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Evaluation Report
No. TRPVP11144/25E/002

Commission testing for Power Conversion System

Applicant: **Jiangsu Weiheng Intelligent Technology Co., Ltd.**
Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000
Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA

File No.: PVP11144/25E-002

Designed: by: Allen Zhang Digitally signed by Allen Zhang Date: 2026.03.25 09:36:37 +08'00'

Reviewed: by: Iris Zheng Digitally signed by Iris Zheng Date: 2026.03.25 18:01:47 +08'00'

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TÜVNORD

Evaluation Report

File No.: PVP11144/25E-002 Report No.: TRPVP11144/25E/002

Applicant ..... :	**Jiangsu Weiheng Intelligent Technology Co., Ltd.** Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000 Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA
Manufacturer ..... :	**Jiangsu Weiheng Intelligent Technology Co., Ltd.** Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000 Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA
Factory..... :	**Jiangsu Weiheng Intelligent Technology Co., Ltd.** Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000 Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA
Order No. ..... :	HZHZPVP11144/25E
Date of Application [YYYY-MM-DD]..... :	2025-12-30
Product(s) ..... :	Power Conversion System
Model type(s)..... :	**TAA-105kW-01, TAA-105kW-11, TAA-125kW-01, TAA-125kW-11**
Type of examination ..... :	Commission testing only
Certification program: ..... :	BOS-P-01 Rev. 01
Certification fundamental(s)..... :	EN 50549-2:2019+A1:2023 EN 50549-10:2022
Testing Period [YYYY-MM-DD] start/end..... :	2026-01-06/2026-03-17
Testing Laboratory..... :	**Dongguan BALUN Testing Technology Co., Ltd.** Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong, China
Annex(es) ..... :	Annex 1: Test report no. BL-DG2630055-202 (295 pages)

Test results listed in this test report refer exclusively to the mentioned test sample.

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The submitted test samples as described in the reports hereunder are in compliance with the requirements / are tested according to the requirements:

EN 50549-2:2019+A1:2023 “Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network — Generating plants up to and including Type B”; EN 50549-10:2022 “Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units”.

中国认可
国际互认
检测
TESTING
CNAS L14701

TEST REPORT

Application number:	PVP11144/25E-002
Applicant:	Jiangsu Weiheng Intelligent Technology Co., Ltd.
Address:	Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000 Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA
Equipment Type:	Power Conversion System
Model Name Under Test:	TAA-125kW-11
Model Name:	TAA-105kW-01, TAA-105kW-11, TAA-125kW-01, TAA-125kW-11
Brand Name:	WHES
Ratings:	See copy of marking label and model list.
Test Standard:	**EN 50549-2:2019+A1:2023** **EN 50549-10:2022**
Sample Arrival Date:	Jan. 05, 2026
Test Date:	Jan. 06, 2026 to Mar. 17, 2026
Date of Issue:	Mar. 23, 2026

ISSUED BY:

Dongguan BALUN Testing Technology Co., Ltd.

Tested by: Leo Sun

Leo Sun

Checked by: Jin Huang

Jin Huang

Approved by: Tao Zheng

Tao Zheng

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Mar. 23, 2026	Initial Issue

-Note:

For reports with CNAS mark, the ownership of accreditation is under "BALUN". "TÜV NORD" is not owing the accreditation.

Summary of testing:

All the tests results confirmed to the requirements of the standard.

Tests performed (name of test and test clause):	**Testing location:**
5.2 Normal operating range 5.3 Immunity to disturbances 5.4 Active response to frequency deviation 5.5 Power specification and response to voltage variations 5.6 Voltage related active power reduction - P(U) 5.7 EMC and power quality 5.8 Interface protection 5.9 Connection and reconnection 5.10 Active power reduction on set point 5.11 Remote information exchange 5.12 Requirements regarding single fault tolerance of interface protection system and interface switch	Dongguan BALUN Testing Technology Co., Ltd. Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong, China

☒ **The product fulfils the requirements of EN 50549-2: 2019+A1:2023, EN 50549-10:2022**

Copy of marking plate:

The following nameplates are based on actual shipment and the parameter information will not change.

WHES

Power Conversion System

Model:	TAA-105kW-01
S/N:	

DC Terminal	
Operating Range	615-950V*
Max .Voltage	950V
Max .Current	171A

AC Terminal	
Nominal Voltage	230V / 400V, 3W+N+PE / 3W+PE
Nominal Operating Frequency	50/60Hz
Rated Power	105kW
Max. Apparent Power	115.5kVA
Max. Current	167A
Power Factor Range	1(lagging)-1(leading)

General	
Protective Class	I
Operating Temperature Range	-30 - +55℃
Enclosure	IP20
Overvoltage Category	II(DC),III(AC)
Altitude	2000m
*When the system wiring is 3P+N+PE,the DC full load operating voltage is 680-950V.	

Jiangsu Weiheng Intelligent Technology Co., Ltd.

Made in China

Sheng Xiang,Yaxi Community,Luoshe Town, Huishan District, 214000,Wuxi City, Jiangsu Province,P.R. China

WHES

Power Conversion System

Model:	TAA-105kW-11
S/N:	

DC Terminal	
Operating Range	615-950V*
Max .Voltage	950V
Max .Current	171A

AC Terminal	
Nominal Voltage	230V / 400V, 3W+N+PE / 3W+PE
Nominal Operating Frequency	50/60Hz
Rated Power	105kW
Max. Apparent Power	115.5kVA
Max. Current	167A
Power Factor Range	1(lagging)-1(leading)

General	
Protective Class	I
Operating Temperature Range	-30 - +55℃
Enclosure	IP20
Overvoltage Category	II(DC),III(AC)
Altitude	2000m
*When the system wiring is 3P+N+PE,the DC full load operating voltage is 680-950V.	

Jiangsu Weiheng Intelligent Technology Co., Ltd.

Made in China

Sheng Xiang,Yaxi Community,Luoshe Town, Huishan District, 214000,Wuxi City, Jiangsu Province,P.R. China

WHES

Power Conversion System

Model:	TAA-125kW-01
S/N:	

DC Terminal	
Operating Range	615-950V*
Max .Voltage	950V
Max .Current	203A

AC Terminal	
Nominal Voltage	230V / 400V, 3W+N+PE / 3W+PE
Nominal Operating Frequency	50/60Hz
Rated Power	125kW
Max. Apparent Power	138kVA
Max. Current	200A
Power Factor Range	1(lagging)-1(leading)

General	
Protective Class	I
Operating Temperature Range	-30 - +55℃
Enclosure	IP20
Overvoltage Category	II(DC),III(AC)
Altitude	2000m
*When the system wiring is 3P+N+PE,the DC full load operating voltage is 680-950V.	

Jiangsu Weiheng Intelligent Technology Co., Ltd.

Made in China

Sheng Xiang,Yaxi Community,Luoshe Town, Huishan District, 214000,Wuxi City, Jiangsu Province,P.R. China

WHES

Power Conversion System

Model:	TAA-125kW-11
S/N:	

DC Terminal	
Operating Range	615-950V*
Max .Voltage	950V
Max .Current	203A

AC Terminal	
Nominal Voltage	230V / 400V, 3W+N+PE / 3W+PE
Nominal Operating Frequency	50/60Hz
Rated Power	125kW
Max. Apparent Power	138kVA
Max. Current	200A
Power Factor Range	1(lagging)-1(leading)

General	
Protective Class	I
Operating Temperature Range	-30 - +55℃
Enclosure	IP20
Overvoltage Category	II(DC),III(AC)
Altitude	2000m
*When the system wiring is 3P+N+PE,the DC full load operating voltage is 680-950V.	

Jiangsu Weiheng Intelligent Technology Co., Ltd.

Made in China

Sheng Xiang,Yaxi Community,Luoshe Town, Huishan District, 214000,Wuxi City, Jiangsu Province,P.R. China

Note: Fixed PF mode conducted under the PF from 0.8 lagging to 0.8 leading; All other reactive power mode conducted from $Q_{max.}$ +75000Var to $Q_{min.}$ -75000Var.

Test item particulars.....:	
Equipment mobility .....:	Permanent connection
Operating condition.....:	Continuous
Class of equipment.....:	Class I
Mass of equipment (kg) .....:	See model list.
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object was not evaluated for the requirement:	N/E
- test object does not meet the requirement.....:	F (Fail)

General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of Manufacturer (ies)..... :	**Jiangsu Weiheng Intelligent Technology Co., Ltd.** Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000 Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA
Name and address of factory (ies) ..... :	**Jiangsu Weiheng Intelligent Technology Co., Ltd.** Sheng Xiang, Yaxi Community, Luoshe Town, Huishan District, 214000 Wuxi, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA

General product information:

The unit under test (EUT) is power conversion system. During inverter, which convert the variable DC power generated from the Batteries to the stable utility AC power which can be fed into the commercial electrical grid or off-grid load. When charging, the grid converts the alternating current into direct current into the battery through the Power Conversion System.
The maximum ambient temperature allowed by the manufacturer's specifications is 55°C (derating at 45°C).
The unit is an AC/DC convert module, additional automatic disconnection protection devices should be installed in final whole system according to the local requirement.

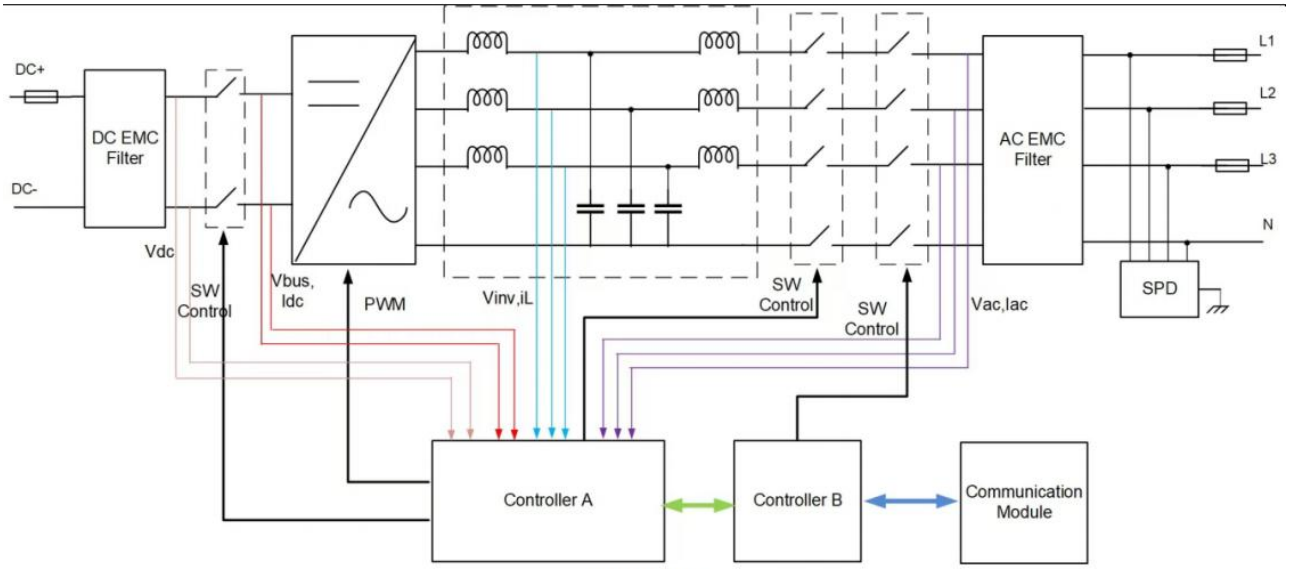
Differences of the models:
The engineering samples of Power Conversion System products:
The models TAA-125kW-01, TAA-125kW-11, TAA-105kW-01, TAA-105kW-11 are same as the hardware and software, expect the output voltage is different due to be adjusted by software. The difference between having the suffix '-11' and having the suffix '-01' is the difference in the way the wires come out and the terminals on the DC side. Among them, having the suffix '-01' adopts the front outlet mode, while having the suffix '-11' adopts the rear outlet mode.

If no specification, all the tests are conducted on model TAA-125kW-11.

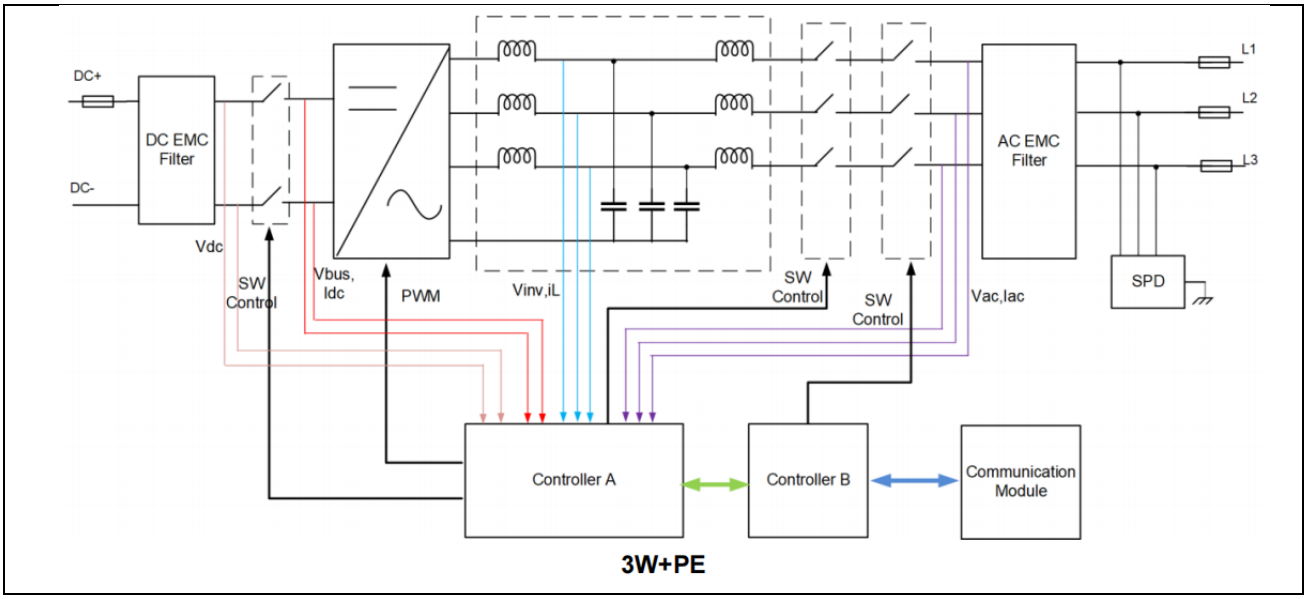
Software Version: V100B000D000

Hardware Version: A00

The topology diagram:



3W+N+PE


DC+
DC-
DC EMC Filter
Vdc
SW Control
Vbus, Idc
PWM
Vinv,iL
SW Control
SW Control
Vac,Iac
AC EMC Filter
L1
L2
L3
SPD
Controller A
Controller B
Communication Module
3W+PE

Model list:

Model or Type designation	TAA-105kW-01 TAA-105kW-11	TAA-125kW-01 TAA-125kW-11
DC terminal		
Voltage Range [Vd.c.]	615-950(3W+PE)/650-950(3W+N+PE)	
Full load voltage Range [Vd.c.]	615-950(3W+PE)/680-950(3W+N+PE)	
Max. Current [Ad.c.]	171	203
Overvoltage Category (OVC)	II	
AC terminal		
Rated Voltage [Va.c.]	230V / 400V, 3W+N+PE / 3W+PE	
Rated Frequency [Hz]	50Hz/60Hz	
Rated Charge/Discharge Power [kW]	105	125
Max. Charge/Discharge Apparent Power [kVA]	115.5	138
Max. Charge/Discharge Apparent Current [Aa.c.]	167	200
Power Factor cosφ [λ]	0.8 lagging – 0.8 leading	
Overvoltage Category (OVC)	III	
System		
Type of converter	Non-Isolated	
Protective Class	I	
Enclosure Protection (IP)	IP20	
Pollution degree	External PD3, Internal PD2	
Operating Temperature Range [ºC]	-30 ~ 55	
Size W*H*D [mm]	For model TAA-105kW-01 and TAA-125kW-01: 520*232*725 For model TAA-105kW-11 and TAA-125kW-11: 520*232*785	
Weight [kg]	For model TAA-105kW-01 and TAA-125kW-01: 69 For model TAA-105kW-11 and TAA-125kW-11: 74.5	

EN 50549-2:2019 & EN 50549-10:2022			
Clause(s) / subclause(s) of EN 50549-2:2019	**Clause(s) / subclause(s) of EN 50549-10:2022**	**Remark**	**Verdict**
4.4.2 Operating frequency range	5.2.1 Frequency operating range		P
4.4.3 Minimal requirement for active power delivery at underfrequency	5.2.1 Frequency operating range		P
4.4.4 Continuous Operating voltage range	5.2.2 Voltage operating range		P
4.5.2 Rate of change of frequency (ROCOF) immunity	5.3.1 Immunity to disturbances - Rate of change of frequency (ROCOF)		P
4.5.3.2 Generating plant with non-synchronous generating technology	5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)		P
4.5.3.3 Generating plant with synchronous generating technology	5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)		N/A
4.5.4 Over-voltage ride through (OVRT)	5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)		P
4.6.1 Power response to over-frequency	5.4.3.2 Power response to over-frequencies		P
4.6.2 Power response to under-frequency	5.4.3.3 Power response to under-frequencies		P
4.7.2.2 Voltage support by reactive power, Capabilities	5.5.1 Power capabilities assessment		P
4.7.2.3 Voltage support by reactive power, control modes	5.5.2 Voltage support by reactive power - test to determine the reactive power control modes		P
4.7.2.3.2 Setpoint control modes	5.5.2.3 Verification procedure for Set point control		P
4.7.2.3.3 Voltage related control mode	5.5.2.5 Verification procedure for power related control modes for reactive power		P
4.7.2.3.4 Power related control mode	5.5.2.5 Verification procedure for power related control modes for reactive power		P
4.7.4.2.2 Zero current mode for converter connected generating technology	5.5.2.5 Verification procedure for power related control modes for reactive power		P

4.9.3 Requirements on voltage and frequency protection	5.8.3 Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as internal device. 5.8.4 Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as dedicated device		P
4.9.4.2 4.9.4 Means to detect island situation	5.8.6 Islanding detection		P
4.10.2 Automatic reconnection after tripping	5.9.3 Automatic reconnection after tripping		P
4.10.3 Starting to generate electrical power	5.9.4 Starting to generate electrical power		P
4.11.1 Ceasing active power	5.10 Active power reduction on set point		P
4.11.2 Reduction of active power on set point	5.10 Active power reduction on set point		P
4.12 Remote information exchange	5.11 Remote information exchange		P
4.13 Requirements regarding single fault tolerance of interface protection system and interface switch	5.12 Requirements regarding single fault tolerance of interface protection system and interface switch		P

General remarks:

The uncertainty of the measurement was not given in test report. Please see below information of measurement uncertainty:

- - Voltage

Type A uncertainty:u(Xi)=0.012 combined standard uncertainty: Uc（%）=0.29

Expansion uncertainty: U（%）=0.58 (factor k=2)

- - Current

Type A uncertainty:u(Xi)=0.011 combined standard uncertainty: Uc（%）=0.49

Expansion uncertainty: U（%）=0.98 (factor k=2)

- - Power

Type A uncertainty:u(Xi)=0.017 combined standard uncertainty: Uc（%）=0.29

Expansion uncertainty: U（%）=0.59 (factor k=2)

- - harmonics

Error in Measurement: 0.04%

- - flicker

Error in Measurement: 0.04%

- - current transducer

Expansion uncertainty:

DC current Urel =0.7%(factor k=2) AC current Urel =0.7%(factor k=2)

combined standard uncertainty: Uc（%）=0.49

EN 50549-10:2022		
Clause	Test items	Remark
5.2	**Normal operating range**	
5.2.1	Frequency operating range	P
5.2.2	Voltage operating range	P

5.2.1 Frequency operating range 5.2.2 Voltage operating range			P
Setting values	Over-voltage [V]:	253.0	
	Under-voltage [V]:	207.0	
	Over-frequency [Hz]:	51.5	
	Under-frequency [Hz]:	47.5	

- Test 1: U = 230.0 V; f = 47.5 Hz; P = 1.00 S_n; cosφ = 1;
- Test 2: U = 230.0 V; f = 48.5 Hz; P = 1.00 S_n; cosφ = 1;
- Test 3: U = 230.0 V; f = 51.5 Hz; P = 1.00 S_n; cosφ = 1;
- Test 4: U = 230.0 V; f = 47.0 Hz; P = 1.00 S_n; cosφ = 1;
- Test 5: U = 230.0 V; f = 52.0 Hz; P = 1.00 S_n; cosφ = 1;
- Test 6-1: U = 207.0 V; f = 50.0 Hz; P = 1.00 S_n; cosφ = 1;
  Test 6-2: U = 230.0 V; f = 50.0 Hz; P = 1.00 S_n; cosφ = 1;
  Test 6-3: U = 253.0 V; f = 50.0 Hz; P = 1.00 S_n; cosφ = 1;
  Test 6-4: U = 230.0 V; f = 50.0 Hz; P = 1.00 S_n; cosφ = 1;

Test :

Test sequence	Voltage [V]	Frequency [Hz]	Output power [W]	Cos φ
1	230.1	47.50	125012	0.9999
2	230.4	48.50	125041	0.9999
3	230.7	51.50	125167	0.9999
4	230.3	47.00	124985	0.9999
5	230.8	52.00	125199	0.9998
6	206.9	50.00	124025	0.9999
	230.1	50.00	125003	0.9999
	253.1	50.00	124770	0.9999
	230.2	50.00	124995	0.9999

Note:

Operating points test 1, test 2, test 3, test 4, test 5 and test 6 must be kept for at least 30 minutes.

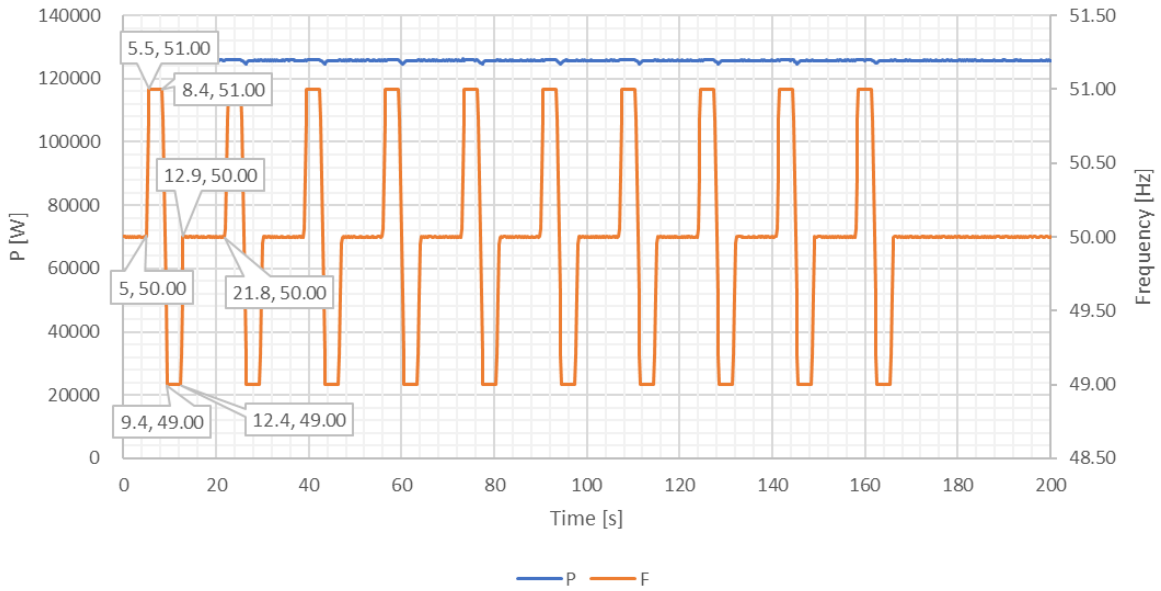
During the tests the interface protection and activating active power response to over/under frequency and voltage shall be disabled.

Operation at reduced power is allowed during test 6, equal to the maximum power that can be supplied on reaching the maximum output current limit (P ≥ 0.85 S_n).

The power supplied by the primary energy source shall be kept stable with a maximum error of 2 % x Sn

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.3	**Immunity to disturbances**	
5.3.1	Rate of change of frequency (ROCOF)	P
5.3.2	Phase jump	P
5.3.3	Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	P

5.3.1 Rate of change of frequency (RoCoF)	P



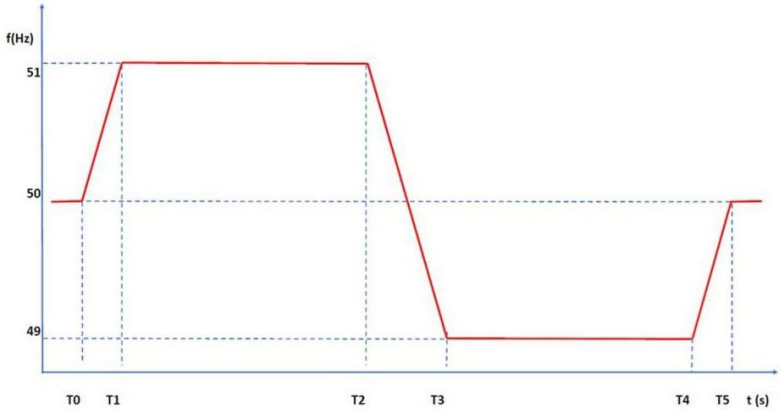
	Start Frequency	Change	End Frequency	Confirm no trip
T0	50Hz	Hold 3s	50Hz	No trip
T0 to T1	50Hz	+2Hz/sec	51Hz	No trip
T1 to T2	51Hz	Hold 3s	51Hz	No trip
T2 to T3	51Hz	-2Hz/sec	49Hz	No trip
T3 to T4	49Hz	Hold 3s	49Hz	No trip
T4 to T5	49Hz	+2Hz/sec	50Hz	No trip
T5	50Hz	Hold 6s	50Hz	No trip

Note:

The test shall be conducted on a grid simulator able to control the frequency within the required range and with the required dynamic. Initial status of the generating unit before the test shall be as follows:

The generating unit, connected to a grid simulator, shall be operating between 100 % and 80 % of the nominal power with an active factor equal to 1.

Then the test shall be conducted following the sequence represented in the Figure 4 below.



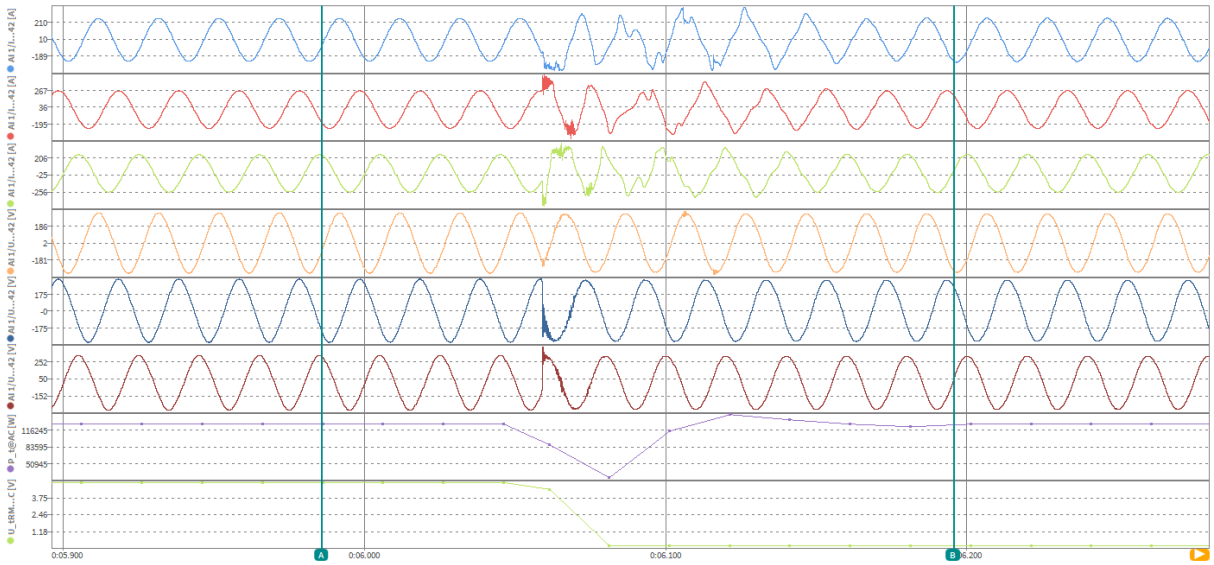
During the Overfrequency and Underfrequency verification, once the higher, respectively, lower values of frequency have been reached, the frequency shall be maintained for a time period equal or longer than 3 s which normally corresponds to the time requested by the system to stabilize during a real event.

During the test, the frequency, RMS voltage, RMS current and active and reactive power measured at the output terminals of the generating unit shall be recorded as 10 cycle average values.

During the tests the interface protection and activating active power response to over/under frequency and voltage shall be disabled.

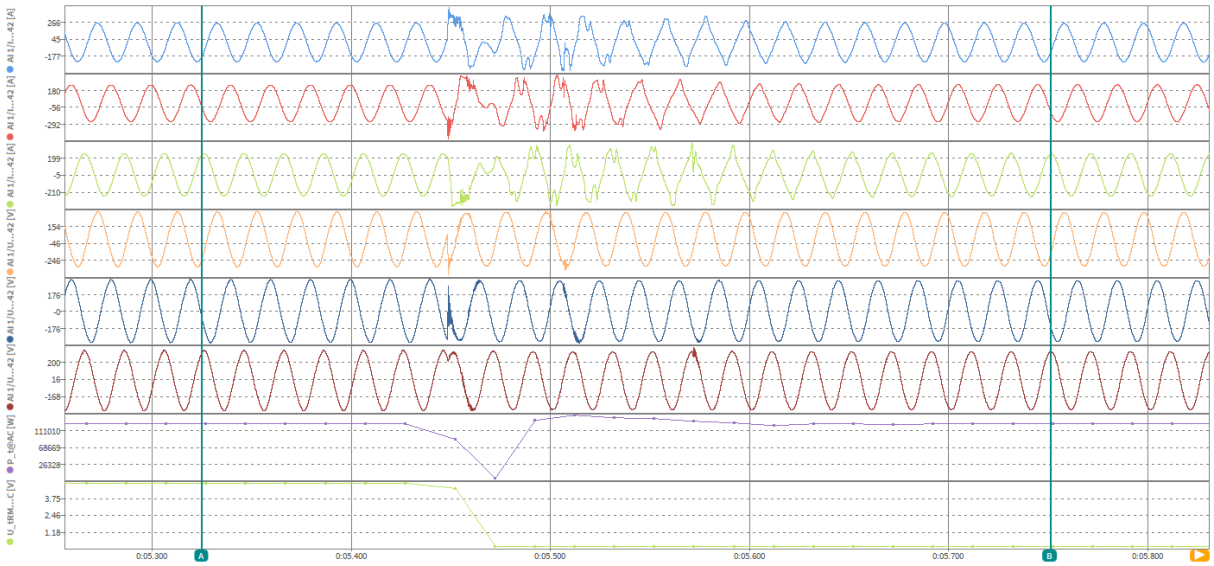
5.3.2 Phase jump			P
Test results			
Test 1:			
P_{EMAX} in %	**Phase shift angle**		**Result an**
100% ±5%	90° to 0°	L1-N	Unit normal use, no damage, no hazard.
		L2-N	Unit normal use, no damage, no hazard.
		L3-N	Unit normal use, no damage, no hazard.
		L1-L2	Unit normal use, no damage, no hazard.
		L2-L3	Unit normal use, no damage, no hazard.
		L3-L1	Unit normal use, no damage, no hazard.
		L1+L2+L3	Unit normal use, no damage, no hazard.
Test 2:			
P_{EMAX} in %	**Phase shift angle**		**Result**
100% ±5%	0° to 90°	L1-N	Unit normal use, no damage, no hazard.
		L2-N	Unit normal use, no damage, no hazard.
		L3-N	Unit normal use, no damage, no hazard.
		L1-L2	Unit normal use, no damage, no hazard.
		L2-L3	Unit normal use, no damage, no hazard.
		L3-L1	Unit normal use, no damage, no hazard.
		L1+L2+L3	Unit normal use, no damage, no hazard.
Test 3:			
P_{EMAX} in %	**Phase shift angle**		**Result**
100% ±5%	180° to 0°	L1-N	Unit shut down, no damage, no hazard.
		L2-N	Unit shut down, no damage, no hazard.
		L3-N	Unit shut down, no damage, no hazard.
		L1-L2	Unit normal use, no damage, no hazard.
		L2-L3	Unit shut down, no damage, no hazard.
		L3-L1	Unit shut down, no damage, no hazard.
		L1+L2+L3	Unit shut down, no damage, no hazard.
Test 4:			
P_{EMAX} in %	**Phase shift angle**		**Result**
100% ±5%	0° to 180°	L1-N	Unit shut down, no damage, no hazard.
		L2-N	Unit normal use, no damage, no hazard.
		L3-N	Unit normal use, no damage, no hazard.
		L1-L2	Unit shut down, no damage, no hazard.
		L2-L3	Unit normal use, no damage, no hazard.
		L3-L1	Unit shut down, no damage, no hazard.
		L1+L2+L3	Unit shut down, no damage, no hazard.
Limit	The generation must be no damage		

Test 1: 90° to 0°



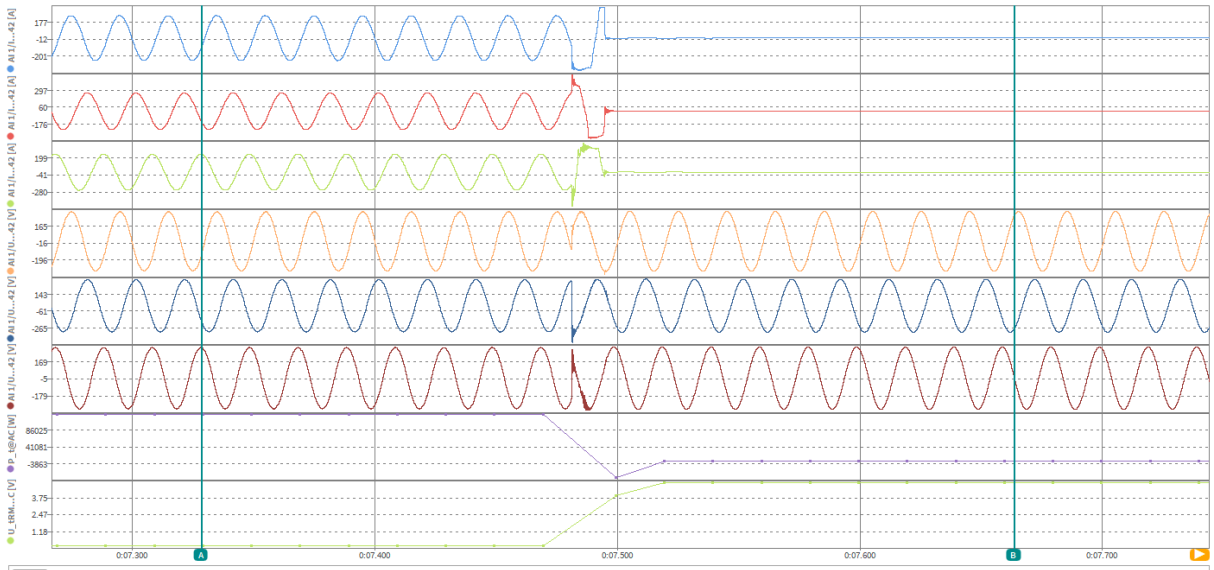
	A	B	间隔	有效值
时间 [s]	5.9859420	6.1955856	0.2096436	
AI 1/I1@TRIONet3_1342 [A]	-66.59782	-247.4623	-180.8645	194.8550
AI 1/I2@TRIONet3_1342 [A]	-186.2618	198.3866	384.6483	197.1851
AI 1/I3@TRIONet3_1342 [A]	249.5501	25.22087	-224.3292	195.9305
AI 1/U1@TRIONet3_1342 [V]	-81.29216	-307.1032	-225.8110	227.9593
AI 1/U2@TRIONet3_1342 [V]	-223.7432	251.1981	474.9413	232.0304
AI 1/U3@TRIONet3_1342 [V]	320.6120	36.38101	-284.2310	230.8206
P_t@AC [W]	126515.2	122414.3	-4100.945	119384.1
U_tRMS@DC [V]	4.915920	0.012073	-4.903847	3.417835

Test 2: 0° to 90°



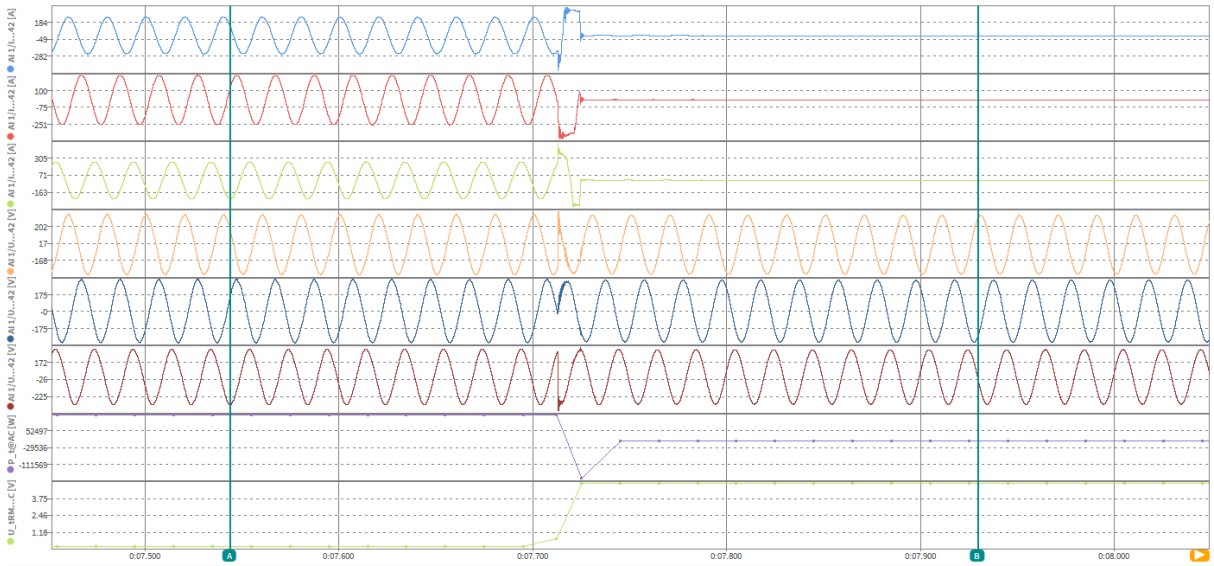
	A	B	间隔	有效值
时间 [s]	5.3252000	5.7509000	0.4257000	
AI 1/I1@TRIONet3_1342 [A]	-193.8679	-154.4587	39.40928	191.3923
AI 1/I2@TRIONet3_1342 [A]	-42.62531	-96.49337	-53.86806	195.4858
AI 1/I3@TRIONet3_1342 [A]	241.8580	254.2148	12.35676	192.9722
AI 1/U1@TRIONet3_1342 [V]	-251.1263	-204.0143	47.11199	230.2671
AI 1/U2@TRIONet3_1342 [V]	-61.70845	-133.2975	-71.58900	229.2609
AI 1/U3@TRIONet3_1342 [V]	303.0598	316.9925	13.93271	231.0802
P_t@AC [W]	126681.1	126100.9	-580.1953	125354.0
U_tRMS@DC [V]	4.915884	0.011356	-4.904529	2.932257

Test 3: 180° to 0°



	A	B	间隔	有效值
时间 [s]	7.3288000	7.6635554	0.3347554	
AI 1/I1@TRIONet3_1342 [A]	-105.5924	-1.222491	104.3699	137.0072
AI 1/I2@TRIONet3_1342 [A]	-156.3537	-0.995517	155.3582	141.7280
AI 1/I3@TRIONet3_1342 [A]	254.8223	-2.035260	-256.8575	138.1768
AI 1/U1@TRIONet3_1342 [V]	-137.5251	281.0047	418.5298	229.3298
AI 1/U2@TRIONet3_1342 [V]	-192.7855	-280.9756	-88.19008	230.4005
AI 1/U3@TRIONet3_1342 [V]	321.5332	1.639843	-319.8934	229.9021
P_t@AC [W]	126540.3	0.430168	-126539.9	90094.56
U_tRMS@DC [V]	0.013532	4.916076	4.902544	3.405153

Test 4: 0° to 180°



	A	B	间隔	有效值
时间 [s]	7.5441000	7.9295286	0.3854286	
AI 1/I1@TRIONet3_1342 [A]	130.1473	-1.185775	-131.3331	132.8801
AI 1/I2@TRIONet3_1342 [A]	124.5731	-0.976324	-125.5494	134.3422
AI 1/I3@TRIONet3_1342 [A]	-262.0554	-1.991868	260.0635	133.2112
AI 1/U1@TRIONet3_1342 [V]	164.2912	295.0683	130.7771	229.5468
AI 1/U2@TRIONet3_1342 [V]	150.8062	-264.5204	-415.3266	230.2577
AI 1/U3@TRIONet3_1342 [V]	-331.2164	-29.53983	301.6765	229.9343
P_t@AC [W]	126703.3	2.356072	-126700.9	96253.95
U_tRMS@DC [V]	0.012748	4.916094	4.903347	3.560271

5.3.3 Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	P

General:

To define the effect of the generating unit on the voltage magnitude, the short circuit power of the test setup shall be in the range of 2 times to 40 times the nominal power of the generating unit. The X/R ratio of the test impedance shall be at least 3.

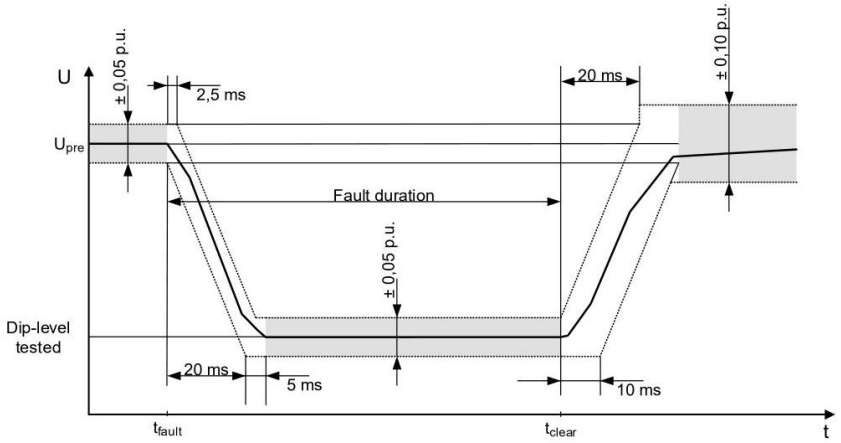


Figure 5 - Tolerances of the positive sequence voltage for the undervoltage event

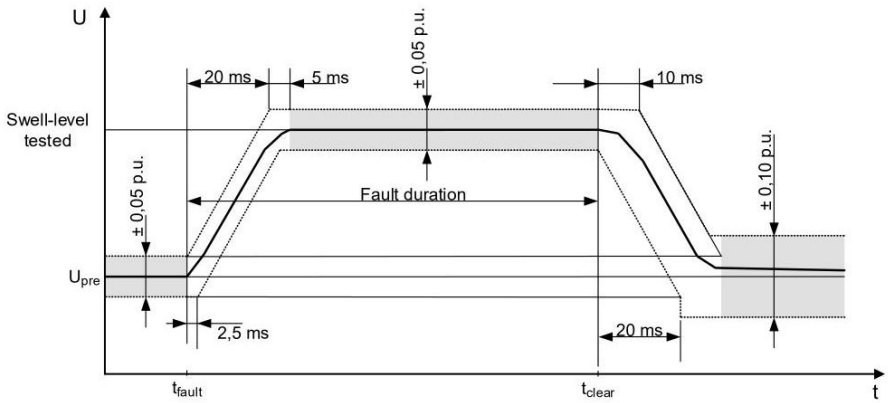


Figure 6 - Tolerances of the positive sequence voltage for the overvoltage event

Each test according to Table 4 and Table 5 represents one point in the voltage-time diagram to be verified e.g. Figure 6, 7, 8 of EN 50549-1:2019 and EN 50549-2:2019. If the voltage-time diagram includes vertical sections as Figure 7 and 8 of EN 50549-1:2019 and EN 50549-2:2019, the voltage level and duration according to Table 4 and Table 5 shall be chosen in a way that the most severe voltage level at this duration shall be tested. For each vertical section at least one test shall be included. If necessary additional tests shall be added to Table 4 and Table 5.

If the test is intended to provide evidence of controlled short circuit current contribution, at least the voltage levels for undervoltage according to Table 4 and at least the voltage levels for overvoltage according to Table 5 shall be tested, with each level tested for (at least) a symmetric event and an asymmetric event (simulated two- phase fault).

Table 4 specifies magnitudes for the undervoltage testing. Voltage levels refer to no-load-tests. Umin is the minimum voltage the generating unit can ride through, UVRC is the under voltage range capability calculated as U_{uvRc} = Un-Umin (see Figure 7).

Table 5 specifies magnitudes for the overvoltage testing. Voltage levels refer to no-load-tests. Umax is the maximum voltage the generating unit can ride through, UOVRC is the over voltage range capability

calculated as UOVRC = Umax-Un (see Figure 7)

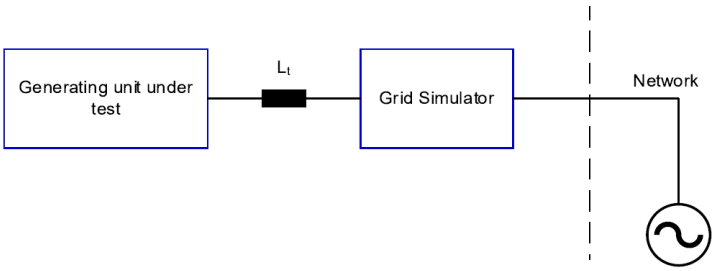


Figure A.3 — Example test setup with AC grid simulator

Regarding phase relationship in the test event:

1) Symmetrical three-phase fault (Table 4, tests VD1, 2, 3, 4, 5), see Figure A.4.

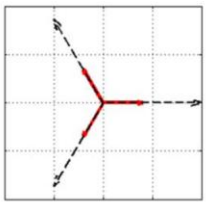


Figure A.4 — Vectorial representation of a symmetrical three-phase fault

2) asymmetric two-phase fault (Table 4, Tests VD 6, 7, 8, 9, 10), see Figure A.5.

A fault in the medium voltage or high voltage grid is causing a variation in LV in voltage amplitude as well as phase relationship (the case considered envisages a Dy transformer to connect the generator to the MV line or secondary station).

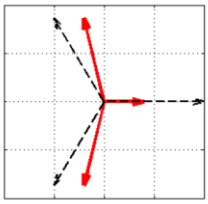


Figure A.5 — Vectorial representation of an asymmetric two-phase fault

During the asymmetric two-phase fault, the residual amplitude of the 3 voltages and phase shifts shall conform to the values given in the following Table A.1 and Table A.2.

