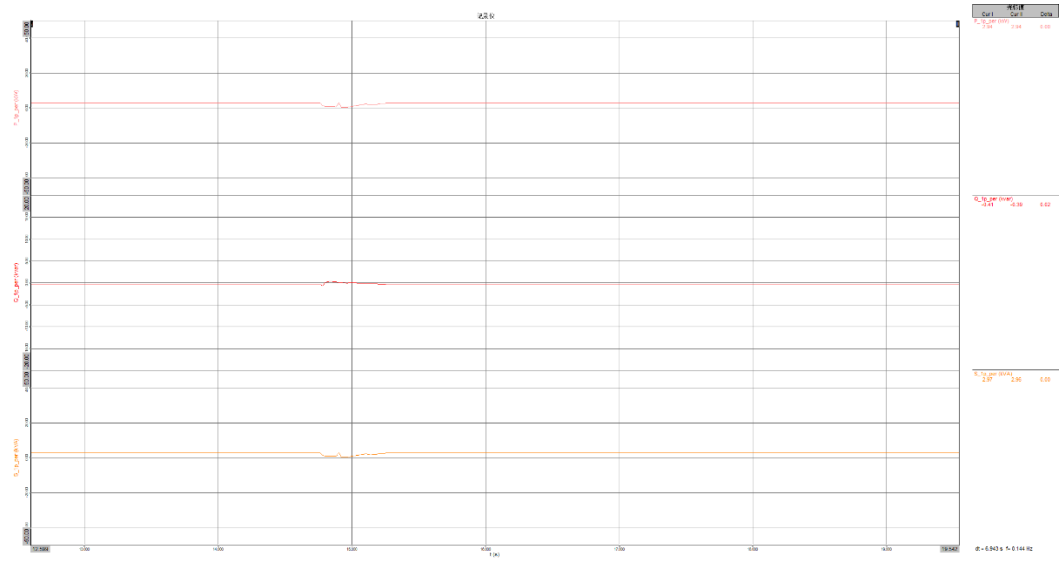
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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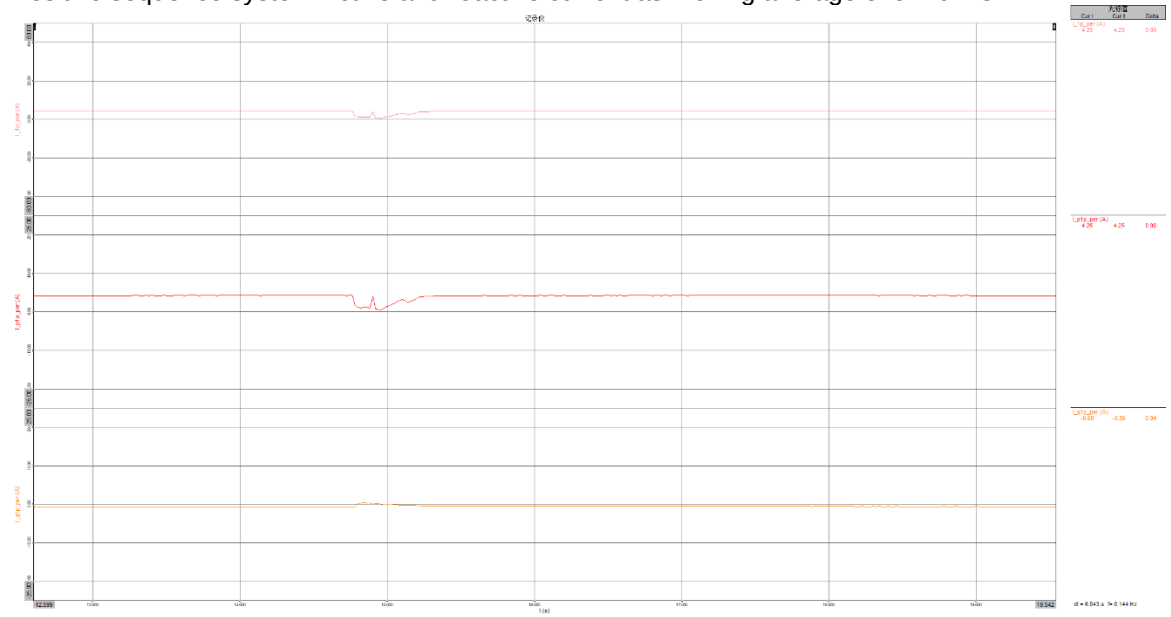
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	5.5
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:48:33 to 12:51:47
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	15689
	7	Fault clearance(t2)	Fault Phase	-	[ms]	15824
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	115
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.072
	10		L2-N		[p.u.]	0.072
	11		L3-N		[p.u.]	0.254
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.050
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.999
	20		L2	t1-10s to t1	[p.u.]	0.994
	21		L3	t1-10s to t1	[p.u.]	1.000
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.997
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.001
	24		Pos. seq.	t1-1s to t1	[p.u.]	0.004

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.995
	27	Active power	Total	t1-10s to t1	[p.u.]	0.999
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.999
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.032
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.001
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.068
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.068
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.250
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.052
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.164
	41		L2	t1+60ms	[p.u.]	0.047
	42		L3	t1+60ms	[p.u.]	0.122
	43		L1	t1+100ms	[p.u.]	0.058
	44		L2	t1+100ms	[p.u.]	0.038
	45		L3	t1+100ms	[p.u.]	0.049
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.058
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.040
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.051
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	-0.038
	52		Pos	t1+100ms to t2-20ms	[p.u.]	-0.040
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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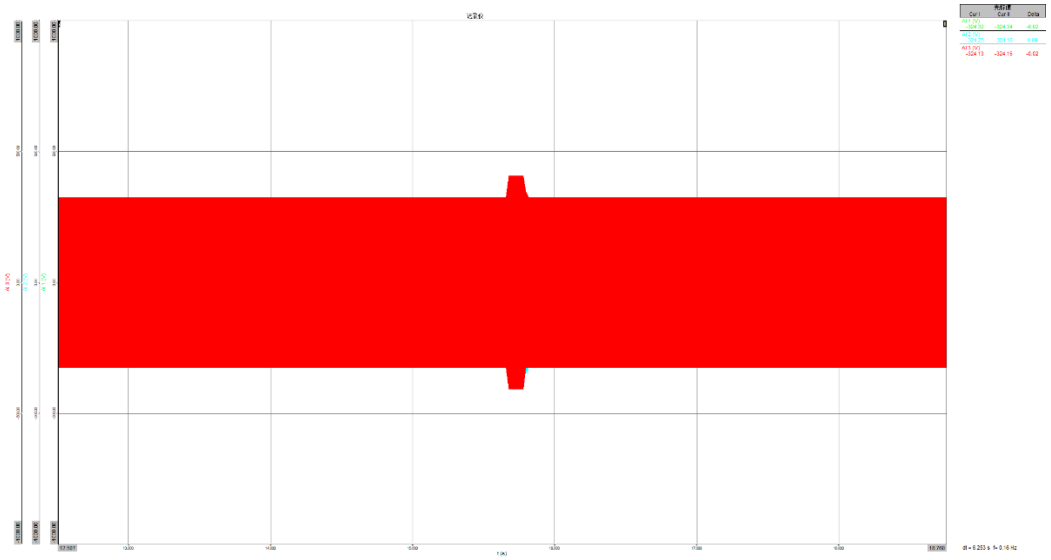
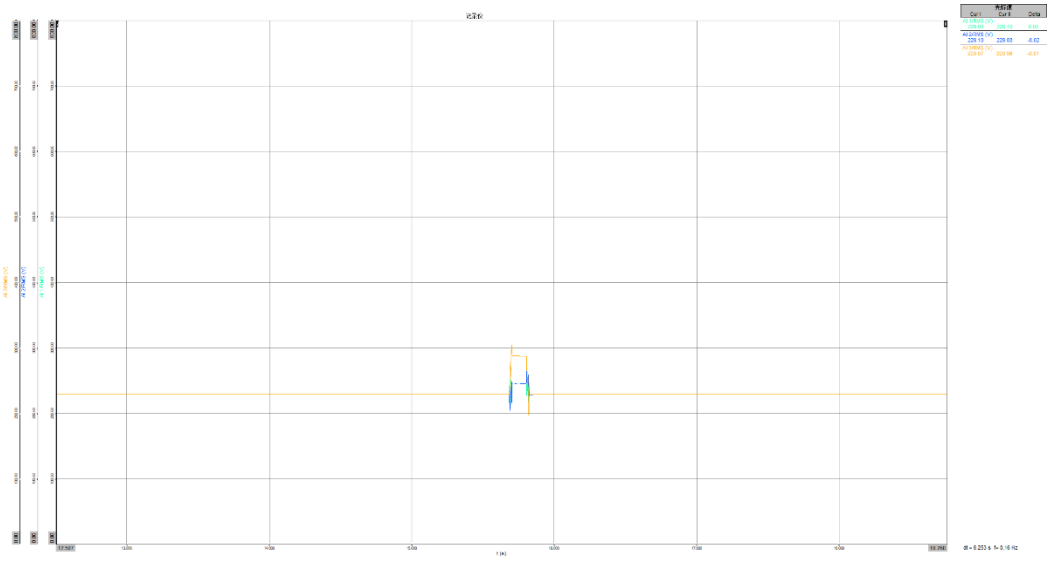
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.000
	58		Pos	t2+3s to t2+10s	[p.u.]	1.000
	59	Active power recover time	Total	-	[ms]	330
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.032
	61		Pos	t2+3s to t2+10s	[p.u.]	0.000
	62	Reactive power recover time	Total	-	[ms]	22

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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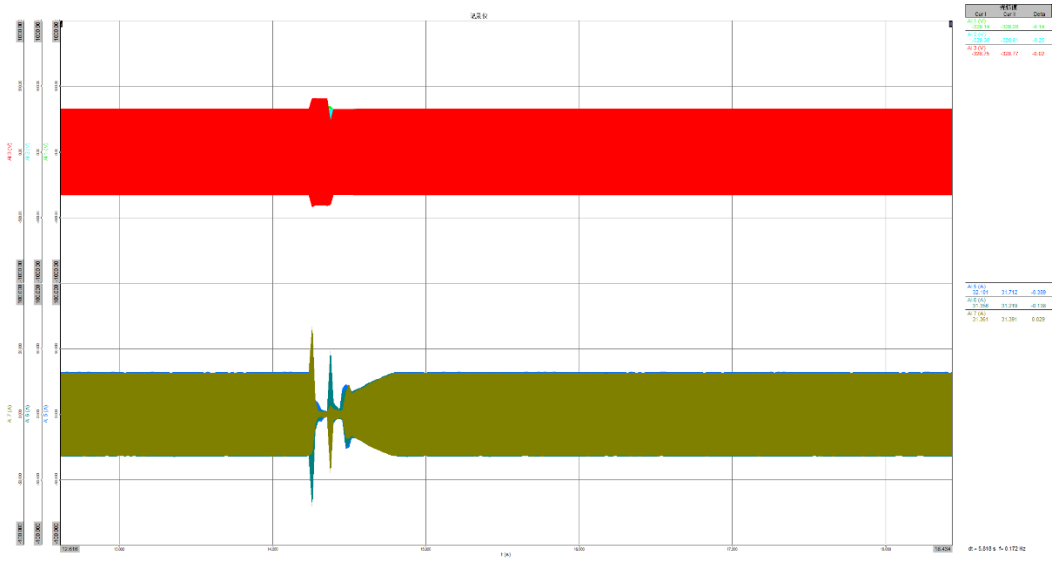
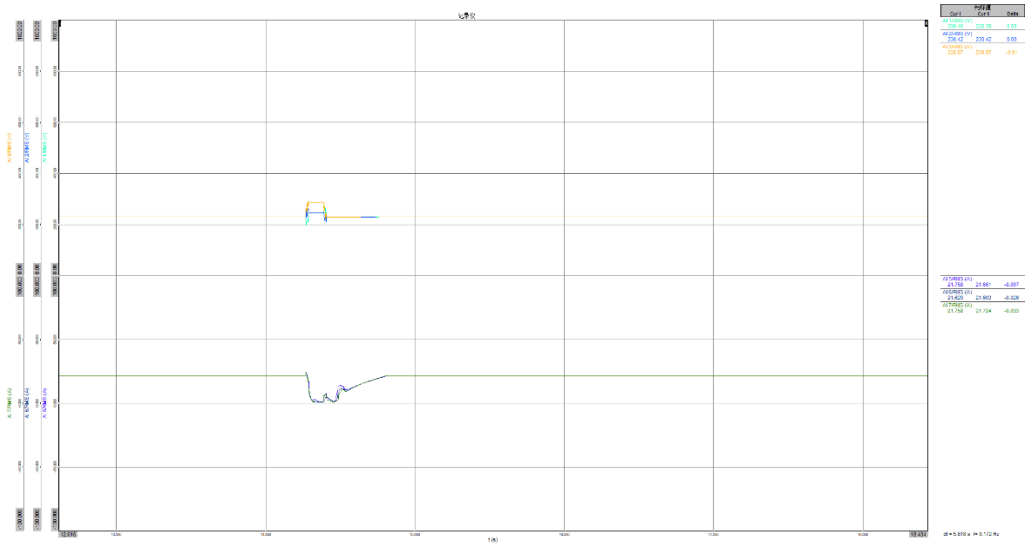
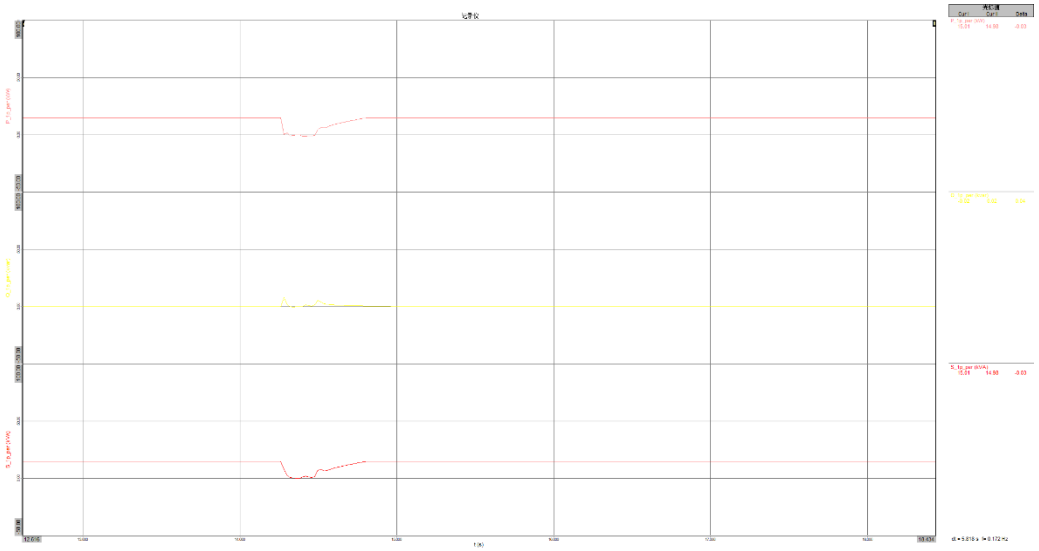
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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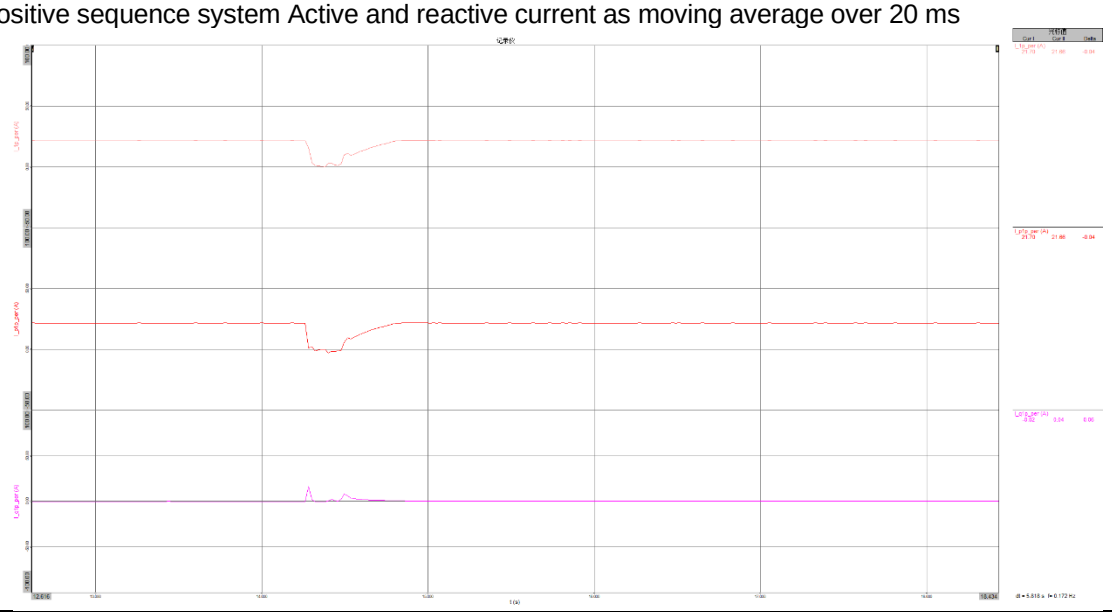
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	6.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:52:33 to 12:55:47
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	21834
	7	Fault clearance(t2)	Fault Phase	-	[ms]	26934
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	5080
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.151
	10		L2-N		[p.u.]	0.151
	11		L3-N		[p.u.]	0.151
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.154
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.998
	20		L2	t1-10s to t1	[p.u.]	1.006
	21		L3	t1-10s to t1	[p.u.]	1.004
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.002
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.016
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.016