Graph of LVRT test one (Type A+B)										
List of tests	Voltage dip to (p.u.)	Limit for fault duration [ms]	Set Q [Q/P_n]	K-factor	Duration fault [ms]			Recovery time after fault		Result
					Duration [ms]	Postive reaictive current(A) at 60ms	Negitive reactive current(A) at 60ms	Active current [ms]	Reactive current [ms]	
symmetrical Three phase fault - UVRT										
VD1.0 (P = 0)	0.03	≥ 260	--	--	359	--	--	--	--	--
VD1.1 (P = 1)	0.03	≥ 260	0	2	360	199.274	2.309	127	27	P
VD1.2 (P = 0.2)	0.03	≥ 260	0	2	360	193.061	1.669	110	27	P
VD2.0 (P = 0)	0.25	≥950	--	--	1051	--	--	--	--	--
VD2.1.a (P = 1)	0.25	≥950	0	2	1050	198.552	-0.501	127	29	P
VD2.1.b (P = 1)	0.25	≥950	Max. Ind	ZCM (zero current mode)	1050	-0.633	-0.226	163	9044	P
VD2.2 (P = 0.2)	0.25	≥950	0	2	1049	194.853	-1.651	109	28	P
VD3.0 (P = 1)	0.5	≥1800	--	--	1907	--	--	--	--	--
VD3.1 (P = 1)	0.5	≥1800	0	2	1899	200.307	-1.398	129	21	P
VD3.2.a (P = 0.2)	0.5	≥1800	0	2	1907	196.517	-0.670	116	24	P
VD3.2.b (P = 0.2)	0.5	≥1800	Max. Ind	2	1899	77.511	-1.234	81	9001	P
VD4.0 (P = 1)	0.75	≥2700	--	--	2800	--	--	--	--	--
VD4.1 (P = 1)	0.75	≥2700	0	2	2798	106.637	1.778	133	22	P
VD4.2.a (P = 0.2)	0.75	≥2700	Max. Ind	2	2803	18.682	-0.089	76	9021	P

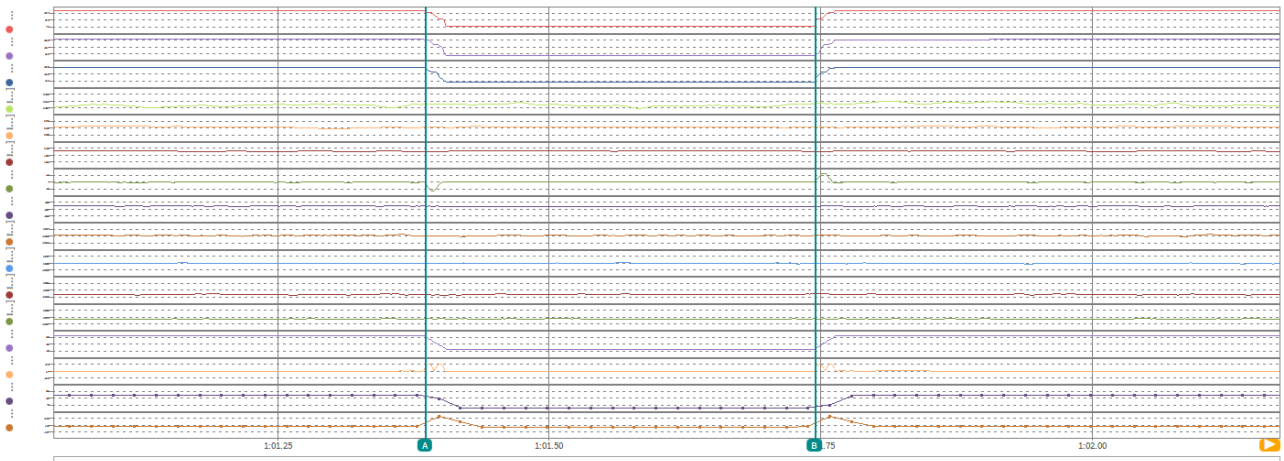
Graph of LVRT test one (Type A+B)										
List of tests	Voltage dip to (p.u.)	Limit for fault duration [ms]	Set Q [Q/P_n]	K-factor	Duration fault [ms]			Recovery time after fault		Result
					Duration [ms]	Postive reaictive current(A) at 60ms	Negitive reactive current(A) at 60ms	Active current [ms]	Reactive current [ms]	
VD4.2.b (P = 0.2)	0.75	≥2700	Max. cap	2	2801	194.789	1.061	120	9017	P
VD4.2.c (P = 0.2)	0.75	≥2700	0	4	2800	201.040	1.563	113	307	P
VD5.0 (P = 1)	0.9	≥60020	--	--	60175	--	--	--	--	--
VD5.1 (P = 1)	0.9	≥60020	0	2	60122	--	--	63	--	P
VD5.2 (P = 0.2)	0.9	≥60020	0	2	60121	--	--	69	--	P
Asymmetrical Two phase fault - UVRT										
VD6.0 (P = 0)	0.03	≥ 260	--	--	279	--	--	--	--	--
VD6.1 (P = 1)	0.03	≥ 260	0	2	362	97.874	-106.444	135	28	P
VD6.2 (P = 0.2)	0.03	≥ 260	0	2	359	99.551	-104.178	116	30	P
VD7.0 (P = 0)	0.25	≥950	--	--	1051	--	--	--	--	--
VD7.1 (P = 1)	0.25	≥950	0	2	1051	101.361	-98.851	187	31	P
VD7.2 (P = 0.2)	0.25	≥950	0	2	1050	100.637	-99.340	124	30	P
VD8.0 (P = 1)	0.5	≥1800	--	--	1900	--	--	--	--	--
VD8.1 (P = 1)	0.5	≥1800	0	2	1901	103.612	-94.260	135	28	P
VD8.2 (P = 0.2)	0.5	≥1800	0	2	1899	103.306	-95.646	123	30	P

Graph of LVRT test one (Type A+B)										
List of tests	Voltage dip to (p.u.)	Limit for fault duration [ms]	Set Q [Q/P_n]	K-factor	Duration fault [ms]			Recovery time after fault		Result
					Duration [ms]	Postive reaictive current(A) at 60ms	Negitive reactive current(A) at 60ms	Active current [ms]	Reactive current [ms]	
VD9.0 (P = 1)	0.75	≥2700	--	--	2804	--	--	--	--	--
VD9.1 (P = 1)	0.75	≥2700	0	2	2804	55.990	-47.850	137	32	P
VD9.2.a (P = 0.2)	0.75	≥2700	0	2	2800	53.492	-49.055	137	30	P
VD9.2.b (P = 0.2)	0.75	≥2700	0	4	2799	108.134	-99.243	137	31	P
VD10.0 (P = 1)	0.9	≥60020	--	--	60131	--	--	--	--	--
VD10.1 (P = 1)	0.9	≥60020	0	2	60119	--	--	55	--	P
VD10.2 (P = 0.2)	0.9	≥60020	0	2	60121	--	--	67	--	P
Symmetrical Three phase fault - OVRT										
VS1.0 (P = 0)	1.25	≥ 120	--	--	221	--	--	--	--	--
VS1.1 (P = 1)	1.25	≥ 120	0	2	220	-94.870	1.880	116	25	P
VS1.2 (P = 0.2)	1.25	≥ 120	0	2	220	-99.797	2.983	99	25	P
VS2.1.0 (P = 0)	1.20	≥ 5020	--	--	5119	--	--	--	--	--
VS2.1.1.a (P = 1)	1.20	≥ 5020	0	2	5029	-74.756	1.027	224	19	P
VS2.1.1.b (P = 1)	1.20	≥ 5020	Max. Ind	2	5116	-195.373	1.561	170	9055	P
VS2.1.2 (P = 0.2)	1.20	≥ 5020	0	2	5121	-76.79	0.12	111	20	P

Graph of LVRT test one (Type A+B)										
List of tests	Voltage dip to (p.u.)	Limit for fault duration [ms]	Set Q [Q/P_n]	K-factor	Duration fault [ms]			Recovery time after fault		Result
					Duration [ms]	Postive reaictive current(A) at 60ms	Negitive reactive current(A) at 60ms	Active current [ms]	Reactive current [ms]	
VS2.2.0 (P = 0)	1.15	≥60020	--	--	60122	--	--	--	--	--
VS2.2.1 (P = 1)	1.15	≥60020	0	2	60120	-51.39	1.12	123	33	P
VS2.2.2 (P = 0.2)	1.15	≥60020	0	2	60121	-55.67	0.66	110	29	P
Asymmetrical Two phase fault - OVRT										
VS3.0 (P = 0)	1.25	≥ 120	--	--	219	--	--	--	--	--
VS3.1 (P = 1)	1.25	≥ 120	0	2	223	-44.716	-52.171	134	42	P
VS3.2 (P = 0.2)	1.25	≥ 120	0	2	221	-48.274	-52.398	122	18	P
VS4.1.0 (P = 0)	1.20	≥ 5020	--	--	5119	--	--	--	--	--
VS4.1.1 (P = 1)	1.20	≥ 5020	0	2	5121	-30.234	-45.092	159	37	P
VS4.1.2 (P = 0.2)	1.20	≥ 5020	0	2	5120	-35.554	-46.168	129	41	P
VS4.2.0 (P = 0)	1.15	≥60020	--	--	60122	--	--	--	--	--
VS4.2.1 (P = 1)	1.15	≥60020	0	2	60119	-21.600	-31.319	130	20	P
VS4.2.2 (P = 0.2)	1.15	≥60020	0	2	60121	-28.110	-34.104	127	20	P

Test - VD1.0

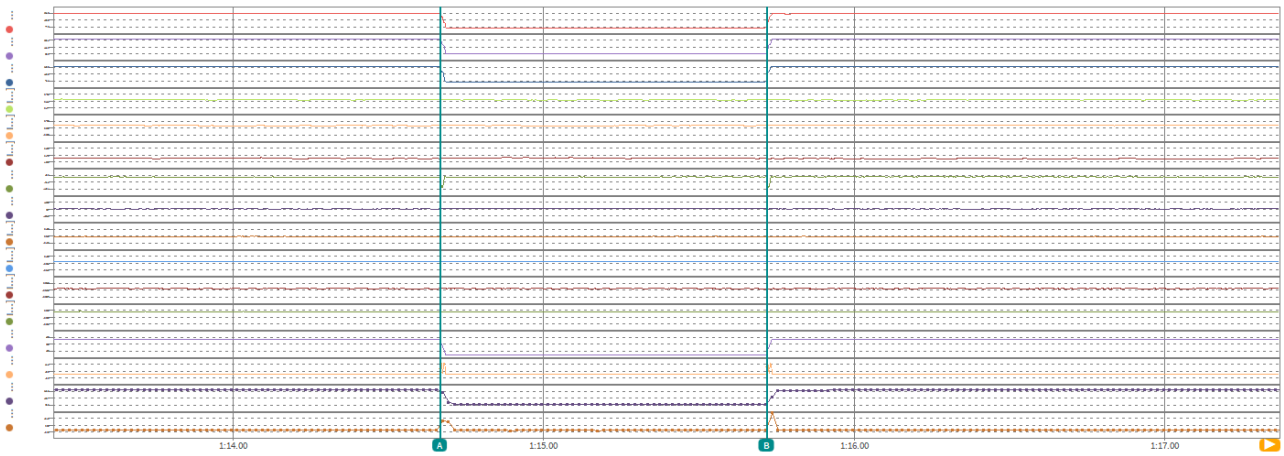
Duration fault time



时间 [s]	A 1:01.3863	B 1:01.7450	间隔 0.3587	有效值
U1_tRMS_rc@AC [V]	230.0587	6.854591	-223.2041	40.02799
U2_tRMS_rc@AC [V]	229.9682	6.873887	-223.0943	42.74545
U3_tRMS_rc@AC [V]	229.9180	6.794465	-223.1236	37.48965
I1_tRMS_rc@AC [A]	0.485359	0.489830	4.471e-3	0.479506
I2_tRMS_rc@AC [A]	0.441550	0.448337	6.787e-3	0.450894
I3_tRMS_rc@AC [A]	1.996819	1.989185	-7.634e-3	2.012302
P_t_rc@AC [W]	-0.574475	0.916313	1.490789	20.55702
Q_t_rc@AC [var]	672.3078	19.93379	-652.3740	110.9779
I_fund_Q_SYM+_rc@AC [A]	6.729e-4	9.401e-4	2.672e-4	2.042e-3
I_fund_Q_SYM-_rc@AC [A]	-4.422e-3	-6.206e-4	3.801e-3	2.526e-3
I_fund_P_SYM+_rc@AC [A]	-6.141e-4	4.019e-3	4.633e-3	2.252e-3
I_fund_P_SYM-_rc@AC [A]	-2.440e-4	2.564e-3	2.808e-3	2.737e-3
U_fund_SYM+_rc@AC [V]	398.3321	11.79817	-386.5339	58.55221
U_fund_SYM-_rc@AC [V]	0.496997	0.047760	-0.449237	10.35392
U+ [V]	230.0510	6.774820	-223.2762	66.31571
U- [V]	0.508734	0.208751	-0.299983	4.011146

Test – VD2.0

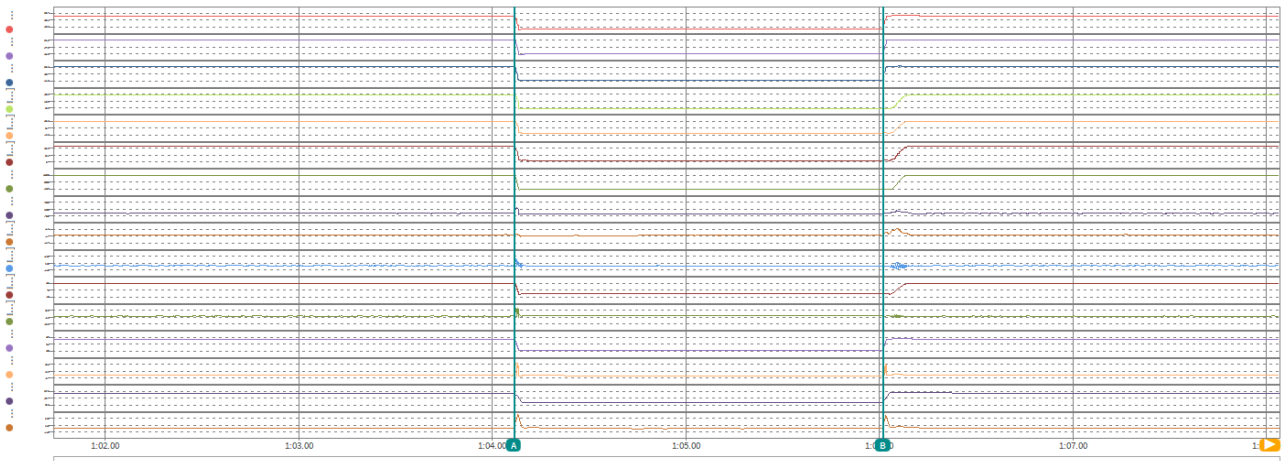
Duration fault time



时间 [s]	A 1:14.66814	B 1:15.71902	间隔 1.05088	有效值
U1_tRMS_rc@AC [V]	229.8473	57.17825	-172.6690	61.94251
U2_tRMS_rc@AC [V]	229.6883	57.45596	-172.2323	62.53096
U3_tRMS_rc@AC [V]	230.5212	57.53783	-172.9833	61.39456
I1_tRMS_rc@AC [A]	0.468202	0.470498	2.296e-3	0.465323
I2_tRMS_rc@AC [A]	0.429317	0.441164	0.011847	0.416421
I3_tRMS_rc@AC [A]	2.017953	2.019765	1.812e-3	2.036744
P_t_rc@AC [W]	-0.724717	1.832750	2.557467	9.772290
Q_t_rc@AC [var]	671.4045	-168.4527	-839.8573	179.5056
I_fund_Q_SYM+_rc@AC [A]	1.540e-4	-1.941e-3	-2.095e-3	2.325e-3
I_fund_Q_SYM-_rc@AC [A]	-3.115e-3	-3.420e-4	2.773e-3	2.485e-3
I_fund_P_SYM+_rc@AC [A]	7.180e-4	-3.111e-3	-3.829e-3	2.078e-3
I_fund_P_SYM-_rc@AC [A]	-1.575e-3	-8.213e-4	7.538e-4	2.226e-3
U_fund_SYM+_rc@AC [V]	398.3778	99.38510	-298.9927	105.9729
U_fund_SYM-_rc@AC [V]	0.396578	0.382506	-0.014072	4.678620
U+ [V]	230.0383	57.37086	-172.6674	70.53176
U- [V]	0.649518	0.122257	-0.527261	1.753499

Test – VD3.0

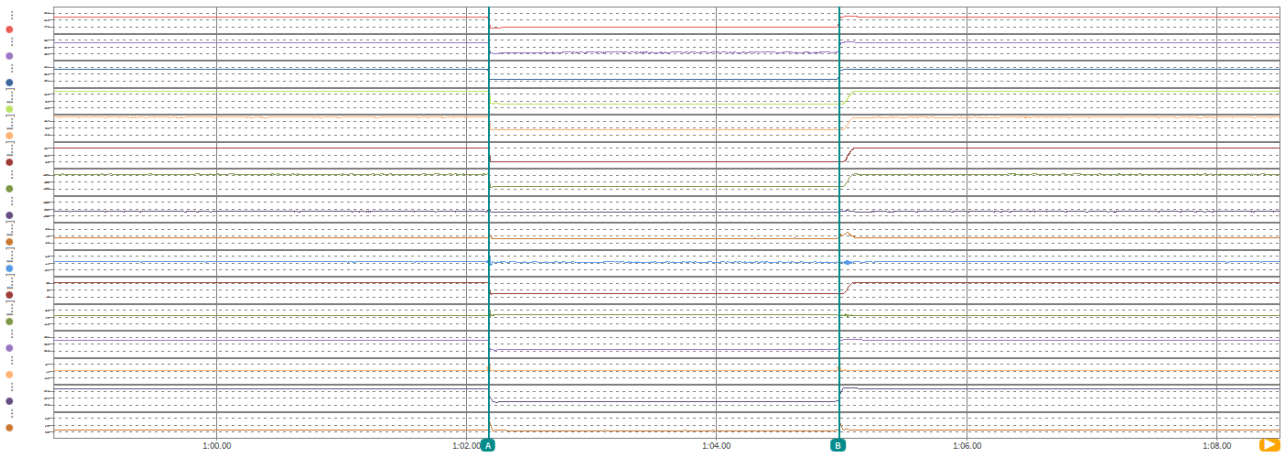
Duration fault time



时间 [s]	A 1:04.11442	B 1:06.02095	间隔 1.90653	有效值
U1_tRMS_rc@AC [V]	230.8806	115.0874	-115.7933	116.6495
U2_tRMS_rc@AC [V]	229.3672	114.9095	-114.4577	116.4616
U3_tRMS_rc@AC [V]	229.8223	114.2101	-115.6122	115.8378
I1_tRMS_rc@AC [A]	181.2614	5.744411	-175.5170	20.48709
I2_tRMS_rc@AC [A]	182.2032	4.762262	-177.4410	20.13490
I3_tRMS_rc@AC [A]	183.4999	5.617908	-177.8820	19.71043
P_t_rc@AC [W]	125789.5	1564.721	-124224.8	11928.85
Q_t_rc@AC [var]	2459.526	-986.9158	-3446.442	3383.711
I_fund_Q_SYM+_rc@AC [A]	0.264526	-0.860159	-1.124685	0.793615
I_fund_Q_SYM-_rc@AC [A]	0.469587	0.239967	-0.229620	0.828826
I_fund_P_SYM+_rc@AC [A]	182.2835	4.541218	-177.7423	18.11832
I_fund_P_SYM-_rc@AC [A]	0.207656	0.315774	0.108118	2.093742
U_fund_SYM+_rc@AC [V]	398.3965	198.7104	-199.6861	201.2711
U_fund_SYM-_rc@AC [V]	2.017184	0.825637	-1.191547	2.513289
U+ [V]	230.0820	114.7320	-115.3500	119.0110
U- [V]	0.636331	0.371444	-0.264887	1.238296

Test – VD4.0

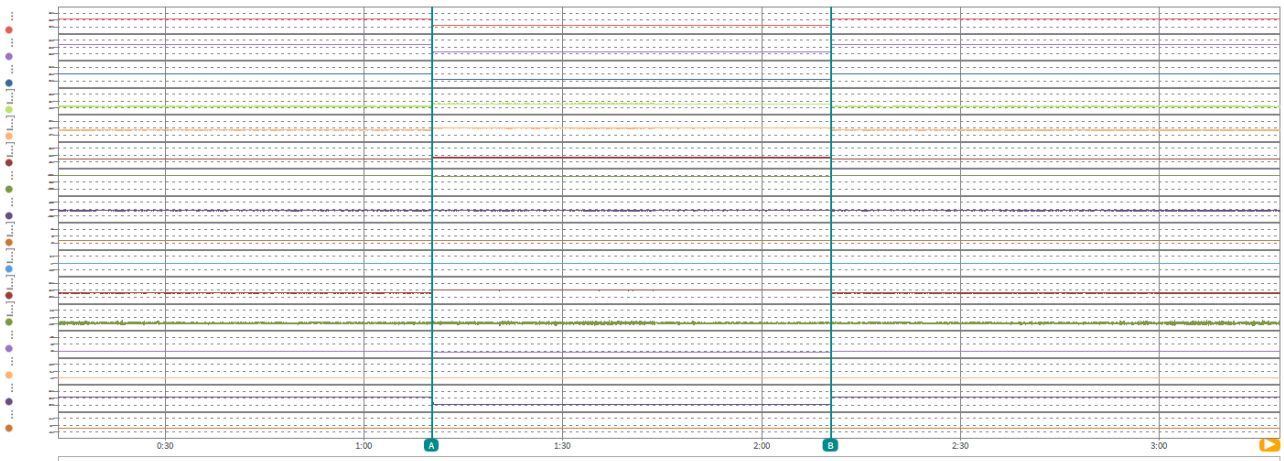
Duration fault time



时间 [s]	A 1:02.17775	B 1:04.97741	间隔 2.79966	有效值
U1_tRMS_rc@AC [V]	230.1980	172.4836	-57.71445	172.4651
U2_tRMS_rc@AC [V]	229.5013	171.9595	-57.54185	171.9390
U3_tRMS_rc@AC [V]	229.4337	171.6481	-57.78566	171.7617
I1_tRMS_rc@AC [A]	180.8804	5.642433	-175.2380	14.72720
I2_tRMS_rc@AC [A]	182.3362	5.695908	-176.6403	13.66082
I3_tRMS_rc@AC [A]	184.2639	6.155591	-178.1083	14.07761
P_t_rc@AC [W]	125744.1	2636.918	-123107.2	7726.531
Q_t_rc@AC [var]	2062.753	-1449.991	-3512.744	3881.409
I_fund_Q_SYM+_rc@AC [A]	0.405164	-0.858707	-1.263871	0.924945
I_fund_Q_SYM-_rc@AC [A]	0.303453	-0.137263	-0.440717	1.016259
I_fund_P_SYM+_rc@AC [A]	182.4662	5.103836	-177.3623	12.02342
I_fund_P_SYM-_rc@AC [A]	-0.782444	0.032528	0.814972	1.589470
U_fund_SYM+_rc@AC [V]	397.8649	297.9572	-99.90775	297.9804
U_fund_SYM-_rc@AC [V]	1.054831	0.522169	-0.532661	1.343531
U+ [V]	229.7513	172.0310	-57.72038	172.9194
U- [V]	0.597311	0.521523	-0.075788	0.719547

Test – VD5.0

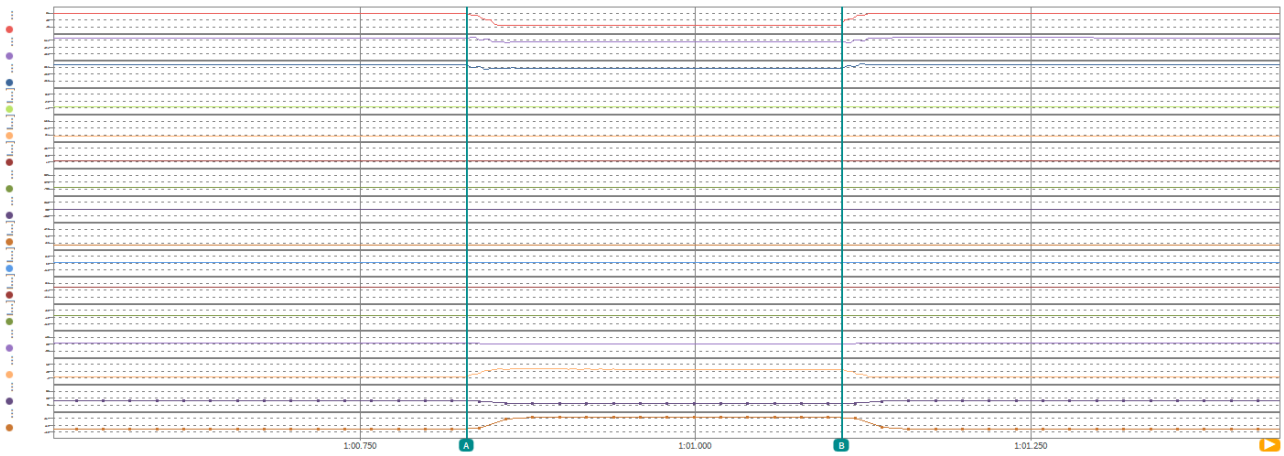
Duration fault time



时间 [s]	A 1:10.3186	B 2:10.4935	间隔 1:00.1750	有效值
U1_tRMS_rc@AC [V]	230.5764	207.4454	-23.13109	207.4752
U2_tRMS_rc@AC [V]	229.8450	206.7890	-23.05602	206.8302
U3_tRMS_rc@AC [V]	229.7721	206.7291	-23.04305	206.7627
I1_tRMS_rc@AC [A]	179.6856	190.9031	11.21750	191.1213
I2_tRMS_rc@AC [A]	181.5151	191.8308	10.31578	192.0168
I3_tRMS_rc@AC [A]	184.5016	194.4830	9.981476	194.4557
P_t_rc@AC [W]	125515.9	119458.2	-6057.742	119550.0
Q_t_rc@AC [var]	2698.601	2050.833	-647.7678	2310.243
I_fund_Q_SYM+_rc@AC [A]	1.029525	0.930484	-0.099041	0.691446
I_fund_Q_SYM-_rc@AC [A]	0.806112	0.874198	0.068086	0.539524
I_fund_P_SYM+_rc@AC [A]	181.8613	192.3785	10.51721	192.4967
I_fund_P_SYM-_rc@AC [A]	-1.354182	-0.544760	0.809423	0.750053
U_fund_SYM+_rc@AC [V]	398.4772	358.5056	-39.97159	358.5671
U_fund_SYM-_rc@AC [V]	1.050663	0.879856	-0.170807	1.014742
U+ [V]	230.0243	206.9715	-23.05278	207.0398
U- [V]	0.582526	0.592620	0.010095	0.584851

Test – VD6.0

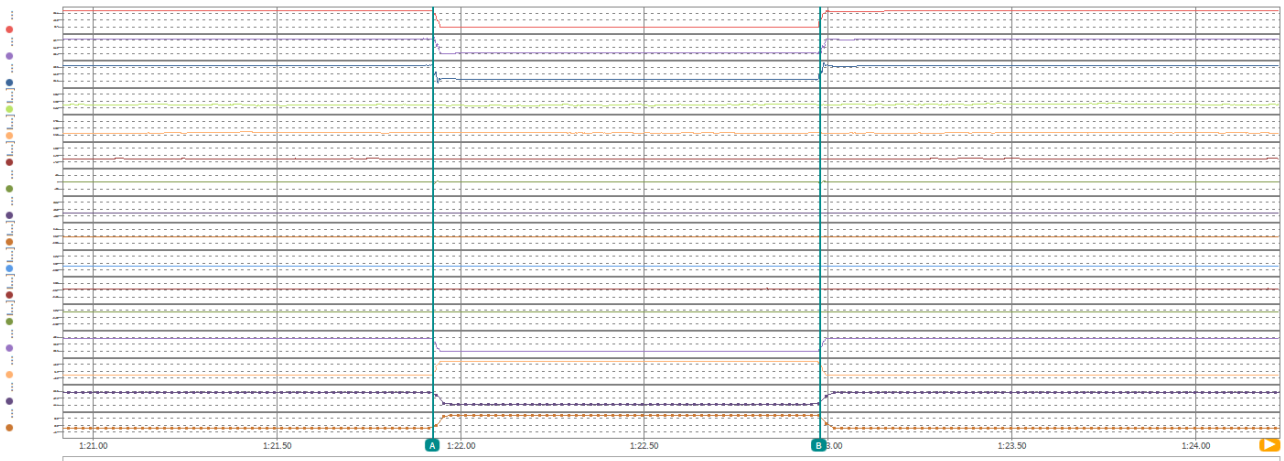
Duration fault time



时间 [s]	A 1:00.82987	B 1:01.10904	间隔 0.27918	有效值
U1_tRMS_rc@AC [V]	230.2397	6.911612	-223.3281	46.55586
U2_tRMS_rc@AC [V]	230.0405	199.6874	-30.35313	201.3337
U3_tRMS_rc@AC [V]	229.9835	200.0441	-29.93936	201.3963
I1_tRMS_rc@AC [A]	0.461462	0.470912	9.449e-3	0.463838
I2_tRMS_rc@AC [A]	0.363335	0.375269	0.011935	0.365364
I3_tRMS_rc@AC [A]	1.635449	1.666987	0.031538	1.654932
P_t_rc@AC [W]	-2.628496	1.900299	4.528795	5.179616
Q_t_rc@AC [var]	565.9489	-411.6578	-977.6068	416.0508
I_fund_Q_SYM+_rc@AC [A]	2.434e-3	-2.604e-3	-5.039e-3	2.133e-3
I_fund_Q_SYM-_rc@AC [A]	8.196e-4	-2.338e-3	-3.157e-3	2.625e-3
I_fund_P_SYM+_rc@AC [A]	-3.450e-3	2.609e-3	6.059e-3	1.987e-3
I_fund_P_SYM-_rc@AC [A]	4.265e-3	1.762e-3	-2.503e-3	2.062e-3
U_fund_SYM+_rc@AC [V]	398.5207	207.8381	-190.6826	217.8445
U_fund_SYM-_rc@AC [V]	0.651431	191.6353	190.9839	186.7904
U+ [V]	230.0439	119.9892	-110.0547	139.3369
U- [V]	0.508896	110.6475	110.1386	102.2362

Test – VD7.0

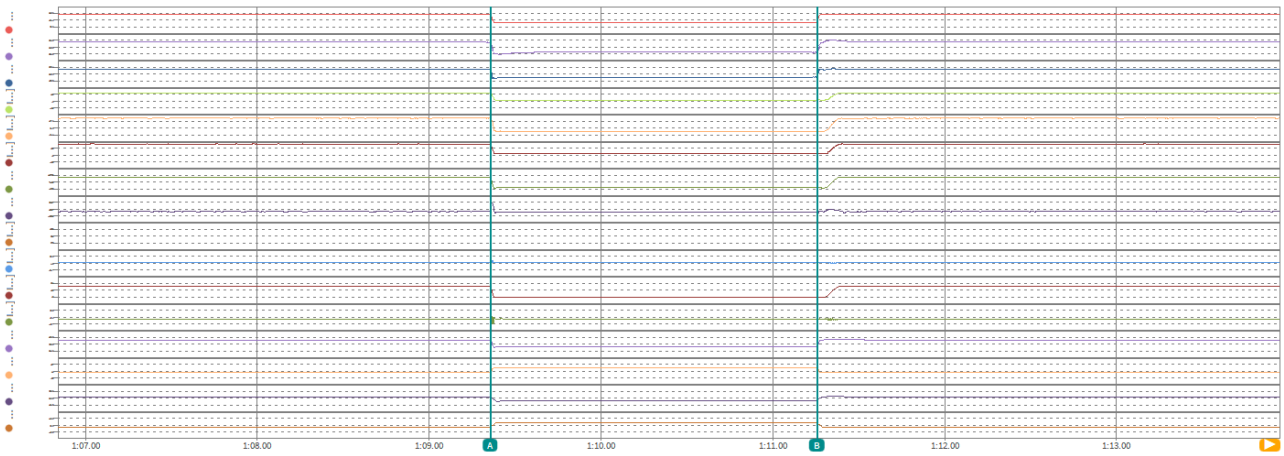
Duration fault time



	A	B	间隔	有效值
时间 [s]	1:21.92588	1:22.97673	1.05086	
U1_tRMS_rc@AC [V]	229.7517	57.19124	-172.5605	61.32491
U2_tRMS_rc@AC [V]	230.0183	203.3124	-26.70586	202.4054
U3_tRMS_rc@AC [V]	230.4300	203.4500	-26.97993	202.6039
I1_tRMS_rc@AC [A]	0.466488	0.475937	9.449e-3	0.470265
I2_tRMS_rc@AC [A]	0.406294	0.397475	-8.819e-3	0.397490
I3_tRMS_rc@AC [A]	1.869543	1.842380	-0.027164	1.844702
P_t_rc@AC [W]	-5.611653	0.097084	5.708736	3.365358
Q_t_rc@AC [var]	631.4054	-482.8632	-1114.269	482.0667
I_fund_Q_SYM+_rc@AC [A]	1.432e-3	-1.935e-3	-3.367e-3	2.219e-3
I_fund_Q_SYM-_rc@AC [A]	4.084e-4	1.101e-3	6.927e-4	2.056e-3
I_fund_P_SYM+_rc@AC [A]	-6.580e-3	-1.014e-3	5.567e-3	2.346e-3
I_fund_P_SYM-_rc@AC [A]	7.780e-4	-4.382e-4	-1.216e-3	2.218e-3
U_fund_SYM+_rc@AC [V]	398.4660	251.1622	-147.3037	251.3188
U_fund_SYM-_rc@AC [V]	0.193979	151.5617	151.3677	149.9056
U+ [V]	230.0765	144.0397	-86.03675	147.6557
U- [V]	0.684905	87.13554	86.45063	85.45859

Test – VD8.0

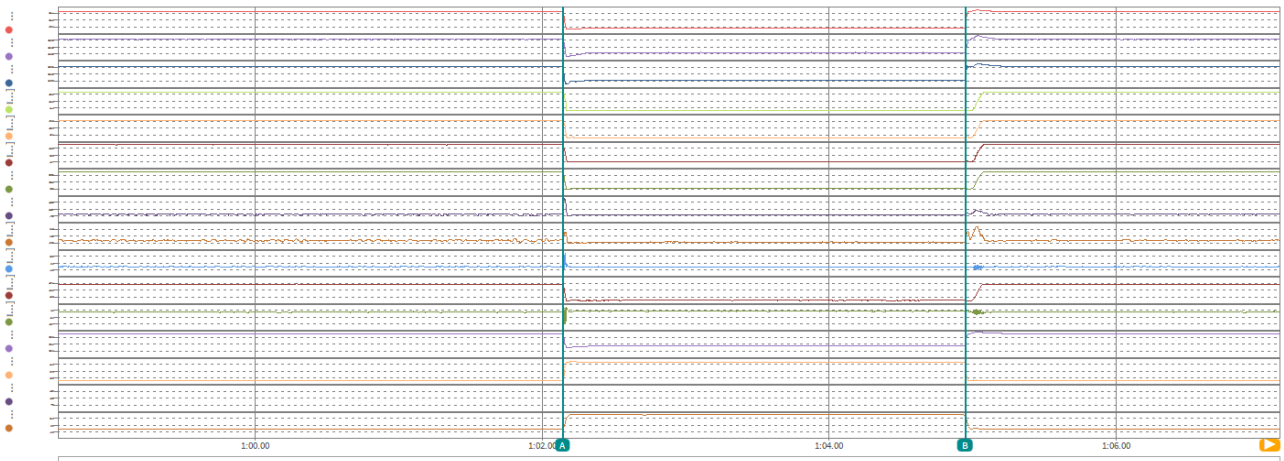
Duration fault time



	A	B	间隔	有效值
时间 [s]	1:09.36052	1:11.26060	1.90008	
U1_tRMS_rc@AC [V]	230.2755	115.1433	-115.1322	116.0588
U2_tRMS_rc@AC [V]	229.5005	206.5633	-22.93716	206.2603
U3_tRMS_rc@AC [V]	230.2548	206.0514	-24.20345	206.3849
I1_tRMS_rc@AC [A]	179.2946	5.279268	-174.0154	17.06872
I2_tRMS_rc@AC [A]	180.2893	5.893249	-174.3961	17.20563
I3_tRMS_rc@AC [A]	183.9098	4.999499	-178.9103	15.94809
P_t_rc@AC [W]	124985.8	2362.452	-122623.4	9321.735
Q_t_rc@AC [var]	2446.003	-1603.707	-4049.710	4950.157
I_fund_Q_SYM+_rc@AC [A]	0.647635	-1.161592	-1.809227	1.237055
I_fund_Q_SYM-_rc@AC [A]	1.594108	0.607337	-0.986772	2.003516
I_fund_P_SYM+_rc@AC [A]	181.1275	4.479922	-176.6476	14.20347
I_fund_P_SYM-_rc@AC [A]	0.814462	0.296600	-0.517862	1.270613
U_fund_SYM+_rc@AC [V]	398.3799	297.5455	-100.8344	297.9827
U_fund_SYM-_rc@AC [V]	1.178820	99.26438	98.08556	98.84501
U+ [V]	230.0452	171.8308	-58.21443	172.7061
U- [V]	0.811748	57.39907	56.58732	56.76484

Test – VD9.0

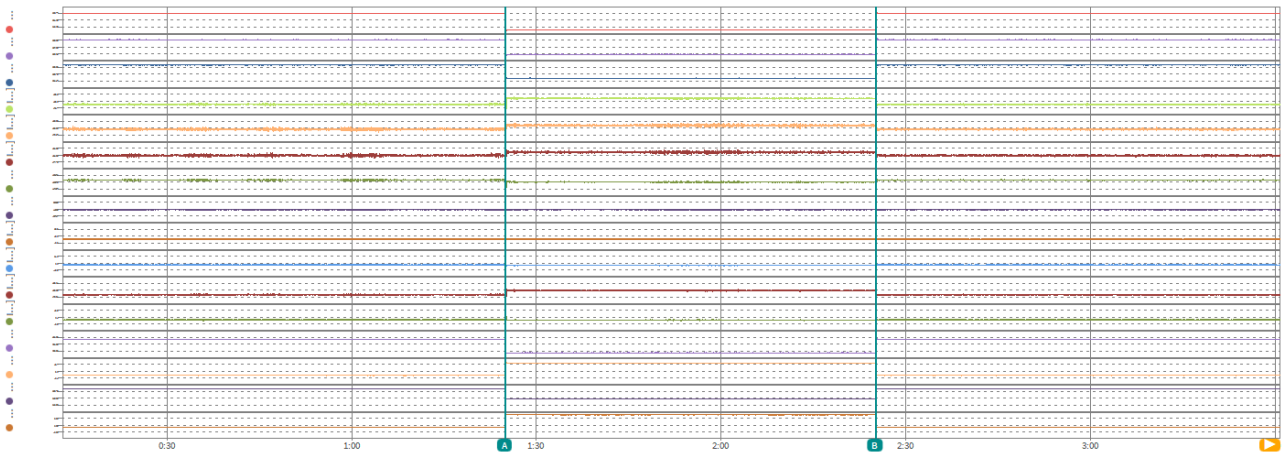
Duration fault time



时间 [s]	A 1:02.14782	B 1:04.95162	间隔 2.80380	有效值
U1_tRMS_rc@AC [V]	230.5128	172.5282	-57.98460	172.7390
U2_tRMS_rc@AC [V]	229.8869	215.6648	-14.22211	215.6287
U3_tRMS_rc@AC [V]	229.8176	215.6312	-14.18642	215.5897
I1_tRMS_rc@AC [A]	179.0931	4.746177	-174.3469	15.33357
I2_tRMS_rc@AC [A]	181.0495	5.641684	-175.4078	15.12533
I3_tRMS_rc@AC [A]	183.4895	5.865183	-177.6243	14.77261
P_t_rc@AC [W]	125052.4	2893.107	-122159.3	8871.126
Q_t_rc@AC [var]	2284.812	-1588.007	-3872.818	4363.069
I_fund_Q_SYM+_rc@AC [A]	0.841154	-0.571221	-1.412375	0.956966
I_fund_Q_SYM-_rc@AC [A]	0.126020	-0.057875	-0.183895	1.472270
I_fund_P_SYM+_rc@AC [A]	181.1822	4.787435	-176.3948	13.24207
I_fund_P_SYM-_rc@AC [A]	-1.192451	0.182756	1.375207	1.136438
U_fund_SYM+_rc@AC [V]	398.4918	346.8659	-51.62592	346.8969
U_fund_SYM-_rc@AC [V]	1.030961	50.07063	49.03967	49.62844
U+ [V]	230.0592	200.3304	-29.72879	200.5921
U- [V]	0.609691	28.76168	28.15199	28.51104

Test – VD10.0

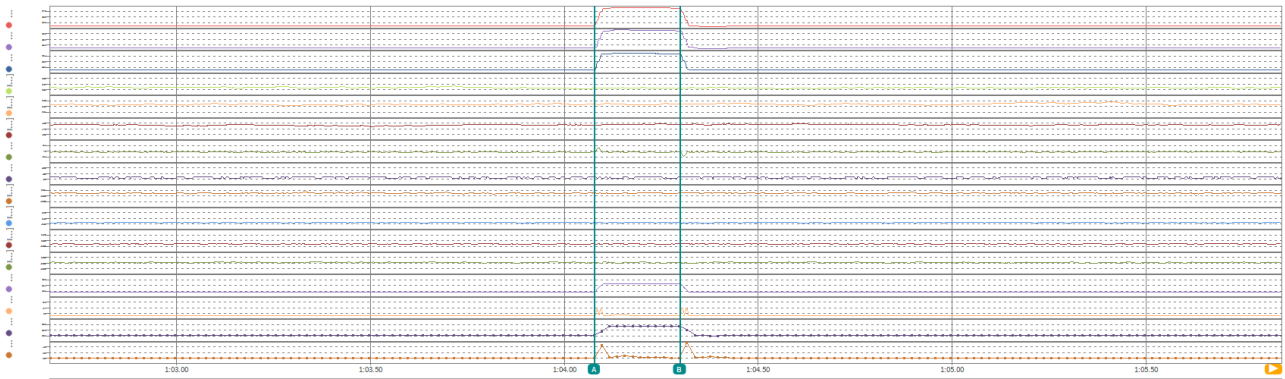
Duration fault time



时间 [s]	A 1:24.9662	B 2:25.0975	间隔 1:00.1313	有效值
U1_tRMS_rc@AC [V]	230.5272	207.5109	-23.01630	207.5141
U2_tRMS_rc@AC [V]	229.8827	225.2010	-4.681625	225.1693
U3_tRMS_rc@AC [V]	229.8004	225.2371	-4.563293	225.1665
I1_tRMS_rc@AC [A]	179.5349	190.9462	11.41135	190.9983
I2_tRMS_rc@AC [A]	180.5237	185.0860	4.562393	185.5423
I3_tRMS_rc@AC [A]	183.6455	188.0951	4.449539	187.7866
P_t_rc@AC [W]	125065.9	123549.2	-1516.672	123569.1
Q_t_rc@AC [var]	2390.657	5486.350	3095.692	5602.669
I_fund_Q_SYM+_rc@AC [A]	0.772563	0.642629	-0.129933	0.606445
I_fund_Q_SYM-_rc@AC [A]	0.492651	-0.920382	-1.413033	0.641792
I_fund_P_SYM+_rc@AC [A]	181.2009	188.0195	6.818573	188.0810
I_fund_P_SYM-_rc@AC [A]	-0.733153	-1.540161	-0.807008	1.653745
U_fund_SYM+_rc@AC [V]	398.4867	379.5558	-18.93091	379.4901
U_fund_SYM-_rc@AC [V]	0.913911	21.26183	20.34792	21.10660
U+ [V]	230.0634	219.1038	-10.95960	219.1098
U- [V]	0.586678	12.17649	11.58981	12.18357

Test – VS1.0

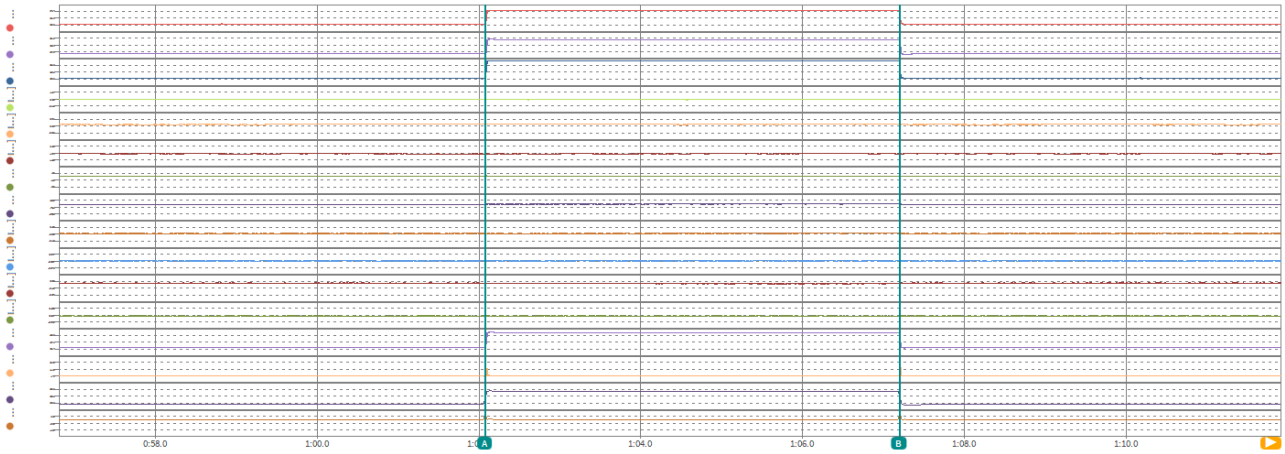
Duration fault time



时间 [s]	A 1:04.078104	B 1:04.298878	间隔 0.220774	有效值
U1_tRMS_rc@AC [V]	230.2119	288.0904	57.87852	285.2245
U2_tRMS_rc@AC [V]	229.9012	288.0276	58.12634	285.3127
U3_tRMS_rc@AC [V]	229.9119	287.7515	57.83961	284.7159
I1_tRMS_rc@AC [A]	0.695660	0.693671	-1.990e-3	0.696400
I2_tRMS_rc@AC [A]	0.470247	0.465878	-4.369e-3	0.463419
I3_tRMS_rc@AC [A]	1.873158	1.899388	0.026230	1.903066
P_t_rc@AC [W]	0.670848	0.308311	-0.362537	5.808091
Q_t_rc@AC [var]	698.9205	880.5773	181.6567	872.7693
I_fund_Q_SYM+_rc@AC [A]	1.639e-3	1.418e-3	-2.204e-4	2.627e-3
I_fund_Q_SYM-_rc@AC [A]	-1.541e-3	1.048e-3	2.589e-3	2.090e-3
I_fund_P_SYM+_rc@AC [A]	1.619e-3	4.339e-4	-1.186e-3	1.721e-3
I_fund_P_SYM-_rc@AC [A]	1.561e-3	-1.011e-3	-2.572e-3	3.059e-3
U_fund_SYM+_rc@AC [V]	398.3835	498.7518	100.3683	493.6283
U_fund_SYM-_rc@AC [V]	0.624996	0.798634	0.173638	3.375264
U+ [V]	230.0348	288.0881	58.05333	276.9573
U- [V]	0.346972	0.475989	0.129017	1.664157

Test – VS2.1.0

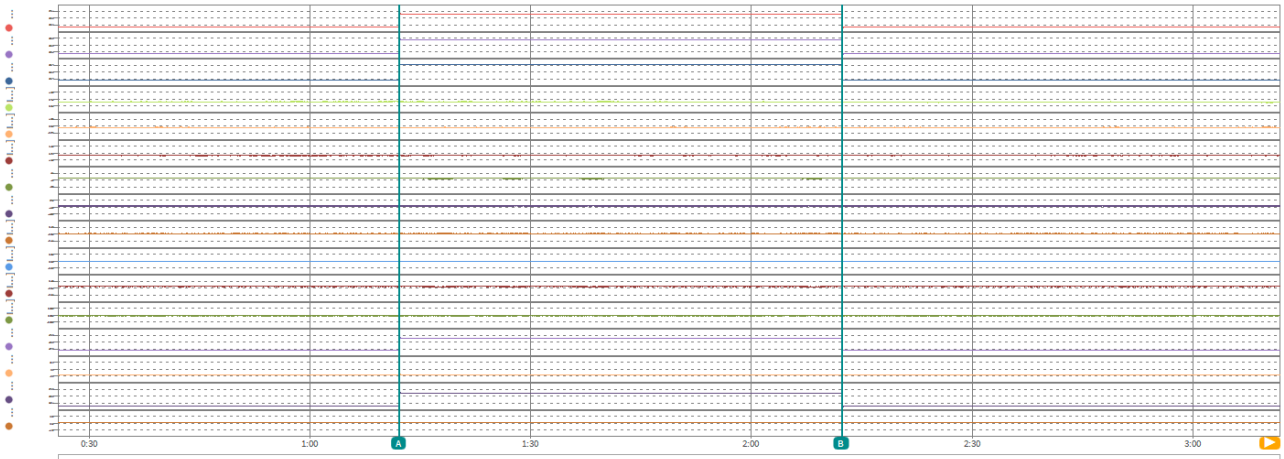
Duration fault time



时间 [s]	A 1:02.0821	B 1:07.2015	间隔 5.1194	有效值
U1_tRMS_rc@AC [V]	230.2299	276.3363	46.10640	276.2840
U2_tRMS_rc@AC [V]	230.0279	276.1129	46.08499	276.0745
U3_tRMS_rc@AC [V]	229.9944	276.0342	46.03986	276.0112
I1_tRMS_rc@AC [A]	0.470057	0.487450	0.017392	0.483201
I2_tRMS_rc@AC [A]	0.461746	0.446934	-0.014812	0.464209
I3_tRMS_rc@AC [A]	1.885123	1.885469	3.464e-4	1.895842
P_t_rc@AC [W]	-0.442346	-11.31554	-10.87319	11.47182
Q_t_rc@AC [var]	-648.0032	778.4761	1426.479	784.7839
I_fund_Q_SYM+_rc@AC [A]	-1.455e-3	4.941e-3	6.396e-3	3.757e-3
I_fund_Q_SYM-_rc@AC [A]	-1.855e-3	-5.212e-4	1.334e-3	2.320e-3
I_fund_P_SYM+_rc@AC [A]	3.268e-4	-0.013702	-0.014028	0.013776
I_fund_P_SYM-_rc@AC [A]	1.807e-3	1.026e-3	-7.809e-4	2.243e-3
U_fund_SYM+_rc@AC [V]	398.5133	478.3225	79.80917	478.2526
U_fund_SYM-_rc@AC [V]	0.350876	1.013871	0.662995	0.904832
U+ [V]	230.0578	276.1488	46.09103	275.9536
U- [V]	0.404077	0.447365	0.043288	0.501742

Test – VS2.2.0

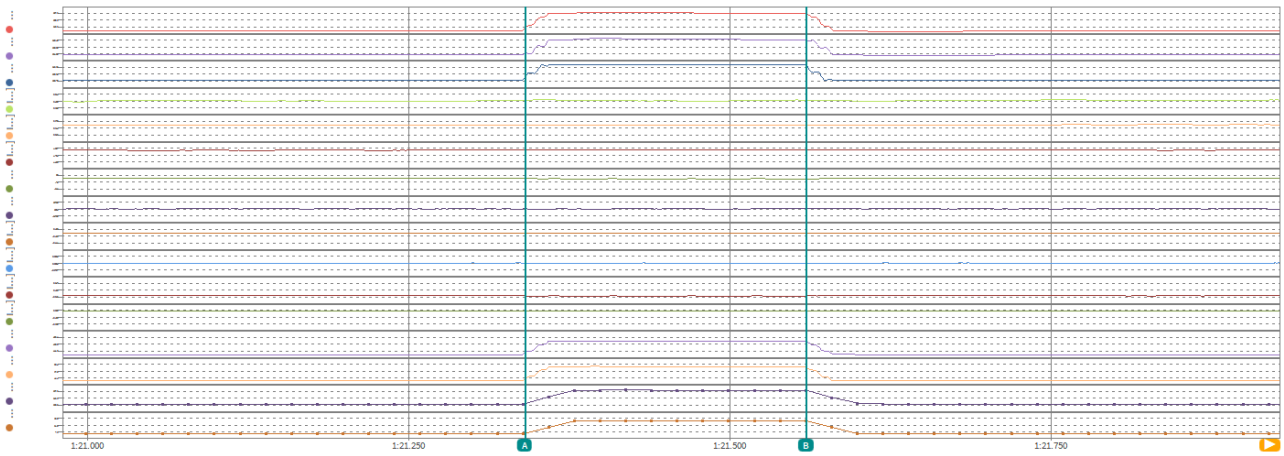
Duration fault time



	A	B	间隔	有效值
时间 [s]	1:12.17735	2:12.29905	1:00.12171	
U1_tRMS_rc@AC [V]	230.2539	264.4179	34.16397	264.8164
U2_tRMS_rc@AC [V]	229.9997	264.5990	34.59927	264.5884
U3_tRMS_rc@AC [V]	229.9433	264.4637	34.52039	264.5396
I1_tRMS_rc@AC [A]	0.533362	0.508444	-0.024918	0.499572
I2_tRMS_rc@AC [A]	0.409627	0.433362	0.023735	0.430576
I3_tRMS_rc@AC [A]	1.896927	1.917272	0.020344	1.904451
P_t_rc@AC [W]	1.439355	-0.256172	-1.695527	3.654630
Q_t_rc@AC [var]	-653.2068	756.1577	1409.365	749.8929
I_fund_Q_SYM+_rc@AC [A]	-3.724e-3	2.060e-3	5.784e-3	2.662e-3
I_fund_Q_SYM-_rc@AC [A]	1.438e-3	1.897e-3	4.582e-4	2.300e-3
I_fund_P_SYM+_rc@AC [A]	1.315e-3	1.104e-3	-2.110e-4	4.593e-3
I_fund_P_SYM-_rc@AC [A]	-2.537e-4	-1.348e-3	-1.094e-3	2.273e-3
U_fund_SYM+_rc@AC [V]	398.4825	458.0988	59.61627	458.3814
U_fund_SYM-_rc@AC [V]	0.476348	0.560791	0.084443	0.718519
U+ [V]	230.0870	264.6667	34.57975	264.6350
U- [V]	0.413215	0.390494	-0.022721	0.413424

Test – VS3.0

Duration fault time



	A	B	间隔	有效值
时间 [s]	1:21.34048	1:21.55945	0.21897	
U1_tRMS_rc@AC [V]	230.3000	288.0962	57.79617	286.2612
U2_tRMS_rc@AC [V]	230.0514	246.4467	16.39531	245.9887
U3_tRMS_rc@AC [V]	229.9828	246.0819	16.09915	245.4963
I1_tRMS_rc@AC [A]	0.463496	0.473895	0.010400	0.465378
I2_tRMS_rc@AC [A]	0.422378	0.437839	0.015461	0.426018
I3_tRMS_rc@AC [A]	1.909359	1.913799	4.440e-3	1.915767
P_t_rc@AC [W]	-0.726397	-4.771163	-4.044766	6.738426
Q_t_rc@AC [var]	643.0309	715.3669	72.33594	708.2109
I_fund_Q_SYM+_rc@AC [A]	3.450e-4	1.484e-3	1.139e-3	2.433e-3
I_fund_Q_SYM-_rc@AC [A]	-2.954e-4	-7.361e-4	-4.407e-4	3.162e-3
I_fund_P_SYM+_rc@AC [A]	-2.351e-4	-4.594e-3	-4.359e-3	7.089e-3
I_fund_P_SYM-_rc@AC [A]	-5.099e-3	-7.075e-3	-1.977e-3	3.796e-3
U_fund_SYM+_rc@AC [V]	398.5594	449.0962	50.53671	447.3940
U_fund_SYM-_rc@AC [V]	0.340442	51.40324	51.06280	49.84223
U+ [V]	230.1055	259.3698	29.26437	255.8996
U- [V]	0.384579	29.55568	29.17110	27.33641

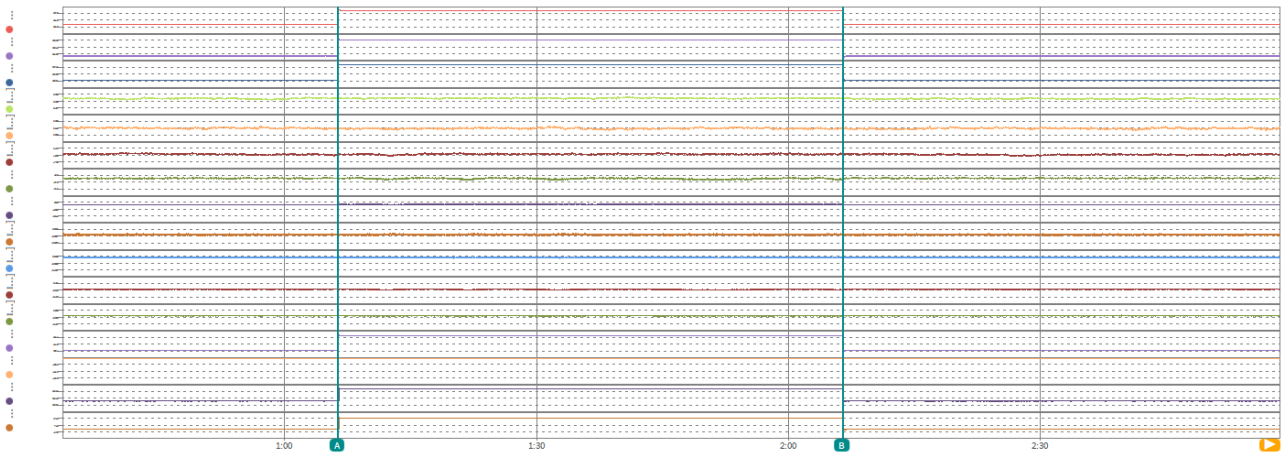
Test – VS4.1.0

Duration fault time

时间 [s]	A 1:01.25655	B 1:06.37592	间隔 5.11938	有效值
U1_tRMS_rc@AC [V]	230.2340	276.2466	46.01262	276.2337
U2_tRMS_rc@AC [V]	230.0416	241.7018	11.66019	241.6495
U3_tRMS_rc@AC [V]	229.9274	241.4253	11.49786	241.4227
I1_tRMS_rc@AC [A]	0.464225	0.455648	-8.577e-3	0.450114
I2_tRMS_rc@AC [A]	0.436996	0.470315	0.033319	0.448036
I3_tRMS_rc@AC [A]	1.979538	1.981394	1.856e-3	1.966979
P_t_rc@AC [W]	-1.214589	-1.455783	-0.241194	1.755330
Q_t_rc@AC [var]	662.5564	717.9043	55.34790	707.3982
I_fund_Q_SYM+_rc@AC [A]	5.069e-3	1.699e-3	-3.369e-3	2.411e-3
I_fund_Q_SYM-_rc@AC [A]	-3.434e-3	8.538e-4	4.288e-3	2.353e-3
I_fund_P_SYM+_rc@AC [A]	-3.651e-3	-2.142e-3	1.510e-3	2.211e-3
I_fund_P_SYM-_rc@AC [A]	-3.490e-3	-1.717e-4	3.319e-3	2.393e-3
U_fund_SYM+_rc@AC [V]	398.4828	437.4454	38.96259	437.4024
U_fund_SYM-_rc@AC [V]	0.383917	40.90403	40.52011	40.73786
U+ [V]	230.0580	252.5788	22.52081	252.3909
U- [V]	0.400966	23.53005	23.12909	23.43491

Test – VS4.2.0

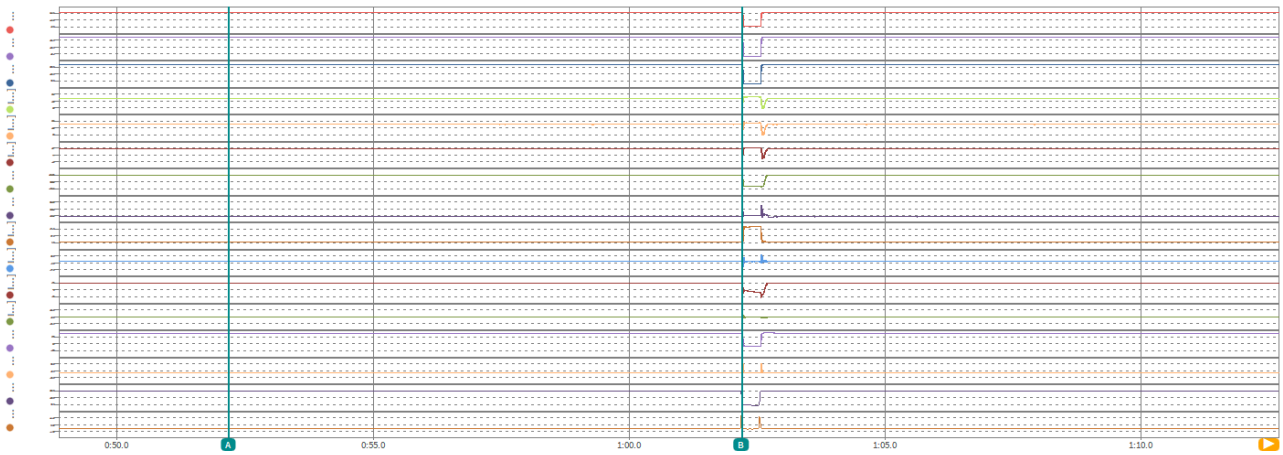
Duration fault time



时间 [s]	A 1:06.3574	B 2:06.4793	间隔 1:00.1219	有效值
U1_tRMS_rc@AC [V]	230.2313	264.6924	34.46103	264.7652
U2_tRMS_rc@AC [V]	229.9980	239.2347	9.236710	239.3232
U3_tRMS_rc@AC [V]	229.9083	239.0733	9.165054	239.1282
I1_tRMS_rc@AC [A]	0.489701	0.468869	-0.020832	0.470043
I2_tRMS_rc@AC [A]	0.433315	0.436872	3.557e-3	0.431601
I3_tRMS_rc@AC [A]	1.954684	1.986435	0.031751	1.981407
P_t_rc@AC [W]	-0.880935	-6.796958	-5.916023	4.943364
Q_t_rc@AC [var]	661.8036	703.4917	41.68805	701.4417
I_fund_Q_SYM+_rc@AC [A]	6.454e-4	2.888e-3	2.242e-3	2.752e-3
I_fund_Q_SYM-_rc@AC [A]	3.001e-3	-5.113e-3	-8.114e-3	2.584e-3
I_fund_P_SYM+_rc@AC [A]	-1.445e-4	-8.577e-3	-8.433e-3	6.583e-3
I_fund_P_SYM-_rc@AC [A]	1.672e-3	-1.871e-3	-3.543e-3	2.587e-3
U_fund_SYM+_rc@AC [V]	398.4478	428.2831	29.83536	428.3860
U_fund_SYM-_rc@AC [V]	0.478375	32.22047	31.74210	32.21810
U+ [V]	230.0538	247.3493	17.29548	247.3257
U- [V]	0.362487	18.57582	18.21333	18.59574

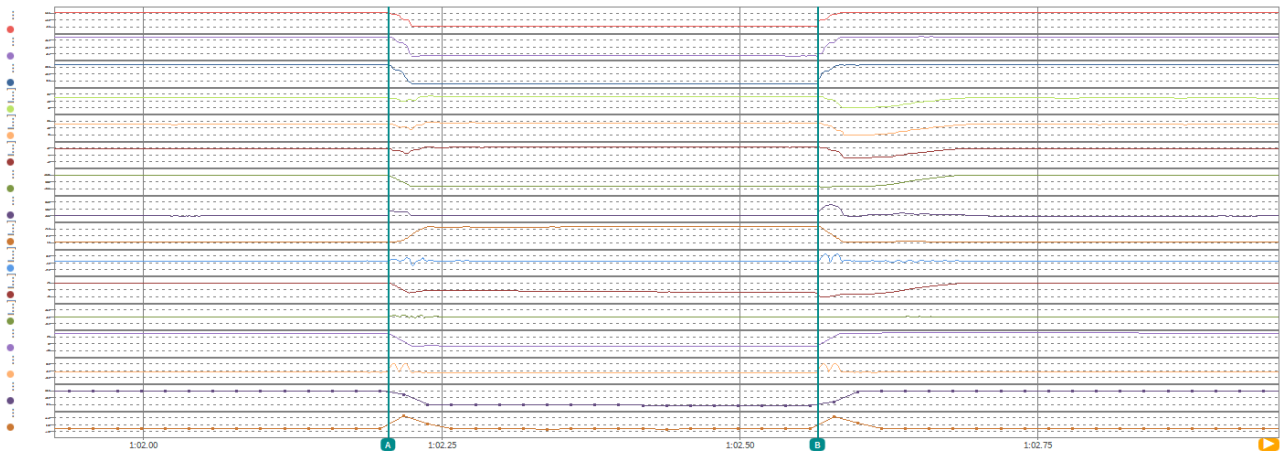
Test - VD1.1

Before fault



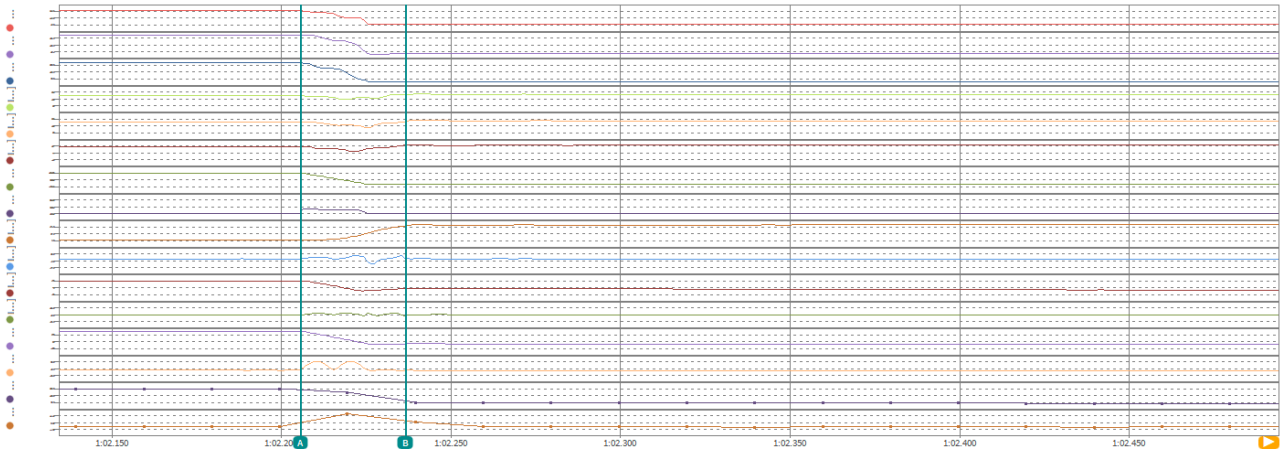
时间 [s]	A 0:52.193808	B 1:02.206733	间隔 0:10.012925	有效值
U1_tRMS_rc@AC [V]	230.4824	230.2743	-0.208084	230.4559
U2_tRMS_rc@AC [V]	229.8032	229.7773	-0.025909	229.8142
U3_tRMS_rc@AC [V]	229.7719	229.7222	-0.049774	229.7661
I1_tRMS_rc@AC [A]	179.9555	179.6780	-0.277542	180.1077
I2_tRMS_rc@AC [A]	181.1915	181.0409	-0.150620	181.3971
I3_tRMS_rc@AC [A]	183.9232	182.0049	-1.918259	183.6251
P_t_rc@AC [W]	125352.2	124761.6	-590.5938	125364.1
Q_t_rc@AC [var]	2411.045	2411.106	0.061279	2299.831
I_fund_Q_SYM+_rc@AC [A]	0.572371	0.299439	-0.272932	0.516607
I_fund_Q_SYM-_rc@AC [A]	0.577402	-0.047760	-0.625162	0.407090
I_fund_P_SYM+_rc@AC [A]	181.6580	180.8783	-0.779724	181.6801
I_fund_P_SYM-_rc@AC [A]	-0.789583	-0.273227	0.516356	0.764206
U_fund_SYM+_rc@AC [V]	398.3987	398.2326	-0.166077	398.3865
U_fund_SYM-_rc@AC [V]	1.083495	0.933196	-0.150299	1.051305
U+ [V]	230.0142	229.9590	-0.055264	230.0153
U- [V]	0.610061	0.693895	0.083834	0.606819

Duration fault time



时间 [s]	A 1:02.205930	B 1:02.565496	间隔 0.359565	有效值
U1_tRMS_rc@AC [V]	230.2743	9.147304	-221.1270	40.33924
U2_tRMS_rc@AC [V]	229.7773	9.077580	-220.6997	42.95391
U3_tRMS_rc@AC [V]	229.7222	8.816829	-220.9053	37.98096
I1_tRMS_rc@AC [A]	179.6780	206.1288	26.45081	202.9337
I2_tRMS_rc@AC [A]	181.0409	207.2042	26.16330	202.7039
I3_tRMS_rc@AC [A]	182.0049	206.9705	24.96553	203.0086
P_t_rc@AC [W]	124761.6	606.3211	-124155.2	17769.33
Q_t_rc@AC [var]	2411.106	5558.286	3147.180	8877.842
I_fund_Q_SYM+_rc@AC [A]	0.299439	205.4366	205.1372	194.7561
I_fund_Q_SYM-_rc@AC [A]	-0.047760	-0.480142	-0.432382	3.221057
I_fund_P_SYM+_rc@AC [A]	180.8783	22.49521	-158.3831	50.13450
I_fund_P_SYM-_rc@AC [A]	-0.273227	0.344665	0.617892	5.083743
U_fund_SYM+_rc@AC [V]	398.2326	15.27839	-382.9542	59.06232
U_fund_SYM-_rc@AC [V]	0.933196	0.273212	-0.659984	10.26453
U+ [V]	229.9590	8.833164	-221.1258	66.44088
U- [V]	0.693895	0.162139	-0.531756	4.019048

Injected reactive current at 30ms

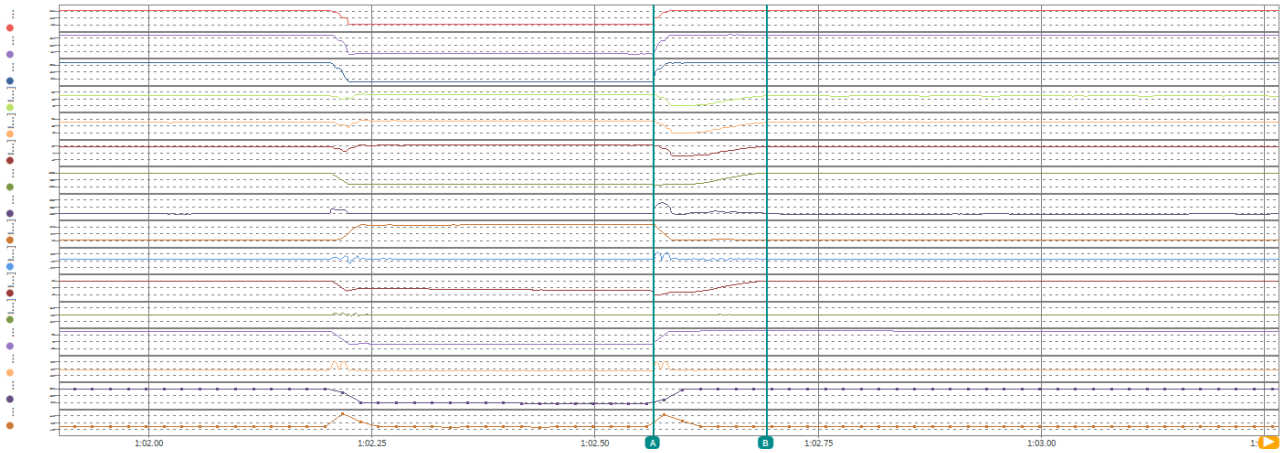


时间 [s]	A 1:02.205930	B 1:02.236793	间隔 0.030863	有效值
U1_tRMS_rc@AC [V]	230.2743	9.993398	-220.2809	133.8636
U2_tRMS_rc@AC [V]	229.7773	10.07672	-219.7005	143.0916
U3_tRMS_rc@AC [V]	229.7222	9.629570	-220.0926	125.8622
I1_tRMS_rc@AC [A]	179.6780	205.2275	25.54955	162.7071
I2_tRMS_rc@AC [A]	181.0409	181.4226	0.381744	153.3842
I3_tRMS_rc@AC [A]	182.0049	200.4459	18.44092	152.1155
P_t_rc@AC [W]	124761.6	1622.727	-123138.8	60420.00
Q_t_rc@AC [var]	2411.106	5578.028	3166.922	23820.62
I_fund_Q_SYM+_rc@AC [A]	0.299439	179.1756	178.8762	88.23261
I_fund_Q_SYM-_rc@AC [A]	-0.047760	18.50123	18.54899	10.63997
I_fund_P_SYM+_rc@AC [A]	180.8783	55.93212	-124.9462	95.08393
I_fund_P_SYM-_rc@AC [A]	-0.273227	-7.589352	-7.316125	16.77887
U_fund_SYM+_rc@AC [V]	398.2326	16.28921	-381.9434	194.3767
U_fund_SYM-_rc@AC [V]	0.933196	0.222373	-0.710823	34.96955
U+ [V]	229.9590	171.3169	-58.64207	202.7691
U- [V]	0.693895	16.21030	15.51641	11.47291

Injected reactive current at 60ms

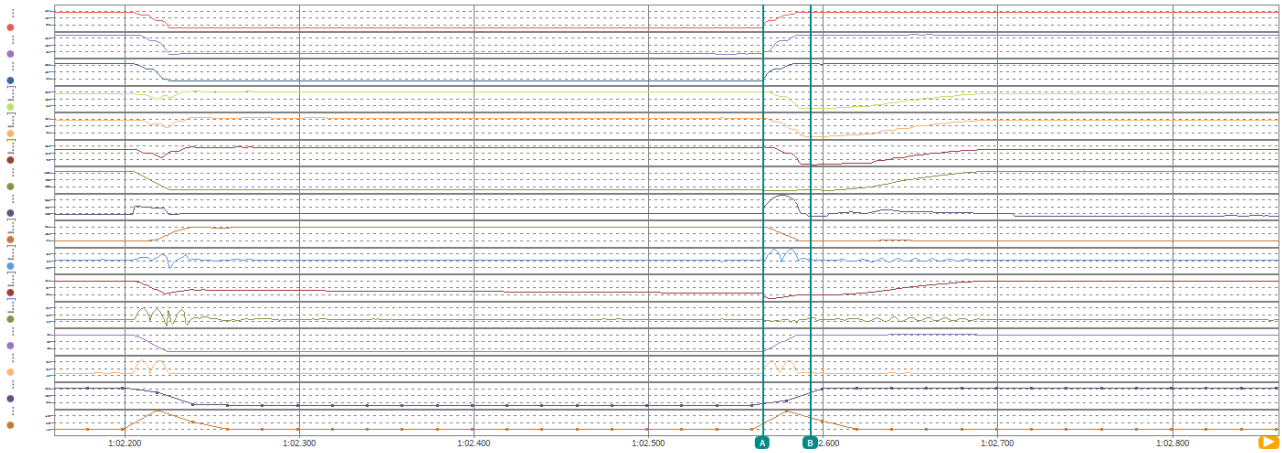
时间 [s]	A 1:02.205930	B 1:02.266169	间隔 0.060239	有效值
U1_tRMS_rc@AC [V]	230.2743	9.885994	-220.3883	95.69065
U2_tRMS_rc@AC [V]	229.7773	9.700982	-220.0763	102.2437
U3_tRMS_rc@AC [V]	229.7222	9.768181	-219.9540	89.98102
I1_tRMS_rc@AC [A]	179.6780	207.5637	27.88577	185.3654
I2_tRMS_rc@AC [A]	181.0409	202.8279	21.78705	181.8680
I3_tRMS_rc@AC [A]	182.0049	210.1087	28.10378	180.6784
P_t_rc@AC [W]	124761.6	1568.625	-123192.9	43090.08
Q_t_rc@AC [var]	2411.106	5865.868	3454.761	17473.16
I_fund_Q_SYM+_rc@AC [A]	0.299439	199.2742	198.9747	151.4806
I_fund_Q_SYM-_rc@AC [A]	-0.047760	2.309233	2.356993	7.694600
I_fund_P_SYM+_rc@AC [A]	180.8783	54.40532	-126.4730	80.10194
I_fund_P_SYM-_rc@AC [A]	-0.273227	-1.927206	-1.653980	12.27877
U_fund_SYM+_rc@AC [V]	398.2326	16.54042	-381.6922	139.0615
U_fund_SYM-_rc@AC [V]	0.933196	0.292317	-0.640879	24.93001
U+ [V]	229.9590	9.662167	-220.2968	143.6974
U- [V]	0.693895	0.146960	-0.546935	8.755118

Recover time – Active power



时间 [s]	A 1:02.565407	B 1:02.692235	间隔 0.126828	有效值
U1_tRMS_rc@AC [V]	9.147304	231.5533	222.4059	219.6008
U2_tRMS_rc@AC [V]	9.077580	231.0561	221.9785	217.9256
U3_tRMS_rc@AC [V]	8.816829	232.4675	223.6506	221.9956
I1_tRMS_rc@AC [A]	206.1288	179.0480	-27.08081	112.8085
I2_tRMS_rc@AC [A]	207.2042	180.5239	-26.68027	111.9001
I3_tRMS_rc@AC [A]	206.9705	181.5204	-25.45010	117.0634
P_t_rc@AC [W]	606.3211	125181.4	124575.1	62944.29
Q_t_rc@AC [var]	5558.286	6834.996	1276.710	28090.90
I_fund_Q_SYM+_rc@AC [A]	205.4366	3.306409	-202.1302	57.03667
I_fund_Q_SYM-_rc@AC [A]	-0.480142	1.046522	1.526664	9.528220
I_fund_P_SYM+_rc@AC [A]	22.49521	180.0883	157.5931	91.50546
I_fund_P_SYM-_rc@AC [A]	0.344665	-0.259964	-0.604629	2.669843
U_fund_SYM+_rc@AC [V]	15.27839	401.2924	386.0140	375.7279
U_fund_SYM-_rc@AC [V]	0.273212	0.549819	0.276606	17.13348
U+ [V]	8.833164	232.1966	223.3634	194.9666
U- [V]	0.162139	0.499478	0.337339	6.583113

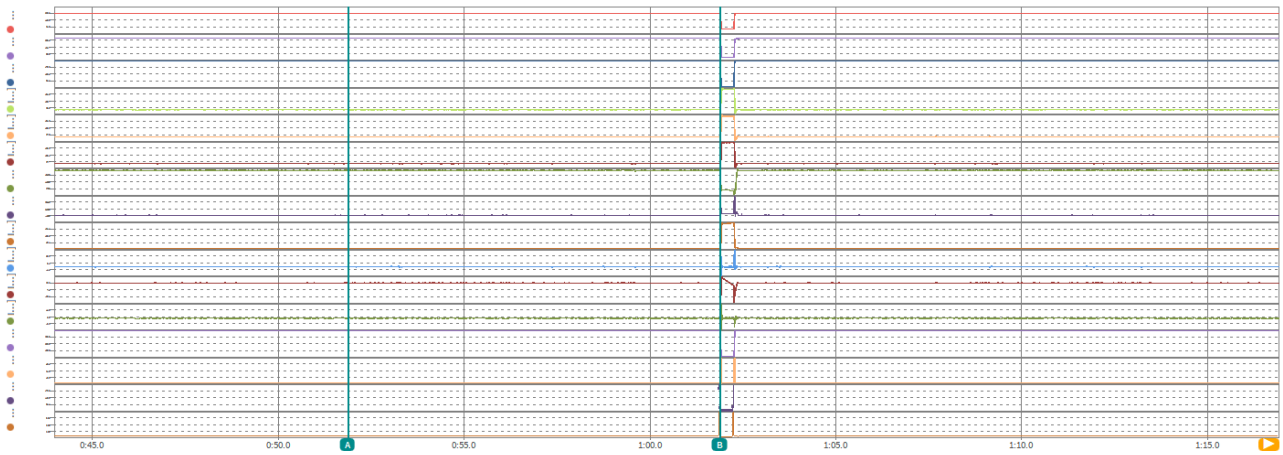
Recover time – Reactive power



时间 [s]	A 1:02.565464	B 1:02.592990	间隔 0.027526	有效值
U1_tRMS_rc@AC [V]	9.147304	227.7473	218.6000	177.0796
U2_tRMS_rc@AC [V]	9.077580	227.3540	218.2765	168.9492
U3_tRMS_rc@AC [V]	8.816829	228.1214	219.3046	183.4457
I1_tRMS_rc@AC [A]	206.1288	7.366391	-198.7624	140.3896
I2_tRMS_rc@AC [A]	207.2042	6.508338	-200.6958	135.0319
I3_tRMS_rc@AC [A]	206.9705	7.532378	-199.4381	150.6758
P_t_rc@AC [W]	606.3211	1434.195	827.8742	3054.297
Q_t_rc@AC [var]	5558.286	-4659.961	-10218.25	54718.04
I_fund_Q_SYM+_rc@AC [A]	205.4366	-0.659121	-206.0958	119.0334
I_fund_Q_SYM-_rc@AC [A]	-0.480142	2.268341	2.748483	19.50471
I_fund_P_SYM+_rc@AC [A]	22.49521	2.093231	-20.40198	30.24606
I_fund_P_SYM-_rc@AC [A]	0.344665	2.289855	1.945190	2.934214
U_fund_SYM+_rc@AC [V]	15.27839	394.4443	379.1659	276.9410
U_fund_SYM-_rc@AC [V]	0.273212	2.617750	2.344537	35.95008
U+ [V]	8.833164	64.43143	55.59827	45.98605
U- [V]	0.162139	15.70644	15.54430	11.10672

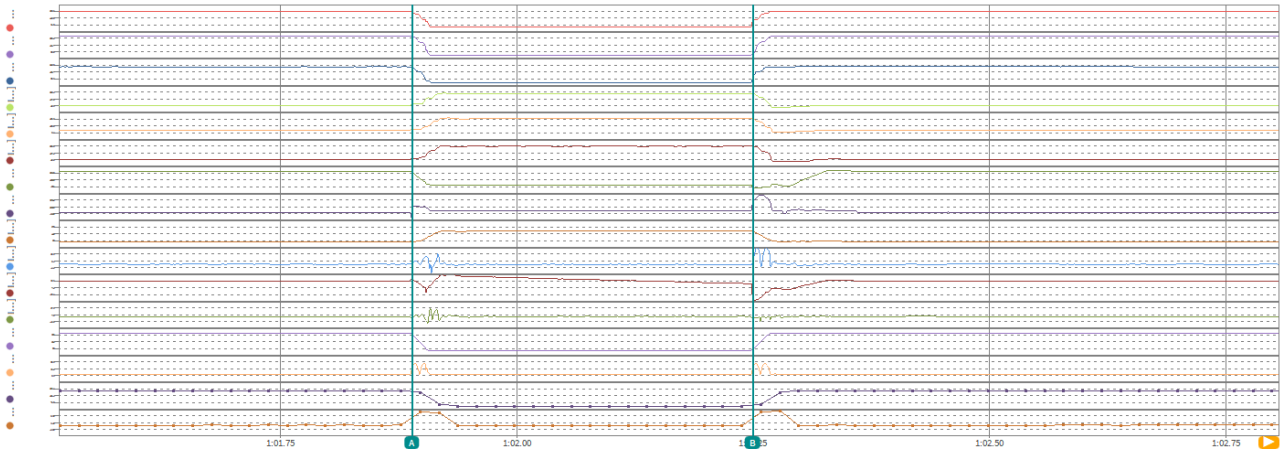
Test - VD1.2

Before fault



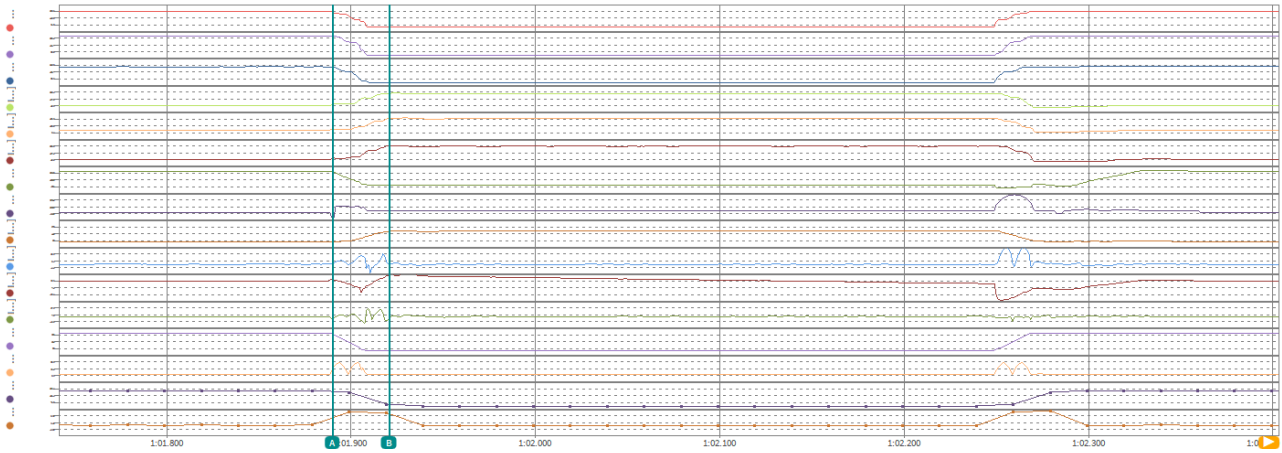
时间 [s]	A 0:51.883238	B 1:01.888528	间隔 0:10.005290	有效值
U1_tRMS_rc@AC [V]	230.2567	230.2210	-0.035629	230.2334
U2_tRMS_rc@AC [V]	229.7958	229.7054	-0.090454	229.7340
U3_tRMS_rc@AC [V]	229.6015	229.5513	-0.050262	229.5778
I1_tRMS_rc@AC [A]	36.90721	36.80958	-0.097630	36.62980
I2_tRMS_rc@AC [A]	37.79399	36.80851	-0.985489	36.84456
I3_tRMS_rc@AC [A]	37.39090	37.50313	0.112232	37.45069
P_t_rc@AC [W]	25698.15	25474.48	-223.6680	25424.91
Q_t_rc@AC [var]	-1896.537	-1804.873	91.66431	1878.729
I_fund_Q_SYM+_rc@AC [A]	-0.656403	-0.850098	-0.193694	0.731223
I_fund_Q_SYM-_rc@AC [A]	-0.063533	0.102495	0.166028	0.289564
I_fund_P_SYM+_rc@AC [A]	37.26185	36.94736	-0.314487	36.87210
I_fund_P_SYM-_rc@AC [A]	0.081660	-0.216754	-0.298414	0.338263
U_fund_SYM+_rc@AC [V]	398.1689	398.0667	-0.102173	398.1058
U_fund_SYM-_rc@AC [V]	0.978776	1.047143	0.068367	1.003455
U+ [V]	229.8721	229.8214	-0.050721	229.8533
U- [V]	0.589112	0.651562	0.062450	0.579165

Duration fault time



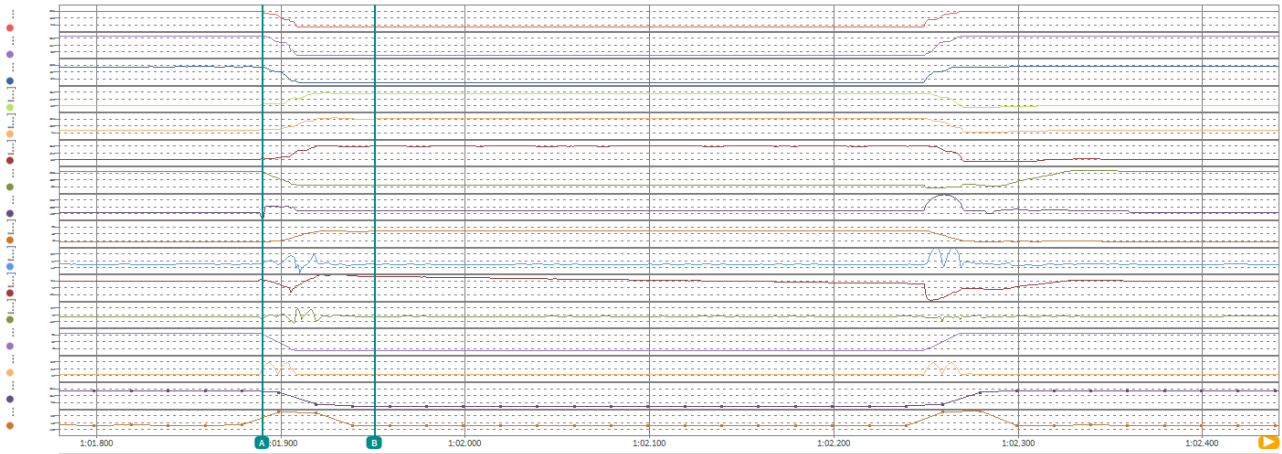
时间 [s]	A 1:01.890371	B 1:02.250239	间隔 0.359868	有效值
U1_tRMS_rc@AC [V]	229.2714	9.392632	-219.8787	39.83083
U2_tRMS_rc@AC [V]	229.4296	9.147807	-220.2818	42.39197
U3_tRMS_rc@AC [V]	229.3391	8.906023	-220.4331	37.58521
I1_tRMS_rc@AC [A]	38.16444	203.0475	164.8830	197.2416
I2_tRMS_rc@AC [A]	37.19590	202.5028	165.3069	196.4803
I3_tRMS_rc@AC [A]	37.81081	203.0815	165.2707	197.2083
P_t_rc@AC [W]	25632.86	647.0657	-24985.80	3813.317
Q_t_rc@AC [var]	-4078.793	5530.532	9609.325	7665.122
I_fund_Q_SYM+_rc@AC [A]	-0.847788	201.2981	202.1459	191.2475
I_fund_Q_SYM-_rc@AC [A]	0.271463	0.022009	-0.249454	2.828786
I_fund_P_SYM+_rc@AC [A]	37.38353	23.33092	-14.05261	42.23562
I_fund_P_SYM-_rc@AC [A]	-0.097079	0.350900	0.447979	3.471322
U_fund_SYM+_rc@AC [V]	397.0949	15.45684	-381.6381	58.61158
U_fund_SYM-_rc@AC [V]	0.291037	0.388435	0.097399	9.916032
U+ [V]	229.8214	8.935452	-220.8859	70.58369
U- [V]	0.651562	0.157940	-0.493623	3.565738

Injected reactive current at 30ms



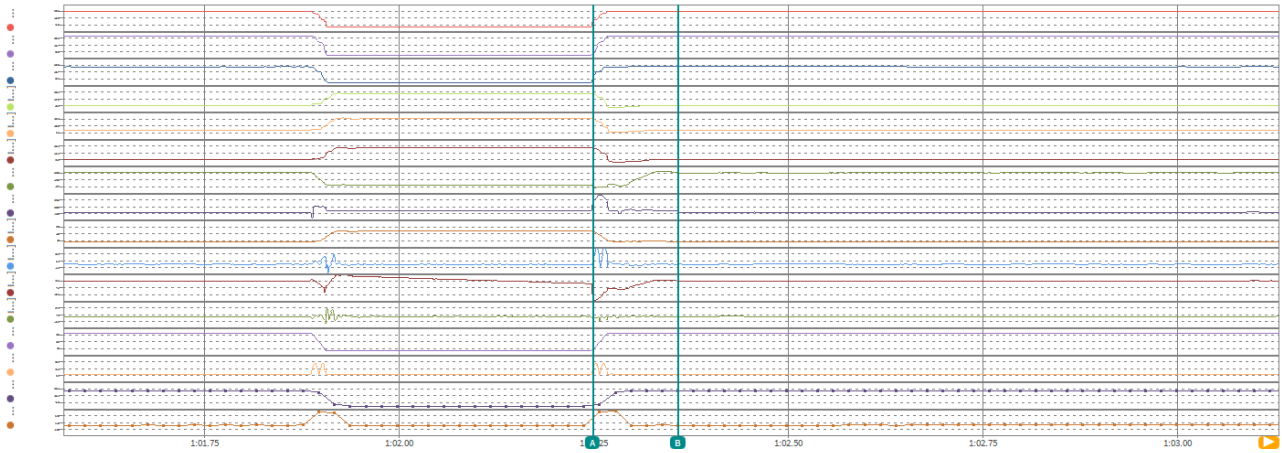
时间 [s]	A 1:01.890371	B 1:01.920982	间隔 0.030611	有效值
U1_tRMS_rc@AC [V]	229.2714	9.724564	-219.5468	130.2044
U2_tRMS_rc@AC [V]	229.4296	9.912851	-219.5168	139.1505
U3_tRMS_rc@AC [V]	229.3391	9.460778	-219.8783	122.7192
I1_tRMS_rc@AC [A]	38.16444	200.7384	162.5739	124.9983
I2_tRMS_rc@AC [A]	37.19590	190.5706	153.3747	106.7205
I3_tRMS_rc@AC [A]	37.81081	205.2737	167.4629	115.5827
P_t_rc@AC [W]	25632.86	1618.721	-24014.14	12193.59
Q_t_rc@AC [var]	-4078.793	5552.083	9630.876	18442.14
I_fund_Q_SYM+_rc@AC [A]	-0.847788	185.6328	186.4806	92.73588
I_fund_Q_SYM-_rc@AC [A]	0.271463	2.225396	1.953933	9.256808
I_fund_P_SYM+_rc@AC [A]	37.38353	57.79490	20.41137	31.42642
I_fund_P_SYM-_rc@AC [A]	-0.097079	-12.77723	-12.68015	11.28110
U_fund_SYM+_rc@AC [V]	397.0949	16.27724	-380.8177	190.1098
U_fund_SYM-_rc@AC [V]	0.291037	0.458596	0.167559	33.29346
U+ [V]	229.8214	31.43728	-198.3841	176.3527
U- [V]	0.651562	10.44651	9.794948	8.966067