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.993
	27	Active power	Total	t1-10s to t1	[p.u.]	0.998
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.998
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.157
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.157
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.156
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.157
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.074
	41		L2	t1+60ms	[p.u.]	0.098
	42		L3	t1+60ms	[p.u.]	0.069
	43		L1	t1+100ms	[p.u.]	0.060
	44		L2	t1+100ms	[p.u.]	0.060
	45		L3	t1+100ms	[p.u.]	0.058
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.062
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.060
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.059
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.067
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.004
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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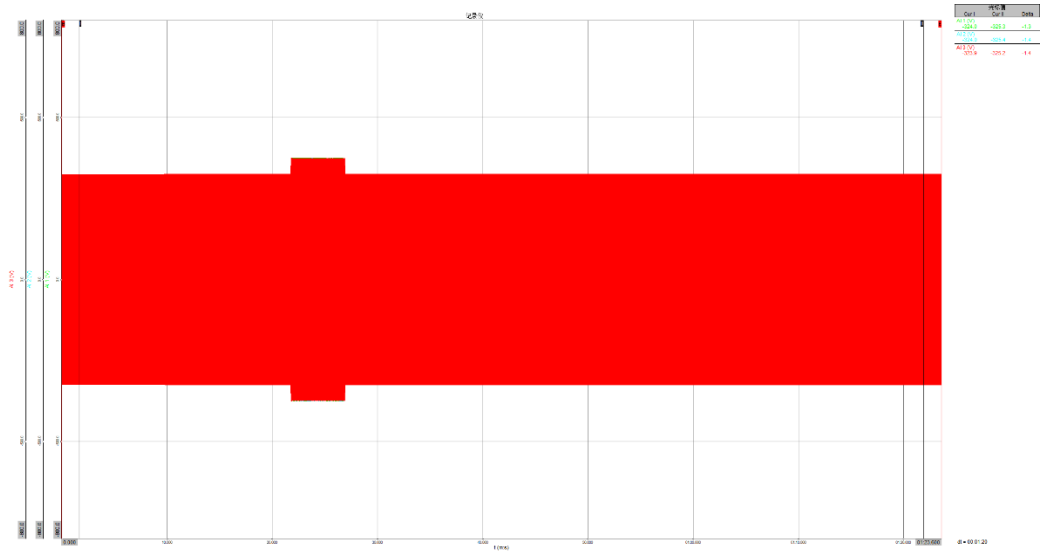
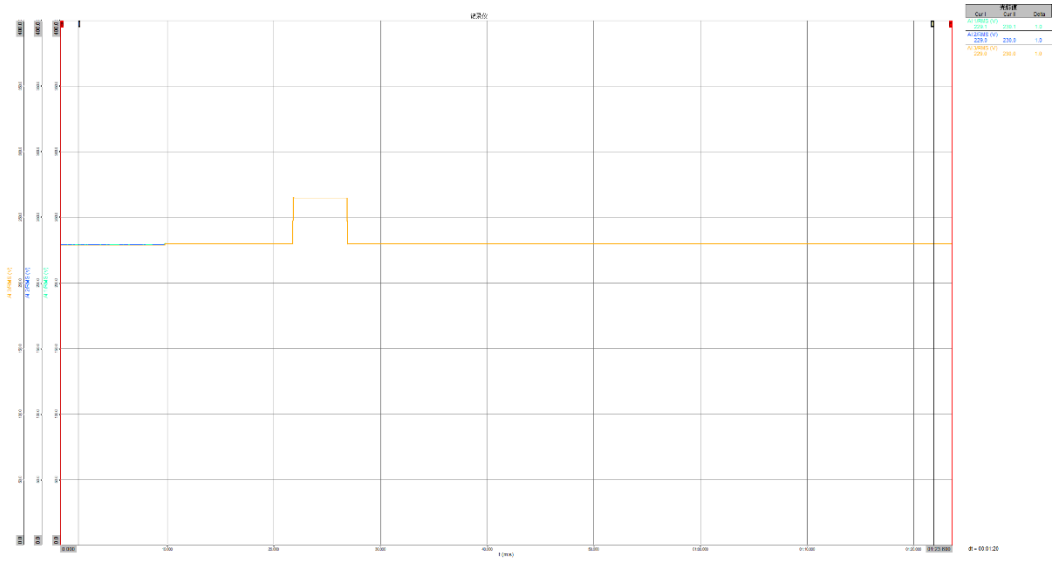
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.999
	58		Pos	t2+3s to t2+10s	[p.u.]	0.999
	59	Active power recover time	Total	-	[ms]	521
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.019
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.015
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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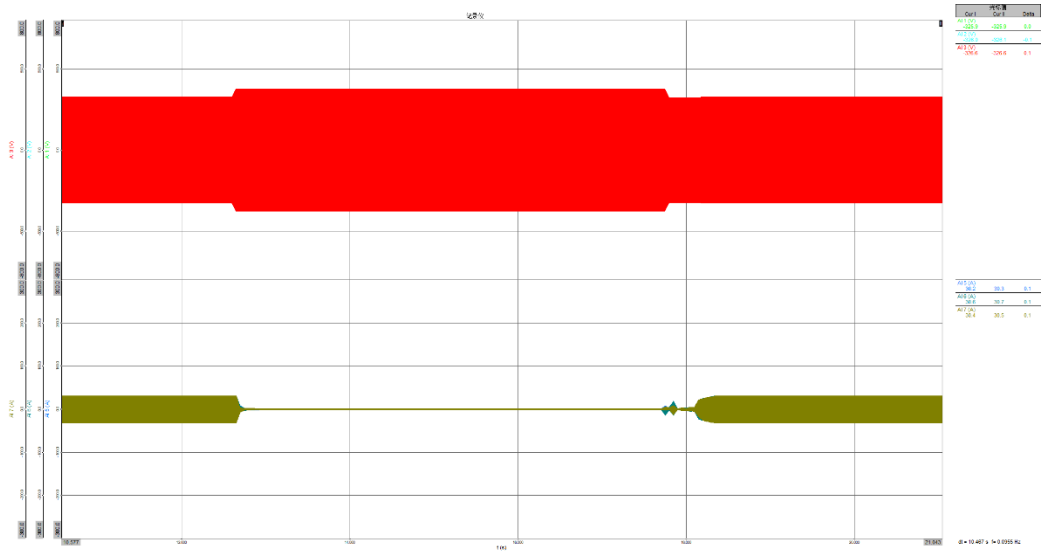
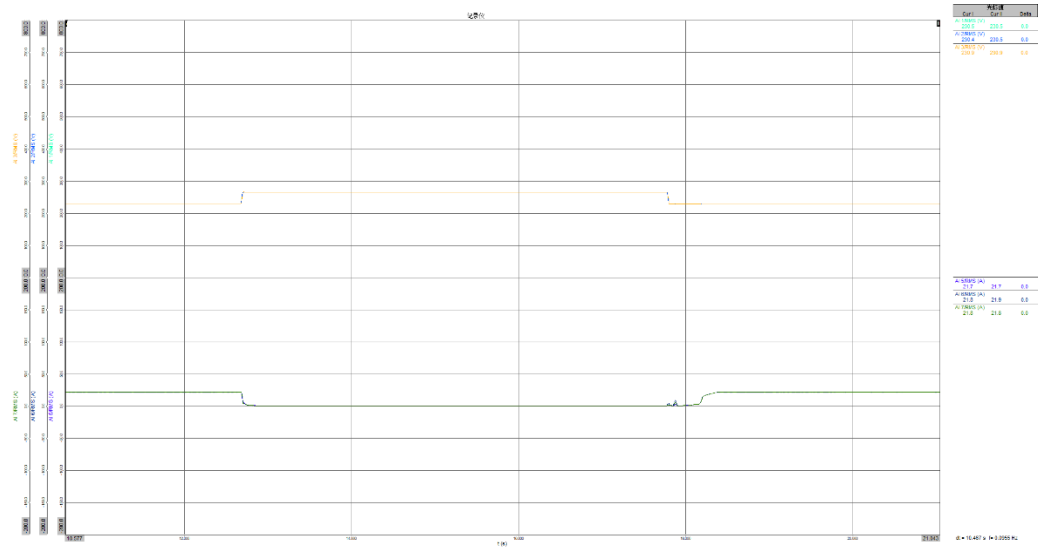
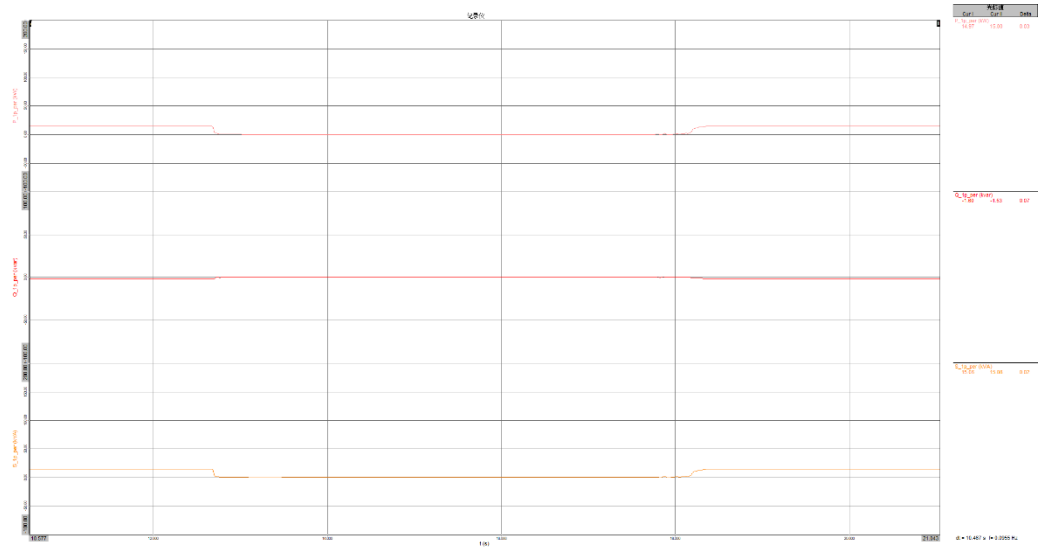
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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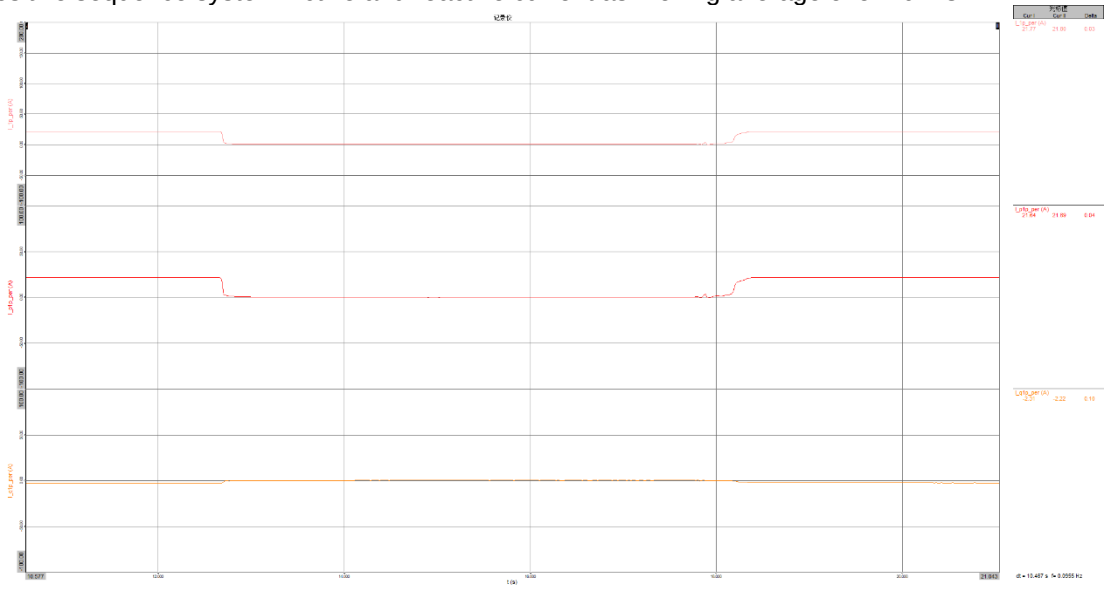
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	6.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	12:56:33 to 12:59:47
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	21834
	7	Fault clearance(t2)	Fault Phase	-	[ms]	26934
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	5080
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.151
	10		L2-N		[p.u.]	0.151
	11		L3-N		[p.u.]	0.151
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.155
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.001
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.196
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.028
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.028