Injected reactive current at 60ms



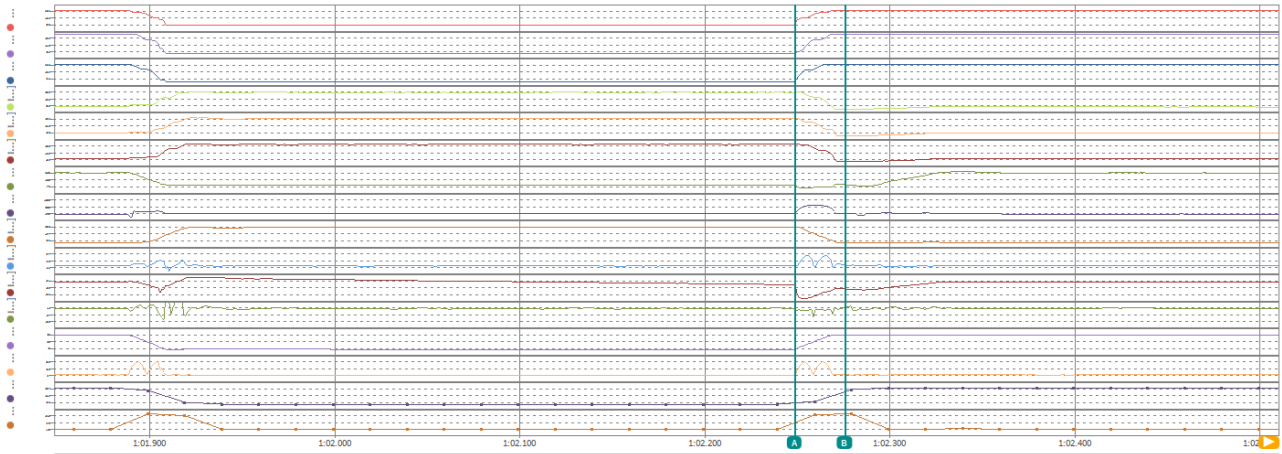
时间 [s]	A 1:01.890371	B 1:01.951170	间隔 0.060799	有效值
U1_tRMS_rc@AC [V]	229.2714	9.821460	-219.4499	93.79959
U2_tRMS_rc@AC [V]	229.4296	9.645755	-219.7839	100.2005
U3_tRMS_rc@AC [V]	229.3391	9.581877	-219.7572	88.41395
I1_tRMS_rc@AC [A]	38.16444	200.9061	162.7416	167.9039
I2_tRMS_rc@AC [A]	37.19590	197.3621	160.1662	161.6021
I3_tRMS_rc@AC [A]	37.81081	204.5067	166.6959	163.9253
P_t_rc@AC [W]	25632.86	1562.215	-24070.65	8842.169
Q_t_rc@AC [var]	-4078.793	5623.495	9702.288	13835.37
I_fund_Q_SYM+_rc@AC [A]	-0.847788	193.0609	193.9087	150.6787
I_fund_Q_SYM-_rc@AC [A]	0.271463	1.669409	1.397946	6.708559
I_fund_P_SYM+_rc@AC [A]	37.38353	54.56067	17.17714	47.31868
I_fund_P_SYM-_rc@AC [A]	-0.097079	-2.087816	-1.990736	8.265218
U_fund_SYM+_rc@AC [V]	397.0949	16.36295	-380.7320	137.0614
U_fund_SYM-_rc@AC [V]	0.291037	0.229660	-0.061376	23.91985
U+ [V]	229.8214	9.578423	-220.2430	152.8010
U- [V]	0.651562	0.215048	-0.436515	7.765586

Recover time – Active power



时间 [s]	A 1:02.249425	B 1:02.359126	间隔 0.109702	有效值
U1_tRMS_rc@AC [V]	9.392632	229.7295	220.3368	218.0353
U2_tRMS_rc@AC [V]	9.147807	229.4233	220.2755	216.2055
U3_tRMS_rc@AC [V]	8.906023	231.5117	222.6057	220.7267
I1_tRMS_rc@AC [A]	203.0475	37.70444	-165.3430	73.01548
I2_tRMS_rc@AC [A]	202.5028	37.10496	-165.3979	69.11644
I3_tRMS_rc@AC [A]	203.0815	37.12003	-165.9615	77.06257
P_t_rc@AC [W]	647.0657	25539.22	24892.15	16844.71
Q_t_rc@AC [var]	5530.532	3428.257	-2102.274	28139.93
I_fund_Q_SYM+_rc@AC [A]	201.2981	0.195730	-201.1024	56.60410
I_fund_Q_SYM-_rc@AC [A]	0.022009	-0.363543	-0.385552	9.731996
I_fund_P_SYM+_rc@AC [A]	23.33092	36.97181	13.64089	28.29558
I_fund_P_SYM-_rc@AC [A]	0.350900	0.112927	-0.237973	2.327240
U_fund_SYM+_rc@AC [V]	15.45684	398.7520	383.2951	372.2115
U_fund_SYM-_rc@AC [V]	0.388435	0.891163	0.502728	18.51015
U+ [V]	8.935452	230.6620	221.7266	183.1067
U- [V]	0.157940	0.706733	0.548793	6.666377

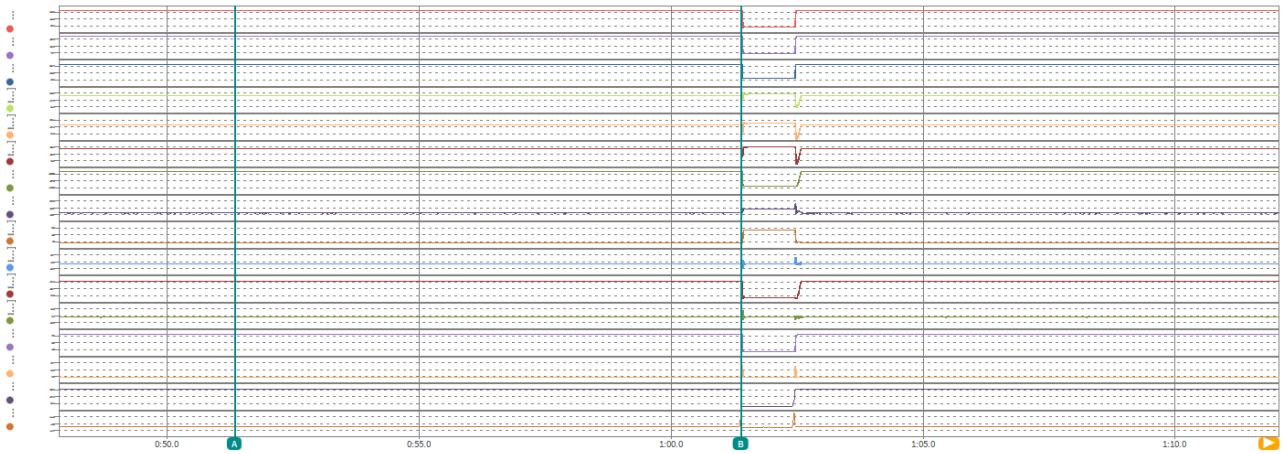
Recover time – Reactive power



时间 [s]	A 1:02.248591	B 1:02.275753	间隔 0.027162	有效值
U1_tRMS_rc@AC [V]	9.357385	227.9368	218.5794	175.5033
U2_tRMS_rc@AC [V]	9.078924	227.4268	218.3479	167.0988
U3_tRMS_rc@AC [V]	8.884277	228.0451	219.1608	182.4376
I1_tRMS_rc@AC [A]	202.8236	8.521652	-194.3020	140.5144
I2_tRMS_rc@AC [A]	202.5490	6.275908	-196.2731	132.8590
I3_tRMS_rc@AC [A]	203.0826	9.706711	-193.3759	148.9152
P_t_rc@AC [W]	649.8589	2018.788	1368.929	2914.223
Q_t_rc@AC [var]	5502.828	5205.522	-297.3057	54485.32
I_fund_Q_SYM+_rc@AC [A]	201.2165	2.997766	-198.2187	118.3169
I_fund_Q_SYM-_rc@AC [A]	-0.106374	3.623329	3.729703	19.15378
I_fund_P_SYM+_rc@AC [A]	23.54145	2.958452	-20.58300	29.24471
I_fund_P_SYM-_rc@AC [A]	0.490928	1.296013	0.805086	3.874562
U_fund_SYM+_rc@AC [V]	15.40401	394.5513	379.1473	272.9406
U_fund_SYM-_rc@AC [V]	0.356465	2.830788	2.474323	36.64056
U+ [V]	8.935452	38.41704	29.48159	27.89006
U- [V]	0.157940	11.20634	11.04840	7.924867

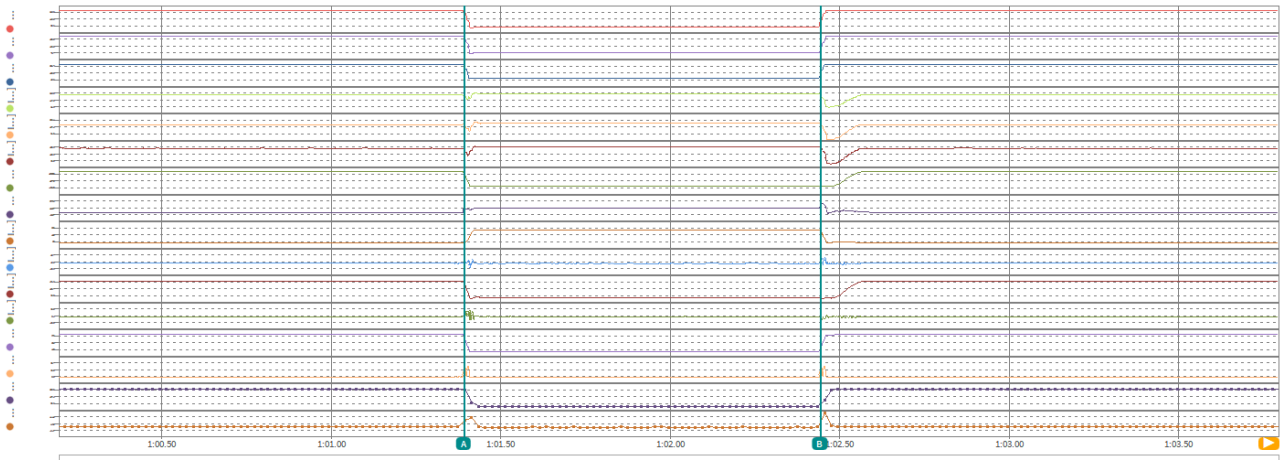
Test – VD2.1.a

Before fault



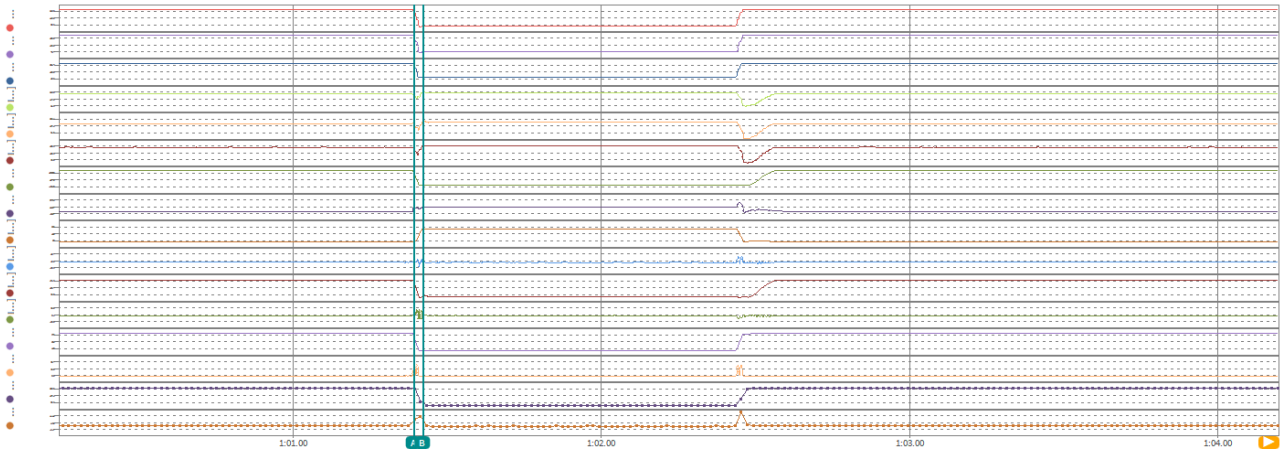
时间 [s]	A 0:51.35423	B 1:01.39303	间隔 0:10.03880	有效值
U1_tRMS_rc@AC [V]	230.4548	231.0366	0.581741	230.4600
U2_tRMS_rc@AC [V]	229.8218	229.5874	-0.234451	229.8148
U3_tRMS_rc@AC [V]	229.7850	229.4002	-0.384842	229.7676
I1_tRMS_rc@AC [A]	179.3202	180.7101	1.389908	179.9529
I2_tRMS_rc@AC [A]	181.1182	181.3046	0.186371	181.4465
I3_tRMS_rc@AC [A]	183.8474	182.8529	-0.994446	183.5952
P_t_rc@AC [W]	125172.6	125303.2	130.6250	125334.6
Q_t_rc@AC [var]	2395.826	2192.944	-202.8813	2265.284
I_fund_Q_SYM+_rc@AC [A]	0.211105	0.260358	0.049254	0.514480
I_fund_Q_SYM-_rc@AC [A]	0.287539	0.505542	0.218004	0.377487
I_fund_P_SYM+_rc@AC [A]	181.3970	181.5856	0.188644	181.6356
I_fund_P_SYM-_rc@AC [A]	-1.084183	0.019224	1.103407	0.827985
U_fund_SYM+_rc@AC [V]	398.4010	398.3602	-0.040802	398.3902
U_fund_SYM-_rc@AC [V]	0.993990	1.994776	1.000786	1.045868
U+ [V]	230.0293	230.0286	-6.784e-4	230.0175
U- [V]	0.608135	0.679522	0.071387	0.603140

Duration fault time



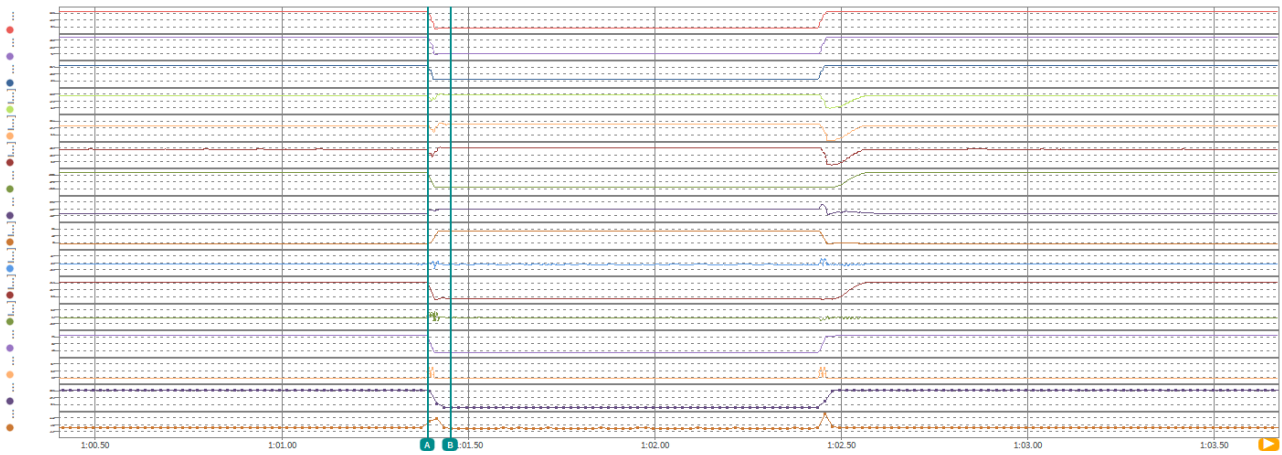
时间 [s]	A 1:01.39312	B 1:02.44355	间隔 1.05043	有效值
U1_tRMS_rc@AC [V]	231.0366	81.85619	-149.1804	62.00826
U2_tRMS_rc@AC [V]	229.5874	63.38585	-166.2015	62.36296
U3_tRMS_rc@AC [V]	229.4002	66.68654	-162.7137	61.17737
I1_tRMS_rc@AC [A]	180.7101	200.2886	19.57851	197.7397
I2_tRMS_rc@AC [A]	181.3046	196.8035	15.49899	197.9671
I3_tRMS_rc@AC [A]	182.8529	204.7802	21.92729	200.2551
P_t_rc@AC [W]	125303.2	-1238.009	-126541.2	10639.35
Q_t_rc@AC [var]	2192.944	42507.48	40314.54	34420.28
I_fund_Q_SYM+_rc@AC [A]	0.260358	200.0816	199.8212	197.3889
I_fund_Q_SYM-_rc@AC [A]	0.505542	0.018627	-0.486915	1.764235
I_fund_P_SYM+_rc@AC [A]	181.5856	-0.680807	-182.2664	16.09031
I_fund_P_SYM-_rc@AC [A]	0.019224	-2.263128	-2.282352	2.984491
U_fund_SYM+_rc@AC [V]	398.3602	109.8869	-288.4733	105.6728
U_fund_SYM-_rc@AC [V]	1.994776	10.24907	8.254293	4.680558
U+ [V]	230.0286	57.48602	-172.5426	71.75736
U- [V]	0.679522	0.288968	-0.390554	1.772352

Injected reactive current at 30ms



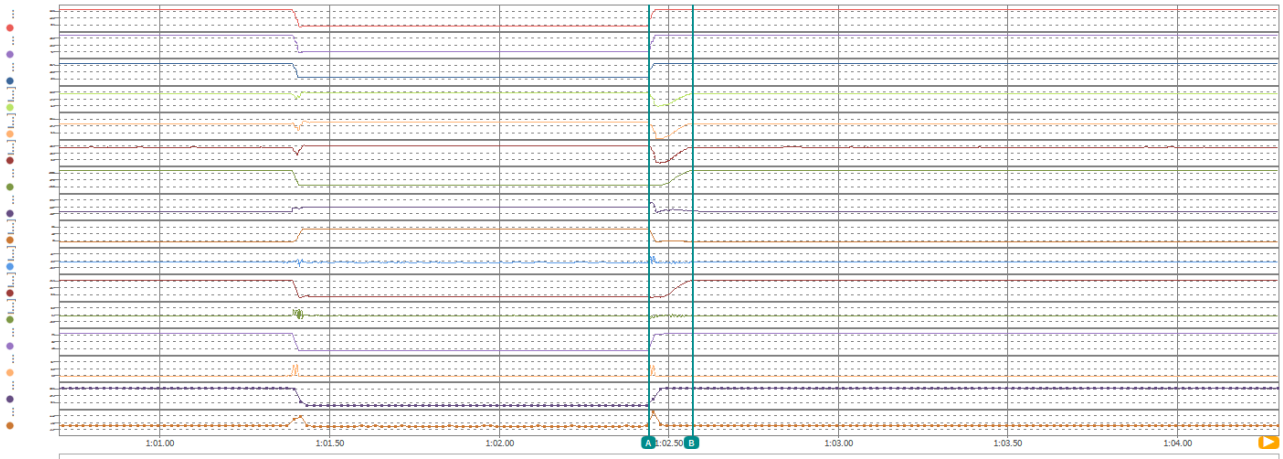
时间 [s]	A	B	间隔	有效值
	1:01.39305	1:01.42306	0.03000	
U1_tRMS_rc@AC [V]	231.0366	56.73740	-174.2992	142.2157
U2_tRMS_rc@AC [V]	229.5874	56.86076	-172.7266	149.6632
U3_tRMS_rc@AC [V]	229.4002	57.12609	-172.2741	134.6361
I1_tRMS_rc@AC [A]	180.7101	201.0789	20.36882	161.2526
I2_tRMS_rc@AC [A]	181.3046	179.6114	-1.693161	152.7309
I3_tRMS_rc@AC [A]	182.8529	195.6704	12.81747	150.3272
P_t_rc@AC [W]	125303.2	-500.9959	-125804.2	61968.09
Q_t_rc@AC [var]	2192.944	32795.59	30602.65	28817.08
I_fund_Q_SYM+_rc@AC [A]	0.260358	183.6882	183.4278	89.53873
I_fund_Q_SYM-_rc@AC [A]	0.505542	17.90948	17.40393	9.176819
I_fund_P_SYM+_rc@AC [A]	181.5856	-3.438382	-185.0240	93.50985
I_fund_P_SYM-_rc@AC [A]	0.019224	6.348965	6.329741	17.01571
U_fund_SYM+_rc@AC [V]	398.3602	98.43084	-299.9294	224.9600
U_fund_SYM-_rc@AC [V]	1.994776	0.146658	-1.848118	27.08802
U+ [V]	230.0286	90.08605	-139.9425	190.2764
U- [V]	0.679522	10.17135	9.491825	7.447738

Injected reactive current at 60ms



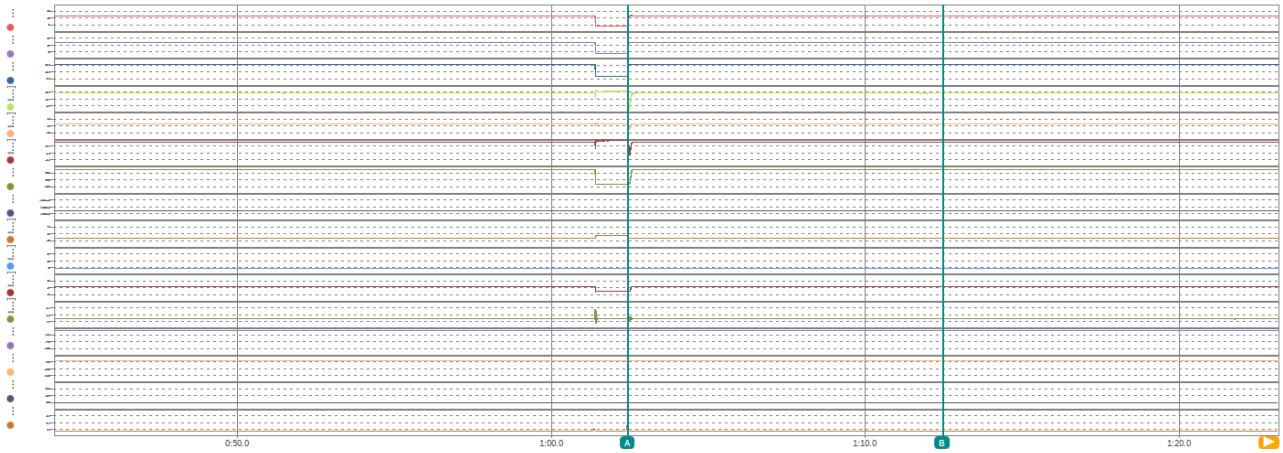
时间 [s]	A	B	间隔	有效值
	1:01.39305	1:01.45381	0.06076	
U1_tRMS_rc@AC [V]	231.0366	58.58455	-172.4520	108.5953
U2_tRMS_rc@AC [V]	229.5874	58.48617	-171.1012	113.4663
U3_tRMS_rc@AC [V]	229.4002	58.22934	-171.1709	103.5923
I1_tRMS_rc@AC [A]	180.7101	198.0263	17.31619	181.8399
I2_tRMS_rc@AC [A]	181.3046	196.0681	14.76357	178.3967
I3_tRMS_rc@AC [A]	182.8529	201.9815	19.12856	178.0816
P_t_rc@AC [W]	125303.2	-181.1555	-125484.3	43823.56
Q_t_rc@AC [var]	2192.944	34829.33	32636.39	31993.95
I_fund_Q_SYM+_rc@AC [A]	0.260358	198.5524	198.2921	155.1037
I_fund_Q_SYM-_rc@AC [A]	0.505542	-0.500745	-1.006288	6.666092
I_fund_P_SYM+_rc@AC [A]	181.5856	-1.029730	-182.6153	66.24201
I_fund_P_SYM-_rc@AC [A]	0.019224	-1.821335	-1.840559	12.26219
U_fund_SYM+_rc@AC [V]	398.3602	101.1619	-297.1983	174.1279
U_fund_SYM-_rc@AC [V]	1.994776	0.529141	-1.465635	19.15691
U+ [V]	230.0286	57.44987	-172.5787	167.2691
U- [V]	0.679522	0.278958	-0.400564	6.451439

Recover time – Active power



时间 [s]	A 1:02.44280	B 1:02.56970	间隔 0.12690	有效值
U1_tRMS_rc@AC [V]	57.47343	231.8610	174.3876	220.7828
U2_tRMS_rc@AC [V]	57.65427	231.1776	173.5233	219.3173
U3_tRMS_rc@AC [V]	57.58201	230.8369	173.2549	221.3508
I1_tRMS_rc@AC [A]	200.0312	179.1845	-20.84671	109.5440
I2_tRMS_rc@AC [A]	198.9018	180.9553	-17.94650	111.5482
I3_tRMS_rc@AC [A]	201.3477	182.8990	-18.44862	115.9491
P_t_rc@AC [W]	51.74211	125421.9	125370.2	63805.85
Q_t_rc@AC [var]	34557.98	6658.885	-27899.10	28226.80
I_fund_Q_SYM+_rc@AC [A]	200.0123	2.367825	-197.6444	54.15498
I_fund_Q_SYM-_rc@AC [A]	-4.071e-3	0.213909	0.217980	8.816340
I_fund_P_SYM+_rc@AC [A]	0.317951	180.7578	180.4398	91.90564
I_fund_P_SYM-_rc@AC [A]	0.156899	-0.986390	-1.143289	3.734077
U_fund_SYM+_rc@AC [V]	99.64329	400.5955	300.9522	378.8658
U_fund_SYM-_rc@AC [V]	0.090015	0.970252	0.880237	13.01686
U+ [V]	57.48602	231.5214	174.0354	200.3473
U- [V]	0.288968	0.563352	0.274384	5.953279

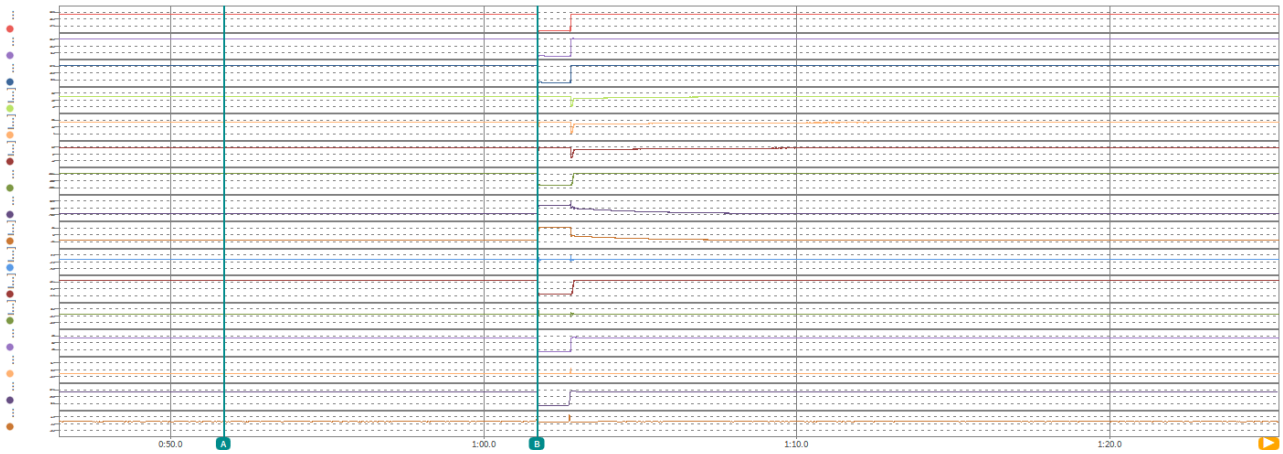
Recover time – Reactive power



时间 [s]	A 1:02.44315	B 1:12.45733	间隔 0:10.01418	有效值
U1_tRMS_rc@AC [V]	57.47343	230.4881	173.0147	230.3477
U2_tRMS_rc@AC [V]	57.65427	229.8666	172.2124	229.7014
U3_tRMS_rc@AC [V]	57.58201	229.7969	172.2149	229.6696
I1_tRMS_rc@AC [A]	200.0312	179.5159	-20.51530	179.0971
I2_tRMS_rc@AC [A]	198.9018	181.4497	-17.45209	180.6084
I3_tRMS_rc@AC [A]	201.3477	183.0056	-18.34206	182.8378
P_t_rc@AC [W]	51.74211	125118.2	125066.5	124677.4
Q_t_rc@AC [var]	34557.98	2315.763	-32242.22	3914.406
I_fund_Q_SYM+_rc@AC [A]	200.0123	0.591030	-199.4212	6.141929
I_fund_Q_SYM-_rc@AC [A]	-4.071e-3	0.074243	0.078314	1.071154
I_fund_P_SYM+_rc@AC [A]	0.317951	181.2925	180.9745	180.6693
I_fund_P_SYM-_rc@AC [A]	0.156899	-0.906963	-1.063862	0.923700
U_fund_SYM+_rc@AC [V]	99.64329	398.4535	298.8102	398.1660
U_fund_SYM-_rc@AC [V]	0.090015	0.974207	0.884192	1.798378
U+ [V]	57.48602	230.0085	172.5225	229.6417
U- [V]	0.288968	0.615577	0.326609	0.922431

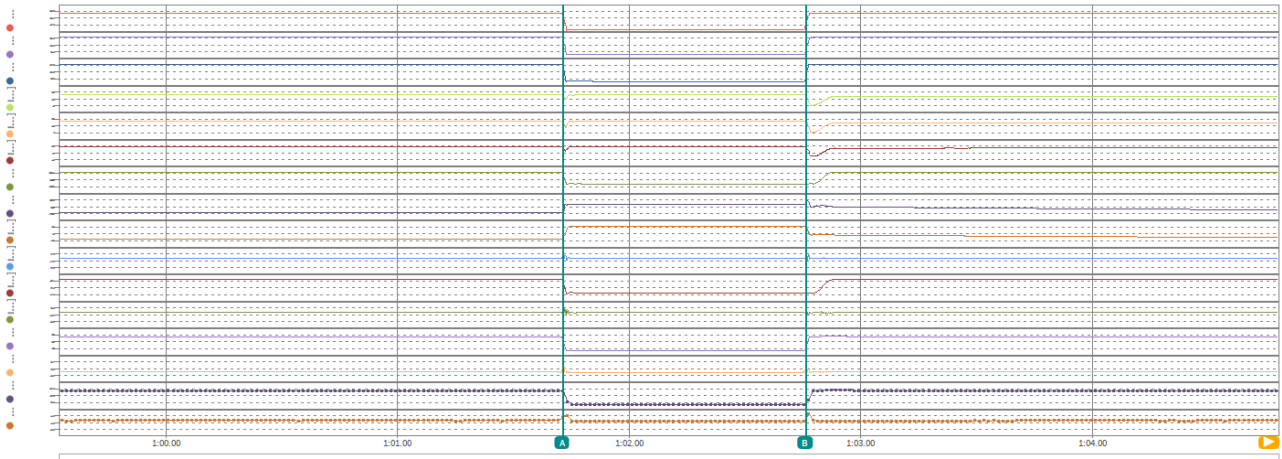
Test – VD2.1.b

Before fault



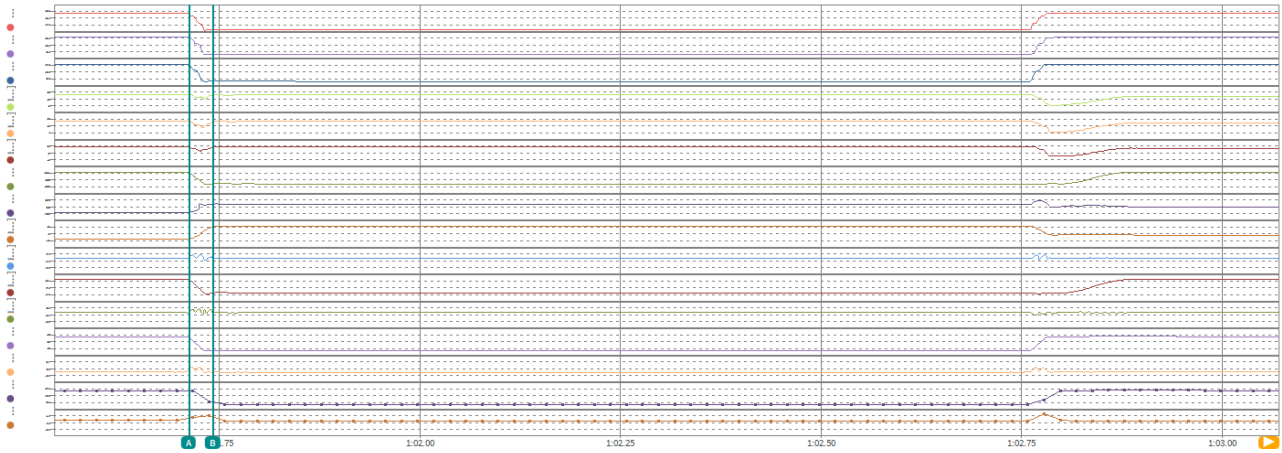
时间 [s]	A 0:51.70443	B 1:01.71306	间隔 0:10.00863	有效值
U1_tRMS_rc@AC [V]	230.4678	230.9749	0.507095	230.4210
U2_tRMS_rc@AC [V]	229.8154	229.8405	0.025131	229.7678
U3_tRMS_rc@AC [V]	229.7688	229.2955	-0.473312	229.7705
I1_tRMS_rc@AC [A]	196.8669	197.1147	0.247803	197.1318
I2_tRMS_rc@AC [A]	198.3203	197.8734	-0.446884	198.4437
I3_tRMS_rc@AC [A]	201.5337	201.0311	-0.502609	201.2052
P_t_rc@AC [W]	115062.4	114870.1	-192.3047	114937.3
Q_t_rc@AC [var]	-74829.82	-74847.93	-18.10938	75013.42
I_fund_Q_SYM+_rc@AC [A]	-108.3757	-108.3737	1.953e-3	108.6666
I_fund_Q_SYM-_rc@AC [A]	0.873748	0.959331	0.085583	0.694653
I_fund_P_SYM+_rc@AC [A]	166.7500	166.4460	-0.304031	166.5894
I_fund_P_SYM-_rc@AC [A]	-0.889338	-0.324286	0.565052	0.556169
U_fund_SYM+_rc@AC [V]	398.3954	398.3961	6.714e-4	398.3416
U_fund_SYM-_rc@AC [V]	1.059897	1.628195	0.568298	1.034478
U+ [V]	230.0222	229.9348	-0.087374	229.9894
U- [V]	0.593445	0.654514	0.061069	0.596717

Duration fault time



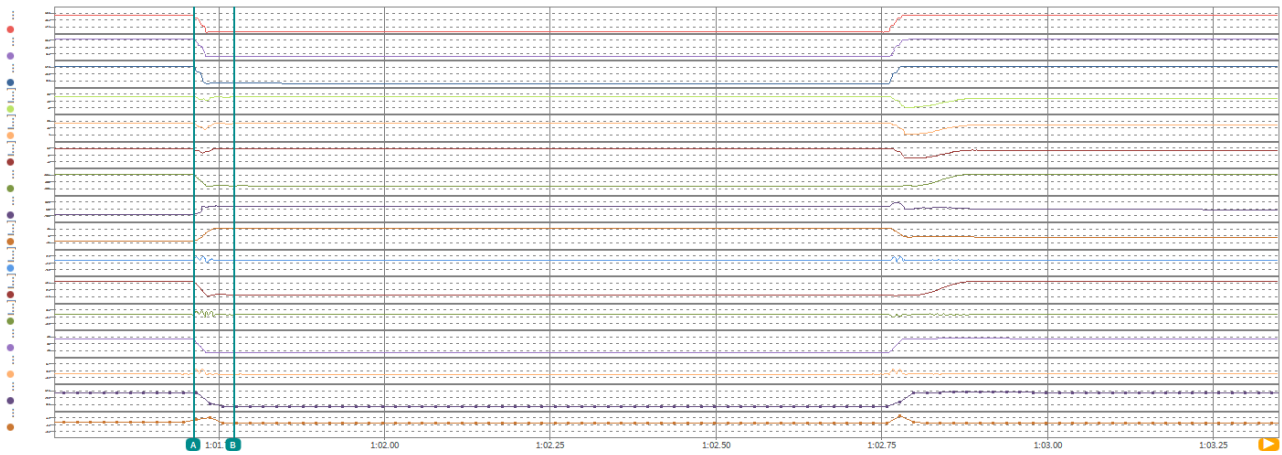
时间 [s]	A 1:01.71326	B 1:02.76307	间隔 1.04982	有效值
U1_tRMS_rc@AC [V]	230.9749	57.27102	-173.7039	62.17885
U2_tRMS_rc@AC [V]	229.8405	57.49483	-172.3457	62.61848
U3_tRMS_rc@AC [V]	229.2955	57.63672	-171.6587	61.40997
I1_tRMS_rc@AC [A]	197.1147	199.1282	2.013489	196.5862
I2_tRMS_rc@AC [A]	197.8734	198.3273	0.453888	196.7282
I3_tRMS_rc@AC [A]	201.0311	199.1195	-1.911575	199.3853
P_t_rc@AC [W]	114870.1	147.7949	-114722.3	10116.02
Q_t_rc@AC [var]	-74847.93	34283.35	109131.3	34812.16
I_fund_Q_SYM+_rc@AC [A]	-108.3737	198.7687	307.1424	196.2791
I_fund_Q_SYM-_rc@AC [A]	0.959331	-0.748323	-1.707653	3.249699
I_fund_P_SYM+_rc@AC [A]	166.4460	0.870300	-165.5757	15.42165
I_fund_P_SYM-_rc@AC [A]	-0.324286	0.163625	0.487911	2.430138
U_fund_SYM+_rc@AC [V]	398.3961	99.46167	-298.9344	106.0958
U_fund_SYM-_rc@AC [V]	1.628195	0.446723	-1.181472	4.692884
U+ [V]	229.9348	57.40085	-172.5340	71.95285
U- [V]	0.654514	0.380835	-0.273679	1.800066

Injected reactive current at 30ms



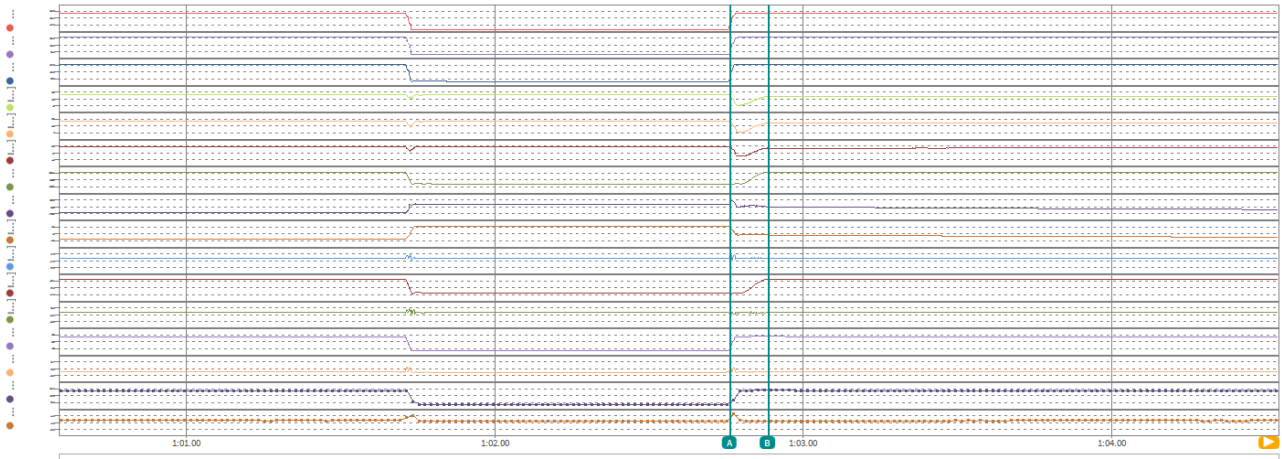
时间 [s]	A 1:01.71326	B 1:01.74345	间隔 0.03019	有效值
U1_tRMS_rc@AC [V]	230.9749	58.04065	-172.9343	143.0090
U2_tRMS_rc@AC [V]	229.8405	58.21661	-171.6239	150.9048
U3_tRMS_rc@AC [V]	229.2955	58.40428	-170.8912	136.5495
I1_tRMS_rc@AC [A]	197.1147	193.2638	-3.850922	172.1464
I2_tRMS_rc@AC [A]	197.8734	174.8422	-23.03127	150.0299
I3_tRMS_rc@AC [A]	201.0311	193.4768	-7.554291	160.6668
P_t_rc@AC [W]	114870.1	-229.4779	-115099.5	57960.47
Q_t_rc@AC [var]	-74847.93	32694.94	107542.9	46986.44
I_fund_Q_SYM+_rc@AC [A]	-108.3737	180.6699	289.0436	100.8434
I_fund_Q_SYM-_rc@AC [A]	0.959331	16.56742	15.60809	17.86776
I_fund_P_SYM+_rc@AC [A]	166.4460	-1.733876	-168.1798	88.08721
I_fund_P_SYM-_rc@AC [A]	-0.324286	-2.848878	-2.524592	13.47318
U_fund_SYM+_rc@AC [V]	398.3961	100.7149	-297.6812	228.5042
U_fund_SYM-_rc@AC [V]	1.628195	0.053584	-1.574611	26.78776
U+ [V]	229.9348	94.08721	-135.8476	191.5349
U- [V]	0.654514	10.89238	10.23786	7.571281

Injected reactive current at 60ms



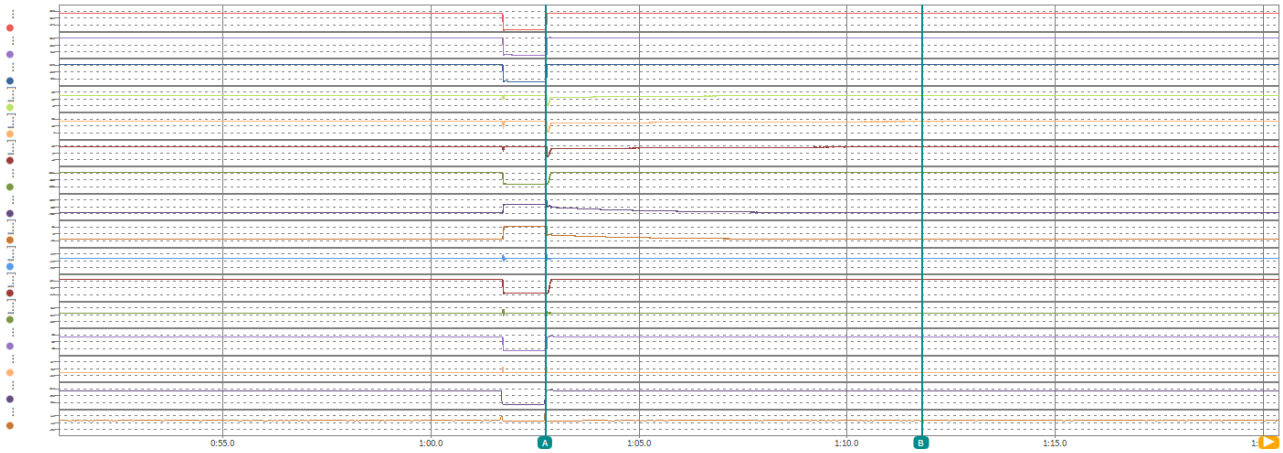
时间 [s]	A 1:01.71326	B 1:01.77374	间隔 0.06048	有效值
U1_tRMS_rc@AC [V]	230.9749	58.53541	-172.4395	110.5324
U2_tRMS_rc@AC [V]	229.8405	58.52971	-171.3108	115.7684
U3_tRMS_rc@AC [V]	229.2955	58.14025	-171.1552	106.1748
I1_tRMS_rc@AC [A]	197.1147	198.2289	1.114243	184.6339
I2_tRMS_rc@AC [A]	197.8734	195.9858	-1.887650	174.8266
I3_tRMS_rc@AC [A]	201.0311	202.7222	1.691132	180.3139
P_t_rc@AC [W]	114870.1	-142.3214	-115012.4	41647.28
Q_t_rc@AC [var]	-74847.93	34860.43	109708.4	41502.27
I_fund_Q_SYM+_rc@AC [A]	-108.3737	198.8234	307.1972	155.2334
I_fund_Q_SYM-_rc@AC [A]	0.959331	-1.435673	-2.395004	12.90506
I_fund_P_SYM+_rc@AC [A]	166.4460	-0.814954	-167.2609	63.43693
I_fund_P_SYM-_rc@AC [A]	-0.324286	-2.200993	-1.876707	9.897828
U_fund_SYM+_rc@AC [V]	398.3961	101.1143	-297.2818	178.6171
U_fund_SYM-_rc@AC [V]	1.628195	0.455889	-1.172306	19.24745
U+ [V]	229.9348	58.44665	-171.4882	168.4286
U- [V]	0.654514	0.295171	-0.359343	6.558583

Recover time – Active power



时间 [s]	A 1:02.76284	B 1:02.88677	间隔 0.12393	有效值
U1_tRMS_rc@AC [V]	57.27102	231.6705	174.3995	220.2064
U2_tRMS_rc@AC [V]	57.49483	231.1090	173.6142	218.5404
U3_tRMS_rc@AC [V]	57.63672	230.7298	173.0931	220.5807
I1_tRMS_rc@AC [A]	199.1282	165.6033	-33.52492	105.6824
I2_tRMS_rc@AC [A]	198.3273	166.3037	-32.02365	108.0763
I3_tRMS_rc@AC [A]	199.1195	169.6712	-29.44832	112.6941
P_t_rc@AC [W]	147.7949	115794.3	115646.5	59567.24
Q_t_rc@AC [var]	34283.35	-5966.300	-40249.65	28889.96
I_fund_Q_SYM+_rc@AC [A]	198.7687	-0.383759	-199.1524	56.81885
I_fund_Q_SYM-_rc@AC [A]	-0.748323	0.933285	1.681607	8.716095
I_fund_P_SYM+_rc@AC [A]	0.870300	166.9600	166.0897	85.79717
I_fund_P_SYM-_rc@AC [A]	0.163625	-0.927041	-1.090667	4.543246
U_fund_SYM+_rc@AC [V]	99.46167	400.3839	300.9222	377.5620
U_fund_SYM-_rc@AC [V]	0.446723	0.887985	0.441262	13.11775
U+ [V]	57.40085	231.5200	174.1192	199.9376
U- [V]	0.380835	0.569042	0.188208	5.734639