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.195
	27	Active power	Total	t1-10s to t1	[p.u.]	0.196
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.196
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.035
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.028
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.157
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.157
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.156
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.157
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.060
	41		L2	t1+60ms	[p.u.]	0.043
	42		L3	t1+60ms	[p.u.]	0.052
	43		L1	t1+100ms	[p.u.]	0.056
	44		L2	t1+100ms	[p.u.]	0.043
	45		L3	t1+100ms	[p.u.]	0.042
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.058
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.047
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.047
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.050
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.003
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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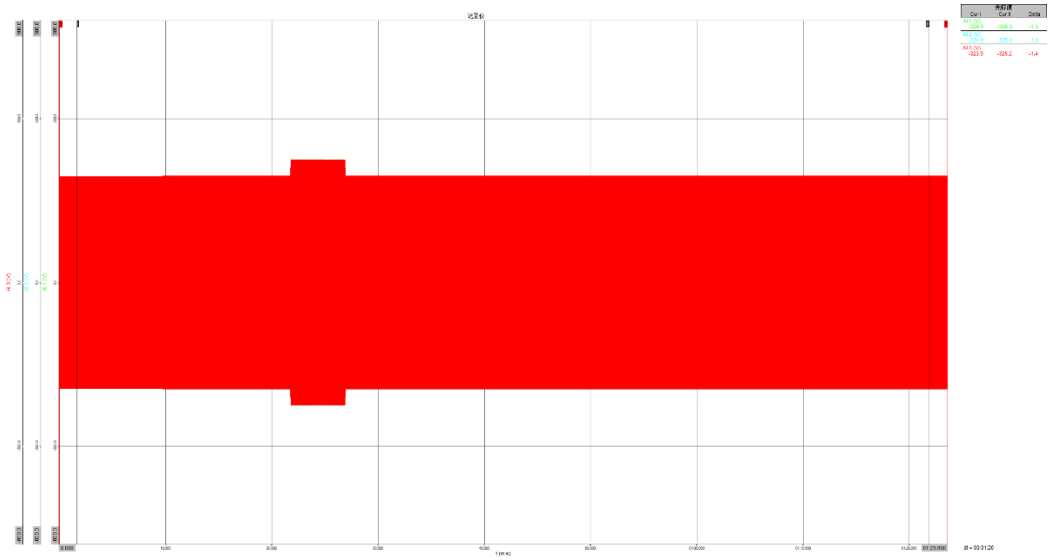
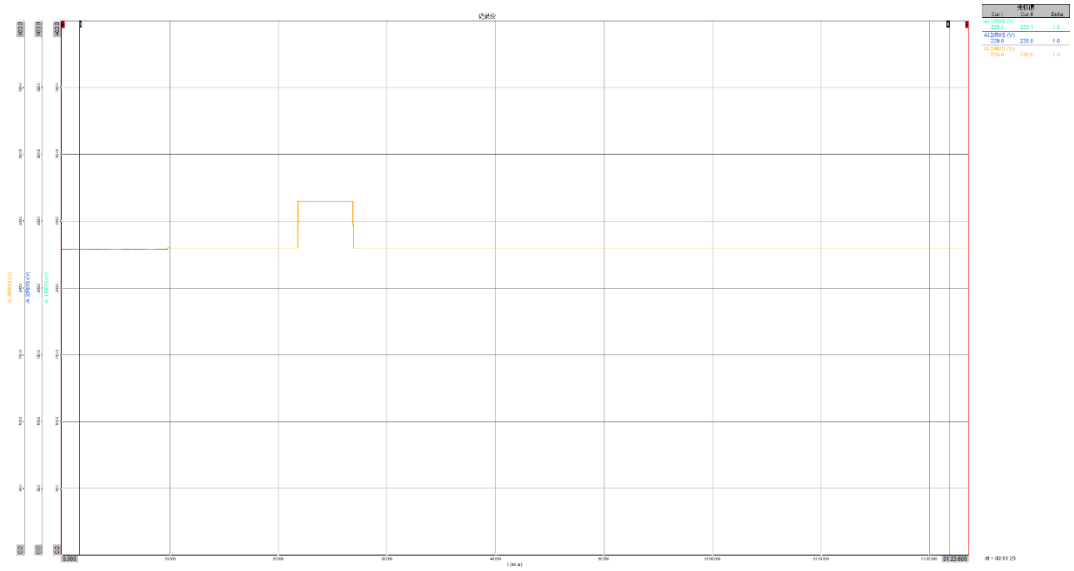
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.001
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.197
	58		Pos	t2+3s to t2+10s	[p.u.]	0.197
	59	Active power recover time	Total	-	[ms]	412
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.032
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.025
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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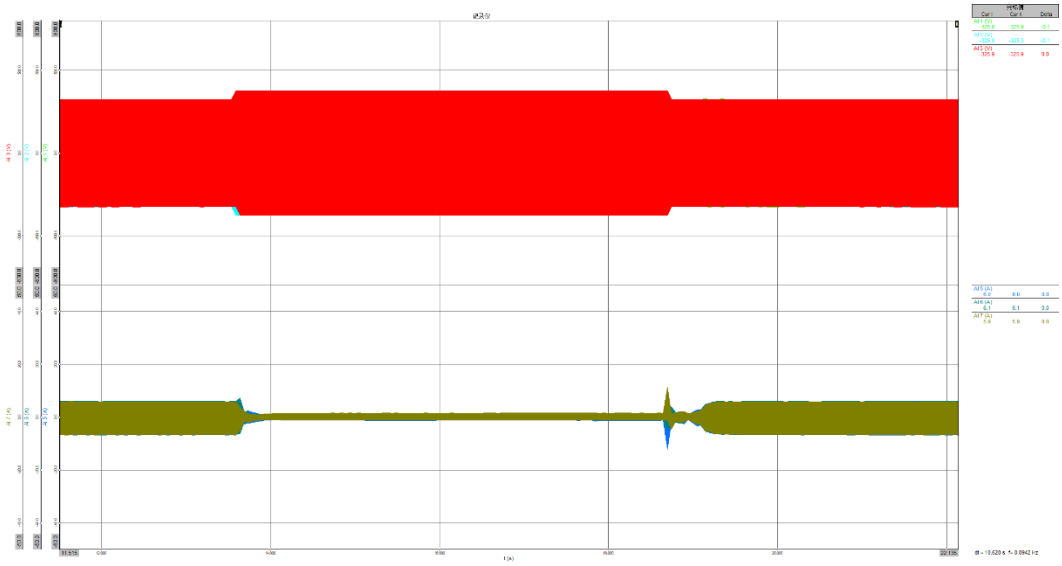
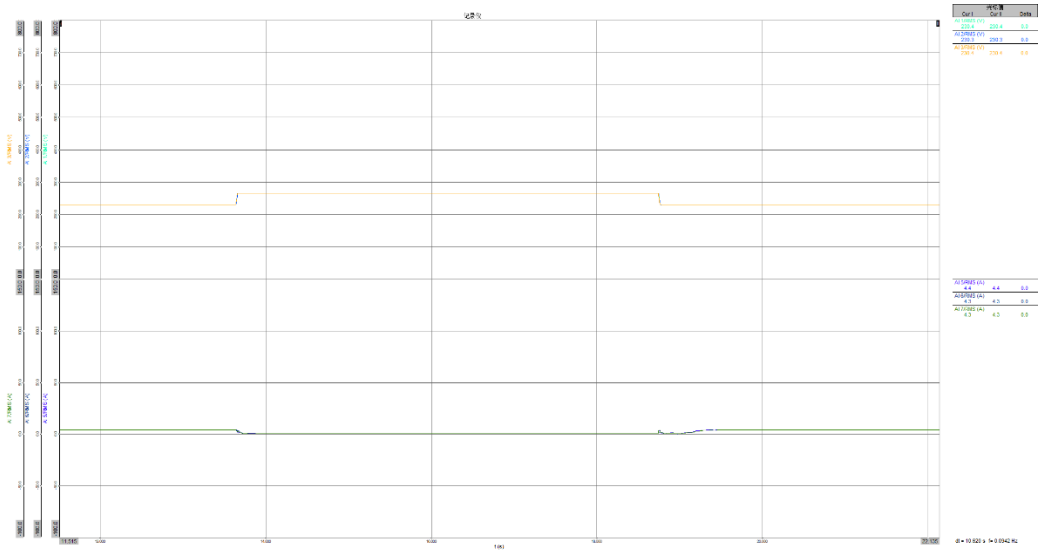
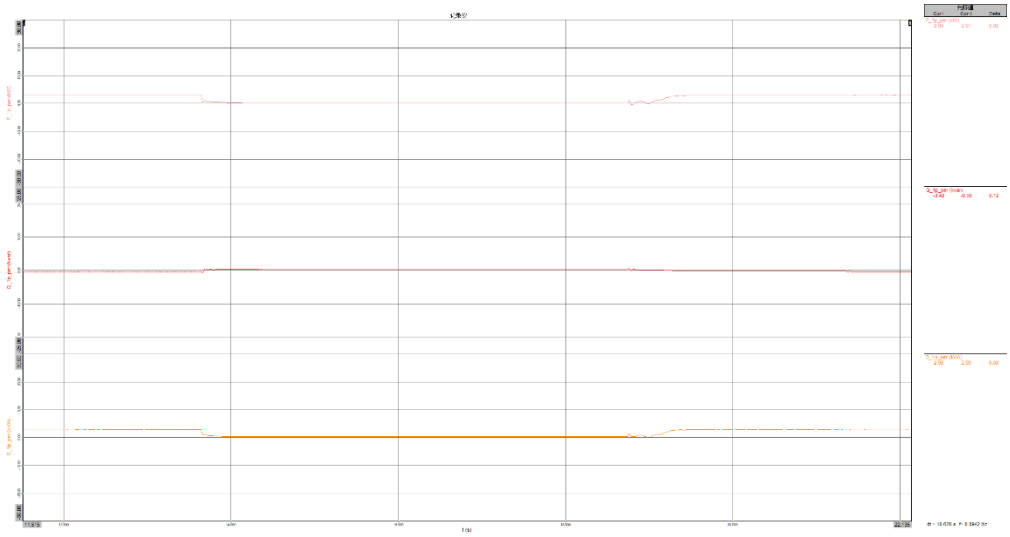
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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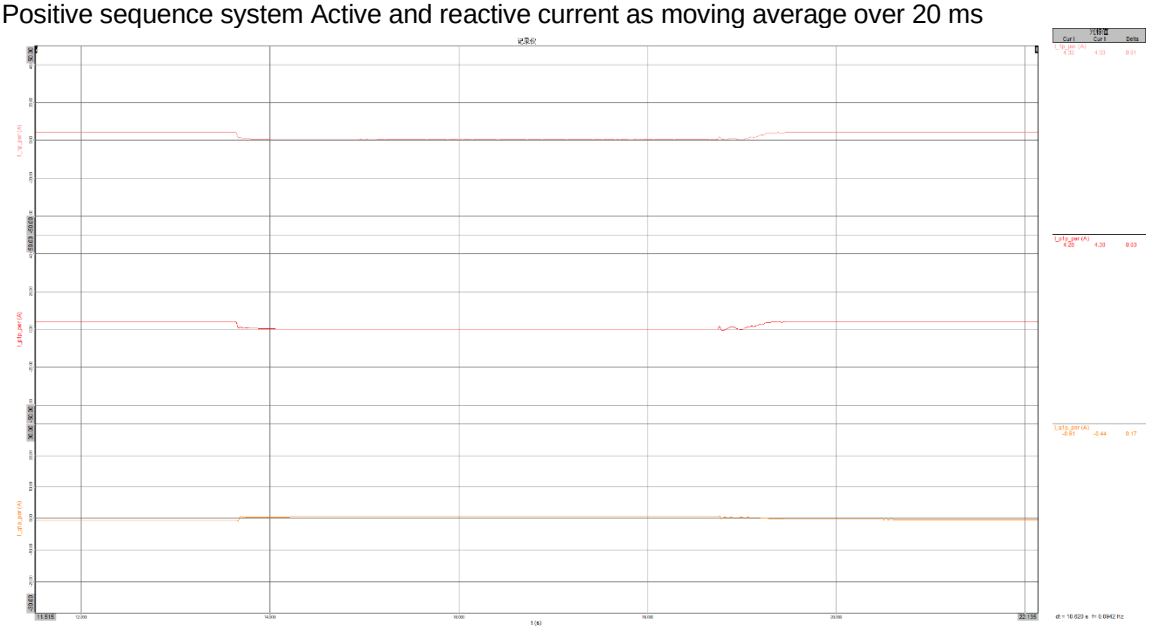
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	6.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	13:01:33 to 13:04:55
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	16034
	7	Fault clearance(t2)	Fault Phase	-	[ms]	21135
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	5081
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.041
	10		L2-N		[p.u.]	0.161
	11		L3-N		[p.u.]	0.041
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.075
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.996
	20		L2	t1-10s to t1	[p.u.]	1.006
	21		L3	t1-10s to t1	[p.u.]	1.000
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.000
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.016
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.016

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.992
	27	Active power	Total	t1-10s to t1	[p.u.]	0.997
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.997
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.016
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.040
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.160
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.040
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.078
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.106
	41		L2	t1+60ms	[p.u.]	0.111
	42		L3	t1+60ms	[p.u.]	0.088
	43		L1	t1+100ms	[p.u.]	0.078
	44		L2	t1+100ms	[p.u.]	0.074
	45		L3	t1+100ms	[p.u.]	0.066
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.078
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.074
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.066
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.073
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.000
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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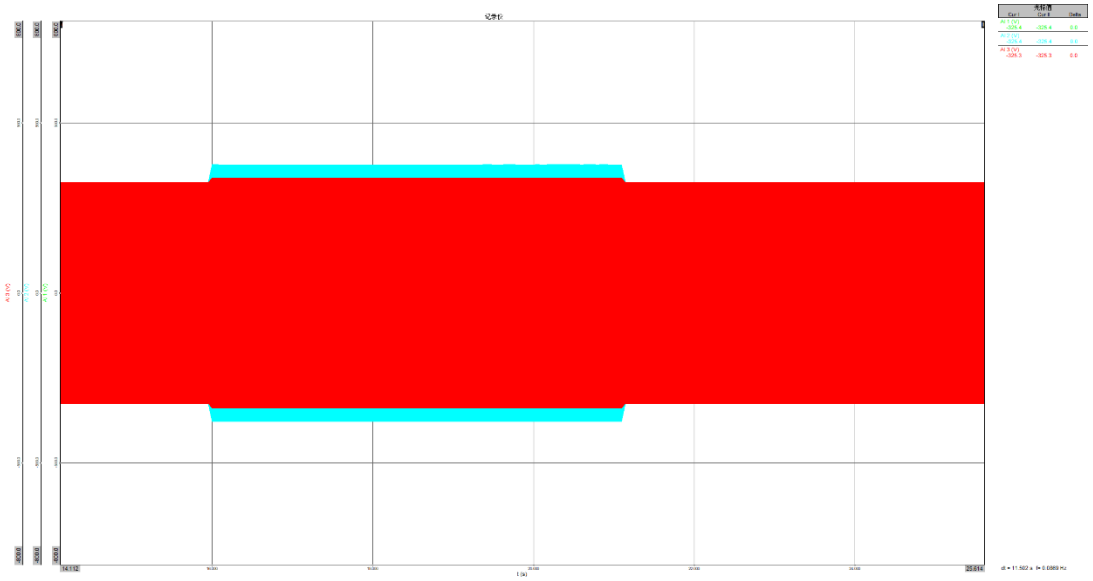
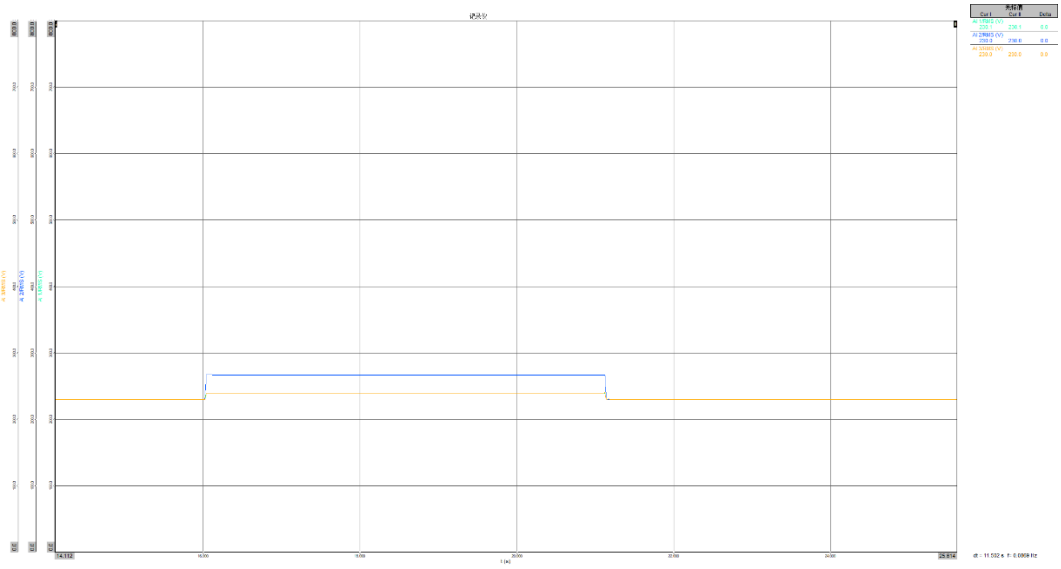
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.997
	58		Pos	t2+3s to t2+10s	[p.u.]	0.997
	59	Active power recover time	Total	-	[ms]	590
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.010
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.016
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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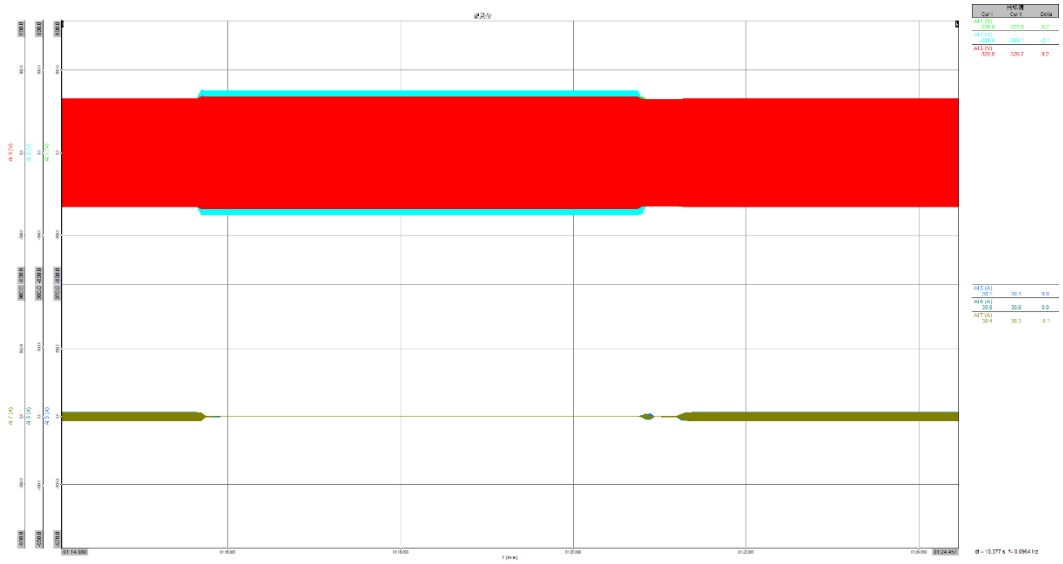
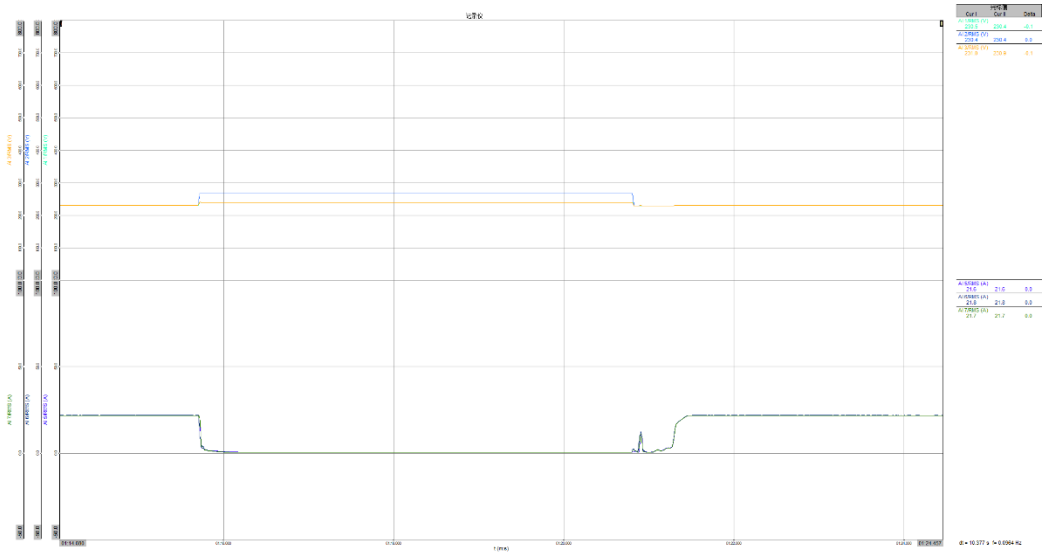
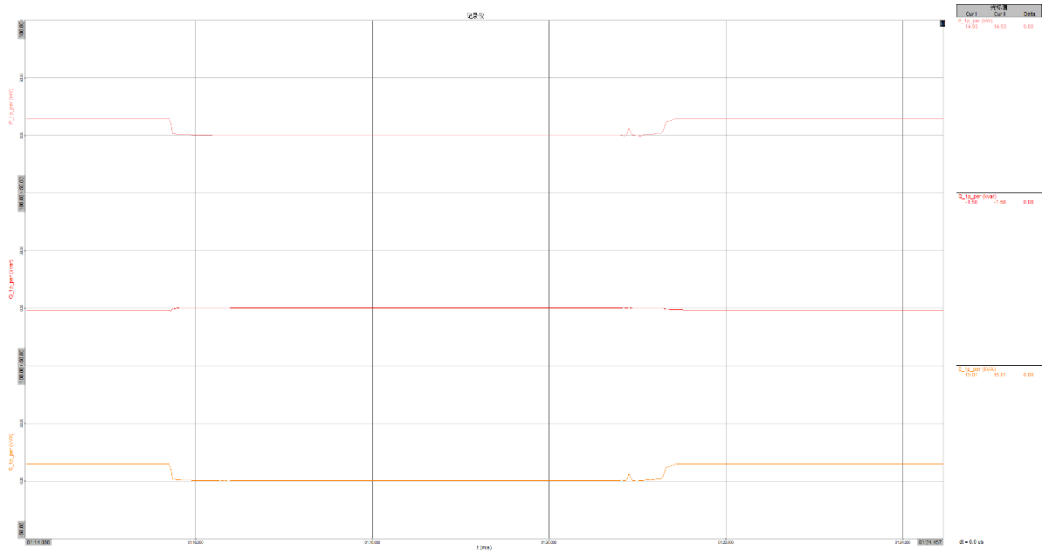
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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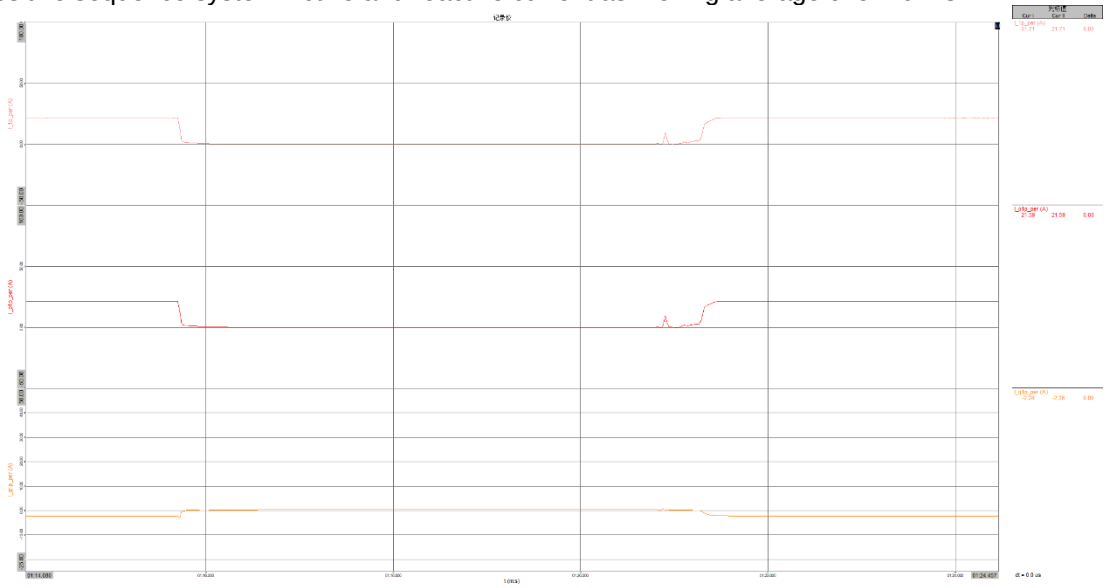
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	6.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	13:05:33 to 13:09:55
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	16034
	7	Fault clearance(t2)	Fault Phase	-	[ms]	21135
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	5081
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.041
	10		L2-N		[p.u.]	0.161
	11		L3-N		[p.u.]	0.041
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.076
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.198
	21		L3	t1-10s to t1	[p.u.]	0.195
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.196
	27	Active power	Total	t1-10s to t1	[p.u.]	0.197
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.197
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.040
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.160
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.040
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.078
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.065
	41		L2	t1+60ms	[p.u.]	0.061
	42		L3	t1+60ms	[p.u.]	0.052
	43		L1	t1+100ms	[p.u.]	0.059
	44		L2	t1+100ms	[p.u.]	0.051
	45		L3	t1+100ms	[p.u.]	0.042
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.059
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.052
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.043
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.049
	52		Pos	t1+100ms to t2-20ms	[p.u.]	-0.001
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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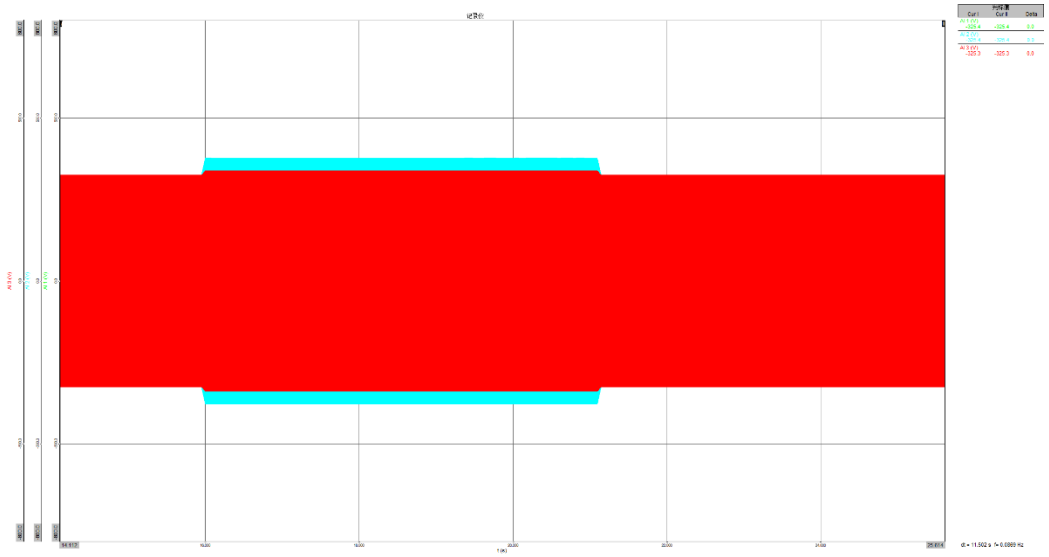
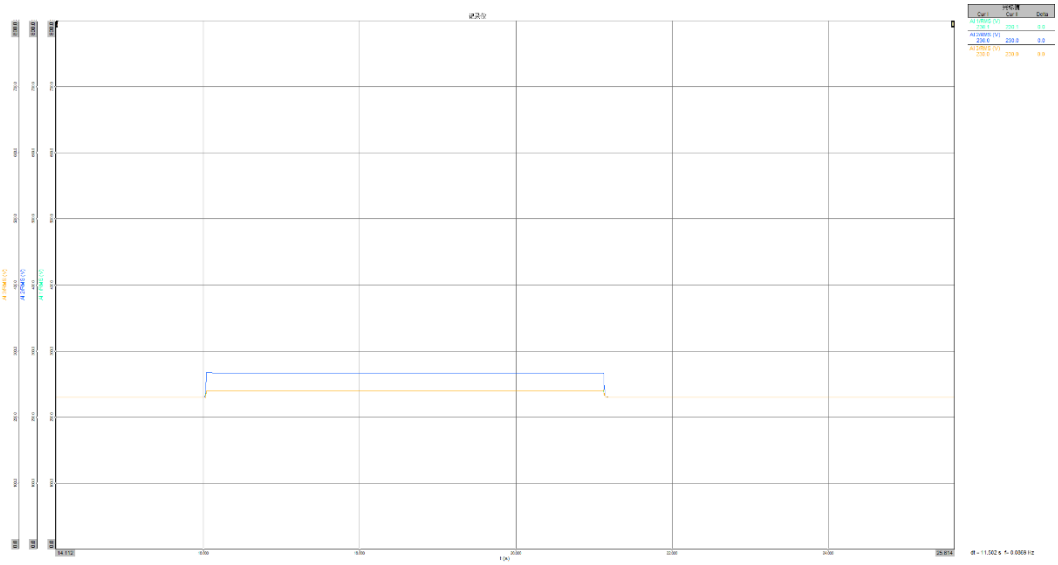
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.197
	58		Pos	t2+3s to t2+10s	[p.u.]	0.197
	59	Active power recover time	Total	-	[ms]	202
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.025
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.016
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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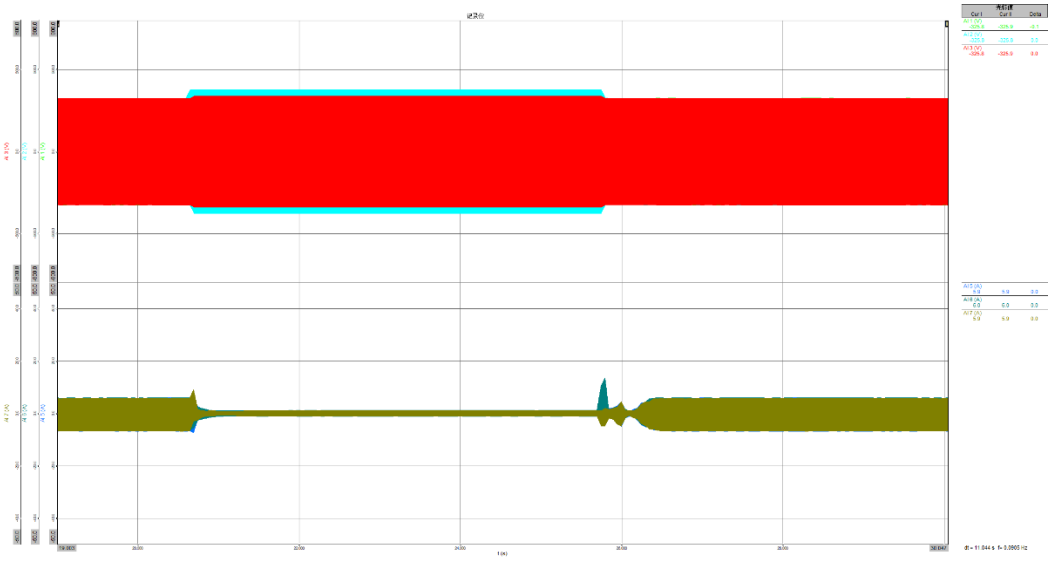
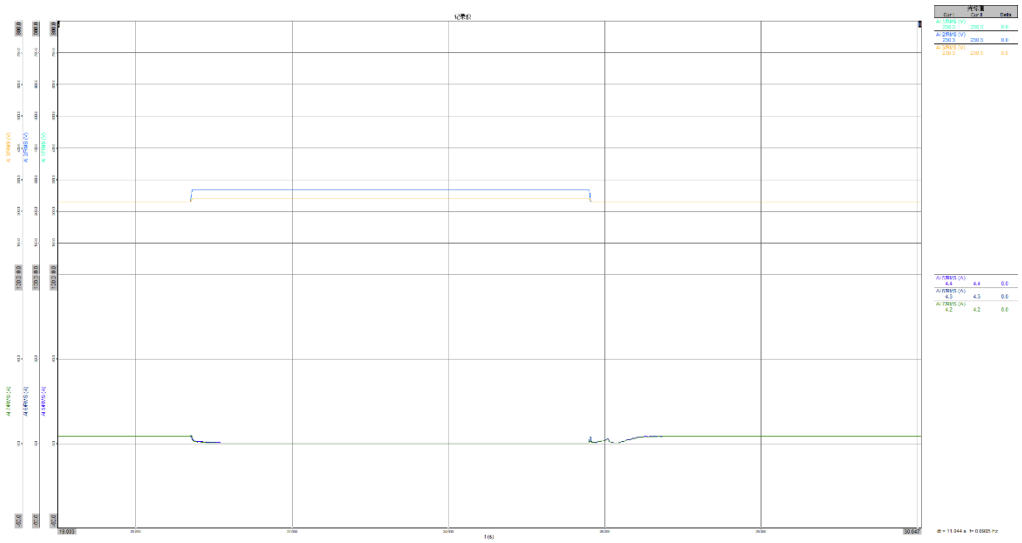
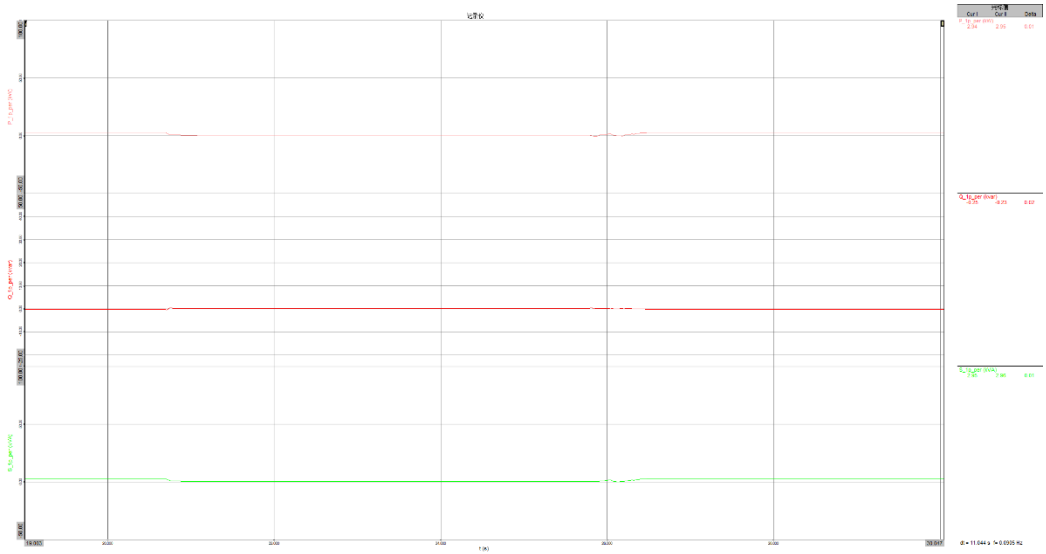
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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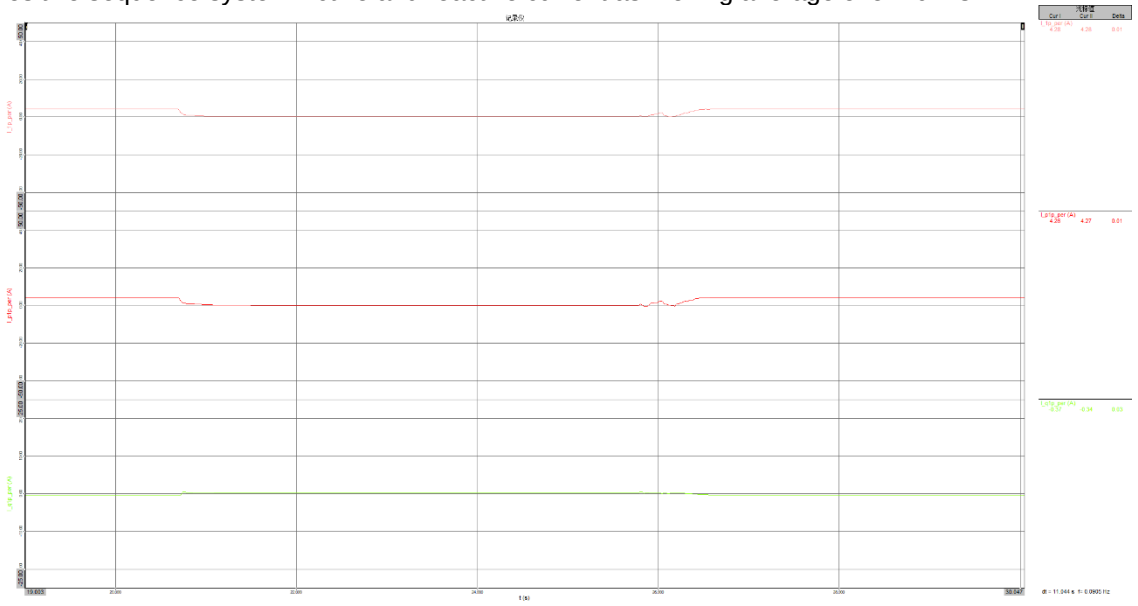
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	7.1
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	13:10:33 to 13:13:55
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	18919
	7	Fault clearance(t2)	Fault Phase	-	[ms]	79919
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.101
	10		L2-N		[p.u.]	0.101
	11		L3-N		[p.u.]	0.101
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.112
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.998
	20		L2	t1-10s to t1	[p.u.]	1.009
	21		L3	t1-10s to t1	[p.u.]	1.008
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.004
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.997