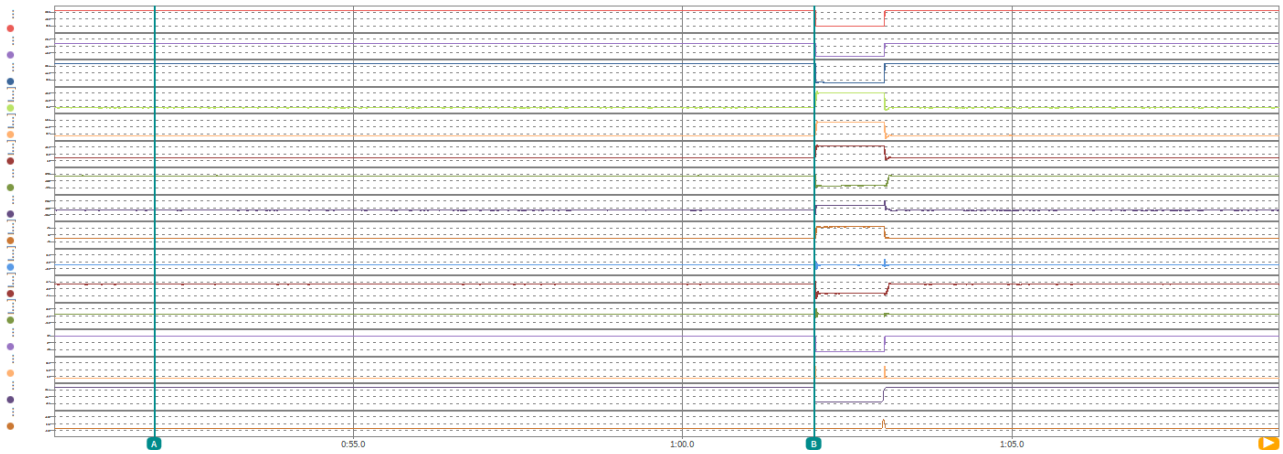
Recover time – Reactive power



时间 [s]	A 1:02.76284	B 1:11.79332	间隔 9.03048	有效值
U1_tRMS_rc@AC [V]	57.27102	230.4236	173.1526	230.3206
U2_tRMS_rc@AC [V]	57.49483	229.7956	172.3008	229.6580
U3_tRMS_rc@AC [V]	57.63672	229.7679	172.1312	229.6649
I1_tRMS_rc@AC [A]	199.1282	196.3270	-2.801163	184.2308
I2_tRMS_rc@AC [A]	198.3273	196.9593	-1.368042	185.3087
I3_tRMS_rc@AC [A]	199.1195	200.3539	1.234390	188.0025
P_t_rc@AC [W]	147.7949	115230.0	115082.2	114479.4
Q_t_rc@AC [var]	34283.35	-73235.80	-107519.1	57645.73
I_fund_Q_SYM+_rc@AC [A]	198.7687	-106.0861	-304.8547	83.58808
I_fund_Q_SYM-_rc@AC [A]	-0.748323	0.772875	1.521197	1.214064
I_fund_P_SYM+_rc@AC [A]	0.870300	167.0060	166.1357	165.8962
I_fund_P_SYM-_rc@AC [A]	0.163625	-0.316569	-0.480194	0.781822
U_fund_SYM+_rc@AC [V]	99.46167	398.3575	298.8958	398.1179
U_fund_SYM-_rc@AC [V]	0.446723	1.019542	0.572818	1.851471
U+ [V]	57.40085	229.9860	172.5851	229.5875
U- [V]	0.380835	0.570377	0.189542	0.925961

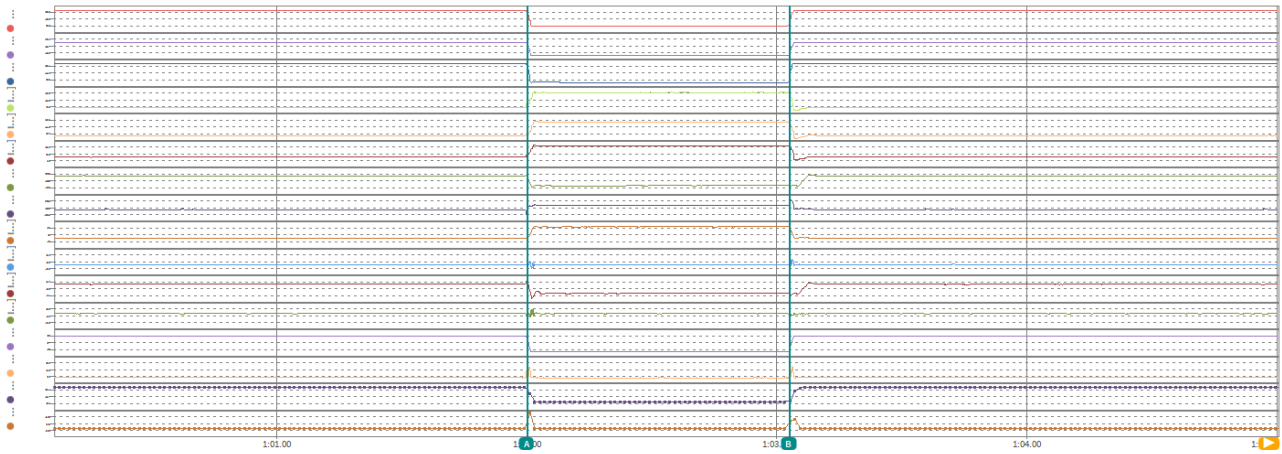
Test – VD2.2

Before fault



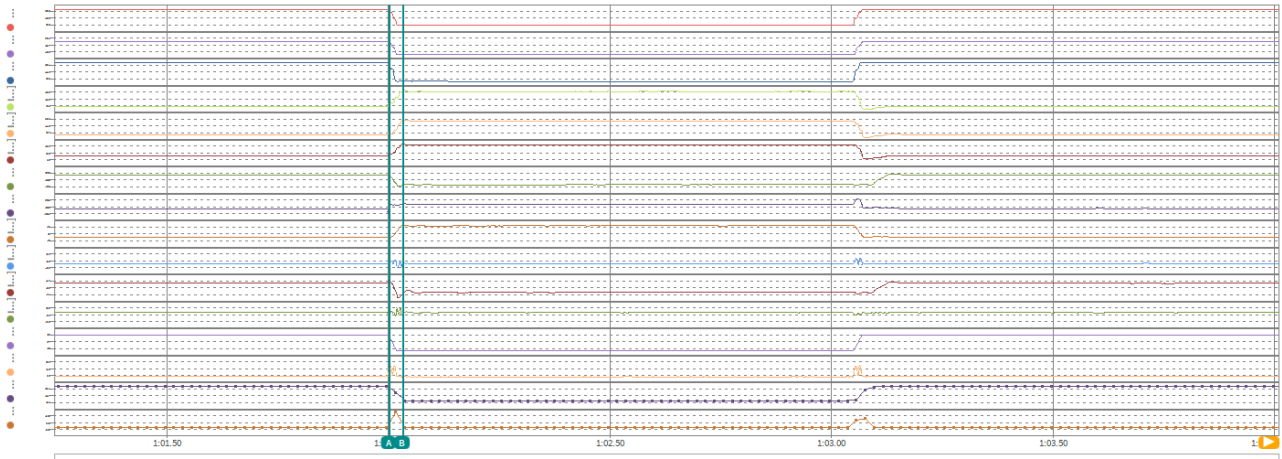
时间 [s]	A 0:51.993277	B 1:02.001508	间隔 0:10.008231	有效值
U1_tRMS_rc@AC [V]	230.2405	230.7480	0.507538	230.2271
U2_tRMS_rc@AC [V]	229.7256	229.5615	-0.164185	229.7259
U3_tRMS_rc@AC [V]	229.6175	229.1151	-0.502350	229.5748
I1_tRMS_rc@AC [A]	36.39152	36.78165	0.390129	36.49411
I2_tRMS_rc@AC [A]	36.60146	36.67010	0.068638	36.75463
I3_tRMS_rc@AC [A]	37.54179	37.29559	-0.246197	37.29471
P_t_rc@AC [W]	25328.66	25376.83	48.16992	25335.23
Q_t_rc@AC [var]	-1998.107	-1932.744	65.36316	1883.468
I_fund_Q_SYM+_rc@AC [A]	-0.607348	-0.842478	-0.235131	0.743325
I_fund_Q_SYM-_rc@AC [A]	-0.031484	0.182677	0.214161	0.358008
I_fund_P_SYM+_rc@AC [A]	36.73137	36.81225	0.080879	36.74287
I_fund_P_SYM-_rc@AC [A]	-0.221512	-0.227279	-5.767e-3	0.362139
U_fund_SYM+_rc@AC [V]	398.1281	398.0248	-0.103241	398.0959
U_fund_SYM-_rc@AC [V]	0.964543	2.182292	1.217749	0.999368
U+ [V]	229.8004	229.8247	0.024321	229.8474
U- [V]	0.542239	0.711591	0.169352	0.576345

Duration fault time



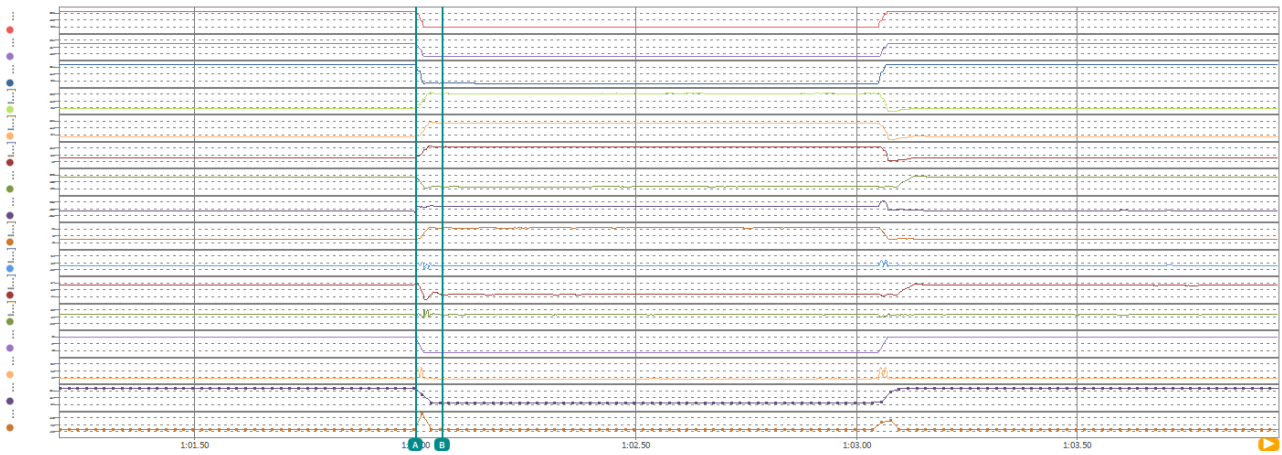
时间 [s]	A 1:02.002137	B 1:03.051630	间隔 1.049493	有效值
U1_tRMS_rc@AC [V]	230.7480	57.25404	-173.4940	62.16257
U2_tRMS_rc@AC [V]	229.5615	57.53668	-172.0248	62.54677
U3_tRMS_rc@AC [V]	229.1151	57.60539	-171.5097	61.35977
I1_tRMS_rc@AC [A]	36.78165	200.6218	163.8402	196.1108
I2_tRMS_rc@AC [A]	36.67010	198.2879	161.6178	195.8554
I3_tRMS_rc@AC [A]	37.29559	199.6900	162.3944	198.7069
P_t_rc@AC [W]	25376.83	374.8450	-25001.98	2456.103
Q_t_rc@AC [var]	-1932.744	34396.41	36329.15	34282.65
I_fund_Q_SYM+_rc@AC [A]	-0.842478	199.3862	200.2287	196.3298
I_fund_Q_SYM-_rc@AC [A]	0.182677	-1.573064	-1.755741	2.270961
I_fund_P_SYM+_rc@AC [A]	36.81225	2.129927	-34.68232	5.078714
I_fund_P_SYM-_rc@AC [A]	-0.227279	0.023935	0.251214	1.907077
U_fund_SYM+_rc@AC [V]	398.0248	99.44791	-298.5769	106.0537
U_fund_SYM-_rc@AC [V]	2.182292	0.375316	-1.806976	4.609798
U+ [V]	229.8247	57.49190	-172.3328	68.42454
U- [V]	0.711591	0.292451	-0.419140	2.298098

Injected reactive current at 30ms



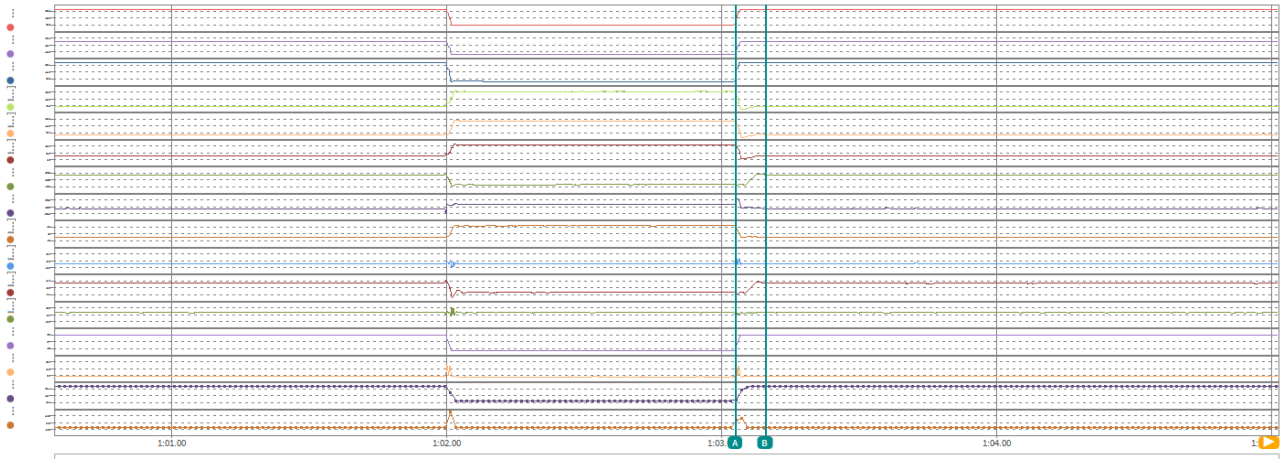
时间 [s]	A 1:02.002137	B 1:02.032864	间隔 0.030727	有效值
U1_tRMS_rc@AC [V]	230.7480	58.61285	-172.1352	142.5150
U2_tRMS_rc@AC [V]	229.5615	58.97620	-170.5853	149.7585
U3_tRMS_rc@AC [V]	229.1151	58.91578	-170.1993	135.2321
I1_tRMS_rc@AC [A]	36.78165	195.9780	159.1964	123.1149
I2_tRMS_rc@AC [A]	36.67010	178.7597	142.0896	100.7621
I3_tRMS_rc@AC [A]	37.29559	204.6048	167.3092	123.2113
P_t_rc@AC [W]	25376.83	-2245.719	-27622.54	13980.41
Q_t_rc@AC [var]	-1932.744	34009.79	35942.53	29346.96
I_fund_Q_SYM+_rc@AC [A]	-0.842478	185.5111	186.3536	89.26548
I_fund_Q_SYM-_rc@AC [A]	0.182677	-16.47814	-16.66081	12.16978
I_fund_P_SYM+_rc@AC [A]	36.81225	-13.06591	-49.87815	27.63570
I_fund_P_SYM-_rc@AC [A]	-0.227279	-9.864663	-9.637384	10.24840
U_fund_SYM+_rc@AC [V]	398.0248	101.8000	-296.2248	227.4547
U_fund_SYM-_rc@AC [V]	2.182292	0.174062	-2.008230	26.29728
U+ [V]	229.8247	159.9896	-69.83512	198.0102
U- [V]	0.711591	16.58486	15.87326	11.73805

Injected reactive current at 60ms



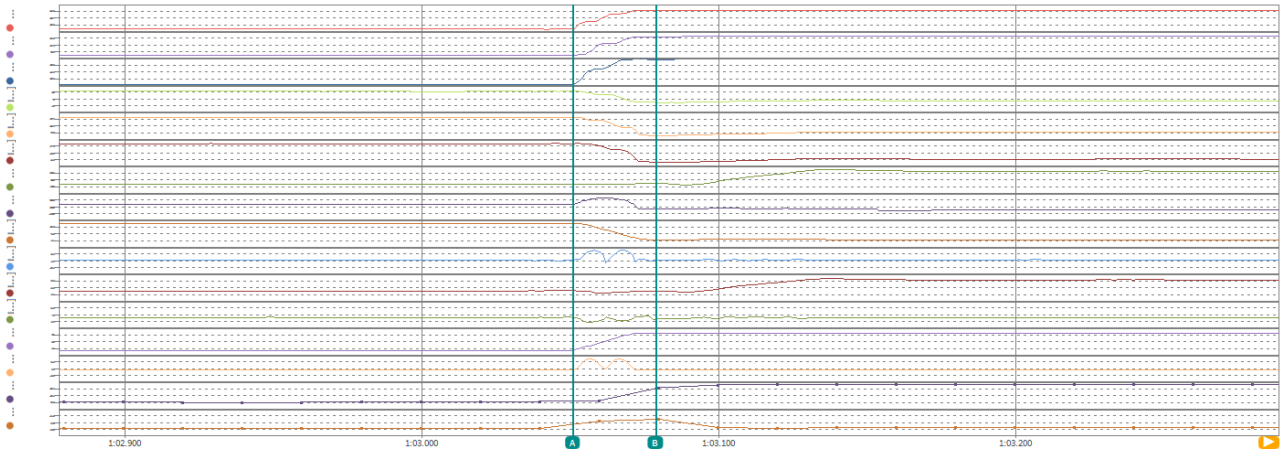
时间 [s]	A 1:02.002137	B 1:02.062633	间隔 0.060496	有效值
U1_tRMS_rc@AC [V]	230.7480	58.40675	-172.3413	110.3000
U2_tRMS_rc@AC [V]	229.5615	58.29544	-171.2660	115.0707
U3_tRMS_rc@AC [V]	229.1151	58.01643	-171.0987	105.3879
I1_tRMS_rc@AC [A]	36.78165	194.3066	157.5249	165.2624
I2_tRMS_rc@AC [A]	36.67010	191.8103	155.1402	157.0813
I3_tRMS_rc@AC [A]	37.29559	199.1458	161.8502	165.2174
P_t_rc@AC [W]	25376.83	-155.3576	-25532.18	10074.77
Q_t_rc@AC [var]	-1932.744	34083.86	36016.60	32397.96
I_fund_Q_SYM+_rc@AC [A]	-0.842478	194.8533	195.6958	152.9527
I_fund_Q_SYM-_rc@AC [A]	0.182677	-1.651319	-1.833996	8.970920
I_fund_P_SYM+_rc@AC [A]	36.81225	-0.893933	-37.70618	20.34807
I_fund_P_SYM-_rc@AC [A]	-0.227279	-1.785135	-1.557856	7.703342
U_fund_SYM+_rc@AC [V]	398.0248	100.8214	-297.2035	178.0791
U_fund_SYM-_rc@AC [V]	2.182292	0.442661	-1.739631	18.89666
U+ [V]	229.8247	58.64726	-171.1775	146.0777
U- [V]	0.711591	0.275339	-0.436253	8.319203

Recover time – Active power



时间 [s]	A 1:03.051887	B 1:03.161324	间隔 0.109437	有效值
U1_tRMS_rc@AC [V]	57.25404	229.9128	172.6588	217.9322
U2_tRMS_rc@AC [V]	57.53668	229.5385	172.0018	216.3478
U3_tRMS_rc@AC [V]	57.60539	229.2757	171.6704	218.8396
I1_tRMS_rc@AC [A]	200.6218	38.00325	-162.6186	68.93397
I2_tRMS_rc@AC [A]	198.2879	37.35651	-160.9313	69.91425
I3_tRMS_rc@AC [A]	199.6900	38.07915	-161.6108	77.34484
P_t_rc@AC [W]	374.8450	25810.46	25435.61	17037.20
Q_t_rc@AC [var]	34396.41	-3471.116	-37867.53	28208.88
I_fund_Q_SYM+_rc@AC [A]	199.3862	-1.428136	-200.8144	58.21868
I_fund_Q_SYM-_rc@AC [A]	-1.573064	0.192645	1.765709	9.077180
I_fund_P_SYM+_rc@AC [A]	2.129927	37.46710	35.33717	24.75679
I_fund_P_SYM-_rc@AC [A]	0.023935	0.139398	0.115463	3.061441
U_fund_SYM+_rc@AC [V]	99.44791	397.6304	298.1825	373.5635
U_fund_SYM-_rc@AC [V]	0.375316	0.815910	0.440594	13.99430
U+ [V]	57.49190	229.7863	172.2944	191.4048
U- [V]	0.292451	0.469648	0.177196	4.761722

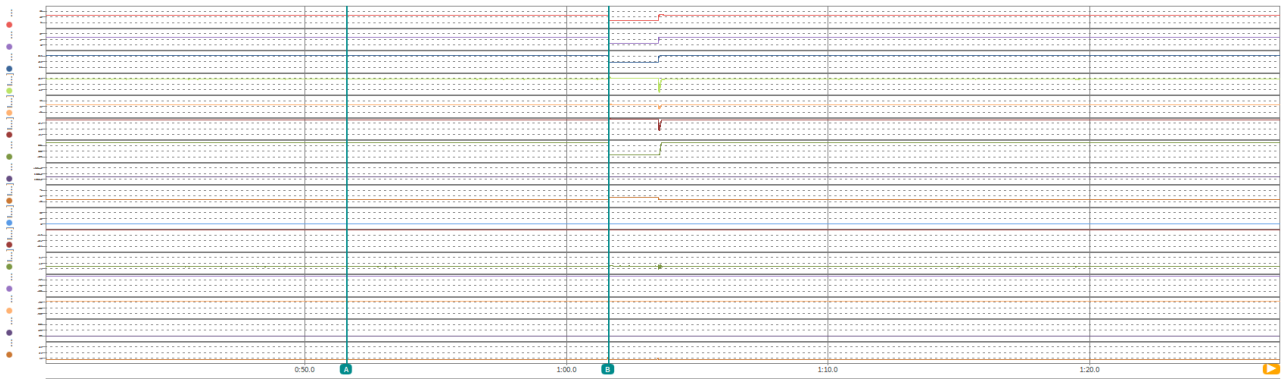
Recover time – Reactive power



时间 [s]	A 1:03.0508867	B 1:03.0787570	间隔 0.0278703	有效值
U1_tRMS_rc@AC [V]	57.43618	226.6580	169.2218	176.8707
U2_tRMS_rc@AC [V]	57.25609	226.6932	169.4371	170.2544
U3_tRMS_rc@AC [V]	57.71284	226.5436	168.8307	183.1394
I1_tRMS_rc@AC [A]	200.1115	7.507278	-192.6043	130.3573
I2_tRMS_rc@AC [A]	199.0271	4.336883	-194.6902	132.2977
I3_tRMS_rc@AC [A]	199.9794	7.571535	-192.4079	147.1555
P_t_rc@AC [W]	345.7962	1082.197	736.4012	725.3830
Q_t_rc@AC [var]	34428.80	4264.848	-30163.95	54496.42
I_fund_Q_SYM+_rc@AC [A]	199.5626	2.321515	-197.2411	119.5870
I_fund_Q_SYM-_rc@AC [A]	-1.442258	0.285132	1.727390	17.68501
I_fund_P_SYM+_rc@AC [A]	1.959911	1.588451	-0.371460	2.992498
I_fund_P_SYM-_rc@AC [A]	0.707879	-3.713559	-4.421438	5.560710
U_fund_SYM+_rc@AC [V]	99.45795	392.5294	293.0715	289.3365
U_fund_SYM-_rc@AC [V]	0.628706	0.329812	-0.298895	27.34569
U+ [V]	57.49190	70.60091	13.10902	64.38093
U- [V]	0.292451	7.909171	7.616719	5.596450

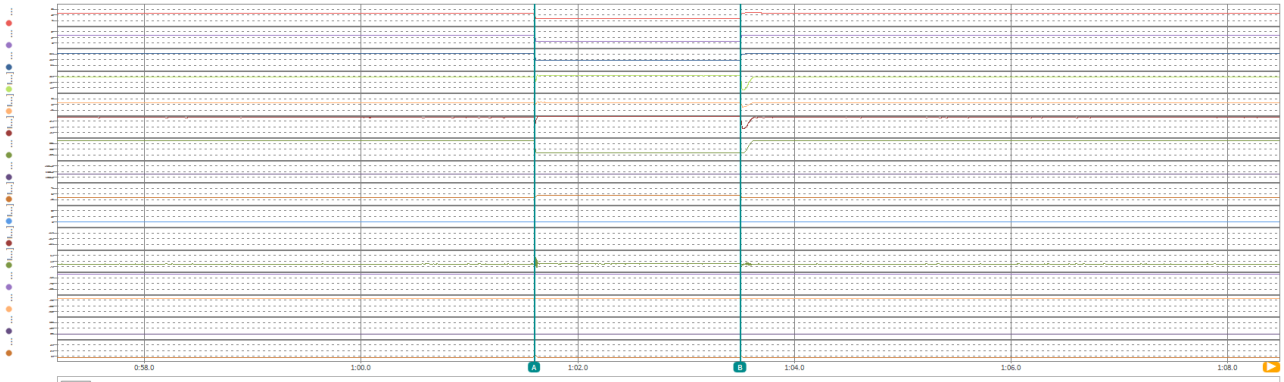
Test – VD3.1

Before fault



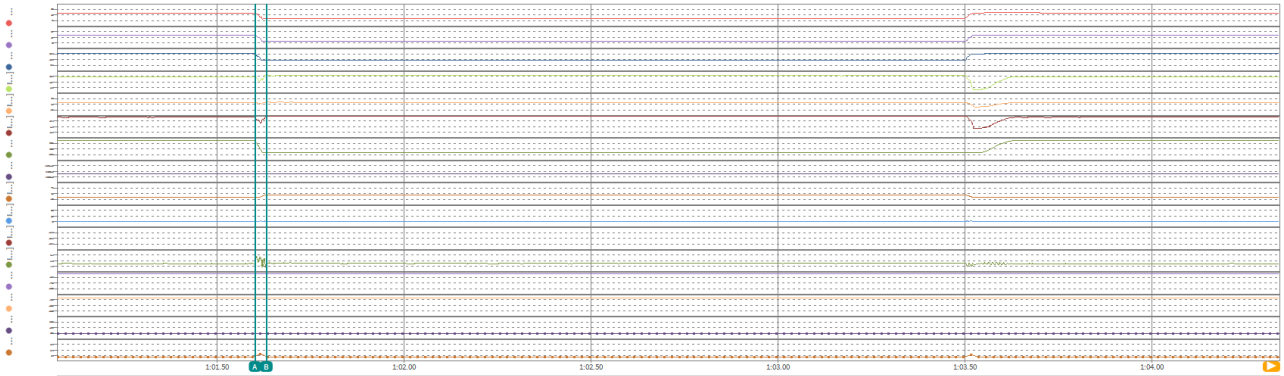
时间 [s]	A 0:51.596656	B 1:01.601808	间隔 0:10.005152	有效值
U1_tRMS_rc@AC [V]	230.4212	230.3987	-0.022537	230.4607
U2_tRMS_rc@AC [V]	229.8089	229.7986	-0.010300	229.8231
U3_tRMS_rc@AC [V]	229.7397	229.7540	0.014359	229.7641
I1_tRMS_rc@AC [A]	180.0781	179.1374	-0.940659	179.6817
I2_tRMS_rc@AC [A]	181.5575	180.2582	-1.299301	181.3243
I3_tRMS_rc@AC [A]	184.2123	183.5707	-0.641617	183.4277
P_t_rc@AC [W]	125513.2	124853.7	-659.4766	125205.6
Q_t_rc@AC [var]	2508.056	2151.081	-356.9756	2307.365
I_fund_Q_SYM+_rc@AC [A]	0.460421	0.204911	-0.255509	0.541813
I_fund_Q_SYM-_rc@AC [A]	0.497619	0.952881	0.455261	0.428052
I_fund_P_SYM+_rc@AC [A]	181.9158	180.9608	-0.955063	181.4475
I_fund_P_SYM-_rc@AC [A]	-1.119504	-0.502770	0.616734	0.870214
U_fund_SYM+_rc@AC [V]	398.3484	398.3361	-0.012390	398.3933
U_fund_SYM-_rc@AC [V]	1.025928	0.898104	-0.127823	1.044822
U+ [V]	230.0332	230.0079	-0.025273	230.0192
U- [V]	0.604254	0.864569	0.260315	0.602856

Duration fault time



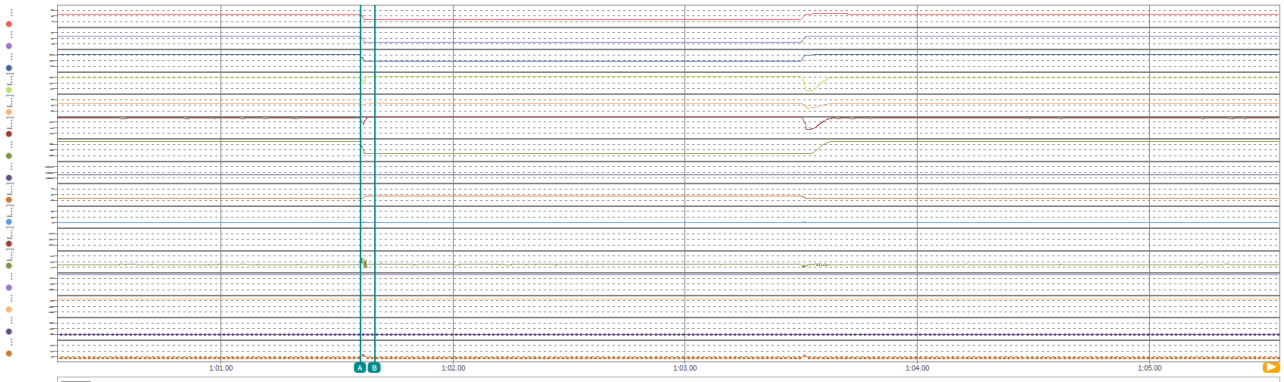
时间 [s]	A 1:01.603713	B 1:03.503113	间隔 1.899400	有效值
U1_tRMS_rc@AC [V]	228.5899	115.4755	-113.1145	116.2359
U2_tRMS_rc@AC [V]	229.3859	114.9452	-114.4407	116.0211
U3_tRMS_rc@AC [V]	229.2884	114.4226	-114.8658	115.2828
I1_tRMS_rc@AC [A]	181.5109	194.5711	13.06024	194.7447
I2_tRMS_rc@AC [A]	180.7244	196.0868	15.36241	195.4442
I3_tRMS_rc@AC [A]	184.1399	197.4588	13.31888	196.9589
P_t_rc@AC [W]	124712.8	940.0427	-123772.7	7755.756
Q_t_rc@AC [var]	10669.49	67594.63	56925.14	67383.09
I_fund_Q_SYM+_rc@AC [A]	0.173079	195.9671	195.7940	195.0171
I_fund_Q_SYM-_rc@AC [A]	-0.671216	-0.783481	-0.112265	1.431164
I_fund_P_SYM+_rc@AC [A]	181.9139	2.711586	-179.2023	11.68355
I_fund_P_SYM-_rc@AC [A]	-0.744633	0.448616	1.193249	2.121447
U_fund_SYM+_rc@AC [V]	396.4808	199.0649	-197.4159	200.4348
U_fund_SYM-_rc@AC [V]	1.226281	1.215551	-0.010730	2.565853
U+ [V]	230.0079	114.9384	-115.0696	117.7071
U- [V]	0.864569	0.461495	-0.403074	1.240497

Injected reactive current at 30ms



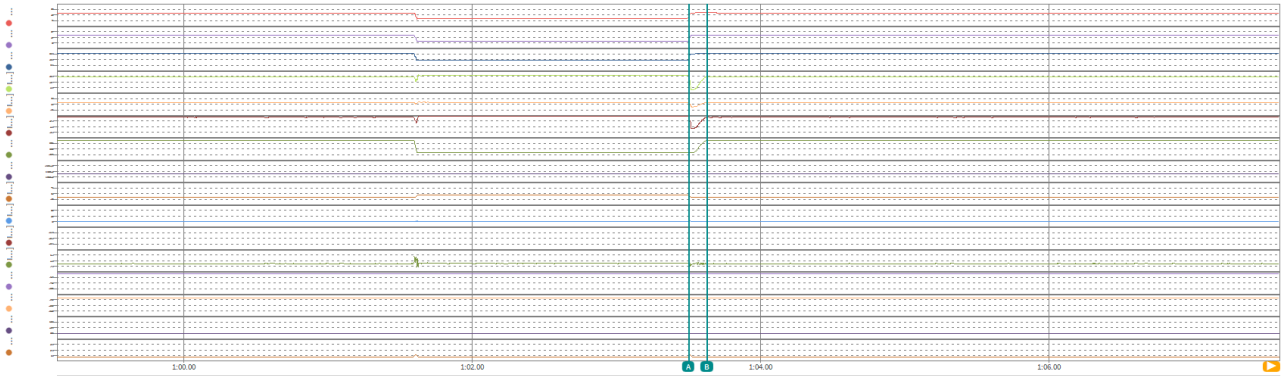
时间 [s]	A 1:01.603290	B 1:01.633491	间隔 0.030201	有效值
U1_tRMS_rc@AC [V]	230.4110	113.8525	-116.5585	164.8929
U2_tRMS_rc@AC [V]	229.8167	113.7965	-116.0202	170.4609
U3_tRMS_rc@AC [V]	229.7535	113.7351	-116.0185	159.6256
I1_tRMS_rc@AC [A]	179.1814	203.1889	24.00757	159.5410
I2_tRMS_rc@AC [A]	180.1725	184.0729	3.900406	156.2189
I3_tRMS_rc@AC [A]	183.5706	193.6442	10.07355	148.7561
P_t_rc@AC [W]	124849.7	-2440.771	-127290.4	64320.67
Q_t_rc@AC [var]	2140.467	66059.48	63919.02	43770.07
I_fund_Q_SYM+_rc@AC [A]	0.165625	187.3359	187.1703	90.49251
I_fund_Q_SYM-_rc@AC [A]	0.808981	8.926680	8.117698	10.34478
I_fund_P_SYM+_rc@AC [A]	180.9471	-7.227889	-188.1749	94.79850
I_fund_P_SYM-_rc@AC [A]	-0.711646	-11.55841	-10.84676	15.89342
U_fund_SYM+_rc@AC [V]	398.3535	197.0302	-201.3233	277.4619
U_fund_SYM-_rc@AC [V]	0.790729	0.644111	-0.146619	18.67457
U+ [V]	230.0079	188.1902	-41.81774	210.1419
U- [V]	0.864569	10.76458	9.900012	7.636219

Injected reactive current at 60ms



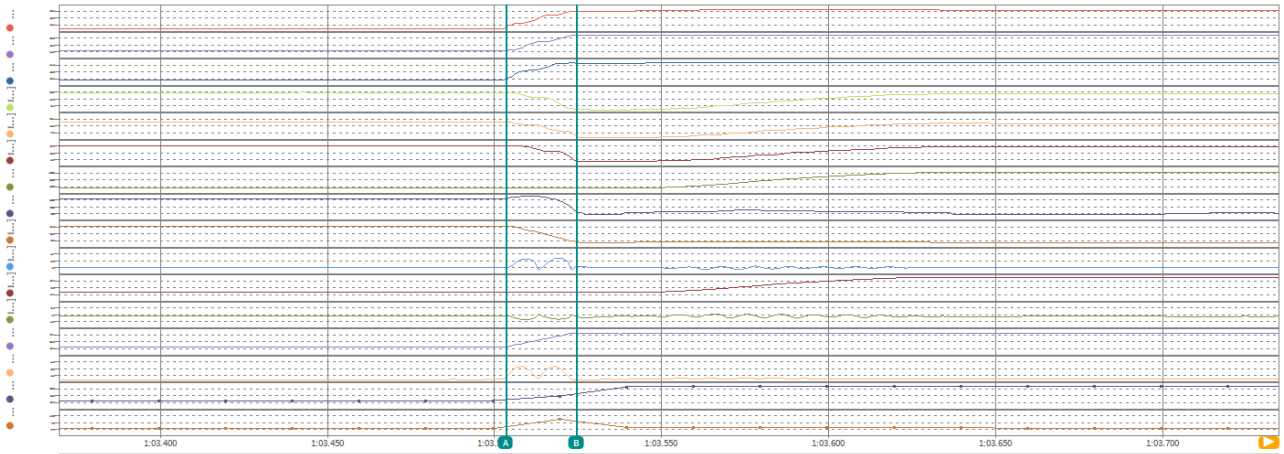
时间 [s]	A 1:01.603290	B 1:01.664146	间隔 0.060856	有效值
U1_tRMS_rc@AC [V]	230.4110	115.9674	-114.4436	142.2242
U2_tRMS_rc@AC [V]	229.8167	115.9305	-113.8862	145.3752
U3_tRMS_rc@AC [V]	229.7535	111.4041	-118.3495	138.2936
I1_tRMS_rc@AC [A]	179.1814	198.7432	19.56181	180.5412
I2_tRMS_rc@AC [A]	180.1725	199.9033	19.73079	179.9205
I3_tRMS_rc@AC [A]	183.5706	202.7452	19.17453	177.4288
P_t_rc@AC [W]	124849.7	-410.3049	-125260.0	45493.11
Q_t_rc@AC [var]	2140.467	68808.03	66667.56	57693.52
I_fund_Q_SYM+_rc@AC [A]	0.165625	200.3073	200.1416	155.2846
I_fund_Q_SYM-_rc@AC [A]	0.808981	-1.398256	-2.207238	7.441987
I_fund_P_SYM+_rc@AC [A]	180.9471	-1.221398	-182.1684	67.09846
I_fund_P_SYM-_rc@AC [A]	-0.711646	0.832641	1.544287	11.36121
U_fund_SYM+_rc@AC [V]	398.3535	198.1758	-200.1777	241.0523
U_fund_SYM-_rc@AC [V]	0.790729	2.995550	2.204820	13.26778
U+ [V]	230.0079	114.4051	-115.6028	169.2560
U- [V]	0.864569	0.980985	0.116416	5.493468

Recover time – Active power



时间 [s]	A 1:03.503478	B 1:03.632649	间隔 0.129171	有效值
U1_tRMS_rc@AC [V]	115.4755	233.9648	118.4893	224.8363
U2_tRMS_rc@AC [V]	114.9452	231.0094	116.0642	221.2365
U3_tRMS_rc@AC [V]	114.4226	231.8558	117.4332	223.5379
I1_tRMS_rc@AC [A]	194.5711	176.9749	-17.59618	110.6274
I2_tRMS_rc@AC [A]	196.0868	181.9194	-14.16747	112.8468
I3_tRMS_rc@AC [A]	197.4588	181.6637	-15.79512	116.1691
P_t_rc@AC [W]	940.0427	125413.0	124473.0	65804.77
Q_t_rc@AC [var]	67594.63	5879.422	-61715.21	30638.80
I_fund_Q_SYM+_rc@AC [A]	195.9671	1.522529	-194.4445	53.35524
I_fund_Q_SYM-_rc@AC [A]	-0.783481	-0.314996	0.468484	8.344793
I_fund_P_SYM+_rc@AC [A]	2.711586	179.9835	177.2719	94.20354
I_fund_P_SYM-_rc@AC [A]	0.448616	-1.456128	-1.904744	3.517251
U_fund_SYM+_rc@AC [V]	199.0649	402.3045	203.2396	385.3104
U_fund_SYM-_rc@AC [V]	1.215551	2.296206	1.080655	8.807961
U+ [V]	114.9384	232.9014	117.9631	207.9387
U- [V]	0.461495	1.531960	1.070465	4.041703

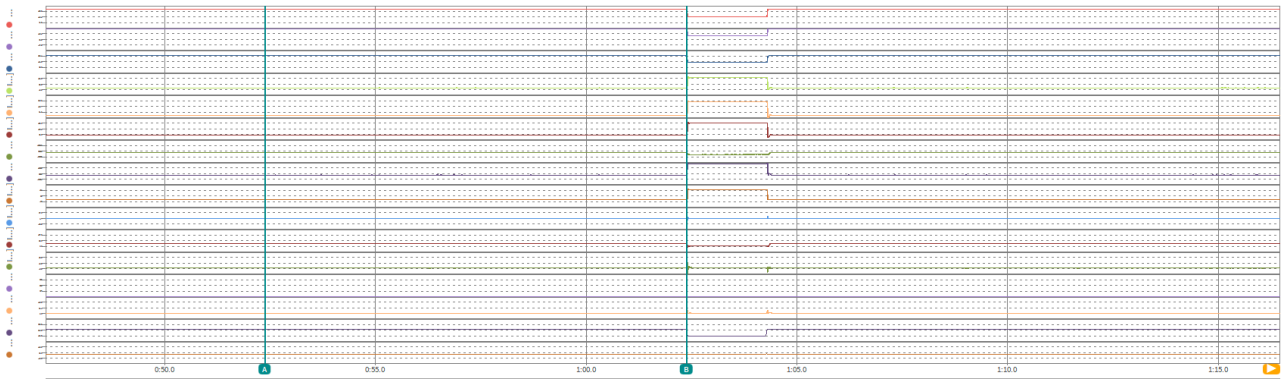
Recover time – Reactive power



时间 [s]	A 1:03.503501	B 1:03.524679	间隔 0.021178	有效值
U1_tRMS_rc@AC [V]	116.2289	226.7891	110.5602	182.8608
U2_tRMS_rc@AC [V]	114.9963	226.7687	111.7724	176.4320
U3_tRMS_rc@AC [V]	114.7003	227.0901	112.3898	189.0551
I1_tRMS_rc@AC [A]	194.4855	14.13848	-180.3470	135.8019
I2_tRMS_rc@AC [A]	196.2631	26.84671	-169.4164	140.9600
I3_tRMS_rc@AC [A]	197.4313	17.95878	-179.4725	153.5964
P_t_rc@AC [W]	893.6309	820.8555	-72.77539	819.2357
Q_t_rc@AC [var]	67813.90	13347.49	-54466.41	69671.58
I_fund_Q_SYM+_rc@AC [A]	195.9791	2.960361	-193.0187	122.6322
I_fund_Q_SYM-_rc@AC [A]	-0.968590	2.458095	3.426685	19.67684
I_fund_P_SYM+_rc@AC [A]	2.617324	1.280641	-1.336682	1.148998
I_fund_P_SYM-_rc@AC [A]	0.421473	0.563301	0.141829	6.386338
U_fund_SYM+_rc@AC [V]	199.6117	392.8932	193.2815	307.2735
U_fund_SYM-_rc@AC [V]	1.792120	0.630219	-1.161900	20.70475
U+ [V]	114.9384	153.3741	38.43571	135.5257
U- [V]	0.461495	10.00734	9.545846	7.083778

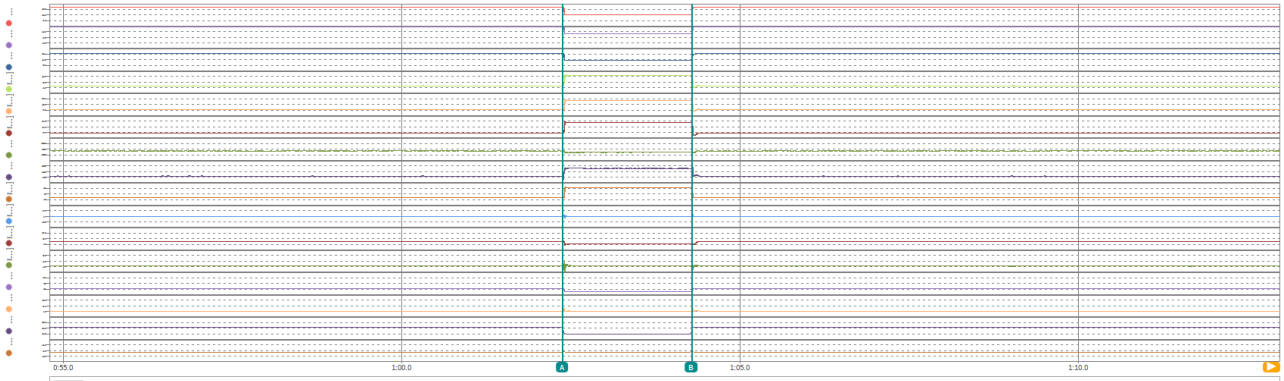
Test – VD3.2.a

Before fault



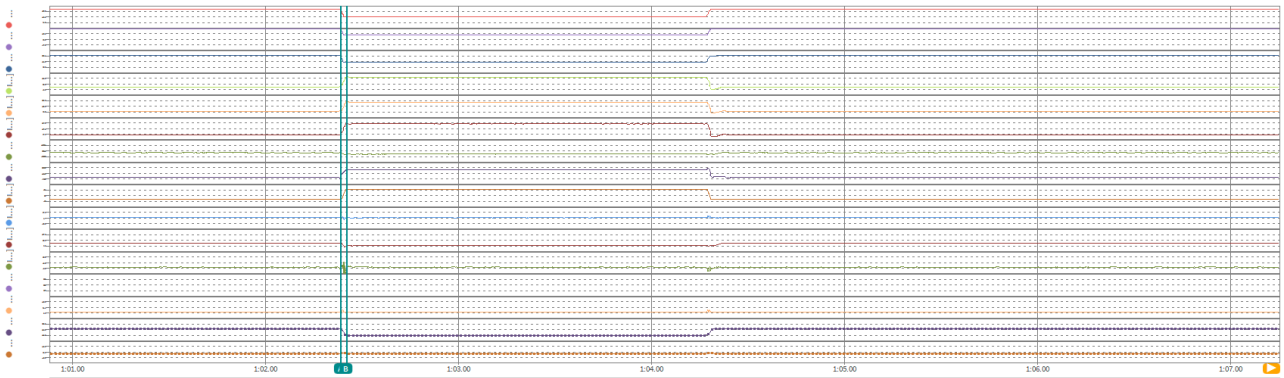
	A	B	间隔	有效值
时间 [s]	0:52.388299	1:02.389273	0:10.000973	
U1_tRMS_rc@AC [V]	230.2022	230.2456	0.043396	230.2207
U2_tRMS_rc@AC [V]	229.7750	229.7006	-0.074448	229.7191
U3_tRMS_rc@AC [V]	229.5110	229.5468	0.035767	229.5744
I1_tRMS_rc@AC [A]	36.57710	36.21568	-0.361420	36.46081
I2_tRMS_rc@AC [A]	36.45037	36.53158	0.081207	36.71668
I3_tRMS_rc@AC [A]	36.39665	36.85209	0.455433	37.30140
P_t_rc@AC [W]	25080.67	25127.87	47.19336	25329.13
Q_t_rc@AC [var]	-1851.865	-1755.378	96.48657	1770.246
I_fund_Q_SYM+_rc@AC [A]	-0.191473	-0.622434	-0.430961	0.678075
I_fund_Q_SYM-_rc@AC [A]	0.123173	-0.064141	-0.187314	0.226831
I_fund_P_SYM+_rc@AC [A]	36.37596	36.44330	0.067337	36.73457
I_fund_P_SYM-_rc@AC [A]	0.070840	0.064162	-6.678e-3	0.269072
U_fund_SYM+_rc@AC [V]	398.0729	398.0747	1.801e-3	398.0878
U_fund_SYM-_rc@AC [V]	0.968740	0.769692	-0.199049	0.992354
U+ [V]	229.8464	229.8055	-0.040936	229.8429
U- [V]	0.554148	0.863548	0.309400	0.572565