	27	Active power	Total	t1-10s to t1	[p.u.]	1.001
	29		Pos. seq.	t1-10s to t1	[p.u.]	1.001
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.114
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.114
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.116
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.115
	40	Momentary Current	L1	t1+60ms	[p.u.]	1.013
	41		L2	t1+60ms	[p.u.]	1.008
	42		L3	t1+60ms	[p.u.]	1.004
	43		L1	t1+100ms	[p.u.]	0.940
	44		L2	t1+100ms	[p.u.]	0.958
	45		L3	t1+100ms	[p.u.]	0.959
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.949
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.961
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.959
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	1.054
	52		Pos	t1+100ms to t2-20ms	[p.u.]	1.002
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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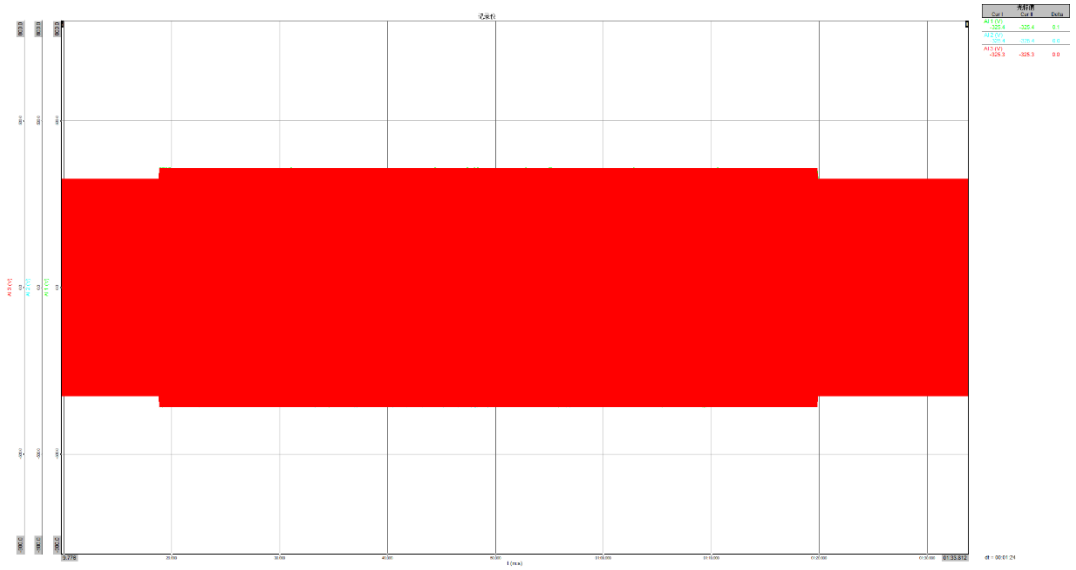
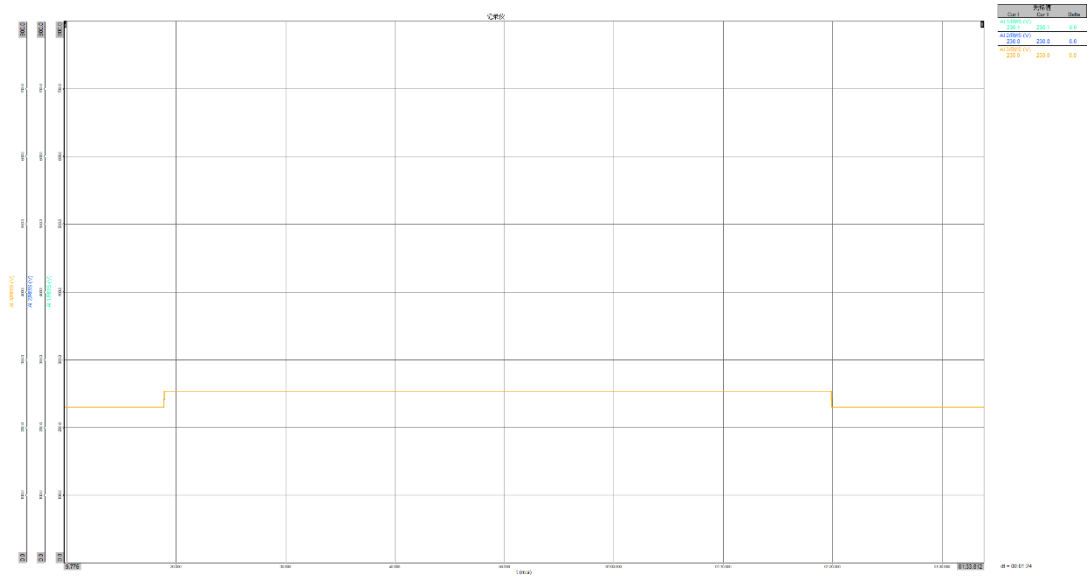
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.002
	58		Pos	t2+3s to t2+10s	[p.u.]	1.002
	59	Active power recover time	Total	-	[ms]	55
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.011
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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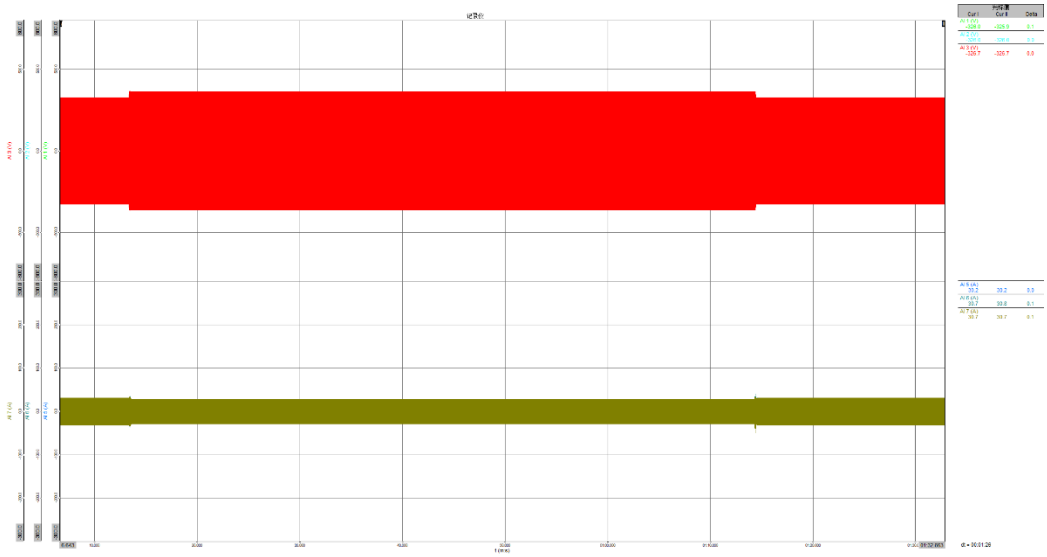
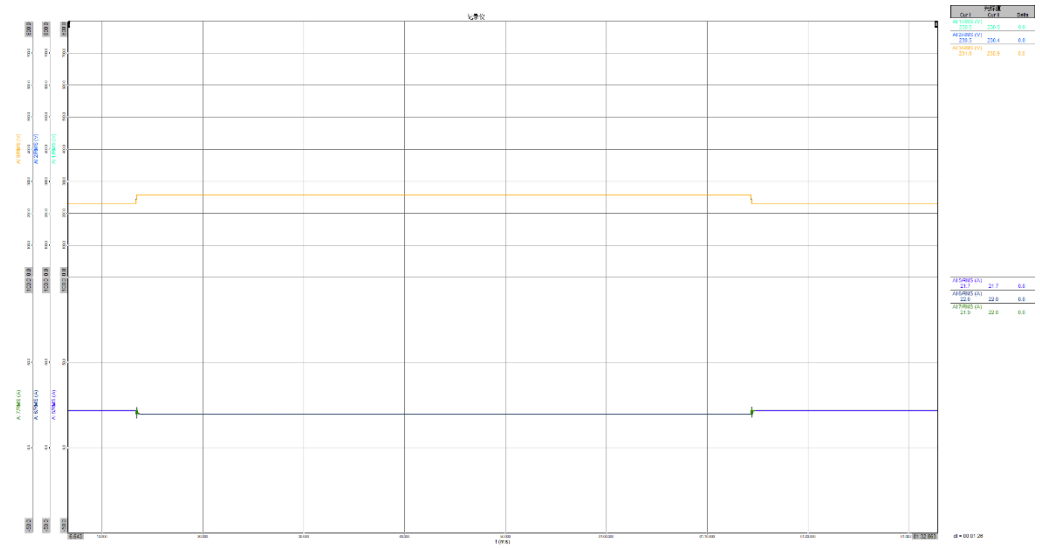
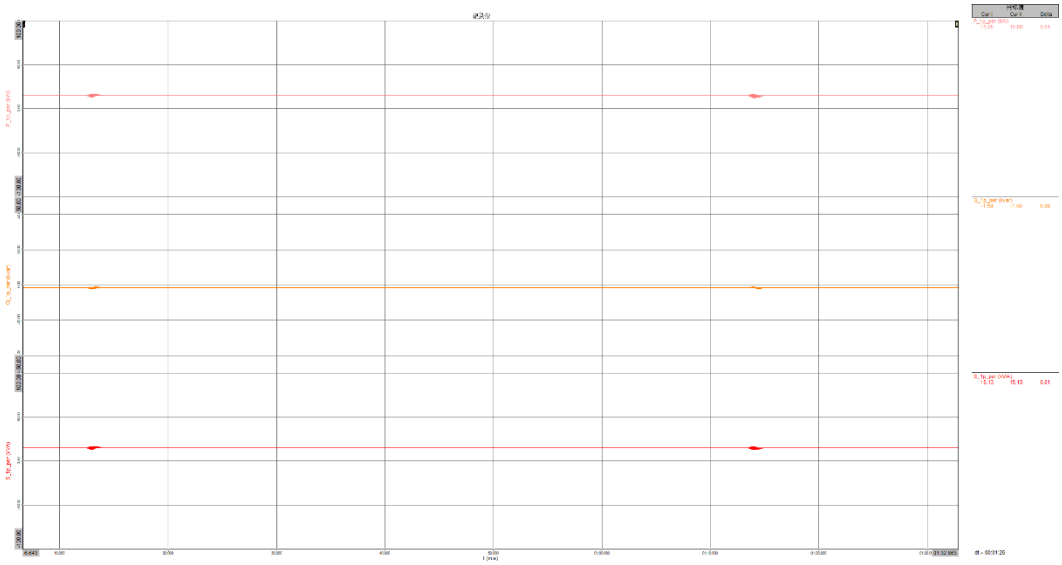
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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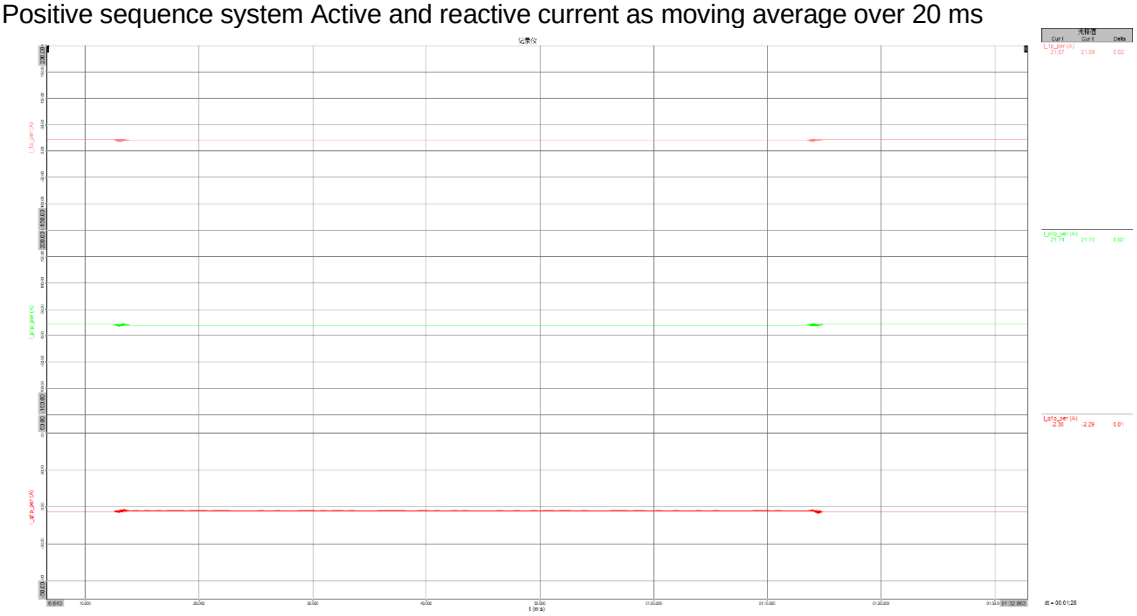
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	7.2
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	13:14:33 to 13:17:55
	3	Fault type (affected phases)	-	-	-	3 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	18919
	7	Fault clearance(t2)	Fault Phase	-	[ms]	79919
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.101
	10		L2-N		[p.u.]	0.101
	11		L3-N		[p.u.]	0.101
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.107
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.001
	19	Current	L1	t1-10s to t1	[p.u.]	0.204
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.197
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.199
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.198
	27	Active power	Total	t1-10s to t1	[p.u.]	0.198
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.199
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.110
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.110
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.110
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.108
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.193
	41		L2	t1+60ms	[p.u.]	0.190
	42		L3	t1+60ms	[p.u.]	0.199
	43		L1	t1+100ms	[p.u.]	0.196
	44		L2	t1+100ms	[p.u.]	0.188
	45		L3	t1+100ms	[p.u.]	0.184
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.196
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.189
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.187
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.208
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.199
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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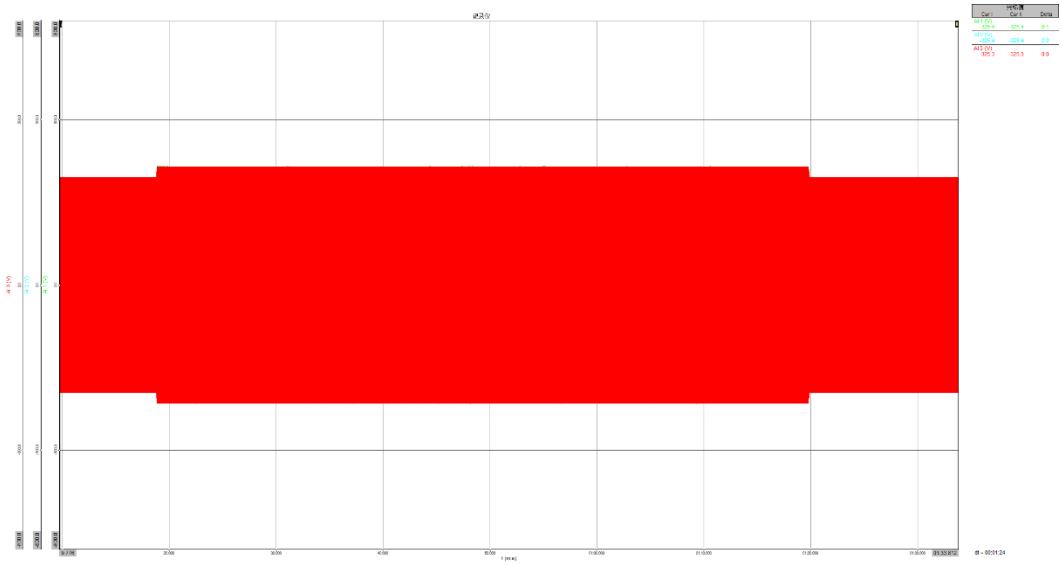
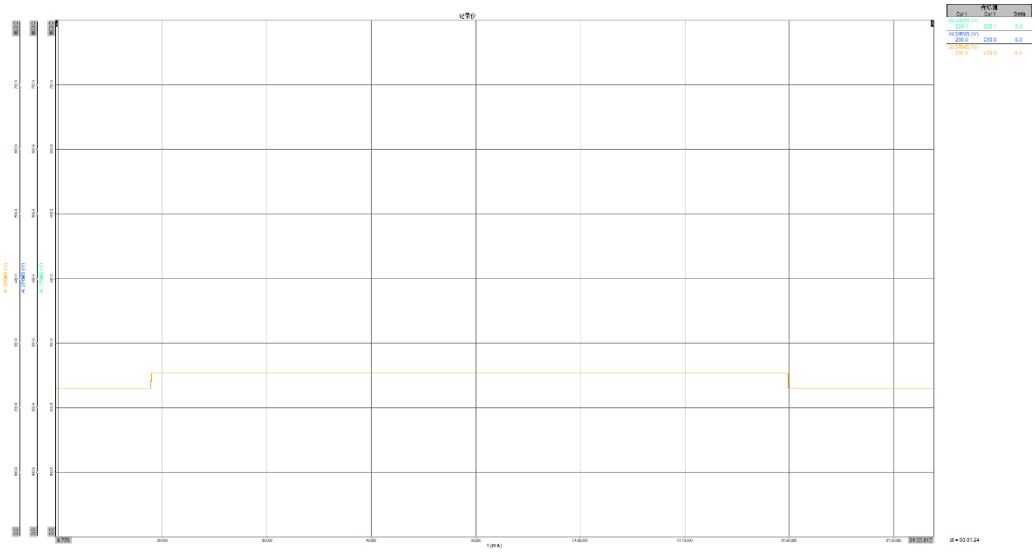
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.001
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.199
	58		Pos	t2+3s to t2+10s	[p.u.]	0.198
	59	Active power recover time	Total	-	[ms]	54
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.026
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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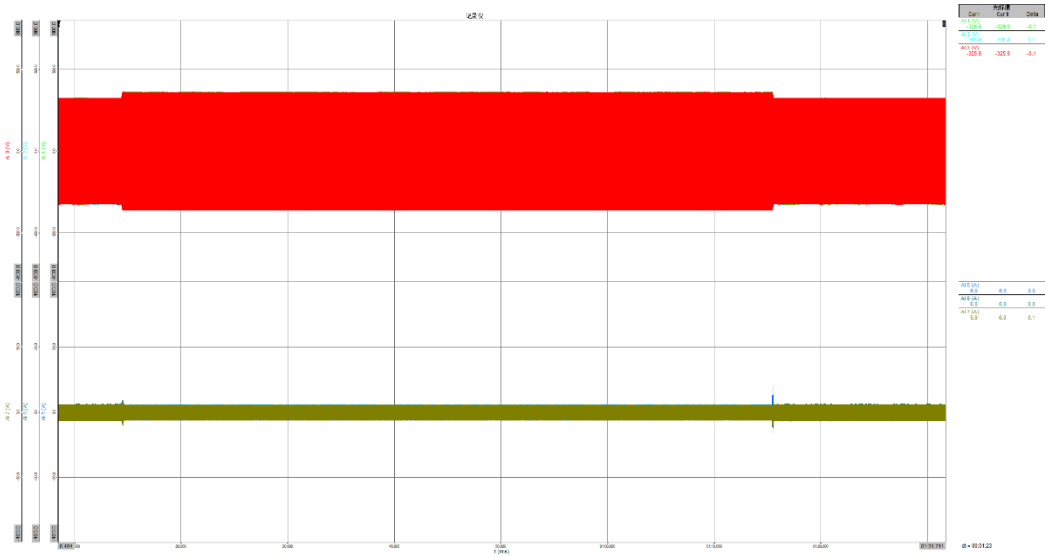
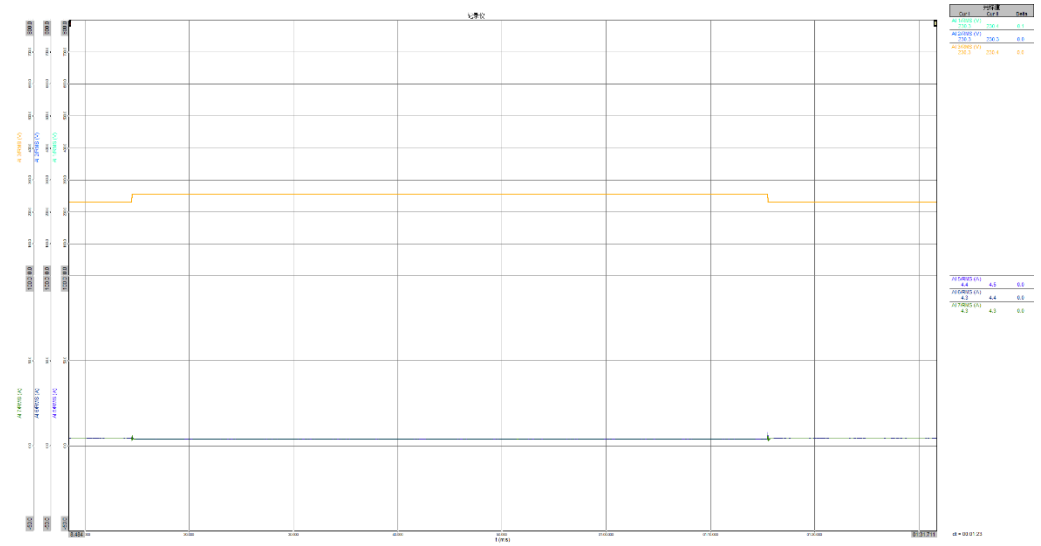
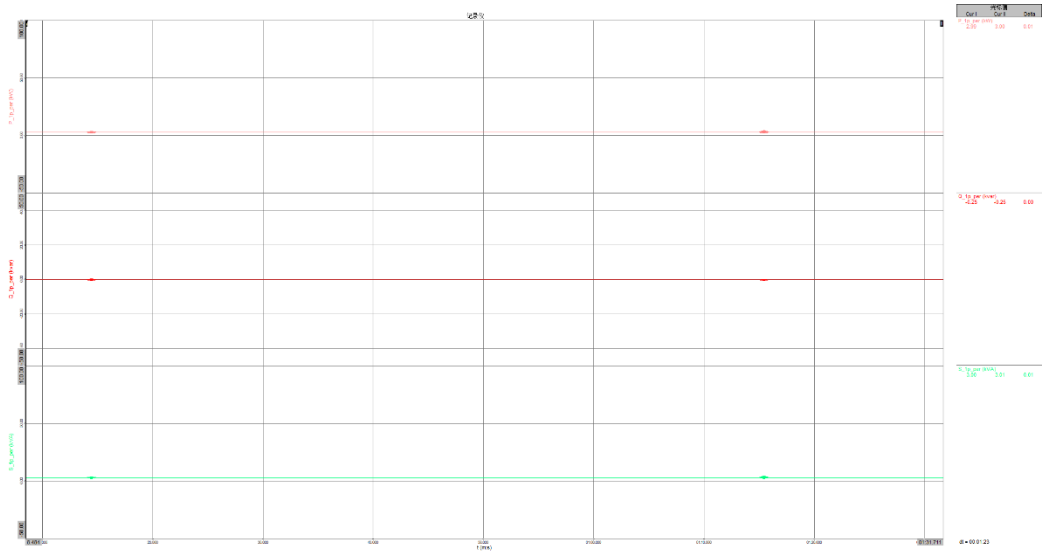
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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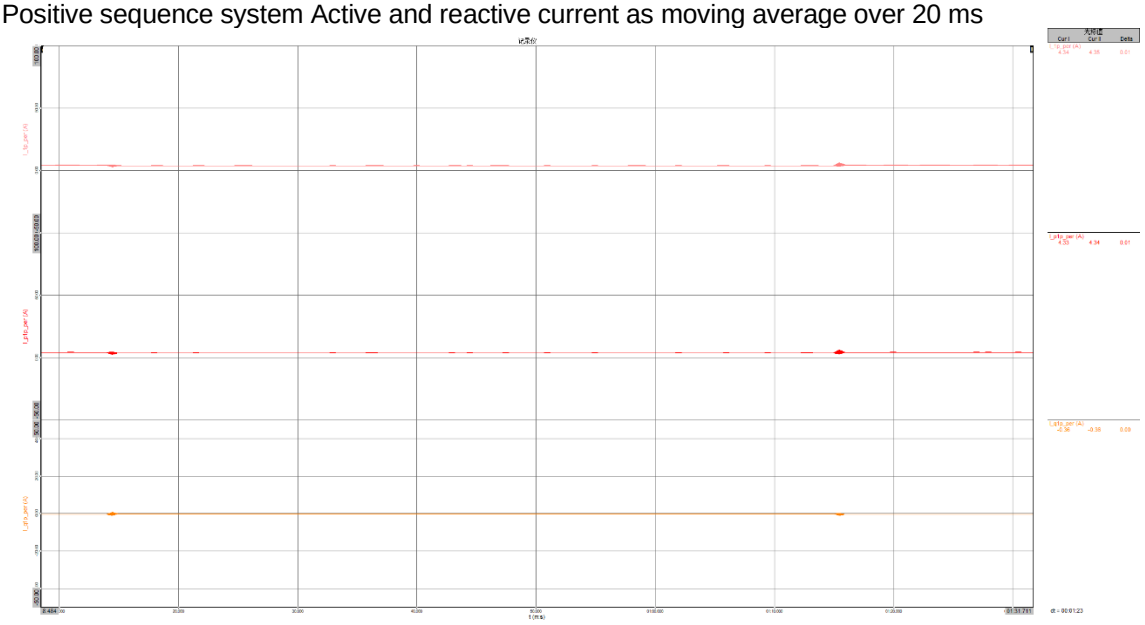
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	7.3
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	13:18:33 to 13:21:55
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14205
	7	Fault clearance(t2)	Fault Phase	-	[ms]	75205
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.026
	10		L2-N		[p.u.]	0.101
	11		L3-N		[p.u.]	0.026
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.049
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.002
	16		L3-N	t1-10s to t1	[p.u.]	1.004
	19	Current	L1	t1-10s to t1	[p.u.]	0.996
	20		L2	t1-10s to t1	[p.u.]	1.008
	21		L3	t1-10s to t1	[p.u.]	1.004
	22		Pos. seq.	t1-10s to t1	[p.u.]	1.002
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.016
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.016

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.995
	27	Active power	Total	t1-10s to t1	[p.u.]	0.999
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.999
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.011
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.029
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.103
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.026
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.051
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.992
	41		L2	t1+60ms	[p.u.]	0.991
	42		L3	t1+60ms	[p.u.]	0.988
	43		L1	t1+100ms	[p.u.]	0.975
	44		L2	t1+100ms	[p.u.]	0.953
	45		L3	t1+100ms	[p.u.]	0.988
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.978
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.953
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.989
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	1.015
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.999
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.002

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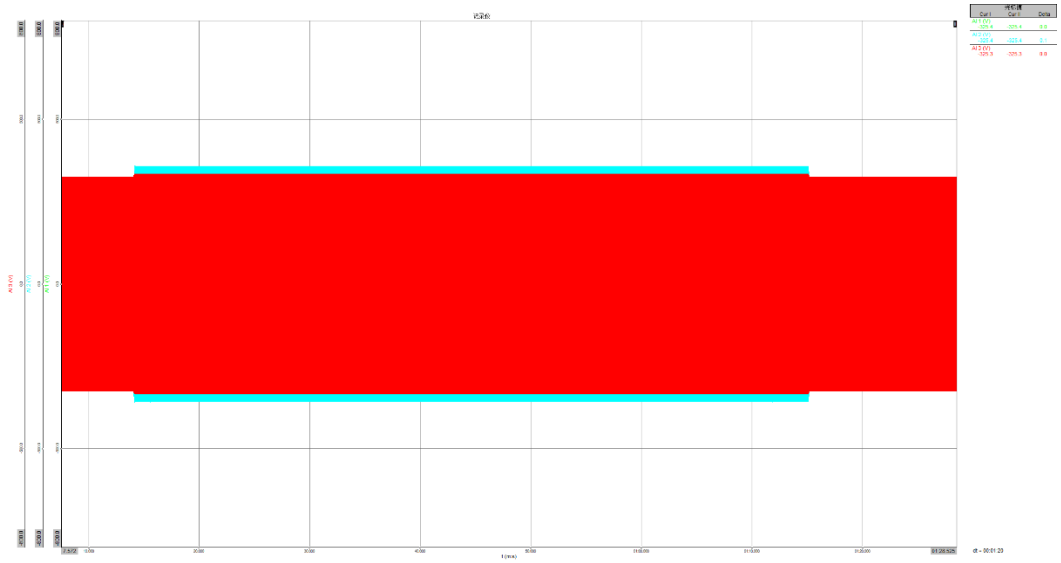
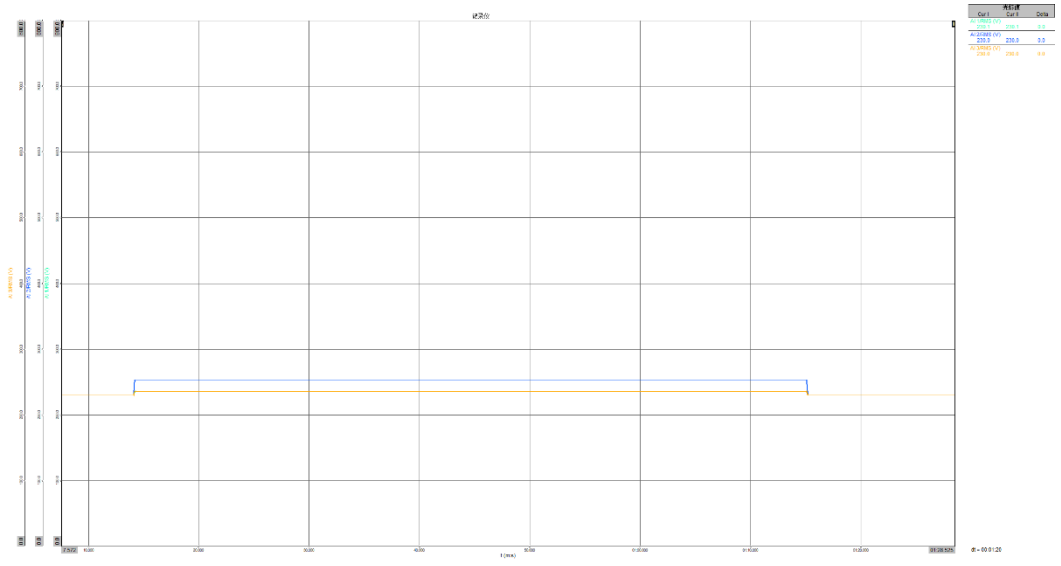
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.004
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	1.000
	58		Pos	t2+3s to t2+10s	[p.u.]	1.000
	59	Active power recover time	Total	-	[ms]	42
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.011
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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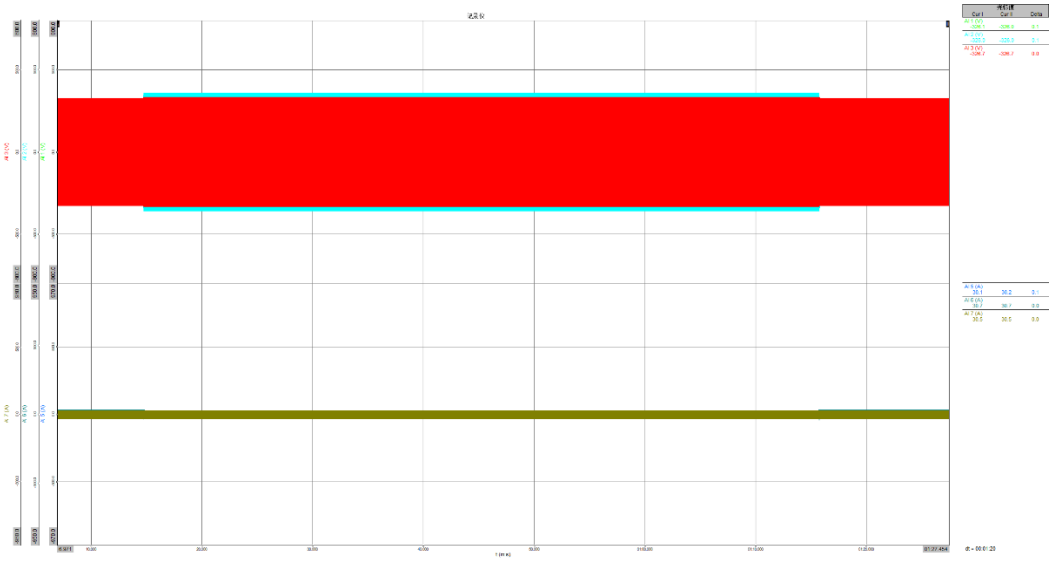
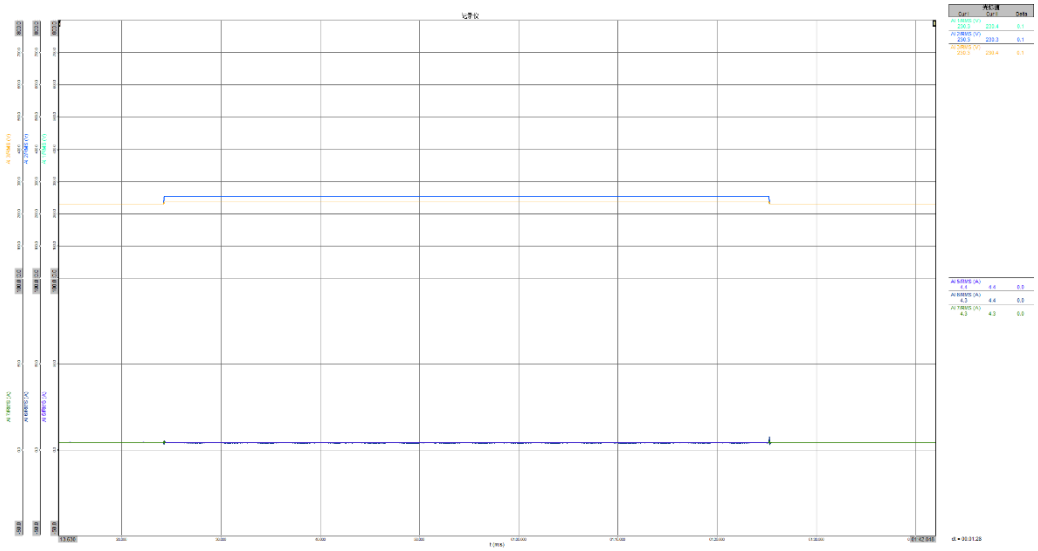
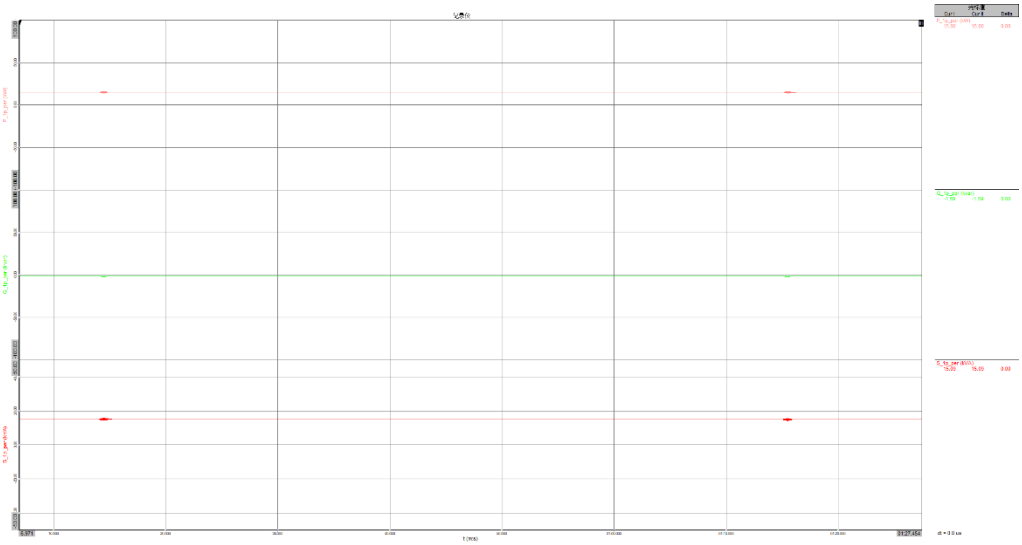
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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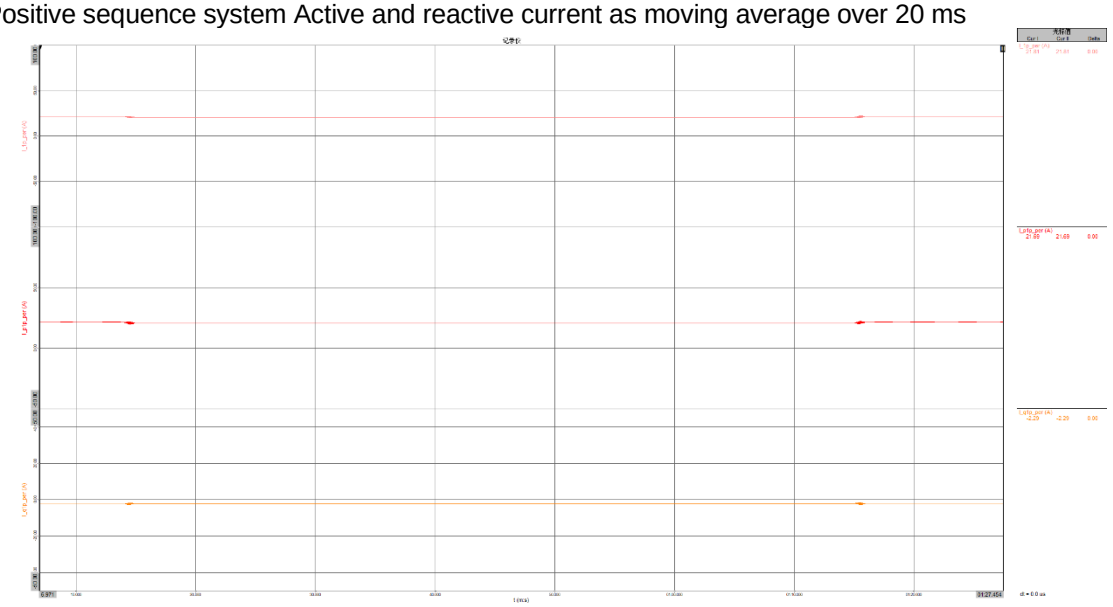
Positive sequence system Active and reactive current as moving average over 20 ms