Duration fault time



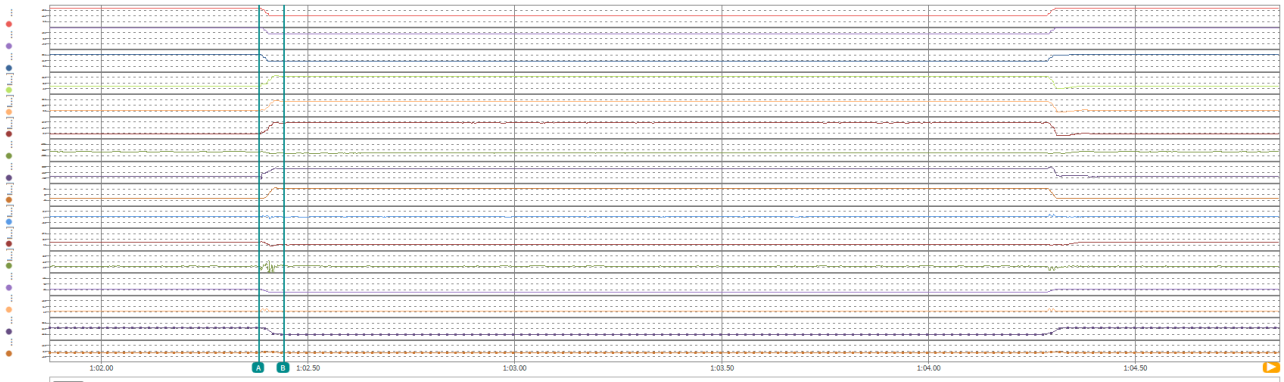
	A	B	间隔	有效值
时间 [s]	1:02.381531	1:04.288554	1.907023	
U1_tRMS_rc@AC [V]	230.1555	115.5552	-114.6003	116.9430
U2_tRMS_rc@AC [V]	229.2446	114.8975	-114.3471	116.7255
U3_tRMS_rc@AC [V]	230.0808	114.5376	-115.5431	116.0676
I1_tRMS_rc@AC [A]	36.29324	198.1042	161.8109	197.0887
I2_tRMS_rc@AC [A]	36.45298	198.3954	161.9424	197.3548
I3_tRMS_rc@AC [A]	36.86589	202.1025	165.2366	199.9508
P_t_rc@AC [W]	25134.10	1119.248	-24014.85	2751.010
Q_t_rc@AC [var]	-1705.131	68826.34	70531.47	68364.56
I_fund_Q_SYM+_rc@AC [A]	-0.482601	199.4315	199.9142	197.7931
I_fund_Q_SYM-_rc@AC [A]	-0.101921	-0.732592	-0.630671	1.546117
I_fund_P_SYM+_rc@AC [A]	36.45499	3.221357	-33.23363	5.324465
I_fund_P_SYM-_rc@AC [A]	0.014011	-0.533917	-0.547927	1.340229
U_fund_SYM+_rc@AC [V]	398.0618	199.1476	-198.9142	201.7216
U_fund_SYM-_rc@AC [V]	1.199076	1.230559	0.031483	2.482240
U+ [V]	229.8055	114.9892	-114.8163	118.2721
U- [V]	0.863548	0.450393	-0.413154	1.015634

Injected reactive current at 30ms



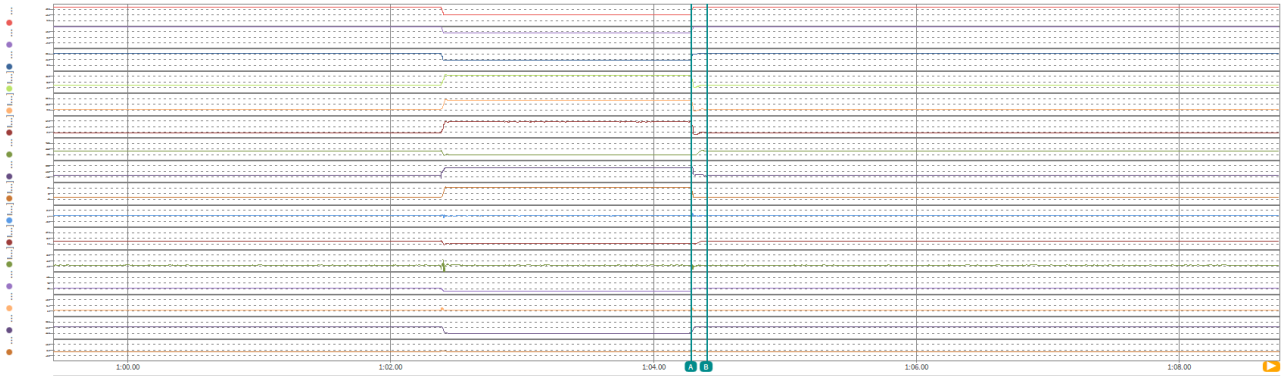
时间 [s]	A 1:02.389088	B 1:02.419864	间隔 0.030776	有效值
U1_tRMS_rc@AC [V]	230.2456	116.2197	-114.0259	162.4660
U2_tRMS_rc@AC [V]	229.7006	116.1027	-113.5979	167.8646
U3_tRMS_rc@AC [V]	229.5468	115.8823	-113.6645	157.2143
I1_tRMS_rc@AC [A]	36.21568	195.7829	159.5672	124.6798
I2_tRMS_rc@AC [A]	36.53158	185.3836	148.8520	105.0498
I3_tRMS_rc@AC [A]	36.85209	205.4654	168.6133	124.1728
P_t_rc@AC [W]	25127.87	-4316.516	-29444.38	15224.71
Q_t_rc@AC [var]	-1755.378	67950.18	69705.56	43463.68
I_fund_Q_SYM+_rc@AC [A]	-0.622434	190.6205	191.2429	95.23169
I_fund_Q_SYM-_rc@AC [A]	-0.064141	-3.726008	-3.661868	11.21600
I_fund_P_SYM+_rc@AC [A]	36.44330	-12.45602	-48.89932	26.97277
I_fund_P_SYM-_rc@AC [A]	0.064162	-15.08488	-15.14904	9.614662
U_fund_SYM+_rc@AC [V]	398.0747	200.9948	-197.0799	274.1052
U_fund_SYM-_rc@AC [V]	0.769692	0.987014	0.217322	17.93717
U+ [V]	229.8055	211.3513	-18.45421	220.7713
U- [V]	0.863548	6.344619	5.481071	4.527687

Injected reactive current at 60ms



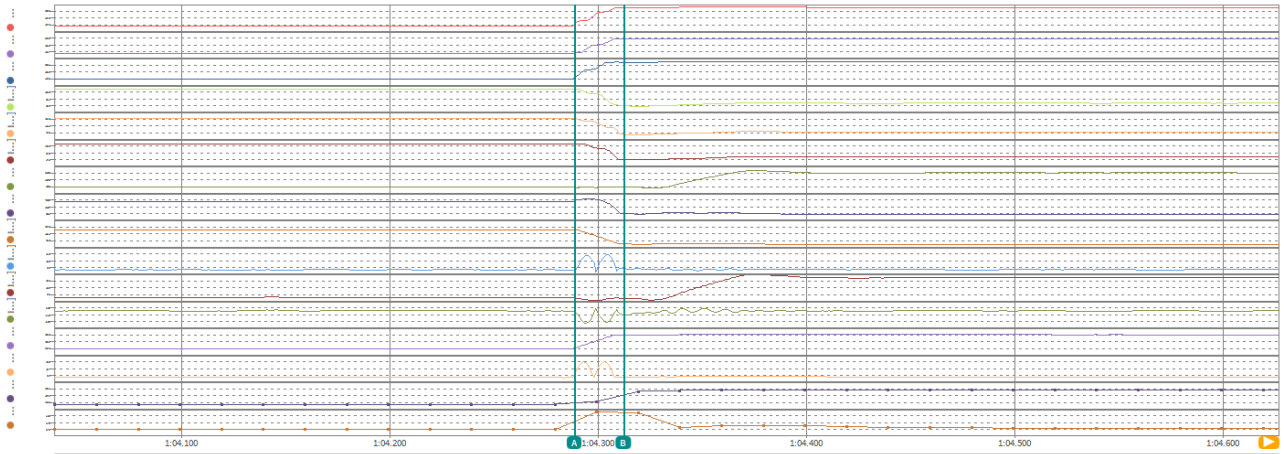
时间 [s]	A 1:02.381531	B 1:02.442073	间隔 0.060541	有效值
U1_tRMS_rc@AC [V]	230.1555	115.6452	-114.5103	157.5303
U2_tRMS_rc@AC [V]	229.2446	115.5474	-113.6971	160.2657
U3_tRMS_rc@AC [V]	230.0808	113.5790	-116.5018	154.3315
I1_tRMS_rc@AC [A]	36.29324	194.3133	158.0200	152.1525
I2_tRMS_rc@AC [A]	36.45298	197.4784	161.0254	144.3228
I3_tRMS_rc@AC [A]	36.86589	198.9514	162.0855	151.7581
P_t_rc@AC [W]	25134.10	1610.650	-23523.45	13993.50
Q_t_rc@AC [var]	-1705.131	67867.12	69572.25	52770.53
I_fund_Q_SYM+_rc@AC [A]	-0.482601	196.5167	196.9993	139.5643
I_fund_Q_SYM-_rc@AC [A]	-0.101921	-0.669513	-0.567592	8.206786
I_fund_P_SYM+_rc@AC [A]	36.45499	4.632656	-31.82233	23.40839
I_fund_P_SYM-_rc@AC [A]	0.014011	1.897153	1.883142	7.236862
U_fund_SYM+_rc@AC [V]	398.0618	199.0175	-199.0443	268.5741
U_fund_SYM-_rc@AC [V]	1.199076	1.413191	0.214114	13.01202
U+ [V]	229.8055	115.9951	-113.8104	178.0270
U- [V]	0.863548	0.602441	-0.261107	4.340994

Recover time – Active power



时间 [s]	A 1:04.289083	B 1:04.405380	间隔 0.116297	有效值
U1_tRMS_rc@AC [V]	115.5552	232.3743	116.8191	223.2530
U2_tRMS_rc@AC [V]	114.8975	229.2672	114.3697	219.7031
U3_tRMS_rc@AC [V]	114.5376	230.2770	115.7394	222.2333
I1_tRMS_rc@AC [A]	198.1042	36.01628	-162.0879	66.24932
I2_tRMS_rc@AC [A]	198.3954	36.37436	-162.0210	68.43936
I3_tRMS_rc@AC [A]	202.1025	37.17694	-164.9256	74.57248
P_t_rc@AC [W]	1119.248	25000.04	23880.80	17668.85
Q_t_rc@AC [var]	68826.34	-3681.760	-72508.10	31537.10
I_fund_Q_SYM+_rc@AC [A]	199.4315	-1.650144	-201.0817	55.95071
I_fund_Q_SYM-_rc@AC [A]	-0.732592	0.359069	1.091661	8.648694
I_fund_P_SYM+_rc@AC [A]	3.221357	36.13940	32.91804	25.45169
I_fund_P_SYM-_rc@AC [A]	-0.533917	-0.314182	0.219734	3.328446
U_fund_SYM+_rc@AC [V]	199.1476	399.4741	200.3265	382.6037
U_fund_SYM-_rc@AC [V]	1.230559	2.246062	1.015502	9.233331
U+ [V]	114.9892	231.2179	116.2287	203.5452
U- [V]	0.450393	1.501207	1.050814	3.352884

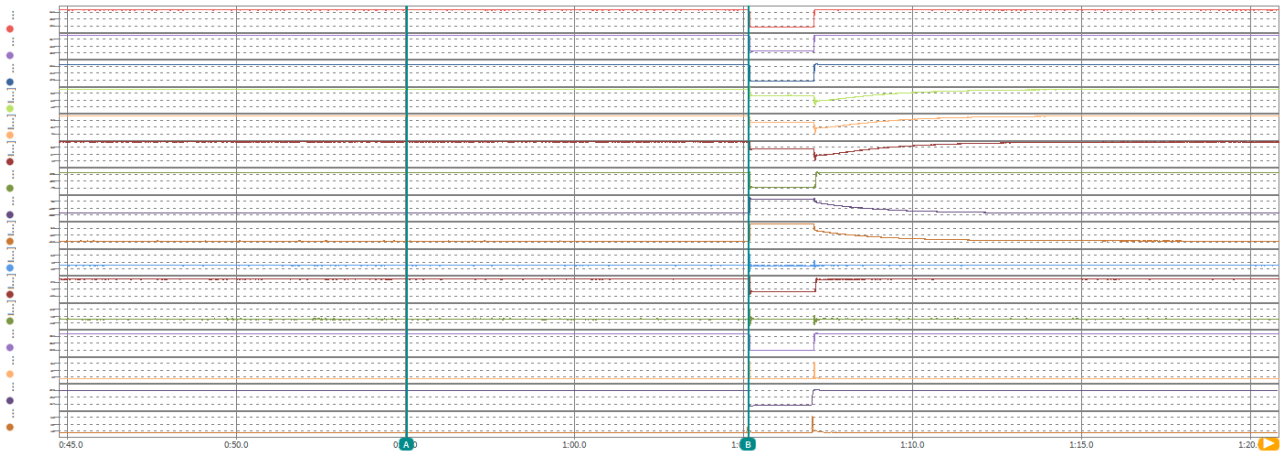
Recover time – Reactive power



时间 [s]	A 1:04.288778	B 1:04.312400	间隔 0.023622	有效值
U1_tRMS_rc@AC [V]	115.5552	226.9760	111.4208	187.1278
U2_tRMS_rc@AC [V]	114.8975	226.8611	111.9636	181.7334
U3_tRMS_rc@AC [V]	114.5376	226.7321	112.1945	192.5014
I1_tRMS_rc@AC [A]	198.1042	7.367111	-190.7370	131.7254
I2_tRMS_rc@AC [A]	198.3954	6.283357	-192.1120	136.7577
I3_tRMS_rc@AC [A]	202.1025	9.579053	-192.5235	150.3740
P_t_rc@AC [W]	1119.248	1492.044	372.7961	991.6319
Q_t_rc@AC [var]	68826.34	5053.838	-63772.50	67385.74
I_fund_Q_SYM+_rc@AC [A]	199.4315	2.920520	-196.5110	120.8715
I_fund_Q_SYM-_rc@AC [A]	-0.732592	2.570507	3.303099	18.60533
I_fund_P_SYM+_rc@AC [A]	3.221357	2.203171	-1.018186	1.466832
I_fund_P_SYM-_rc@AC [A]	-0.533917	-3.902450	-3.368534	6.707361
U_fund_SYM+_rc@AC [V]	199.1476	392.9198	193.7722	316.1288
U_fund_SYM-_rc@AC [V]	1.230559	0.768147	-0.462412	19.36932
U+ [V]	114.9892	132.5786	17.58936	124.0959
U- [V]	0.450393	6.069745	5.619352	4.303758

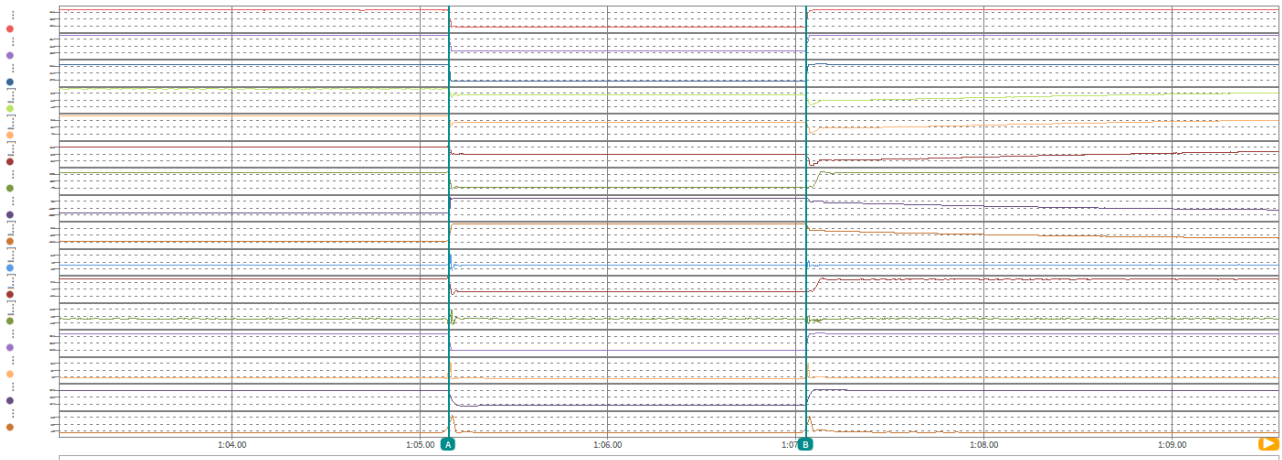
Test – VD3.2.b

Before fault



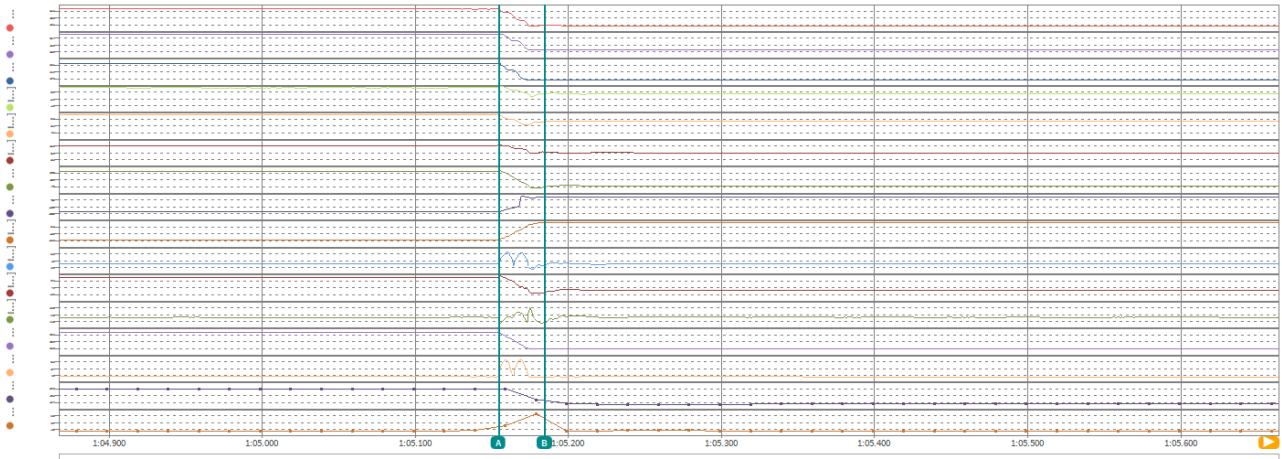
时间 [s]	A 0:55.06268	B 1:05.15419	间隔 0:10.09151	有效值
U1_tRMS_rc@AC [V]	230.1149	230.1364	0.021423	230.1386
U2_tRMS_rc@AC [V]	229.6560	229.6656	9.674e-3	229.6241
U3_tRMS_rc@AC [V]	229.5554	229.5595	4.074e-3	229.5667
I1_tRMS_rc@AC [A]	124.0194	124.7480	0.728600	124.5986
I2_tRMS_rc@AC [A]	124.8414	125.3335	0.492081	125.1648
I3_tRMS_rc@AC [A]	126.8999	126.8432	-0.056702	126.4465
P_t_rc@AC [W]	26134.36	26058.79	-75.57813	26200.22
Q_t_rc@AC [var]	-82289.51	-82598.80	-309.2891	82377.26
I_fund_Q_SYM+_rc@AC [A]	-119.3422	-119.7687	-0.426559	119.4630
I_fund_Q_SYM-_rc@AC [A]	0.661117	0.153665	-0.507452	0.378836
I_fund_P_SYM+_rc@AC [A]	37.91274	37.80136	-0.111378	38.00822
I_fund_P_SYM-_rc@AC [A]	-0.023465	-0.180307	-0.156841	0.220197
U_fund_SYM+_rc@AC [V]	397.9790	397.9957	0.016693	397.9807
U_fund_SYM-_rc@AC [V]	0.913990	0.505412	-0.408579	0.929191
U+ [V]	229.7441	229.7813	0.037235	229.7809
U- [V]	0.552437	0.699509	0.147071	0.535795

Duration fault time



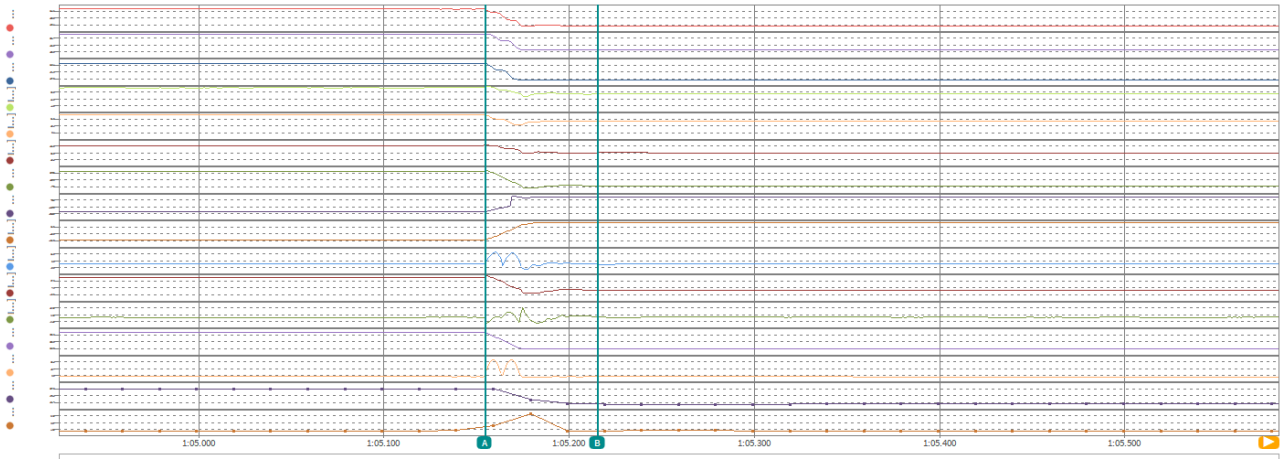
时间 [s]	A 1:05.15467	B 1:07.05413	间隔 1.89945	有效值
U1_tRMS_rc@AC [V]	230.1364	115.3960	-114.7404	116.1831
U2_tRMS_rc@AC [V]	229.6656	114.8890	-114.7766	115.9958
U3_tRMS_rc@AC [V]	229.5595	114.3290	-115.2305	115.3996
I1_tRMS_rc@AC [A]	124.7480	78.22093	-46.52703	78.69468
I2_tRMS_rc@AC [A]	125.3335	78.07500	-47.25849	78.33881
I3_tRMS_rc@AC [A]	126.8432	79.40857	-47.43465	79.58819
P_t_rc@AC [W]	26058.79	-181.9005	-26240.69	1905.561
Q_t_rc@AC [var]	-82598.80	27074.43	109673.2	27600.56
I_fund_Q_SYM+_rc@AC [A]	-119.7687	78.51700	198.2857	78.36083
I_fund_Q_SYM-_rc@AC [A]	0.153665	-0.486191	-0.639856	2.081505
I_fund_P_SYM+_rc@AC [A]	37.80136	-0.529123	-38.33049	3.121608
I_fund_P_SYM-_rc@AC [A]	-0.180307	-0.146885	0.033421	0.638083
U_fund_SYM+_rc@AC [V]	397.9957	198.9451	-199.0506	200.4898
U_fund_SYM-_rc@AC [V]	0.505412	1.201526	0.696114	2.458847
U+ [V]	229.7813	114.8892	-114.8921	118.7004
U- [V]	0.699509	0.412416	-0.287092	1.088929

Injected reactive current at 30ms



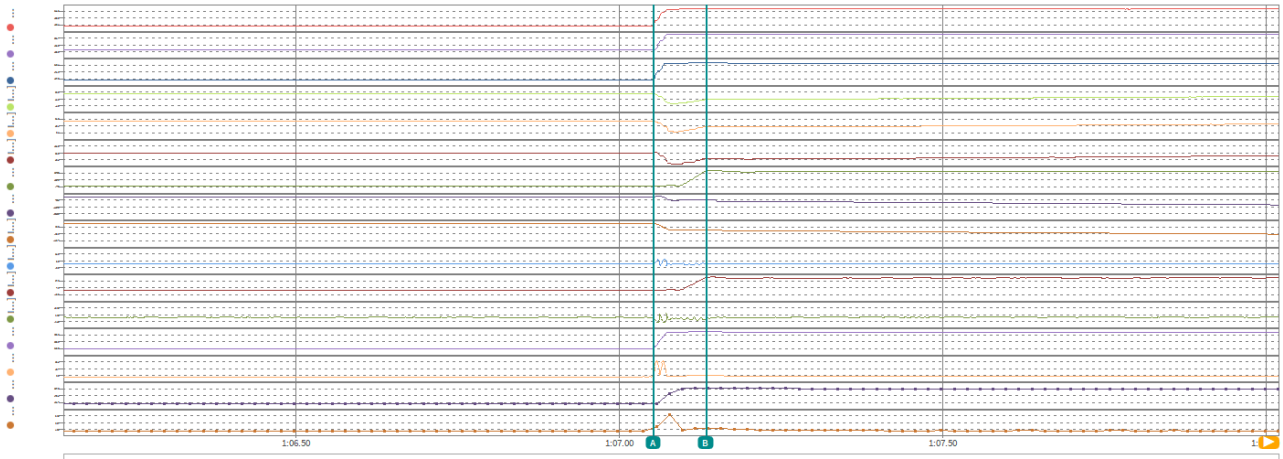
	A	B	间隔	有效值
时间 [s]	1:05.15467	1:05.18498	0.03030	
U1_tRMS_rc@AC [V]	230.1364	115.9119	-114.2244	166.4421
U2_tRMS_rc@AC [V]	229.6656	116.0277	-113.6380	171.5929
U3_tRMS_rc@AC [V]	229.5595	115.9875	-113.5719	160.8407
I1_tRMS_rc@AC [A]	124.7480	78.21854	-46.52943	100.1561
I2_tRMS_rc@AC [A]	125.3335	73.24300	-52.09049	83.28365
I3_tRMS_rc@AC [A]	126.8432	86.06063	-40.78259	105.6031
P_t_rc@AC [W]	26058.79	-3483.646	-29542.43	14798.54
Q_t_rc@AC [var]	-82598.80	27325.47	109924.3	50533.58
I_fund_Q_SYM+_rc@AC [A]	-119.7687	77.32803	197.0967	71.11486
I_fund_Q_SYM-_rc@AC [A]	0.153665	-4.779990	-4.933655	15.98977
I_fund_P_SYM+_rc@AC [A]	37.80136	-10.03734	-47.83870	23.79731
I_fund_P_SYM-_rc@AC [A]	-0.180307	-6.567140	-6.386833	4.332394
U_fund_SYM+_rc@AC [V]	397.9957	200.8635	-197.1321	280.6326
U_fund_SYM-_rc@AC [V]	0.505412	0.381282	-0.124129	18.32246
U+ [V]	229.7813	148.6344	-81.14691	205.1243
U- [V]	0.699509	9.228378	8.528870	5.656650

Injected reactive current at 60ms



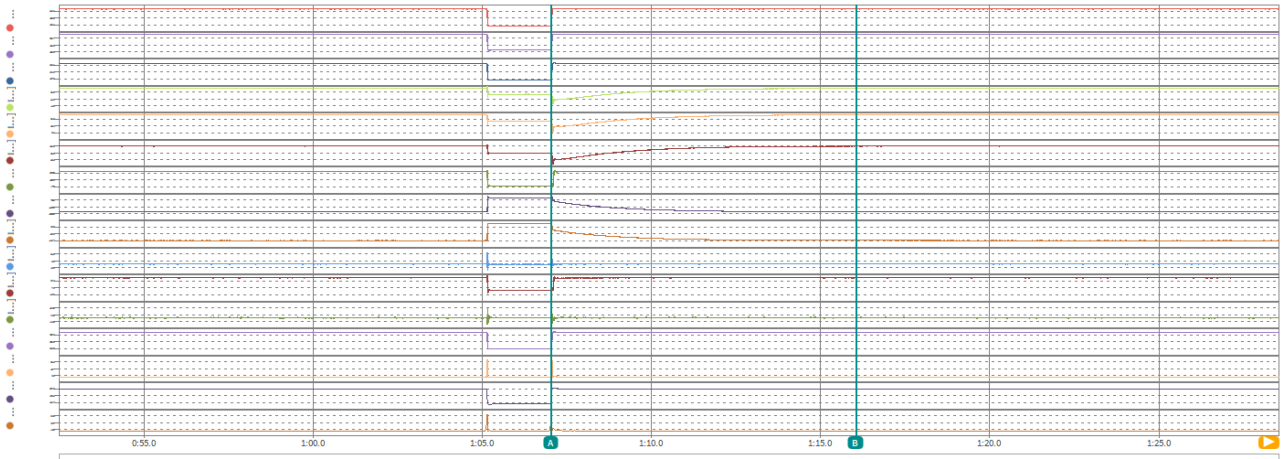
	A	B	间隔	有效值
时间 [s]	1:05.15467	1:05.21554	0.06087	
U1_tRMS_rc@AC [V]	230.1364	114.1451	-115.9913	143.1714
U2_tRMS_rc@AC [V]	229.6656	114.1756	-115.4901	146.0297
U3_tRMS_rc@AC [V]	229.5595	112.5686	-116.9909	139.6269
I1_tRMS_rc@AC [A]	124.7480	76.55303	-48.19493	90.38968
I2_tRMS_rc@AC [A]	125.3335	77.06768	-48.26582	80.82081
I3_tRMS_rc@AC [A]	126.8432	79.46777	-47.37544	93.40856
P_t_rc@AC [W]	26058.79	-465.3617	-26524.15	10488.05
Q_t_rc@AC [var]	-82598.80	26478.88	109077.7	40590.65
I_fund_Q_SYM+_rc@AC [A]	-119.7687	77.51060	197.2793	74.90450
I_fund_Q_SYM-_rc@AC [A]	0.153665	-1.232518	-1.386183	11.35719
I_fund_P_SYM+_rc@AC [A]	37.80136	-1.370978	-39.17234	16.95005
I_fund_P_SYM-_rc@AC [A]	-0.180307	0.290410	0.470716	3.413910
U_fund_SYM+_rc@AC [V]	397.9957	196.7989	-201.1968	243.2764
U_fund_SYM-_rc@AC [V]	0.505412	1.338514	0.833102	12.97130
U+ [V]	229.7813	115.8636	-113.9177	186.8504
U- [V]	0.699509	0.349791	-0.349717	4.901923

Recover time – Active power



时间 [s]	A 1:07.05346	B 1:07.13463	间隔 0.08117	有效值
U1_tRMS_rc@AC [V]	115.2598	235.2486	119.9888	218.0510
U2_tRMS_rc@AC [V]	115.0381	229.8827	114.8445	214.1191
U3_tRMS_rc@AC [V]	114.3117	232.3165	118.0048	217.6635
I1_tRMS_rc@AC [A]	78.33597	35.55449	-42.78148	35.14430
I2_tRMS_rc@AC [A]	77.97626	38.96172	-39.01455	36.94095
I3_tRMS_rc@AC [A]	79.29068	38.72230	-40.56838	39.36760
P_t_rc@AC [W]	-178.9863	25627.18	25806.16	9982.755
Q_t_rc@AC [var]	27062.49	5984.233	-21078.26	16745.67
I_fund_Q_SYM+_rc@AC [A]	78.48232	3.788169	-74.69415	30.26466
I_fund_Q_SYM-_rc@AC [A]	-0.441108	-0.829870	-0.388762	3.819306
I_fund_P_SYM+_rc@AC [A]	-0.520019	36.74897	37.26899	14.33997
I_fund_P_SYM-_rc@AC [A]	-0.136380	-2.142501	-2.006121	2.428673
U_fund_SYM+_rc@AC [V]	198.9418	402.6655	203.7236	373.0667
U_fund_SYM-_rc@AC [V]	1.087263	3.269425	2.182163	10.86352
U+ [V]	114.8892	231.2639	116.3747	184.7414
U- [V]	0.412416	1.616150	1.203734	4.239779

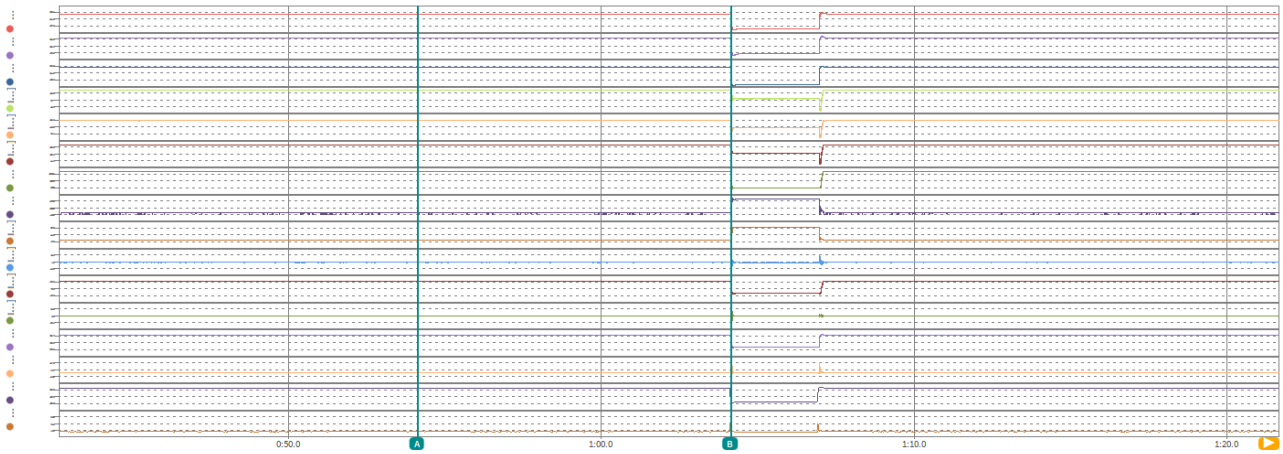
Recover time – Reactive power



时间 [s]	A 1:07.05346	B 1:16.05454	间隔 9.00108	有效值
U1_tRMS_rc@AC [V]	115.2598	230.2826	115.0228	230.0917
U2_tRMS_rc@AC [V]	115.0381	229.6410	114.6029	229.5066
U3_tRMS_rc@AC [V]	114.3117	229.5856	115.2739	229.4890
I1_tRMS_rc@AC [A]	78.33597	123.1484	44.81244	104.9884
I2_tRMS_rc@AC [A]	77.97626	124.0801	46.10386	105.3124
I3_tRMS_rc@AC [A]	79.29068	125.8431	46.55238	106.5010
P_t_rc@AC [W]	-178.9863	26202.34	26381.33	26073.59
Q_t_rc@AC [var]	27062.49	-81642.94	-108705.4	67948.82
I_fund_Q_SYM+_rc@AC [A]	78.48232	-118.3572	-196.8395	98.52441
I_fund_Q_SYM-_rc@AC [A]	-0.441108	0.502706	0.943814	0.533483
I_fund_P_SYM+_rc@AC [A]	-0.520019	37.99982	38.51984	37.81712
I_fund_P_SYM-_rc@AC [A]	-0.136380	0.102960	0.239340	0.322464
U_fund_SYM+_rc@AC [V]	198.9418	398.0844	199.1425	397.8226
U_fund_SYM-_rc@AC [V]	1.087263	0.990052	-0.097210	1.430486
U+ [V]	114.8892	229.7575	114.8683	229.3700
U- [V]	0.412416	0.537508	0.125091	0.726199

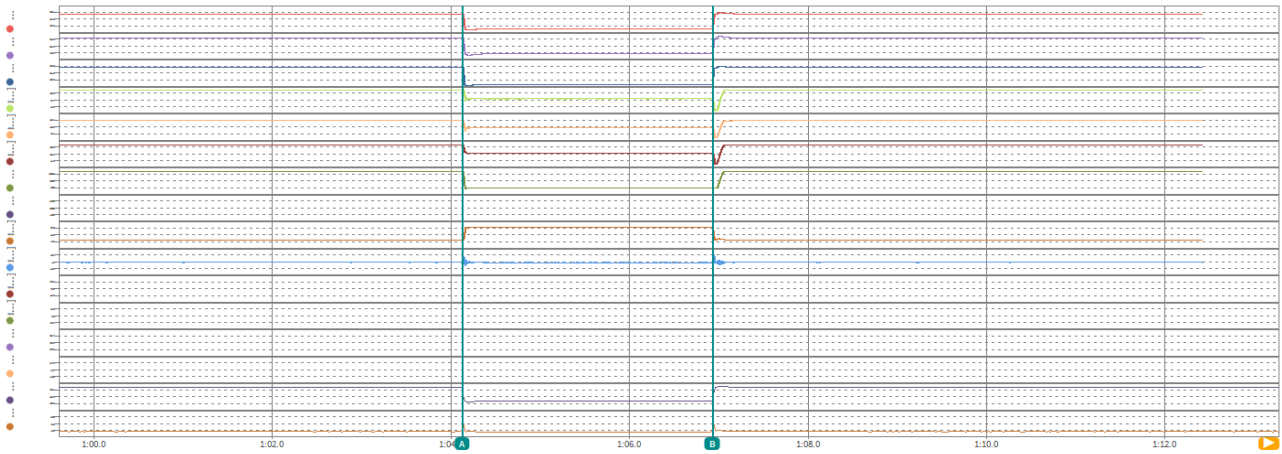
Test – VD4.1

Before fault



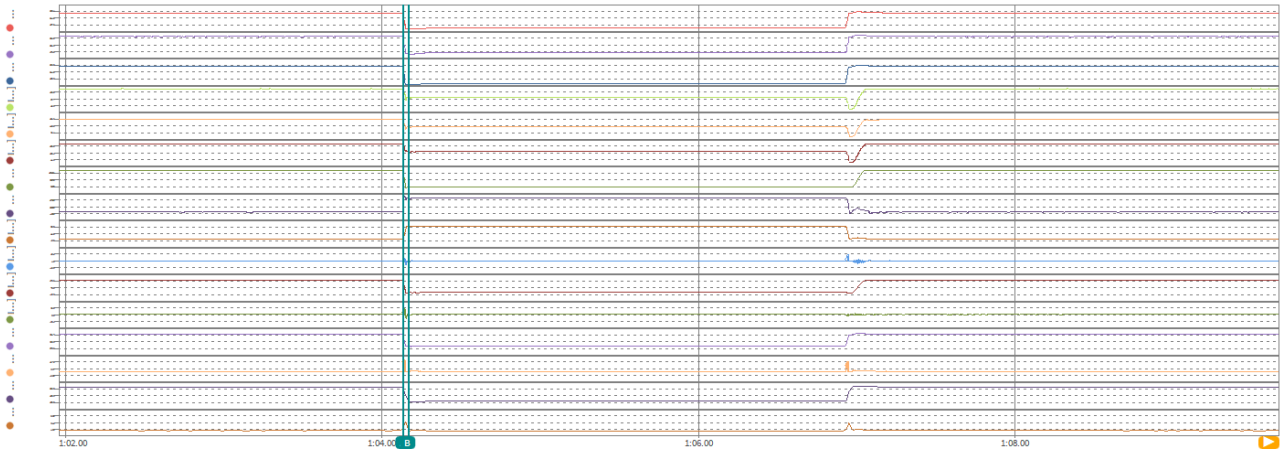
时间 [s]	A 0:54.13020	B 1:04.13712	间隔 0:10.00691	有效值
U1_tRMS_rc@AC [V]	230.4190	230.3262	-0.092773	230.4537
U2_tRMS_rc@AC [V]	229.8176	229.7562	-0.061386	229.8185
U3_tRMS_rc@AC [V]	229.7854	229.7466	-0.038788	229.7672
I1_tRMS_rc@AC [A]	179.6683	179.7445	0.076218	179.7770
I2_tRMS_rc@AC [A]	180.4307	181.3448	0.914154	181.3520
I3_tRMS_rc@AC [A]	183.7113	183.1542	-0.557053	183.5479
P_t_rc@AC [W]	125059.4	125122.7	63.33594	125261.8
Q_t_rc@AC [var]	2233.082	2311.019	77.93677	2219.710
I_fund_Q_SYM+_rc@AC [A]	0.648368	0.453898	-0.194470	0.491544
I_fund_Q_SYM-_rc@AC [A]	0.569331	-0.267101	-0.836432	0.368648
I_fund_P_SYM+_rc@AC [A]	181.2397	181.3867	0.146973	181.5310
I_fund_P_SYM-_rc@AC [A]	-0.768094	-0.838212	-0.070117	0.824572
U_fund_SYM+_rc@AC [V]	398.3777	398.2629	-0.114838	398.3884
U_fund_SYM-_rc@AC [V]	0.993425	0.652968	-0.340457	1.040881
U+ [V]	230.0157	230.0193	3.626e-3	230.0164
U- [V]	0.612930	0.587913	-0.025017	0.600800

Duration fault time



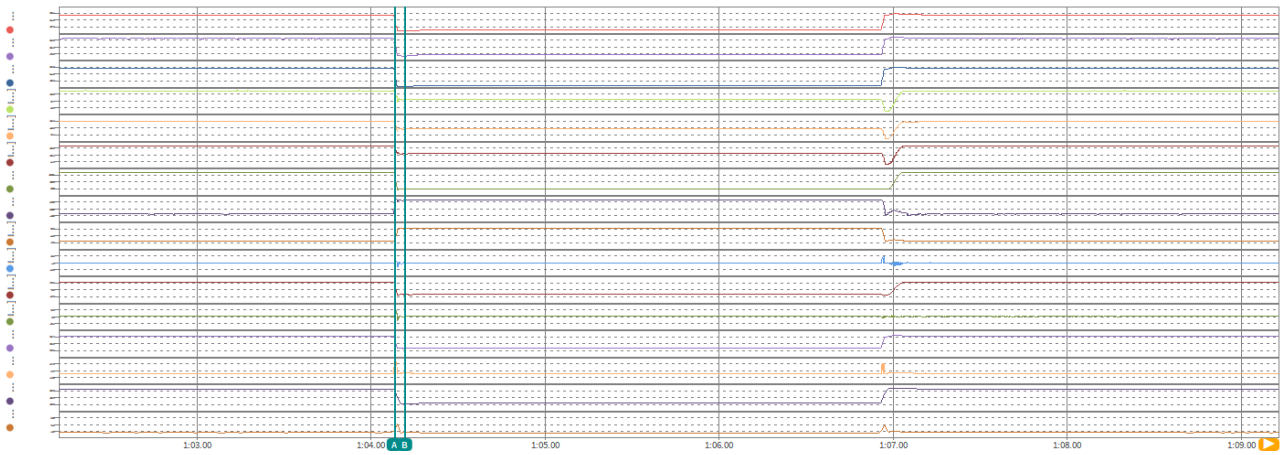
时间 [s]	A 1:04.13715	B 1:06.93528	间隔 2.79813	有效值
U1_tRMS_rc@AC [V]	230.3262	172.6734	-57.65280	172.7889
U2_tRMS_rc@AC [V]	229.7562	172.1980	-57.55823	172.2904
U3_tRMS_rc@AC [V]	229.7466	171.9686	-57.77808	172.1162
I1_tRMS_rc@AC [A]	179.7445	105.7190	-74.02543	106.3445
I2_tRMS_rc@AC [A]	181.3448	106.1799	-75.16494	106.6974
I3_tRMS_rc@AC [A]	183.1542	107.6059	-75.54832	108.0563
P_t_rc@AC [W]	125122.7	2142.424	-122980.3	7159.403
Q_t_rc@AC [var]	2311.019	55001.95	52690.93	54997.38
I_fund_Q_SYM+_rc@AC [A]	0.453898	106.3761	105.9222	106.1342
I_fund_Q_SYM-_rc@AC [A]	-0.267101	-0.211347	0.055754	0.740401
I_fund_P_SYM+_rc@AC [A]	181.3867	4.139844	-177.2468	10.92249
I_fund_P_SYM-_rc@AC [A]	-0.838212	-0.169199	0.669012	1.755506
U_fund_SYM+_rc@AC [V]	398.2629	298.3850	-99.87784	298.5683
U_fund_SYM-_rc@AC [V]	0.652968	0.845613	0.192645	1.385841
U+ [V]	230.0193	172.3228	-57.69652	173.2353
U- [V]	0.587913	0.541586	-0.046327	0.717503

Injected reactive current at 30ms



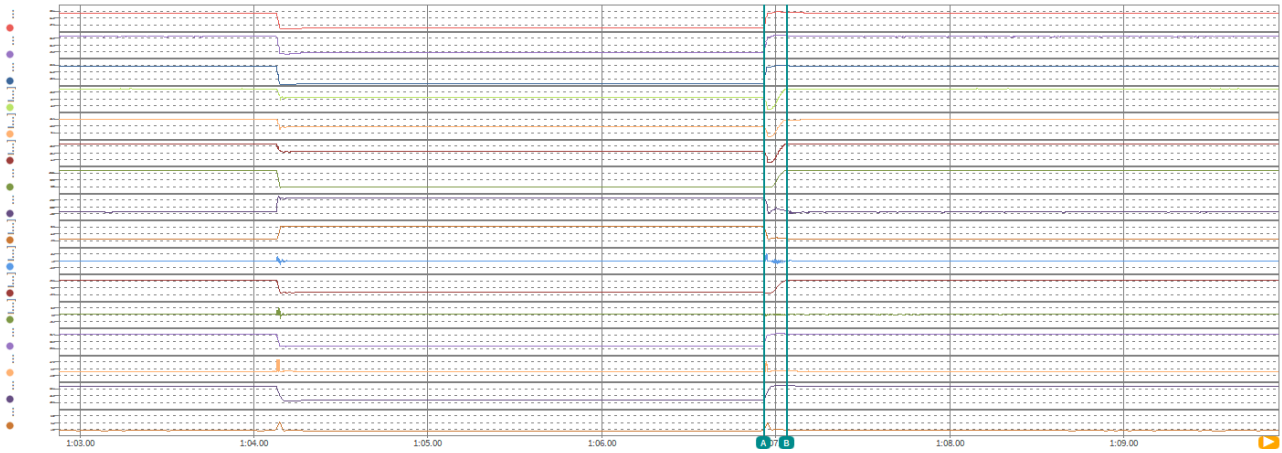
时间 [s]	A 1:04.13715	B 1:04.16741	间隔 0.03026	有效值
U1_tRMS_rc@AC [V]	230.3262	170.2854	-60.04077	191.6364
U2_tRMS_rc@AC [V]	229.7562	169.8057	-59.95055	194.0398
U3_tRMS_rc@AC [V]	229.7466	170.0785	-59.66814	188.8115
I1_tRMS_rc@AC [A]	179.7445	108.1010	-71.64352	139.2759
I2_tRMS_rc@AC [A]	181.3448	105.0773	-76.26758	130.9058
I3_tRMS_rc@AC [A]	183.1542	110.3977	-72.75656	139.6162
P_t_rc@AC [W]	125122.7	-1378.457	-126501.2	64066.02
Q_t_rc@AC [var]	2311.019	55009.73	52698.72	51223.83
I_fund_Q_SYM+_rc@AC [A]	0.453898	106.4052	105.9513	65.95824
I_fund_Q_SYM-_rc@AC [A]	-0.267101	-0.667849	-0.400748	6.224199
I_fund_P_SYM+_rc@AC [A]	181.3867	-2.731585	-184.1182	94.96058
I_fund_P_SYM-_rc@AC [A]	-0.838212	-3.080743	-2.242531	16.11285
U_fund_SYM+_rc@AC [V]	398.2629	294.5343	-103.7286	329.8139
U_fund_SYM-_rc@AC [V]	0.652968	0.911585	0.258618	9.552174
U+ [V]	230.0193	189.8742	-40.14515	217.1420
U- [V]	0.587913	5.462102	4.874189	3.262445