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	No.	Parameter	Phase reference	Reference time	Unit	Value
General information	0	Test Number	-	-	-	7.4
	1	Date	-	-	[dd.mm.yyyy]	2022/8/09
	2	Time	-	-	[hh:mm:ss.f]	13:22:33 to 13:25:55
	3	Fault type (affected phases)	-	-	-	2 Phase
	6	Fault occurrence(t1)	Fault Phase	-	[ms]	14205
	7	Fault clearance(t2)	Fault Phase	-	[ms]	75205
	8	Fault duration determined from no load test	Fault Phase	-	[ms]	60980
	9	Voltage drop depth or voltage increase determined from no load test	L1-N	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.026
	10		L2-N		[p.u.]	0.101
	11		L3-N		[p.u.]	0.026
	12	Voltage drop depth or voltage increase determined from test	Pos. seq.	t1+100ms to t2 and t1-10s to t1	[p.u.]	0.053
Before t1	14	Voltage	L1-N	t1-10s to t1	[p.u.]	1.002
	15		L2-N	t1-10s to t1	[p.u.]	1.001
	16		L3-N	t1-10s to t1	[p.u.]	1.002
	19	Current	L1	t1-10s to t1	[p.u.]	0.203
	20		L2	t1-10s to t1	[p.u.]	0.199
	21		L3	t1-10s to t1	[p.u.]	0.196
	22		Pos. seq.	t1-10s to t1	[p.u.]	0.137
	23	Reactive current	Pos. seq.	t1-10s to t1	[p.u.]	-0.017
	24		Pos. seq.	t1-1s to t1	[p.u.]	-0.017

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	26	Active current	Pos. seq.	t1-1s to t1	[p.u.]	0.197
	27	Active power	Total	t1-10s to t1	[p.u.]	0.198
	29		Pos. seq.	t1-10s to t1	[p.u.]	0.198
	31	Reactive power	Total	t1-10s to t1	[p.u.]	0.026
	32		Pos. seq.	t1-10s to t1	[p.u.]	-0.017
t1 to t2	35	Voltage	L1-N	t1+100ms to t2-20ms	[p.u.]	1.014
	36		L2-N	t1+100ms to t2-20ms	[p.u.]	1.150
	37		L3-N	t1+100ms to t2-20ms	[p.u.]	1.013
	38		Pos. seq.	t1+100ms to t2-20ms	[p.u.]	1.052
	40	Momentary Current	L1	t1+60ms	[p.u.]	0.215
	41		L2	t1+60ms	[p.u.]	0.212
	42		L3	t1+60ms	[p.u.]	0.186
	43		L1	t1+100ms	[p.u.]	0.208
	44		L2	t1+100ms	[p.u.]	0.199
	45		L3	t1+100ms	[p.u.]	0.194
	46	Max current after t1+100ms during fault	L1	t1+100ms to t2-20ms	[p.u.]	0.267
	47		L2	t1+100ms to t2-20ms	[p.u.]	0.349
	48		L3	t1+100ms to t2-20ms	[p.u.]	0.235
	51	Active power	Total	t1+100ms to t2-20ms	[p.u.]	0.261
	52		Pos	t1+100ms to t2-20ms	[p.u.]	0.198
After t2	53	Voltage	L1-N	t2+3s to t2+10s	[p.u.]	1.002
	54		L2-N	t2+3s to t2+10s	[p.u.]	1.001

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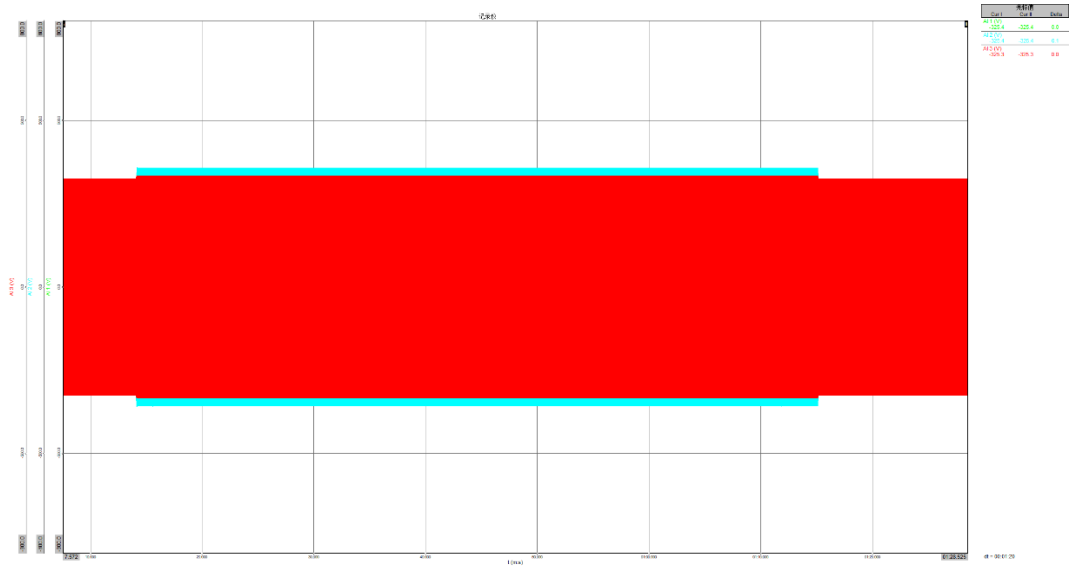
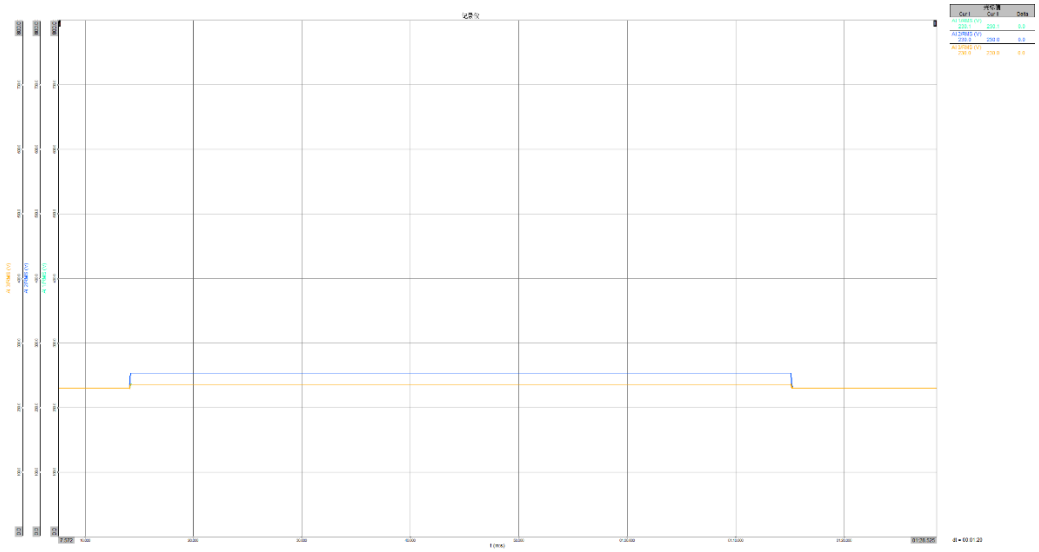
	55		L3-N	t2+3s to t2+10s	[p.u.]	1.002
	57	Active power	Total	t2+3s to t2+10s	[p.u.]	0.198
	58		Pos	t2+3s to t2+10s	[p.u.]	0.198
	59	Active power recover time	Total	-	[ms]	5
	60	Reactive power	Total	t2+3s to t2+10s	[p.u.]	0.026
	61		Pos	t2+3s to t2+10s	[p.u.]	-0.017
	62	Reactive power recover time	Total	-	[ms]	0

Graphic:

Phase-to-neutral voltages and Phase-to-phase voltages (no load)



RMS Phase-to-neutral voltages as moving averages over 20 ms (no load)



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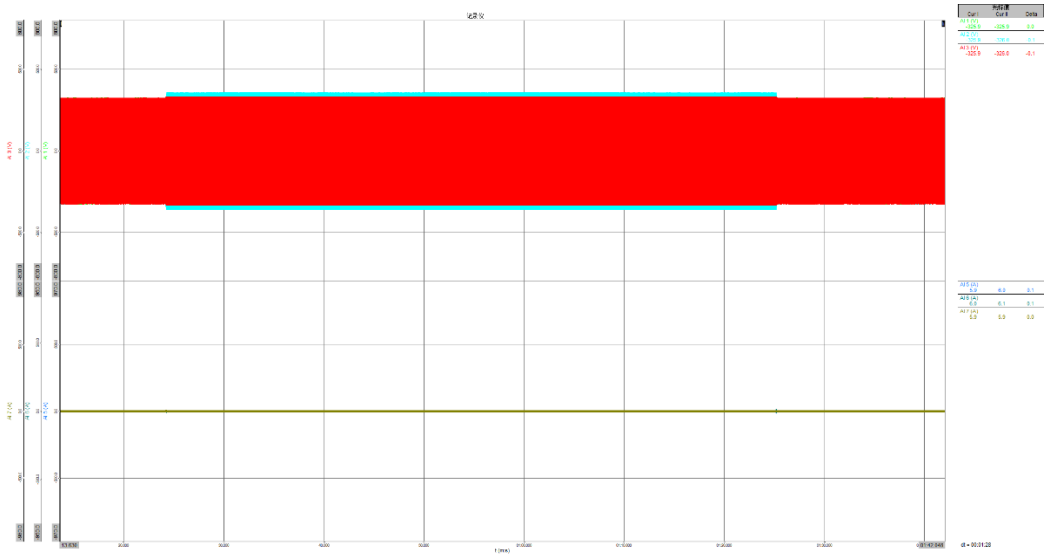
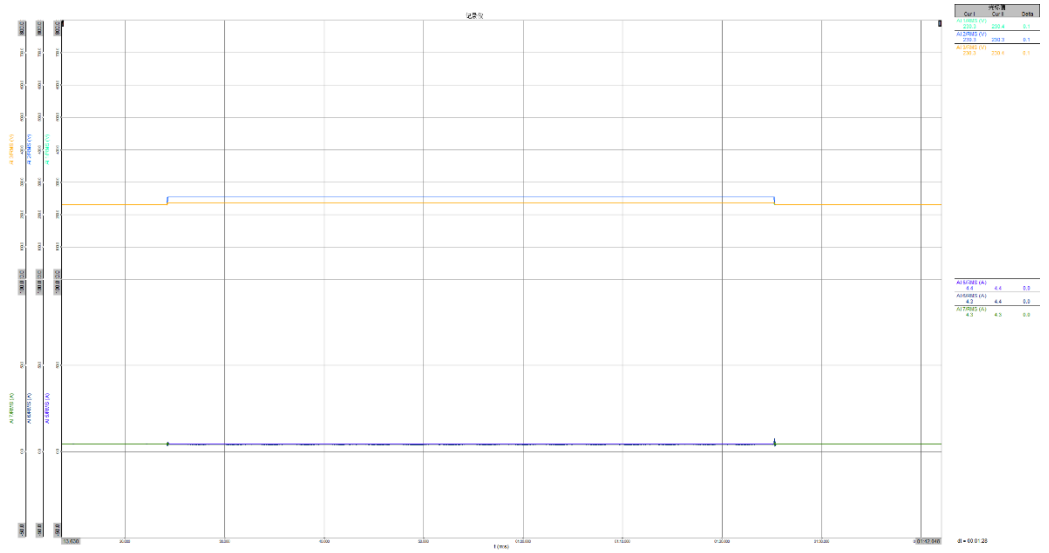
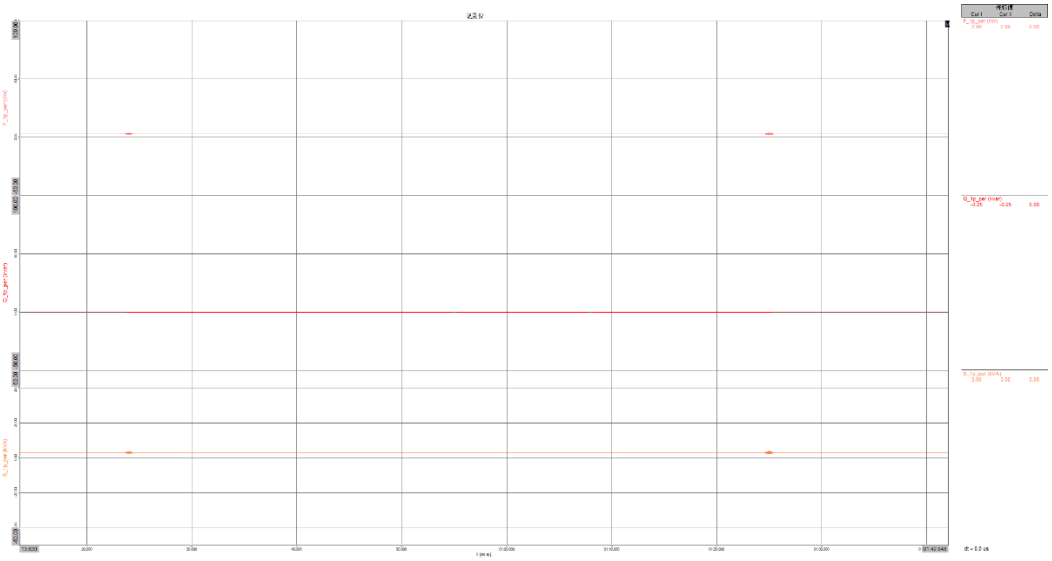
Phase-to-neutral voltages and Phase currents



RMS Phase-to-neutral voltages and currents as moving averages over 20 ms



Positive sequence system Active and reactive power as moving average over 20 ms



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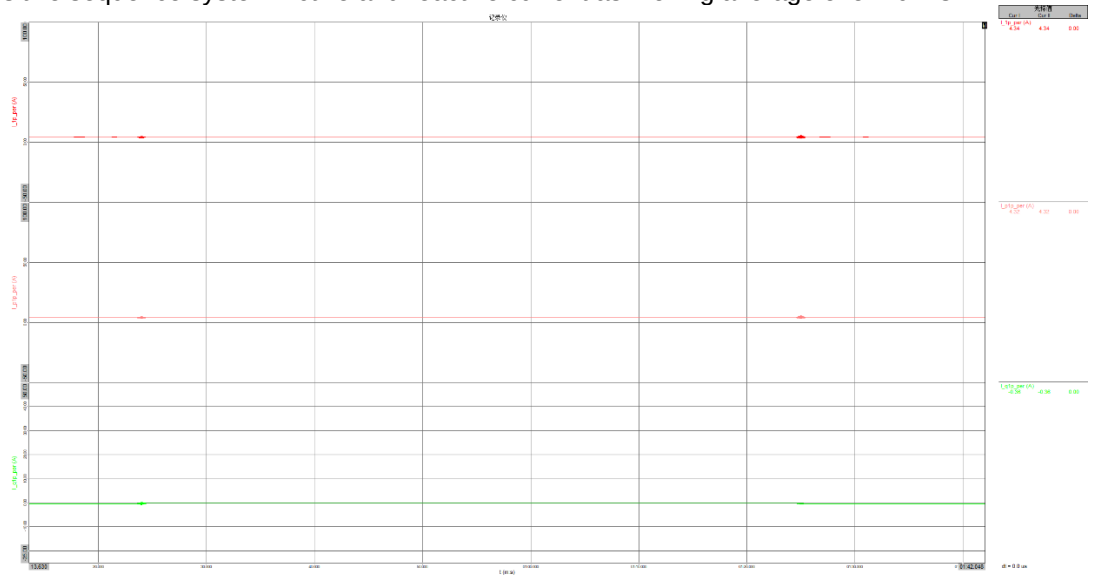
Positive sequence system Active and reactive current as moving average over 20 ms



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

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