Injected reactive current at 60ms



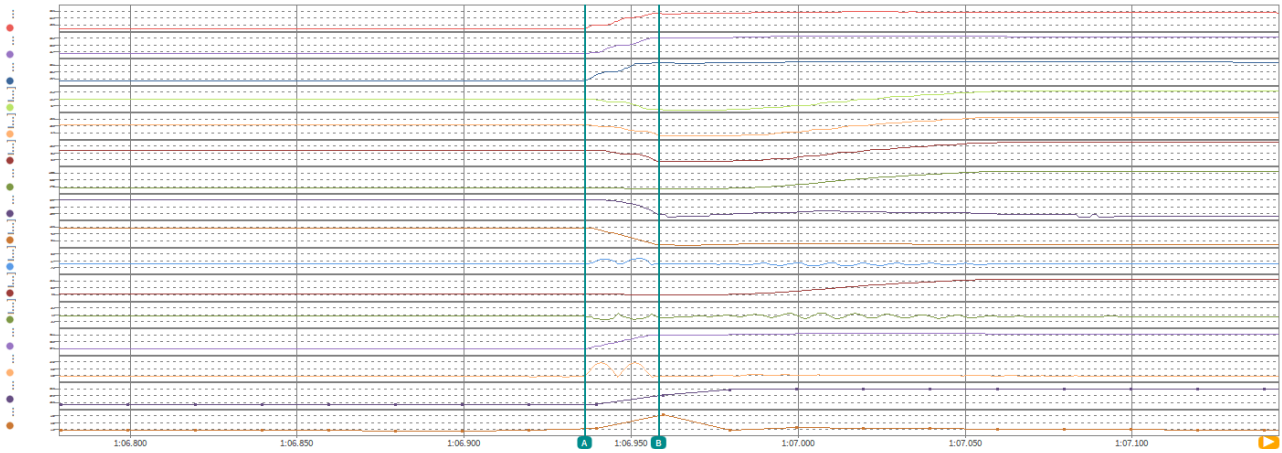
时间 [s]	A 1:04.13715	B 1:04.19763	间隔 0.06048	有效值
U1_tRMS_rc@AC [V]	230.3262	168.3745	-61.95172	181.1925
U2_tRMS_rc@AC [V]	229.7562	166.3289	-63.42737	181.7918
U3_tRMS_rc@AC [V]	229.7466	169.9629	-59.78375	180.0239
I1_tRMS_rc@AC [A]	179.7445	106.1992	-73.54527	124.3715
I2_tRMS_rc@AC [A]	181.3448	105.1551	-76.18977	119.8119
I3_tRMS_rc@AC [A]	183.1542	109.2376	-73.91660	124.6370
P_t_rc@AC [W]	125122.7	1182.803	-123939.9	46054.91
Q_t_rc@AC [var]	2311.019	53924.93	51613.91	52550.38
I_fund_Q_SYM+_rc@AC [A]	0.453898	106.6373	106.1834	87.57925
I_fund_Q_SYM-_rc@AC [A]	-0.267101	1.778407	2.045508	4.673958
I_fund_P_SYM+_rc@AC [A]	181.3867	2.346594	-179.0401	68.29640
I_fund_P_SYM-_rc@AC [A]	-0.838212	-1.270355	-0.432143	11.67027
U_fund_SYM+_rc@AC [V]	398.2629	291.3564	-106.9065	312.4685
U_fund_SYM-_rc@AC [V]	0.652968	1.770466	1.117498	6.947839
U+ [V]	230.0193	169.9133	-60.10599	206.3507
U- [V]	0.587913	0.508386	-0.079526	2.836772

Recover time – Active power



时间 [s]	A 1:06.93269	B 1:07.06575	间隔 0.13306	有效值
U1_tRMS_rc@AC [V]	172.6473	233.4780	60.83061	226.5967
U2_tRMS_rc@AC [V]	172.2193	233.1656	60.94633	226.3758
U3_tRMS_rc@AC [V]	171.9717	231.7240	59.75230	225.4866
I1_tRMS_rc@AC [A]	105.8023	177.9993	72.19701	99.21771
I2_tRMS_rc@AC [A]	106.1993	179.4980	73.29876	100.5075
I3_tRMS_rc@AC [A]	107.6384	181.3815	73.74311	102.4086
P_t_rc@AC [W]	2146.313	125320.0	123173.7	65092.48
Q_t_rc@AC [var]	55024.98	5534.396	-49490.58	22488.90
I_fund_Q_SYM+_rc@AC [A]	106.4223	1.671790	-104.7505	33.45975
I_fund_Q_SYM-_rc@AC [A]	-0.295373	-0.521309	-0.225936	4.681376
I_fund_P_SYM+_rc@AC [A]	4.148854	179.4390	175.2902	92.87103
I_fund_P_SYM-_rc@AC [A]	-0.205908	-0.578859	-0.372952	2.781302
U_fund_SYM+_rc@AC [V]	298.3855	403.1930	104.8076	391.3905
U_fund_SYM-_rc@AC [V]	1.053719	1.583186	0.529467	4.372435
U+ [V]	172.3228	233.3963	61.07353	215.9675
U- [V]	0.541586	0.984840	0.443254	1.939828

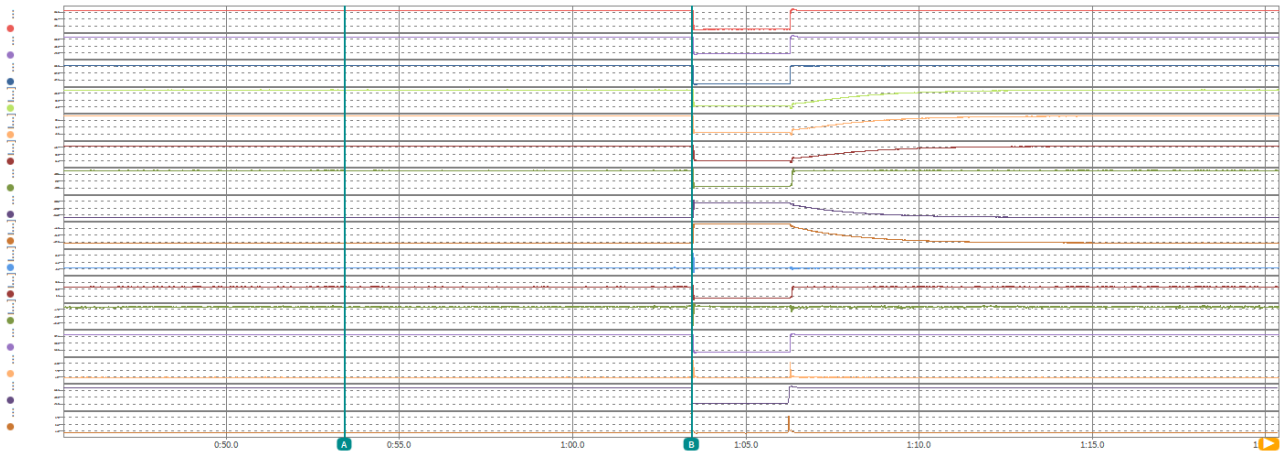
Recover time – Reactive power



时间 [s]	A 1:06.93633	B 1:06.95845	间隔 0.02212	有效值
U1_tRMS_rc@AC [V]	172.6564	228.3978	55.74138	202.9756
U2_tRMS_rc@AC [V]	172.1829	227.9238	55.74092	200.0535
U3_tRMS_rc@AC [V]	171.9688	227.8145	55.84567	205.8274
I1_tRMS_rc@AC [A]	105.6933	7.035118	-98.65819	73.90000
I2_tRMS_rc@AC [A]	106.2169	6.983106	-99.23384	76.84515
I3_tRMS_rc@AC [A]	107.6799	7.184774	-100.4951	83.44426
P_t_rc@AC [W]	2154.085	346.7249	-1807.361	1473.285
Q_t_rc@AC [var]	55012.80	4822.770	-50190.03	44634.10
I_fund_Q_SYM+_rc@AC [A]	106.4028	1.764507	-104.6383	68.49538
I_fund_Q_SYM-_rc@AC [A]	-0.236999	1.587810	1.824809	9.983142
I_fund_P_SYM+_rc@AC [A]	4.162573	0.504873	-3.657700	2.470839
I_fund_P_SYM-_rc@AC [A]	-0.191217	-2.289187	-2.097970	4.097341
U_fund_SYM+_rc@AC [V]	298.3669	394.9801	96.61322	349.6272
U_fund_SYM-_rc@AC [V]	0.715186	0.937329	0.222143	9.544449
U+ [V]	172.3228	173.0489	0.726092	172.6862
U- [V]	0.541586	1.165135	0.623549	0.908531

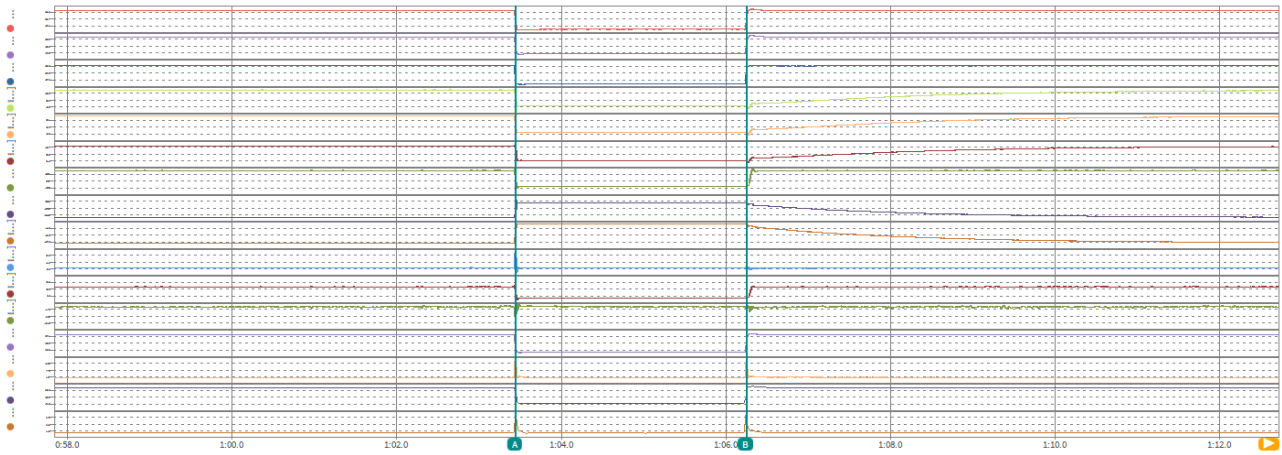
Test – VD4.2.a

Before fault



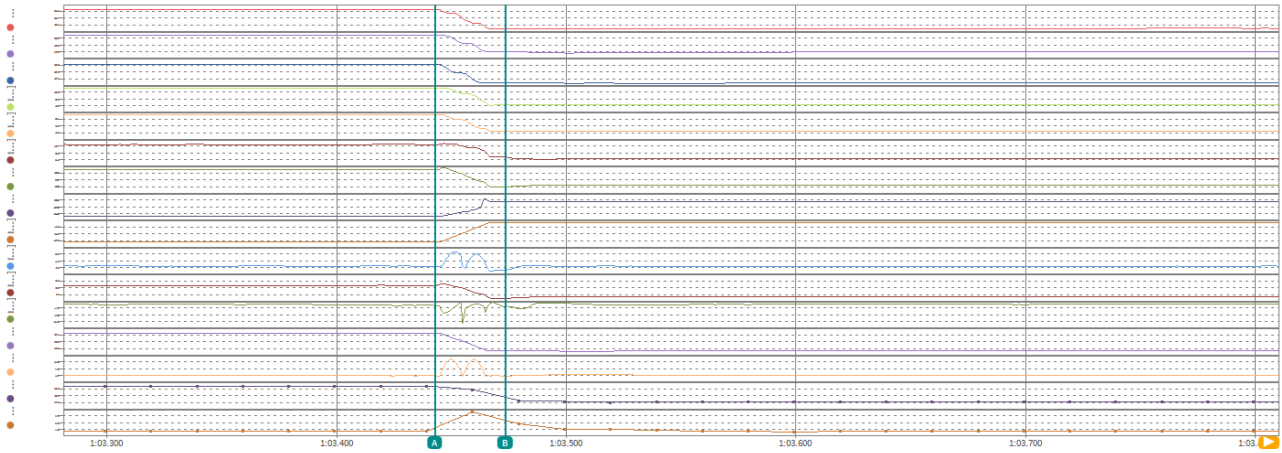
时间 [s]	A 0:53.4367	B 1:03.4446	间隔 0:10.0079	有效值
U1_tRMS_rc@AC [V]	230.1680	230.1253	-0.042618	230.1402
U2_tRMS_rc@AC [V]	229.6066	229.6411	0.034561	229.6213
U3_tRMS_rc@AC [V]	229.5685	229.6086	0.040085	229.5711
I1_tRMS_rc@AC [A]	124.5324	124.9980	0.465576	124.7098
I2_tRMS_rc@AC [A]	125.8600	125.5089	-0.351143	125.2713
I3_tRMS_rc@AC [A]	126.3489	126.6257	0.276787	126.5937
P_t_rc@AC [W]	26524.88	26475.45	-49.42188	26344.31
Q_t_rc@AC [var]	-82403.55	-82518.34	-114.7891	82419.72
I_fund_Q_SYM+_rc@AC [A]	-119.5038	-119.6448	-0.140953	119.5234
I_fund_Q_SYM-_rc@AC [A]	0.405023	0.196338	-0.208686	0.407081
I_fund_P_SYM+_rc@AC [A]	38.47883	38.40663	-0.072205	38.21701
I_fund_P_SYM-_rc@AC [A]	-0.107448	-0.242033	-0.134585	0.213139
U_fund_SYM+_rc@AC [V]	397.9890	398.0035	0.014496	397.9825
U_fund_SYM-_rc@AC [V]	0.966336	0.501143	-0.465192	0.925307
U+ [V]	229.8153	229.8150	-2.978e-4	229.7821
U- [V]	0.535812	0.507745	-0.028067	0.534111

Duration fault time



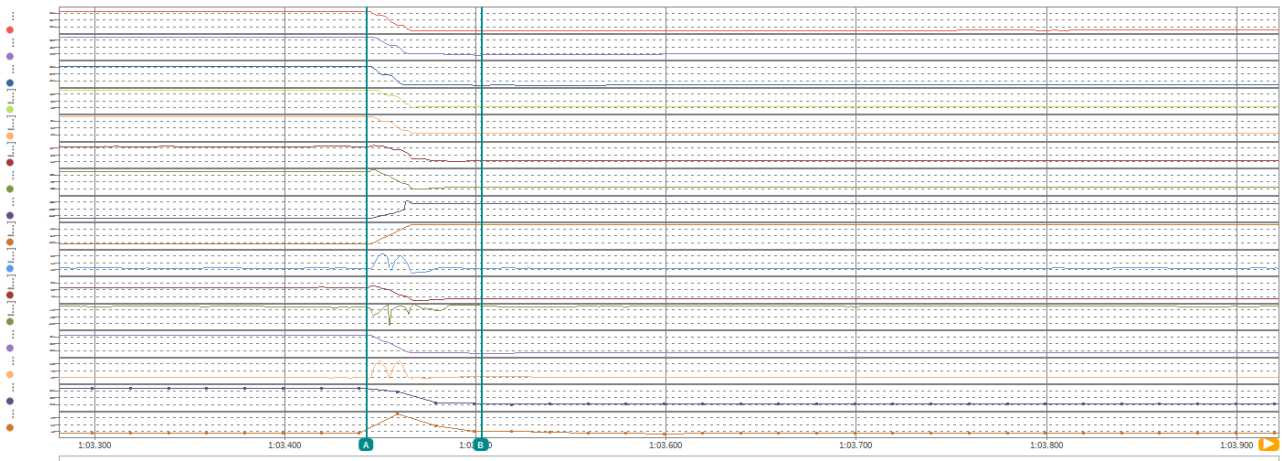
时间 [s]	A 1:03.4431	B 1:06.2458	间隔 2.8027	有效值
U1_tRMS_rc@AC [V]	230.1299	172.6761	-57.45383	172.8542
U2_tRMS_rc@AC [V]	229.6330	172.2175	-57.41551	172.3912
U3_tRMS_rc@AC [V]	229.6095	171.9308	-57.67865	172.1859
I1_tRMS_rc@AC [A]	125.1621	19.85361	-105.3084	21.63289
I2_tRMS_rc@AC [A]	125.4983	19.60142	-105.8969	21.49126
I3_tRMS_rc@AC [A]	126.5645	19.69789	-106.8667	22.37657
P_t_rc@AC [W]	26501.07	-236.6905	-26737.76	1851.366
Q_t_rc@AC [var]	-82532.11	10187.88	92719.99	11674.98
I_fund_Q_SYM+_rc@AC [A]	-119.6679	19.53403	139.2019	20.79681
I_fund_Q_SYM-_rc@AC [A]	0.335748	0.149944	-0.185804	1.563312
I_fund_P_SYM+_rc@AC [A]	38.44503	-0.462717	-38.90775	2.801895
I_fund_P_SYM-_rc@AC [A]	-0.135262	0.039830	0.175092	0.426897
U_fund_SYM+_rc@AC [V]	398.0029	298.3805	-99.62238	298.7137
U_fund_SYM-_rc@AC [V]	0.924762	0.612641	-0.312121	1.324787
U+ [V]	229.8150	172.2528	-57.56213	172.9846
U- [V]	0.507745	0.529843	0.022098	0.656335

Injected reactive current at 30ms



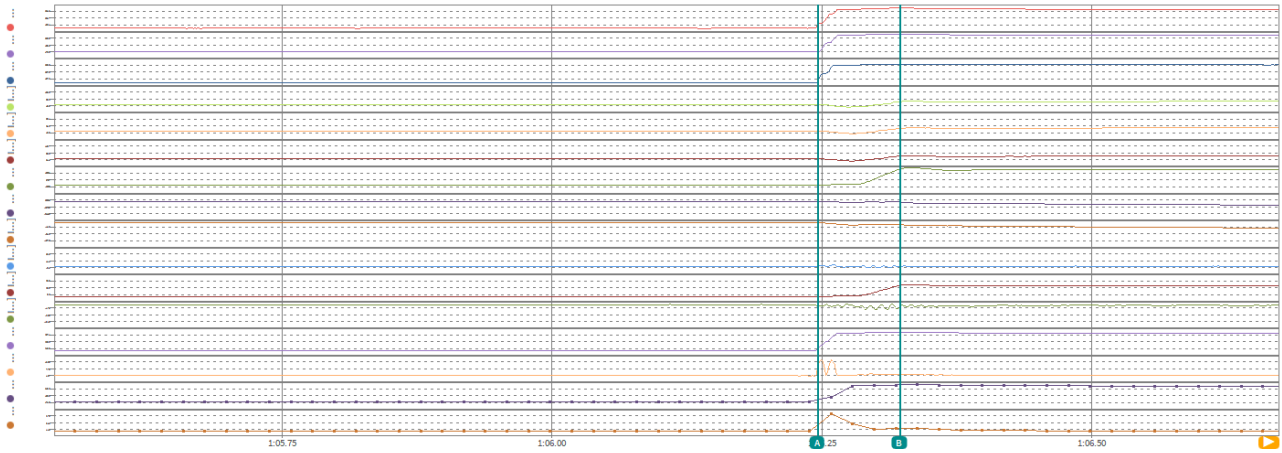
时间 [s]	A 1:03.4431	B 1:03.4737	间隔 0.0306	有效值
U1_tRMS_rc@AC [V]	230.1299	172.3893	-57.74057	198.9322
U2_tRMS_rc@AC [V]	229.6330	172.2578	-57.37524	200.8076
U3_tRMS_rc@AC [V]	229.6095	172.1026	-57.50685	195.7457
I1_tRMS_rc@AC [A]	125.1621	18.23203	-106.9300	87.74096
I2_tRMS_rc@AC [A]	125.4983	17.05971	-108.4386	80.05231
I3_tRMS_rc@AC [A]	126.5645	33.16426	-93.40029	102.4284
P_t_rc@AC [W]	26501.07	-3558.213	-30059.28	17187.53
Q_t_rc@AC [var]	-82532.11	11239.55	93771.66	54705.95
I_fund_Q_SYM+_rc@AC [A]	-119.6679	19.83664	139.5045	70.35661
I_fund_Q_SYM-_rc@AC [A]	0.335748	-7.101723	-7.437471	14.38600
I_fund_P_SYM+_rc@AC [A]	38.44503	-6.907757	-45.35279	25.87010
I_fund_P_SYM-_rc@AC [A]	-0.135262	-1.016969	-0.881707	3.021134
U_fund_SYM+_rc@AC [V]	398.0029	298.3395	-99.66339	342.3096
U_fund_SYM-_rc@AC [V]	0.924762	0.549816	-0.374946	9.103235
U+ [V]	229.8150	214.6037	-15.21125	222.3395
U- [V]	0.507745	4.350346	3.842601	3.097040

Injected reactive current at 60ms



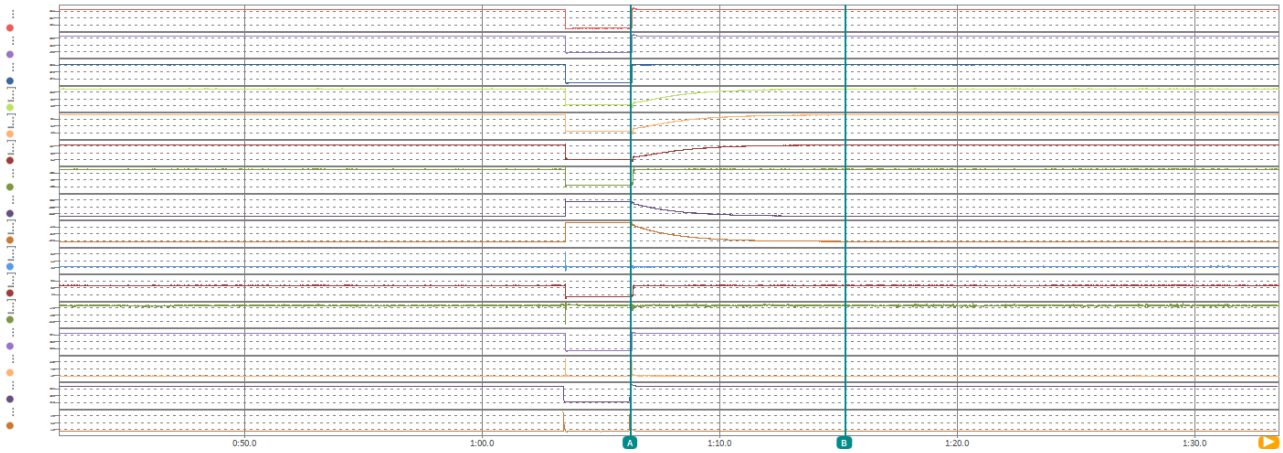
时间 [s]	A 1:03.4431	B 1:03.5034	间隔 0.0603	有效值
U1_tRMS_rc@AC [V]	230.1299	169.8364	-60.29344	186.3490
U2_tRMS_rc@AC [V]	229.6330	167.4618	-62.17122	186.7818
U3_tRMS_rc@AC [V]	229.6095	171.1977	-58.41176	184.7858
I1_tRMS_rc@AC [A]	125.1621	19.85868	-105.3034	64.99493
I2_tRMS_rc@AC [A]	125.4983	18.22507	-107.2732	59.32692
I3_tRMS_rc@AC [A]	126.5645	19.17759	-107.3870	75.52452
P_t_rc@AC [W]	26501.07	-196.0925	-26697.16	12487.49
Q_t_rc@AC [var]	-82532.11	9705.911	92238.02	40201.45
I_fund_Q_SYM+_rc@AC [A]	-119.6679	18.68225	138.3501	52.52569
I_fund_Q_SYM-_rc@AC [A]	0.335748	-0.088952	-0.424700	10.52882
I_fund_P_SYM+_rc@AC [A]	38.44503	-0.397471	-38.84251	18.83430
I_fund_P_SYM-_rc@AC [A]	-0.135262	0.985041	1.120303	2.398184
U_fund_SYM+_rc@AC [V]	398.0029	293.5747	-104.4282	321.2628
U_fund_SYM-_rc@AC [V]	0.924762	1.858114	0.933353	6.670833
U+ [V]	229.8150	170.9487	-58.86624	199.0682
U- [V]	0.507745	0.867293	0.359548	2.443637

Recover time – Active power



时间 [s]	A 1:06.2462	B 1:06.3225	间隔 0.0763	有效值
U1_tRMS_rc@AC [V]	172.6761	234.2708	61.59476	224.4634
U2_tRMS_rc@AC [V]	172.2175	235.2114	62.99387	223.8815
U3_tRMS_rc@AC [V]	171.9308	232.2574	60.32651	223.9953
I1_tRMS_rc@AC [A]	19.85361	35.69121	15.83759	17.45684
I2_tRMS_rc@AC [A]	19.60142	36.03110	16.42969	17.40622
I3_tRMS_rc@AC [A]	19.69789	39.24154	19.54365	19.45663
P_t_rc@AC [W]	-236.6905	25160.81	25397.50	10105.24
Q_t_rc@AC [var]	10187.88	6353.006	-3834.871	6886.742
I_fund_Q_SYM+_rc@AC [A]	19.53403	4.383607	-15.15042	8.848856
I_fund_Q_SYM-_rc@AC [A]	0.149944	-0.634456	-0.784399	1.268864
I_fund_P_SYM+_rc@AC [A]	-0.462717	35.85233	36.31505	14.41581
I_fund_P_SYM-_rc@AC [A]	0.039830	-2.104300	-2.144130	1.253054
U_fund_SYM+_rc@AC [V]	298.3805	405.1460	106.7655	387.6183
U_fund_SYM-_rc@AC [V]	0.612641	1.930515	1.317874	5.586771
U+ [V]	172.2528	233.5164	61.26357	211.7731
U- [V]	0.529843	1.187300	0.657458	2.150523

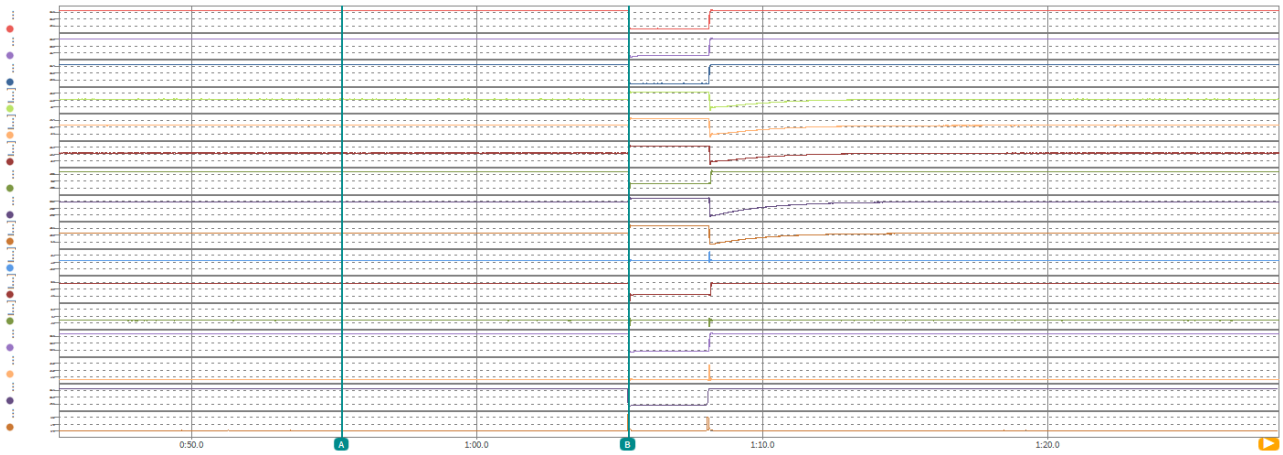
Recover time – Reactive power



时间 [s]	A 1:06.2462	B 1:15.2671	间隔 9.0209	有效值
U1_tRMS_rc@AC [V]	172.6761	230.1735	57.49742	230.1440
U2_tRMS_rc@AC [V]	172.2175	229.6811	57.46359	229.6376
U3_tRMS_rc@AC [V]	171.9308	229.5022	57.57133	229.5466
I1_tRMS_rc@AC [A]	19.85361	123.4255	103.5719	105.1500
I2_tRMS_rc@AC [A]	19.60142	124.5471	104.9457	105.6570
I3_tRMS_rc@AC [A]	19.69789	125.5202	105.8223	106.7926
P_t_rc@AC [W]	-236.6905	26561.29	26797.98	26265.62
Q_t_rc@AC [var]	10187.88	-81608.87	-91796.74	68090.09
I_fund_Q_SYM+_rc@AC [A]	19.53403	-118.3454	-137.8794	98.71439
I_fund_Q_SYM-_rc@AC [A]	0.149944	0.254689	0.104745	0.380010
I_fund_P_SYM+_rc@AC [A]	-0.462717	38.53143	38.99415	38.09310
I_fund_P_SYM-_rc@AC [A]	0.039830	-0.289754	-0.329584	0.295076
U_fund_SYM+_rc@AC [V]	298.3805	397.9967	99.61618	397.9754
U_fund_SYM-_rc@AC [V]	0.612641	0.949725	0.337084	1.081314
U+ [V]	172.2528	229.7350	57.48217	229.6377
U- [V]	0.529843	0.526682	-3.161e-3	0.592776

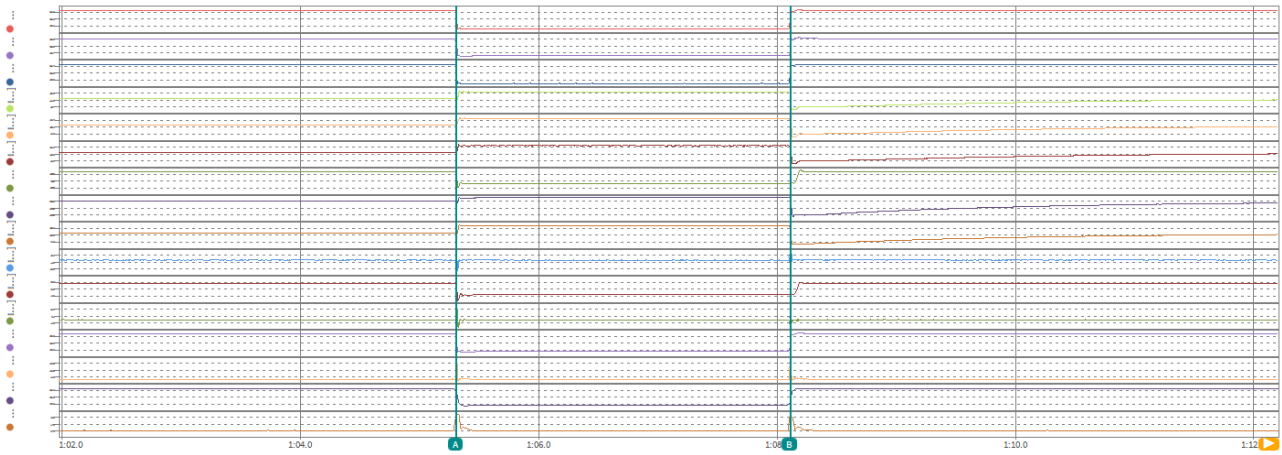
Test – VD4.2.b

Before fault



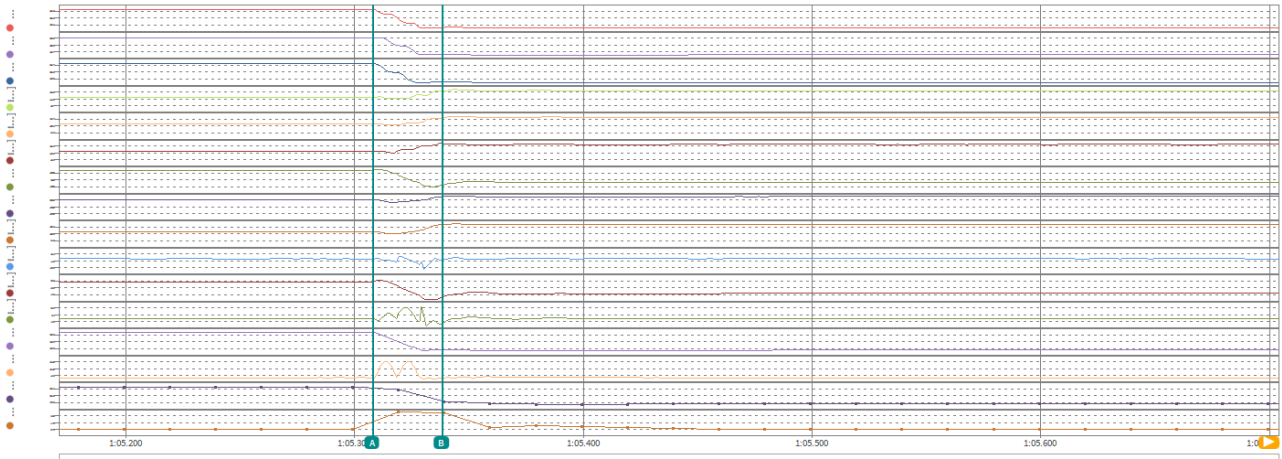
时间 [s]	A 0:55.27746	B 1:05.30781	间隔 0:10.03035	有效值
U1_tRMS_rc@AC [V]	230.4751	230.5435	0.068390	230.4887
U2_tRMS_rc@AC [V]	229.9191	229.8934	-0.025757	229.9577
U3_tRMS_rc@AC [V]	229.6689	229.6578	-0.011139	229.7027
I1_tRMS_rc@AC [A]	123.9148	123.3805	-0.534325	123.6647
I2_tRMS_rc@AC [A]	124.7056	125.1713	0.465714	124.4420
I3_tRMS_rc@AC [A]	126.3560	126.0805	-0.275520	125.9748
P_t_rc@AC [W]	25364.34	25436.76	72.41602	25376.14
Q_t_rc@AC [var]	82437.71	82336.33	-101.3828	82229.75
I_fund_Q_SYM+_rc@AC [A]	119.4283	119.2811	-0.147202	119.1083
I_fund_Q_SYM-_rc@AC [A]	-0.205155	-0.560855	-0.355700	0.375968
I_fund_P_SYM+_rc@AC [A]	36.75608	36.85807	0.101986	36.76904
I_fund_P_SYM-_rc@AC [A]	-0.536418	-0.204098	0.332320	0.543675
U_fund_SYM+_rc@AC [V]	398.4015	398.4200	0.018494	398.4508
U_fund_SYM-_rc@AC [V]	1.125773	1.116161	-9.612e-3	1.125866
U+ [V]	230.0779	230.0678	-0.010108	230.0525
U- [V]	0.657652	0.669860	0.012208	0.649872

Duration fault time



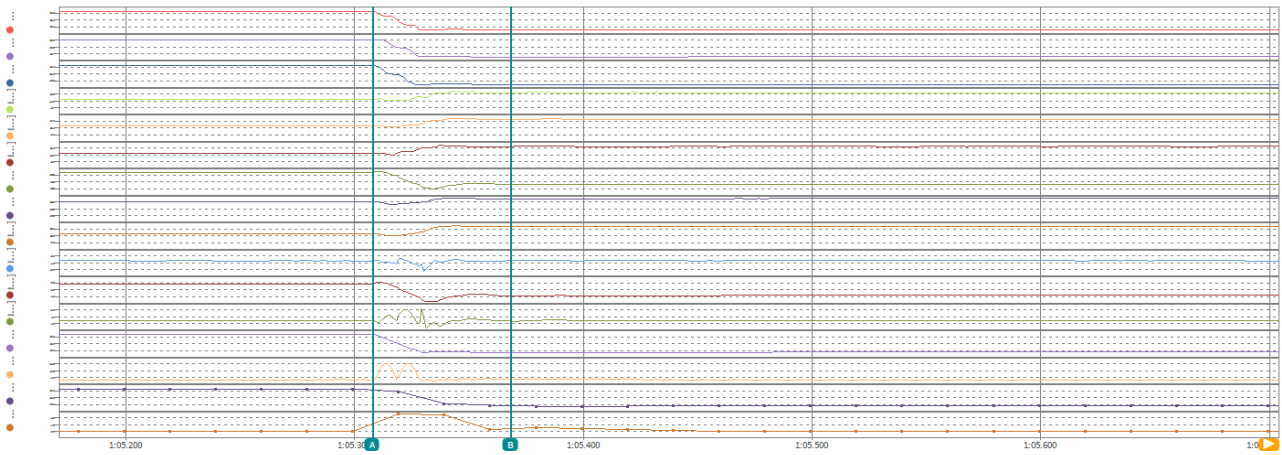
时间 [s]	A 1:05.30799	B 1:08.10927	间隔 2.80128	有效值
U1_tRMS_rc@AC [V]	230.5435	172.9713	-57.57222	173.1232
U2_tRMS_rc@AC [V]	229.8934	172.4887	-57.40466	172.5809
U3_tRMS_rc@AC [V]	229.6578	172.1623	-57.49542	172.3187
I1_tRMS_rc@AC [A]	123.3805	196.1029	72.72241	195.9973
I2_tRMS_rc@AC [A]	125.1713	196.7013	71.52996	196.4149
I3_tRMS_rc@AC [A]	126.0805	199.3502	73.26975	198.5561
P_t_rc@AC [W]	25436.76	-353.8331	-25790.59	1855.673
Q_t_rc@AC [var]	82336.33	102168.9	19832.58	101919.1
I_fund_Q_SYM+_rc@AC [A]	119.2811	197.3409	78.05981	196.8255
I_fund_Q_SYM-_rc@AC [A]	-0.560855	-0.583699	-0.022844	1.254631
I_fund_P_SYM+_rc@AC [A]	36.85807	-0.687771	-37.54584	2.951360
I_fund_P_SYM-_rc@AC [A]	-0.204098	-0.457564	-0.253466	1.390673
U_fund_SYM+_rc@AC [V]	398.4200	298.8319	-99.58807	299.0431
U_fund_SYM-_rc@AC [V]	1.116161	0.807745	-0.308416	1.468907
U+ [V]	230.0678	172.4809	-57.58685	173.2943
U- [V]	0.669860	0.575064	-0.094795	0.736155

Injected reactive current at 30ms



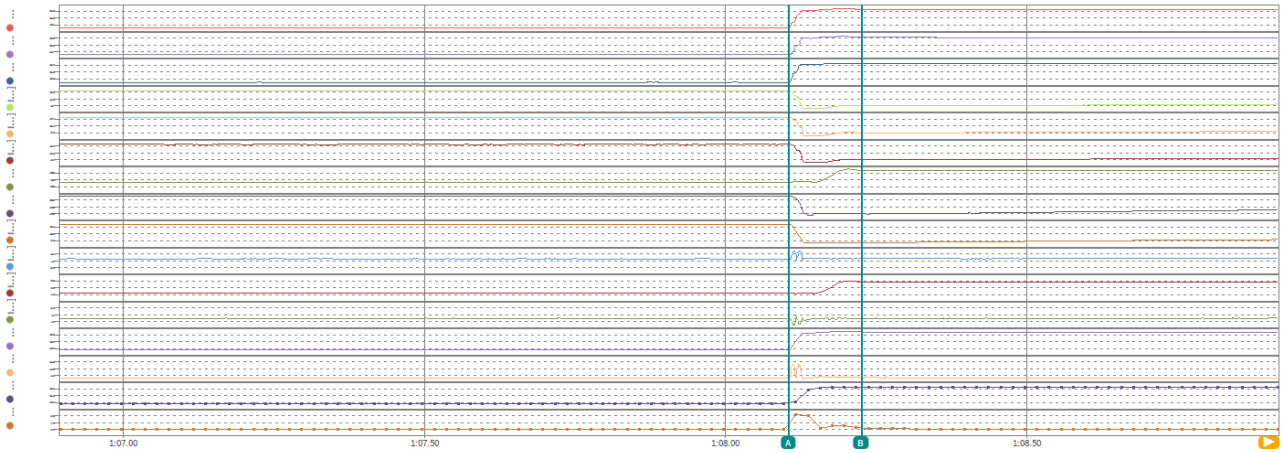
时间 [s]	A 1:05.30799	B 1:05.33841	间隔 0.03043	有效值
U1_tRMS_rc@AC [V]	230.5435	172.4346	-58.10892	196.7068
U2_tRMS_rc@AC [V]	229.8934	172.3065	-57.58685	199.6390
U3_tRMS_rc@AC [V]	229.6578	172.2299	-57.42789	194.1296
I1_tRMS_rc@AC [A]	123.3805	197.1951	73.81459	140.8241
I2_tRMS_rc@AC [A]	125.1713	184.6280	59.45670	141.1048
I3_tRMS_rc@AC [A]	126.0805	208.5693	82.48885	152.6381
P_t_rc@AC [W]	25436.76	-9488.010	-34924.77	16742.09
Q_t_rc@AC [var]	82336.33	101294.3	18958.01	80992.35
I_fund_Q_SYM+_rc@AC [A]	119.2811	194.4664	75.18531	130.5168
I_fund_Q_SYM-_rc@AC [A]	-0.560855	-4.511531	-3.950676	10.68344
I_fund_P_SYM+_rc@AC [A]	36.85807	-18.33963	-55.19770	26.12342
I_fund_P_SYM-_rc@AC [A]	-0.204098	-12.55107	-12.34698	12.05536
U_fund_SYM+_rc@AC [V]	398.4200	298.4505	-99.96948	339.3298
U_fund_SYM-_rc@AC [V]	1.116161	0.839302	-0.276859	9.359791
U+ [V]	230.0678	222.2096	-7.858196	226.1728
U- [V]	0.669860	3.400397	2.730538	2.450654

Injected reactive current at 60ms



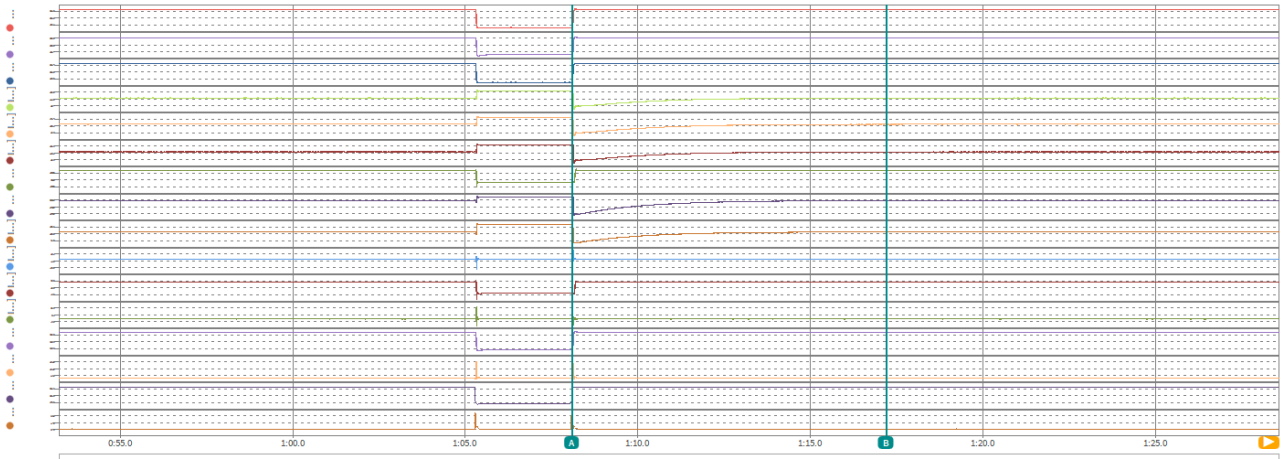
时间 [s]	A 1:05.30799	B 1:05.36846	间隔 0.06048	有效值
U1_tRMS_rc@AC [V]	230.5435	170.5263	-60.01718	185.1474
U2_tRMS_rc@AC [V]	229.8934	167.8345	-62.05881	185.9062
U3_tRMS_rc@AC [V]	229.6578	171.3893	-58.26843	183.7663
I1_tRMS_rc@AC [A]	123.3805	193.7783	70.39777	170.3701
I2_tRMS_rc@AC [A]	125.1713	192.8395	67.66816	170.4639
I3_tRMS_rc@AC [A]	126.0805	198.2607	72.18026	176.4425
P_t_rc@AC [W]	25436.76	-1167.846	-26604.61	12161.99
Q_t_rc@AC [var]	82336.33	99382.33	17046.00	91516.93
I_fund_Q_SYM+_rc@AC [A]	119.2811	194.7888	75.50765	166.0794
I_fund_Q_SYM-_rc@AC [A]	-0.560855	1.061099	1.621954	7.817162
I_fund_P_SYM+_rc@AC [A]	36.85807	-2.281674	-39.13974	19.08763
I_fund_P_SYM-_rc@AC [A]	-0.204098	-1.672725	-1.468627	8.982450
U_fund_SYM+_rc@AC [V]	398.4200	294.2856	-104.1344	319.4345
U_fund_SYM-_rc@AC [V]	1.116161	2.028520	0.912359	6.826317
U+ [V]	230.0678	171.8550	-58.21279	202.3054
U- [V]	0.669860	0.859436	0.189576	2.415774

Recover time – Active power



时间 [s]	A 1:08.10567	B 1:08.22615	间隔 0.12048	有效值
U1_tRMS_rc@AC [V]	172.9855	231.7983	58.81282	224.3803
U2_tRMS_rc@AC [V]	172.4812	232.0824	59.60124	224.2450
U3_tRMS_rc@AC [V]	172.1453	230.3365	58.19125	223.4959
I1_tRMS_rc@AC [A]	196.1502	37.15373	-158.9965	73.25389
I2_tRMS_rc@AC [A]	196.7850	37.28260	-159.5024	75.56384
I3_tRMS_rc@AC [A]	199.3618	38.74753	-160.6143	80.15417
P_t_rc@AC [W]	-397.1605	25961.40	26358.56	16331.67
Q_t_rc@AC [var]	102191.3	3451.125	-98740.16	40965.40
I_fund_Q_SYM+_rc@AC [A]	197.3869	0.824669	-196.5622	65.37452
I_fund_Q_SYM-_rc@AC [A]	-0.689026	-0.040116	0.648910	8.008841
I_fund_P_SYM+_rc@AC [A]	-0.772494	37.39889	38.17139	23.45772
I_fund_P_SYM-_rc@AC [A]	-0.493389	-0.605424	-0.112036	4.095721
U_fund_SYM+_rc@AC [V]	298.8269	400.8026	101.9757	387.7020
U_fund_SYM-_rc@AC [V]	1.037678	1.506299	0.468622	4.503349
U+ [V]	172.4809	232.1628	59.68184	215.1159
U- [V]	0.575064	0.943584	0.368519	1.771602

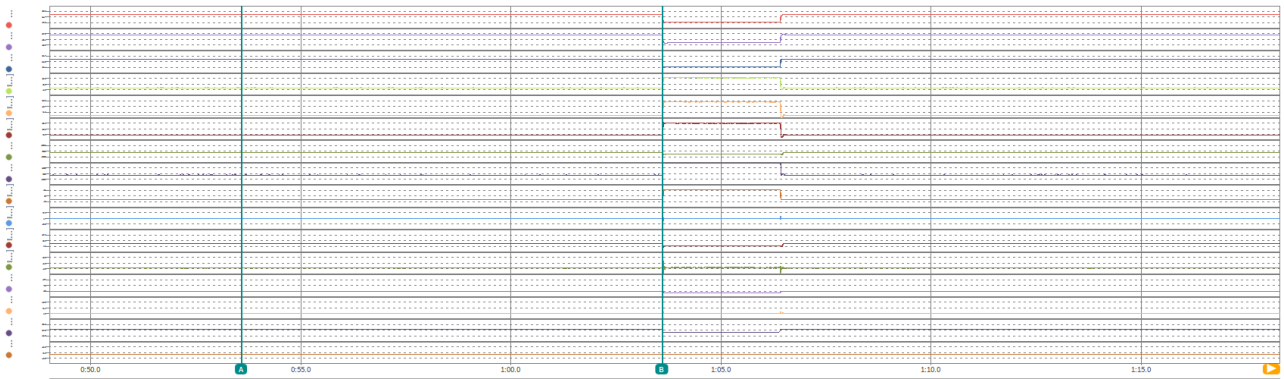
Recover time – Reactive power



时间 [s]	A 1:08.10567	B 1:17.20042	间隔 9.09475	有效值
U1_tRMS_rc@AC [V]	172.9855	230.4165	57.43105	230.3948
U2_tRMS_rc@AC [V]	172.4812	229.9528	57.47165	229.8749
U3_tRMS_rc@AC [V]	172.1453	229.6646	57.51927	229.6207
I1_tRMS_rc@AC [A]	196.1502	122.2401	-73.91018	104.3124
I2_tRMS_rc@AC [A]	196.7850	123.4090	-73.37601	104.8993
I3_tRMS_rc@AC [A]	199.3618	124.5374	-74.82447	106.3812
P_t_rc@AC [W]	-397.1605	25197.07	25594.23	25192.69
Q_t_rc@AC [var]	102191.3	81332.54	-20858.74	68005.80
I_fund_Q_SYM+_rc@AC [A]	197.3869	117.8197	-79.56717	98.54050
I_fund_Q_SYM-_rc@AC [A]	-0.689026	-0.462885	0.226141	0.977606
I_fund_P_SYM+_rc@AC [A]	-0.772494	36.51755	37.29005	36.50364
I_fund_P_SYM-_rc@AC [A]	-0.493389	-0.464535	0.028854	0.723271
U_fund_SYM+_rc@AC [V]	298.8269	398.3846	99.55774	398.2979
U_fund_SYM-_rc@AC [V]	1.037678	1.091274	0.053596	1.210495
U+ [V]	172.4809	230.0207	57.53983	229.8255
U- [V]	0.575064	0.620967	0.045903	0.667299

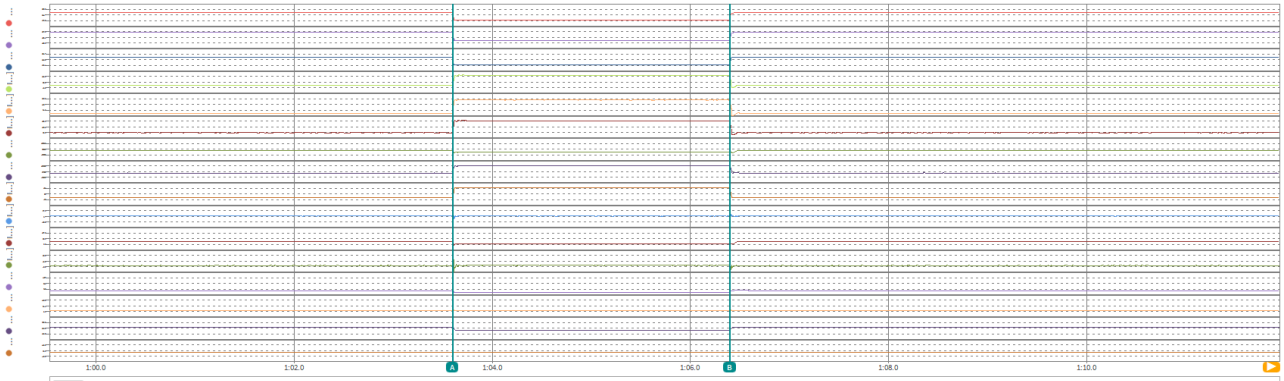
Test – VD4.2.c

Before fault



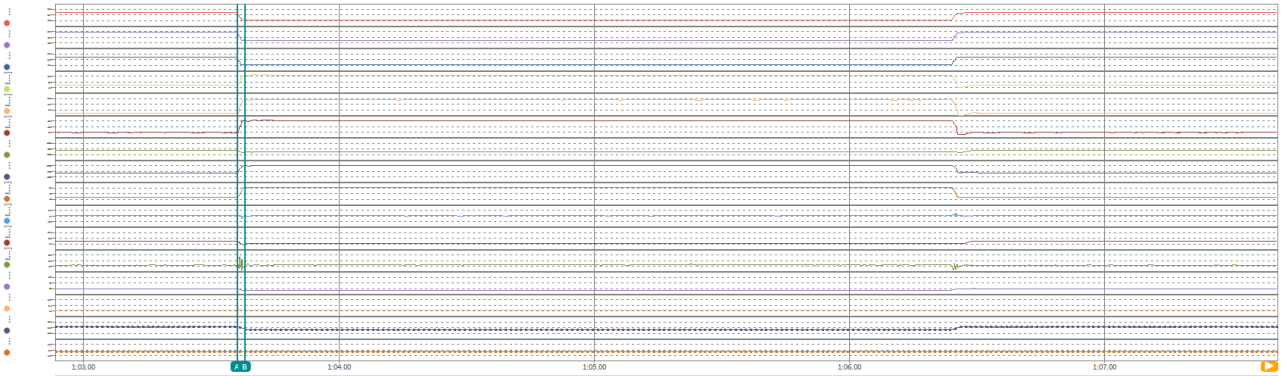
时间 [s]	A 0:53.593631	B 1:03.604253	间隔 0:10.010622	有效值
U1_tRMS_rc@AC [V]	230.2008	230.1933	-7.477e-3	230.2240
U2_tRMS_rc@AC [V]	229.7666	229.6653	-0.101227	229.7161
U3_tRMS_rc@AC [V]	229.5486	229.5245	-0.024048	229.5704
I1_tRMS_rc@AC [A]	36.25877	36.51183	0.253063	36.52258
I2_tRMS_rc@AC [A]	37.07708	37.66098	0.583900	36.71038
I3_tRMS_rc@AC [A]	37.37381	36.61861	-0.755199	37.24557
P_t_rc@AC [W]	25384.15	25401.48	17.33398	25323.21
Q_t_rc@AC [var]	-1758.299	-1711.359	46.94019	1839.236
I_fund_Q_SYM+_rc@AC [A]	-0.373393	-0.730452	-0.357059	0.749805
I_fund_Q_SYM-_rc@AC [A]	-0.092488	-0.296295	-0.203807	0.335945
I_fund_P_SYM+_rc@AC [A]	36.81512	36.84746	0.032341	36.72646
I_fund_P_SYM-_rc@AC [A]	-0.348414	0.017593	0.366008	0.341730
U_fund_SYM+_rc@AC [V]	398.0889	398.0124	-0.076477	398.0858
U_fund_SYM-_rc@AC [V]	0.979595	0.914325	-0.065270	0.991482
U+ [V]	229.8261	229.8196	-6.528e-3	229.8417
U- [V]	0.583605	0.585608	2.003e-3	0.572337

Duration fault time



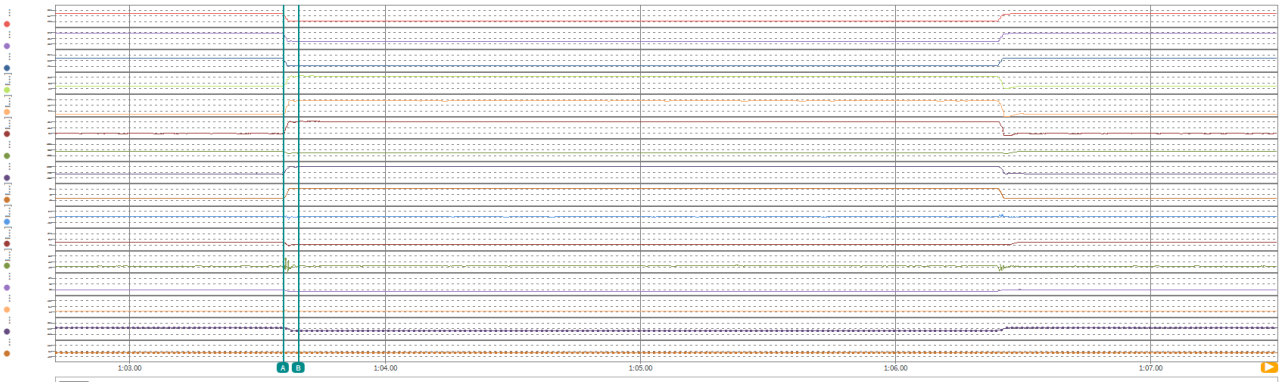
时间 [s]	A 1:03.603349	B 1:06.402870	间隔 2.799521	有效值
U1_tRMS_rc@AC [V]	230.1933	172.8663	-57.32707	173.0425
U2_tRMS_rc@AC [V]	229.6653	172.3525	-57.31287	172.5098
U3_tRMS_rc@AC [V]	229.5245	172.1157	-57.40878	172.2962
I1_tRMS_rc@AC [A]	36.51183	196.3158	159.8040	196.4165
I2_tRMS_rc@AC [A]	37.66098	196.0478	158.3868	197.1890
I3_tRMS_rc@AC [A]	36.61861	197.6416	161.0230	198.4377
P_t_rc@AC [W]	25401.48	2480.849	-22920.64	2689.211
Q_t_rc@AC [var]	-1711.359	101712.7	103424.0	102015.1
I_fund_Q_SYM+_rc@AC [A]	-0.730452	196.4887	197.2192	197.0628
I_fund_Q_SYM-_rc@AC [A]	-0.296295	0.579909	0.876203	1.456975
I_fund_P_SYM+_rc@AC [A]	36.84746	4.770525	-32.07693	4.828372
I_fund_P_SYM-_rc@AC [A]	0.017593	0.599398	0.581805	1.441418
U_fund_SYM+_rc@AC [V]	398.0124	298.6620	-99.35040	298.9400
U_fund_SYM-_rc@AC [V]	0.914325	0.885289	-0.029036	1.418937
U+ [V]	229.8196	172.4456	-57.37401	173.1368
U- [V]	0.585608	0.596424	0.010817	0.734704

Injected reactive current at 30ms



时间 [s]	A 1:03.603349	B 1:03.633985	间隔 0.030636	有效值
U1_tRMS_rc@AC [V]	230.1933	173.4498	-56.74355	195.3334
U2_tRMS_rc@AC [V]	229.6653	173.2490	-56.41632	197.8126
U3_tRMS_rc@AC [V]	229.5245	173.0601	-56.46440	192.3615
I1_tRMS_rc@AC [A]	36.51183	201.0819	164.5700	124.0478
I2_tRMS_rc@AC [A]	37.66098	197.5015	159.8405	125.1576
I3_tRMS_rc@AC [A]	36.61861	211.6517	175.0331	140.0143
P_t_rc@AC [W]	25401.48	-5205.401	-30606.89	15239.01
Q_t_rc@AC [var]	-1711.359	105994.8	107306.1	67667.62
I_fund_Q_SYM+_rc@AC [A]	-0.730452	201.6155	202.3459	110.5853
I_fund_Q_SYM-_rc@AC [A]	-0.296295	-4.402393	-4.106098	12.29237
I_fund_P_SYM+_rc@AC [A]	36.84746	-10.02205	-46.86950	23.42681
I_fund_P_SYM-_rc@AC [A]	0.017593	-6.414500	-6.432094	10.18474
U_fund_SYM+_rc@AC [V]	398.0124	300.0573	-97.95517	336.4557
U_fund_SYM-_rc@AC [V]	0.914325	0.938432	0.024107	9.309651
U+ [V]	229.8196	211.8196	-17.99998	221.0029
U- [V]	0.585608	4.949199	4.363592	3.524025

Injected reactive current at 60ms

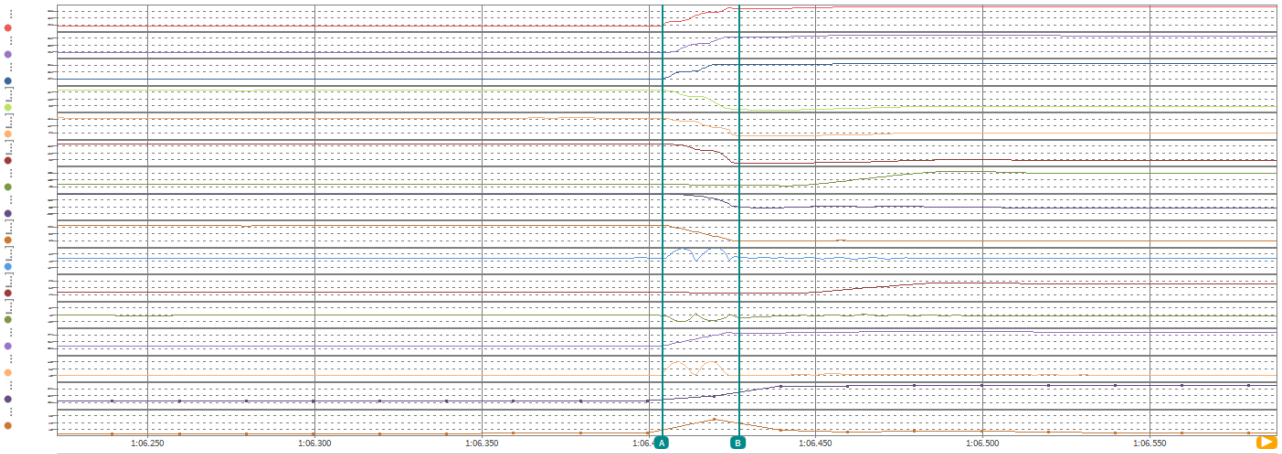


时间 [s]	A 1:03.603349	B 1:03.663766	间隔 0.060417	有效值
U1_tRMS_rc@AC [V]	230.1933	170.9744	-59.21898	184.4905
U2_tRMS_rc@AC [V]	229.6653	168.5470	-61.11836	185.0435
U3_tRMS_rc@AC [V]	229.5245	172.0746	-57.44992	182.9979
I1_tRMS_rc@AC [A]	36.51183	200.2841	163.7722	163.8893
I2_tRMS_rc@AC [A]	37.66098	199.2675	161.6065	164.3898
I3_tRMS_rc@AC [A]	36.61861	204.2403	167.6217	170.6403
P_t_rc@AC [W]	25401.48	924.3159	-24477.17	11049.02
Q_t_rc@AC [var]	-1711.359	102969.8	104681.1	86078.25
I_fund_Q_SYM+_rc@AC [A]	-0.730452	201.0396	201.7700	158.6182
I_fund_Q_SYM-_rc@AC [A]	-0.296295	1.562538	1.858832	8.908184
I_fund_P_SYM+_rc@AC [A]	36.84746	1.795878	-35.05158	17.14855
I_fund_P_SYM-_rc@AC [A]	0.017593	-0.947383	-0.964977	7.459461
U_fund_SYM+_rc@AC [V]	398.0124	295.3449	-102.6675	318.1259
U_fund_SYM-_rc@AC [V]	0.914325	1.946715	1.032390	6.734417
U+ [V]	229.8196	171.9318	-57.88772	198.4873
U- [V]	0.585608	0.953219	0.367611	2.650785

Recover time – Active power

时间 [s]	A 1:06.405133	B 1:06.517820	间隔 0.112687	有效值
U1_tRMS_rc@AC [V]	173.5025	231.5468	58.04430	225.8505
U2_tRMS_rc@AC [V]	172.5693	231.8666	59.29733	225.7368
U3_tRMS_rc@AC [V]	172.2600	230.0721	57.81206	225.0577
I1_tRMS_rc@AC [A]	196.4868	36.11341	-160.3734	64.37259
I2_tRMS_rc@AC [A]	196.3345	36.37580	-159.9587	67.05124
I3_tRMS_rc@AC [A]	198.7826	38.20839	-160.5742	72.76249
P_t_rc@AC [W]	2345.759	25394.96	23049.20	17541.73
Q_t_rc@AC [var]	102187.6	-3128.717	-105316.3	36627.14
I_fund_Q_SYM+_rc@AC [A]	197.0269	-1.398057	-198.4250	54.17260
I_fund_Q_SYM-_rc@AC [A]	0.269014	-0.077450	-0.346464	8.517503
I_fund_P_SYM+_rc@AC [A]	4.530117	36.62217	32.09205	25.21247
I_fund_P_SYM-_rc@AC [A]	-0.148428	-0.935880	-0.787452	3.794973
U_fund_SYM+_rc@AC [V]	299.1938	400.3807	101.1869	390.2903
U_fund_SYM-_rc@AC [V]	1.307009	1.441572	0.134563	4.694472
U+ [V]	172.4456	232.2134	59.76783	214.7312
U- [V]	0.596424	1.109434	0.513009	2.127347

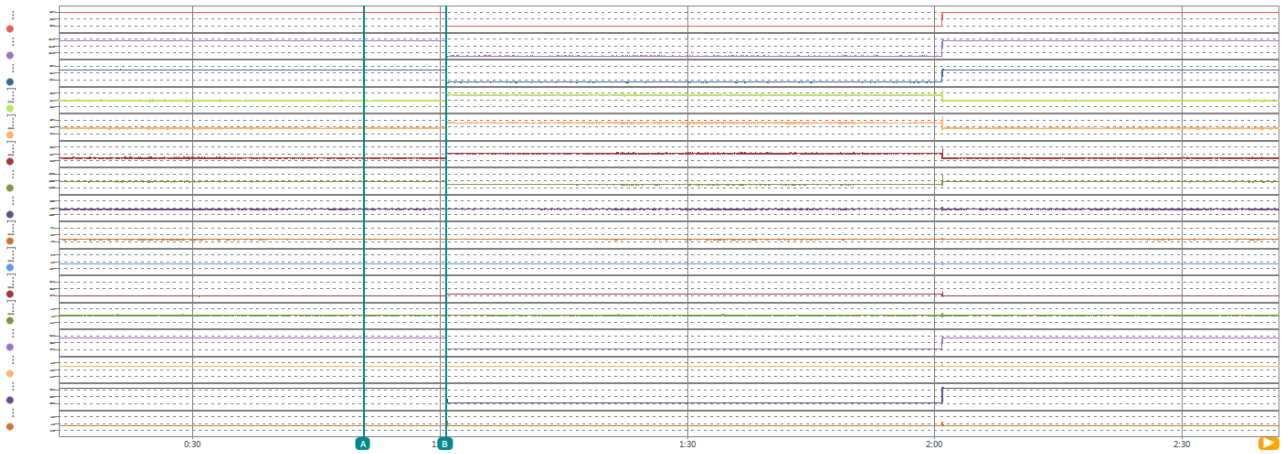
Recover time – Reactive power



时间 [s]	A 1:06.404002	B 1:06.426953	间隔 0.022952	有效值
U1_tRMS_rc@AC [V]	172.9002	227.3400	54.43985	203.3553
U2_tRMS_rc@AC [V]	172.3427	227.0856	54.74289	200.5118
U3_tRMS_rc@AC [V]	172.1309	227.1819	55.05106	206.3922
I1_tRMS_rc@AC [A]	196.4945	9.064720	-187.4297	134.7719
I2_tRMS_rc@AC [A]	196.1127	8.553712	-187.5590	140.6543
I3_tRMS_rc@AC [A]	198.1232	9.208905	-188.9143	152.8407
P_t_rc@AC [W]	2424.109	1075.161	-1348.947	1770.753
Q_t_rc@AC [var]	101846.8	5999.721	-95847.08	81843.71
I_fund_Q_SYM+_rc@AC [A]	196.7352	3.302208	-193.4330	124.5091
I_fund_Q_SYM-_rc@AC [A]	0.606283	3.536293	2.930010	18.46554
I_fund_P_SYM+_rc@AC [A]	4.661448	1.577587	-3.083861	2.622150
I_fund_P_SYM-_rc@AC [A]	0.210102	-3.131517	-3.341620	7.677985
U_fund_SYM+_rc@AC [V]	298.6847	393.5210	94.83630	350.4436
U_fund_SYM-_rc@AC [V]	0.810787	0.622764	-0.188022	9.603242
U+ [V]	172.4456	189.3603	16.91472	181.1005
U- [V]	0.596424	4.576521	3.980096	3.263454

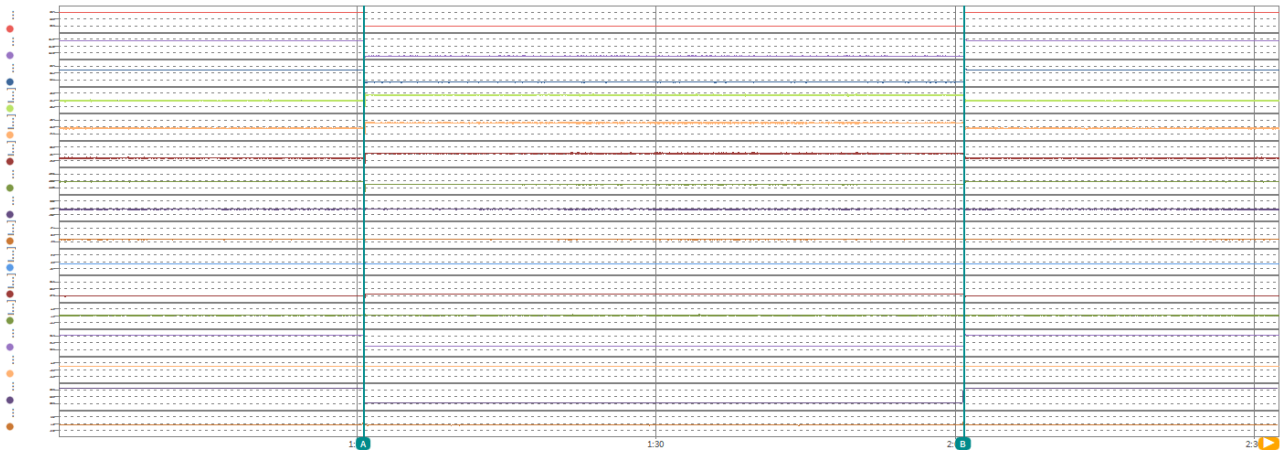
Test – VD5.1

Before fault



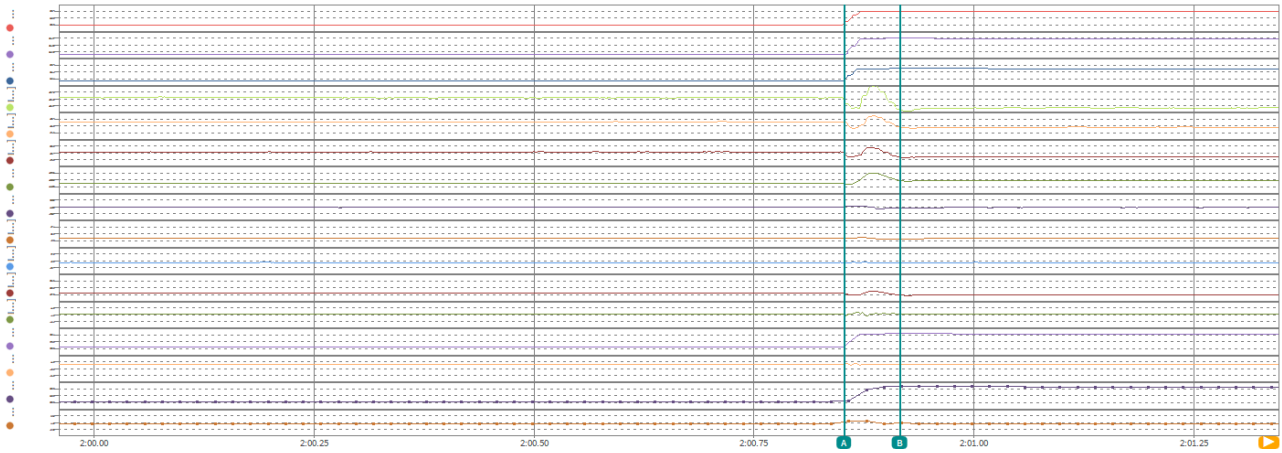
时间 [s]	A 0:50.72766	B 1:00.73209	间隔 0:10.00443	有效值
U1_tRMS_rc@AC [V]	230.4663	230.4475	-0.018738	230.4508
U2_tRMS_rc@AC [V]	229.8299	229.8077	-0.022232	229.8157
U3_tRMS_rc@AC [V]	229.7629	229.7533	-9.674e-3	229.7630
I1_tRMS_rc@AC [A]	178.9701	179.7417	0.771561	179.2692
I2_tRMS_rc@AC [A]	180.6879	180.5494	-0.138474	180.8495
I3_tRMS_rc@AC [A]	183.3136	182.7850	-0.528610	183.3148
P_t_rc@AC [W]	124871.8	124891.4	19.64063	124974.0
Q_t_rc@AC [var]	2286.657	2041.512	-245.1454	2210.832
I_fund_Q_SYM+_rc@AC [A]	0.353834	0.350154	-3.680e-3	0.477311
I_fund_Q_SYM-_rc@AC [A]	0.431451	0.428497	-2.954e-3	0.442297
I_fund_P_SYM+_rc@AC [A]	180.9612	181.0002	0.038971	181.1166
I_fund_P_SYM-_rc@AC [A]	-1.085697	-0.383668	0.702029	0.919499
U_fund_SYM+_rc@AC [V]	398.3999	398.3699	-0.029968	398.3828
U_fund_SYM-_rc@AC [V]	1.042839	1.277346	0.234506	1.047064
U+ [V]	230.0209	230.0045	-0.016332	230.0132
U- [V]	0.623138	0.598291	-0.024847	0.604451

Duration fault time



时间 [s]	A 1:00.73066	B 2:00.85217	间隔 1:00.12151	有效值
U1_tRMS_rc@AC [V]	230.4479	207.4104	-23.03748	207.4299
U2_tRMS_rc@AC [V]	229.8043	206.7460	-23.05827	206.7874
U3_tRMS_rc@AC [V]	229.7554	206.7416	-23.01381	206.7266
I1_tRMS_rc@AC [A]	179.7457	189.9995	10.25383	190.2848
I2_tRMS_rc@AC [A]	180.6240	191.6064	10.98239	191.5621
I3_tRMS_rc@AC [A]	182.7910	194.7366	11.94559	194.2745
P_t_rc@AC [W]	124910.7	119263.8	-5646.930	119223.7
Q_t_rc@AC [var]	2042.665	2078.906	36.24084	2237.702
I_fund_Q_SYM+_rc@AC [A]	0.349081	0.378480	0.029399	0.658897
I_fund_Q_SYM-_rc@AC [A]	0.343812	0.527532	0.183720	0.568250
I_fund_P_SYM+_rc@AC [A]	181.0278	192.0865	11.05873	192.0079
I_fund_P_SYM-_rc@AC [A]	-0.425027	-1.193743	-0.768715	0.918597
U_fund_SYM+_rc@AC [V]	398.3695	358.4686	-39.90091	358.4956
U_fund_SYM-_rc@AC [V]	1.209910	0.786157	-0.423753	1.012552
U+ [V]	230.0045	206.9517	-23.05284	206.9957
U- [V]	0.598291	0.572497	-0.025793	0.583521

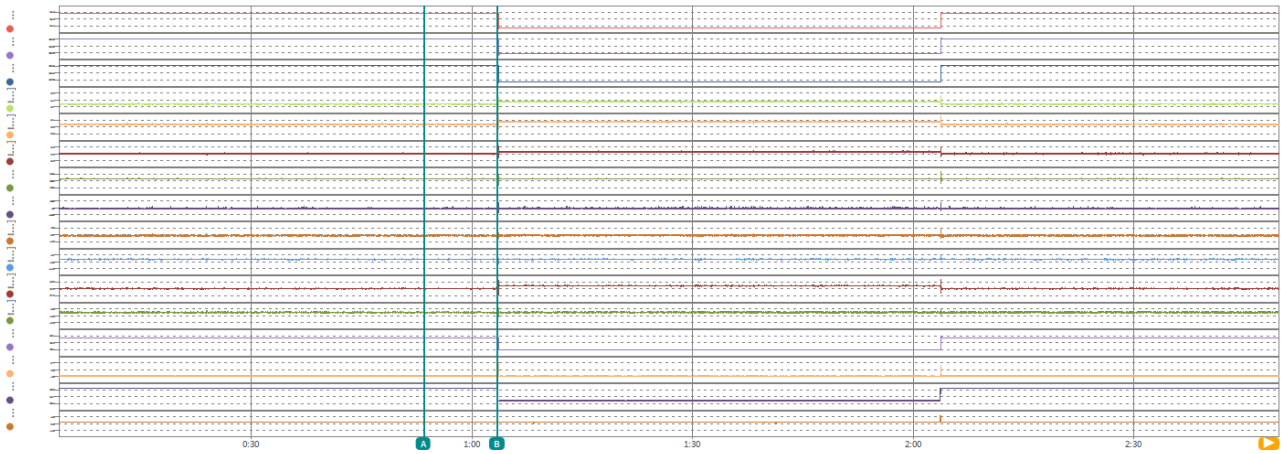
Recover time – Active power



时间 [s]	A 2:00.85315	B 2:00.91640	间隔 0.06325	有效值
U1_tRMS_rc@AC [V]	208.4131	231.2674	22.85431	227.2546
U2_tRMS_rc@AC [V]	207.0901	231.2321	24.14198	226.3738
U3_tRMS_rc@AC [V]	206.9917	229.9797	22.98801	226.7613
I1_tRMS_rc@AC [A]	188.6272	177.9784	-10.64877	189.0801
I2_tRMS_rc@AC [A]	191.3036	182.5226	-8.780960	190.6279
I3_tRMS_rc@AC [A]	194.4795	182.4583	-12.02115	192.9091
P_t_rc@AC [W]	119077.8	125269.9	6192.055	129658.1
Q_t_rc@AC [var]	5056.010	-3797.576	-8853.586	9158.276
I_fund_Q_SYM+_rc@AC [A]	0.121144	-2.171856	-2.293000	2.578450
I_fund_Q_SYM-_rc@AC [A]	0.316383	-1.143817	-1.460200	1.708664
I_fund_P_SYM+_rc@AC [A]	191.3881	180.9029	-10.48518	190.5379
I_fund_P_SYM-_rc@AC [A]	-1.870549	-0.986295	0.884254	1.785950
U_fund_SYM+_rc@AC [V]	359.3471	399.7969	40.44974	392.7101
U_fund_SYM-_rc@AC [V]	1.705049	1.397693	-0.307356	2.607195
U+ [V]	206.9517	230.1573	23.20559	217.8801
U- [V]	0.572497	0.685497	0.112999	1.095885

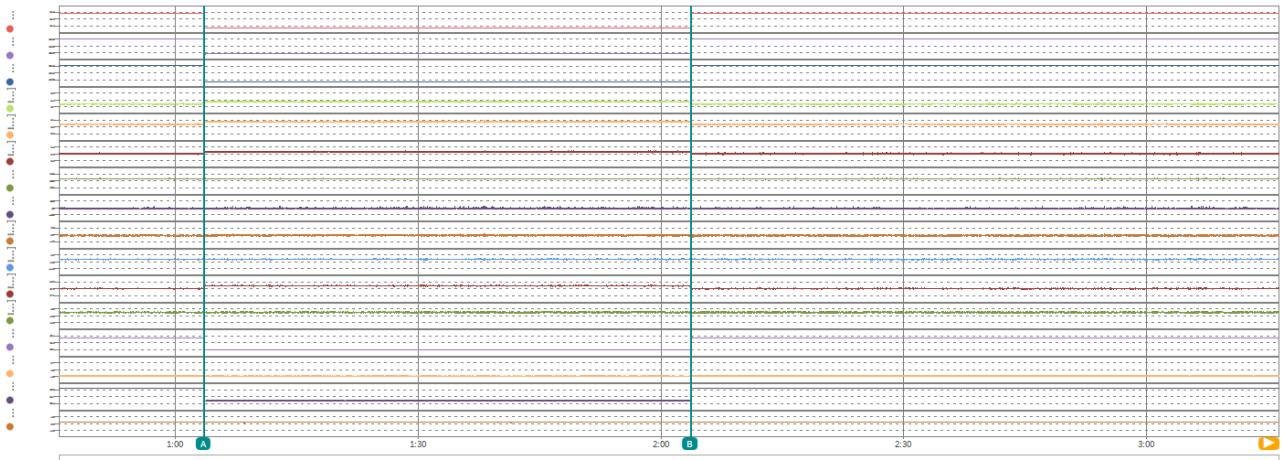
Test – VD5.2

Before fault



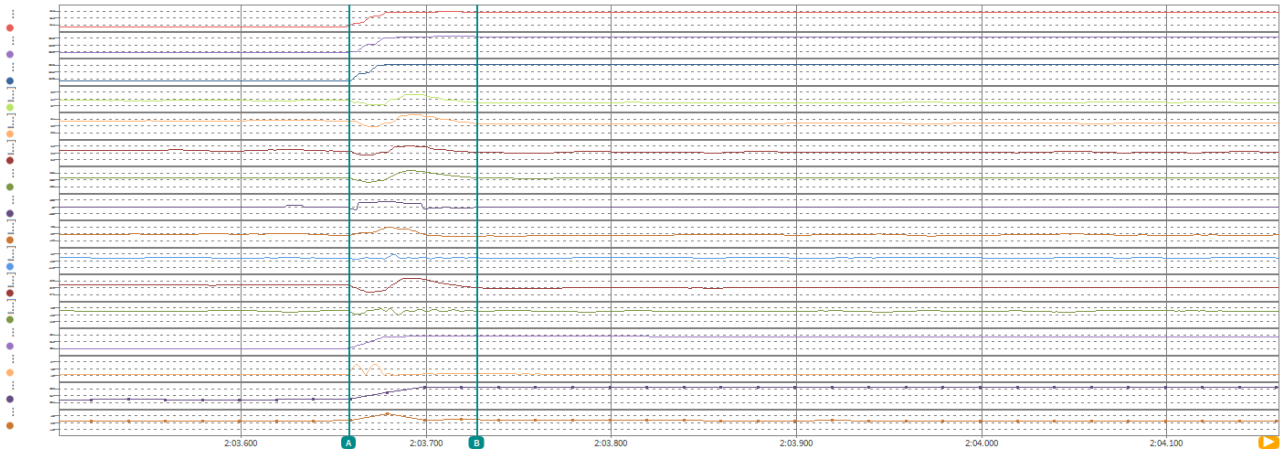
时间 [s]	A 0:53.5065	B 1:03.5387	间隔 0:10.0322	有效值
U1_tRMS_rc@AC [V]	230.2581	230.2159	-0.042175	230.2206
U2_tRMS_rc@AC [V]	229.7719	229.7662	-5.707e-3	229.7198
U3_tRMS_rc@AC [V]	229.6457	229.5566	-0.089066	229.5705
I1_tRMS_rc@AC [A]	36.88079	36.80513	-0.075668	36.49168
I2_tRMS_rc@AC [A]	36.87512	36.66589	-0.209232	36.70708
I3_tRMS_rc@AC [A]	38.35669	36.27586	-2.080837	37.36181
P_t_rc@AC [W]	25713.60	25164.18	-549.4199	25348.95
Q_t_rc@AC [var]	-1754.865	-1751.552	3.312378	1752.366
I_fund_Q_SYM+_rc@AC [A]	-0.642335	-0.983481	-0.341146	0.711205
I_fund_Q_SYM-_rc@AC [A]	0.297104	-0.121579	-0.418683	0.241009
I_fund_P_SYM+_rc@AC [A]	37.28402	36.49210	-0.791920	36.76392
I_fund_P_SYM-_rc@AC [A]	-0.371250	0.238434	0.609684	0.290690
U_fund_SYM+_rc@AC [V]	398.1812	398.1017	-0.079498	398.0861
U_fund_SYM-_rc@AC [V]	0.983138	1.131512	0.148374	0.990379
U+ [V]	229.8587	229.8610	2.244e-3	229.8419
U- [V]	0.588063	0.558822	-0.029241	0.571703

Duration fault time



时间 [s]	A 1:03.5379	B 2:03.6588	间隔 1:00.1209	有效值
U1_tRMS_rc@AC [V]	230.2159	207.1664	-23.04947	207.1893
U2_tRMS_rc@AC [V]	229.7662	206.6545	-23.11171	206.6867
U3_tRMS_rc@AC [V]	229.5566	206.3785	-23.17816	206.5349
I1_tRMS_rc@AC [A]	36.80513	40.61585	3.810722	40.62269
I2_tRMS_rc@AC [A]	36.66589	40.43094	3.765053	40.62954
I3_tRMS_rc@AC [A]	36.27586	39.95590	3.680042	41.30418
P_t_rc@AC [W]	25164.18	24965.20	-198.9844	25287.18
Q_t_rc@AC [var]	-1751.552	-1585.784	165.7688	1692.632
I_fund_Q_SYM+_rc@AC [A]	-0.983481	-1.003149	-0.019668	0.577143
I_fund_Q_SYM-_rc@AC [A]	-0.121579	-0.047935	0.073644	0.281885
I_fund_P_SYM+_rc@AC [A]	36.49210	40.25323	3.761127	40.75879
I_fund_P_SYM-_rc@AC [A]	0.238434	0.282867	0.044433	0.315230
U_fund_SYM+_rc@AC [V]	398.1017	358.0684	-40.03333	358.1909
U_fund_SYM-_rc@AC [V]	1.131512	0.879120	-0.252392	0.953893
U+ [V]	229.8610	206.8621	-22.99893	206.8226
U- [V]	0.558822	0.554008	-4.814e-3	0.550139

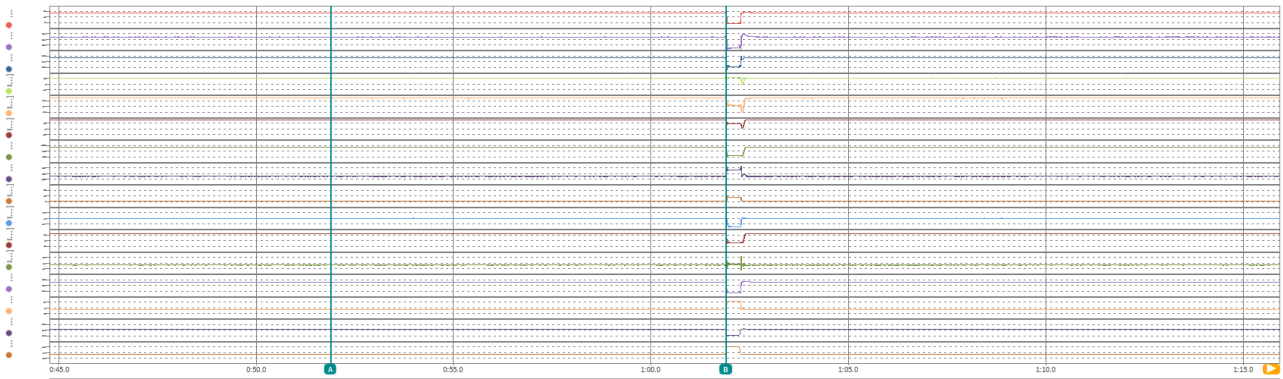
Recover time – Active power



时间 [s]	A 2:03.6585	B 2:03.7275	间隔 0.0691	有效值
U1_tRMS_rc@AC [V]	207.1664	230.9814	23.81496	226.9827
U2_tRMS_rc@AC [V]	206.6545	231.0157	24.36121	226.3367
U3_tRMS_rc@AC [V]	206.3785	229.7202	23.34178	226.4416
I1_tRMS_rc@AC [A]	40.61585	37.01892	-3.596931	41.65183
I2_tRMS_rc@AC [A]	40.43094	36.41127	-4.019665	41.43683
I3_tRMS_rc@AC [A]	39.95590	37.98598	-1.969921	41.84756
P_t_rc@AC [W]	24965.20	25564.50	599.3027	27806.11
Q_t_rc@AC [var]	-1585.784	-2519.996	-934.2120	5852.032
I_fund_Q_SYM+_rc@AC [A]	-1.003149	-2.034055	-1.030907	2.363832
I_fund_Q_SYM-_rc@AC [A]	-0.047935	0.505879	0.553814	1.205992
I_fund_P_SYM+_rc@AC [A]	40.25323	36.96014	-3.293091	40.78060
I_fund_P_SYM-_rc@AC [A]	0.282867	-0.153039	-0.435906	1.260791
U_fund_SYM+_rc@AC [V]	358.0684	399.3599	41.29156	392.3664
U_fund_SYM-_rc@AC [V]	0.879120	1.352983	0.473862	2.355963
U+ [V]	206.8621	230.8262	23.96411	219.1319
U- [V]	0.554008	0.788695	0.234687	1.071517

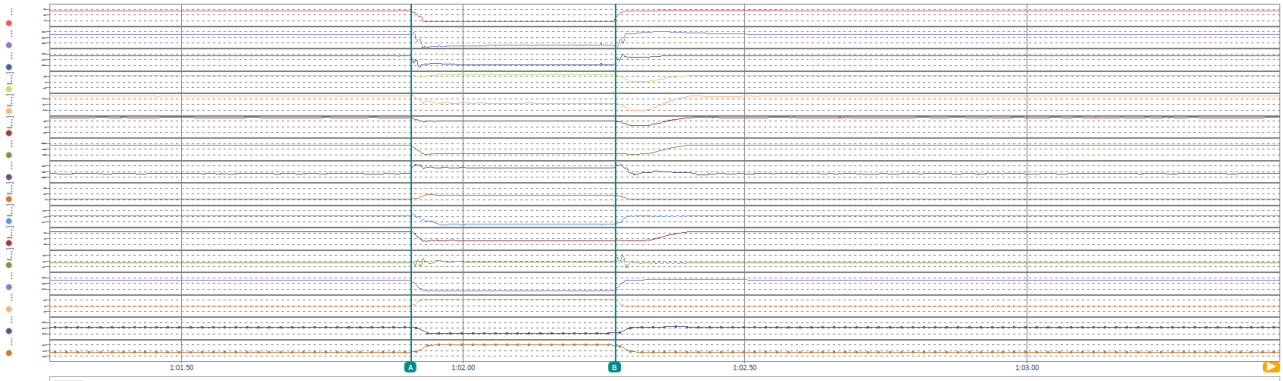
Test – VD6.1

Before fault



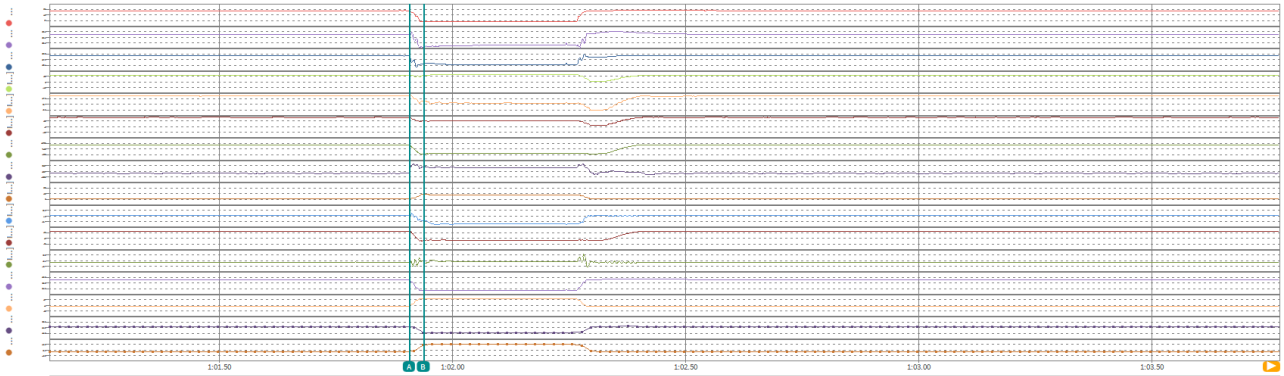
时间 [s]	A 0:51.898896	B 1:01.910211	间隔 0:10.011315	有效值
U1_tRMS_rc@AC [V]	230.5198	230.4751	-0.044708	230.5142
U2_tRMS_rc@AC [V]	229.7827	229.7680	-0.014694	229.7498
U3_tRMS_rc@AC [V]	229.5910	229.5703	-0.020721	229.6031
I1_tRMS_rc@AC [A]	179.4122	179.7539	0.341644	179.6079
I2_tRMS_rc@AC [A]	181.1548	181.0261	-0.128662	181.1798
I3_tRMS_rc@AC [A]	184.3799	183.5315	-0.848358	183.8319
P_t_rc@AC [W]	125294.6	125133.5	-161.1406	125214.8
Q_t_rc@AC [var]	2326.440	2381.365	54.92432	2310.475
I_fund_Q_SYM+_rc@AC [A]	0.998544	0.348612	-0.649933	0.553168
I_fund_Q_SYM-_rc@AC [A]	0.470079	0.416567	-0.053512	0.561098
I_fund_P_SYM+_rc@AC [A]	181.6184	181.4059	-0.212418	181.5090
I_fund_P_SYM-_rc@AC [A]	-1.204567	-0.848558	0.356009	1.045436
U_fund_SYM+_rc@AC [V]	398.3044	398.2574	-0.046936	398.2891
U_fund_SYM-_rc@AC [V]	1.137184	1.100175	-0.037009	1.119204
U+ [V]	229.9659	229.9393	-0.026581	229.9591
U- [V]	0.654066	0.737051	0.082985	0.646010

Duration fault time



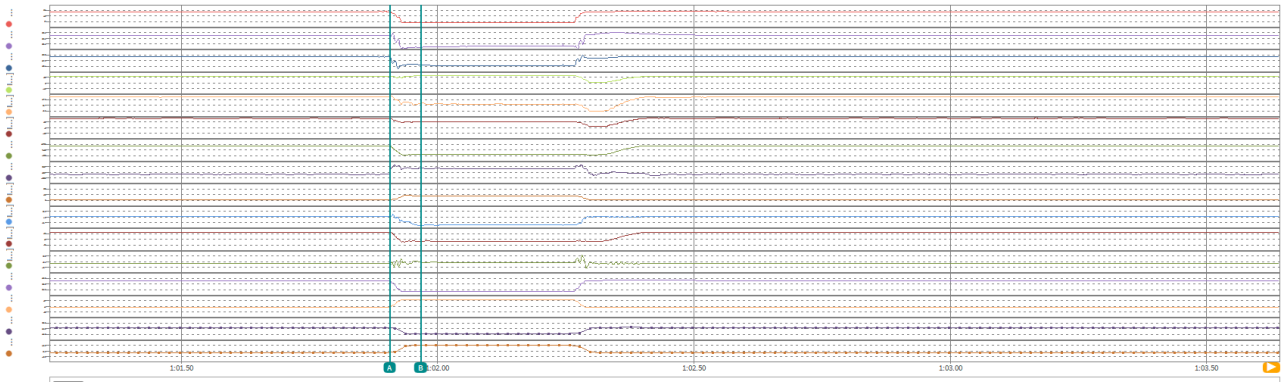
时间 [s]	A 1:01.907990	B 1:02.270221	间隔 0.362231	有效值
U1_tRMS_rc@AC [V]	230.5147	10.12896	-220.3857	44.25115
U2_tRMS_rc@AC [V]	229.7753	198.9863	-30.78896	199.9108
U3_tRMS_rc@AC [V]	229.5664	199.3753	-30.19115	200.5355
I1_tRMS_rc@AC [A]	179.6991	198.9999	19.30081	195.8863
I2_tRMS_rc@AC [A]	181.4019	95.90567	-85.49622	101.9073
I3_tRMS_rc@AC [A]	183.5063	105.1017	-78.40462	108.3925
P_t_rc@AC [W]	125208.9	2604.520	-122604.4	20493.39
Q_t_rc@AC [var]	2393.997	41973.52	39579.52	42968.75
I_fund_Q_SYM+_rc@AC [A]	0.521852	98.96721	98.44536	96.55535
I_fund_Q_SYM-_rc@AC [A]	0.255247	-100.5145	-100.7697	95.34818
I_fund_P_SYM+_rc@AC [A]	181.5039	4.959822	-176.5441	31.37035
I_fund_P_SYM-_rc@AC [A]	-0.797972	2.467233	3.265205	4.543911
U_fund_SYM+_rc@AC [V]	398.2823	208.5774	-189.7049	216.8833
U_fund_SYM-_rc@AC [V]	1.126073	189.5377	188.4116	185.3132
U+ [V]	229.9393	120.5359	-109.4034	135.3745
U- [V]	0.737051	109.5919	108.8549	102.9246

Injected reactive current at 30ms



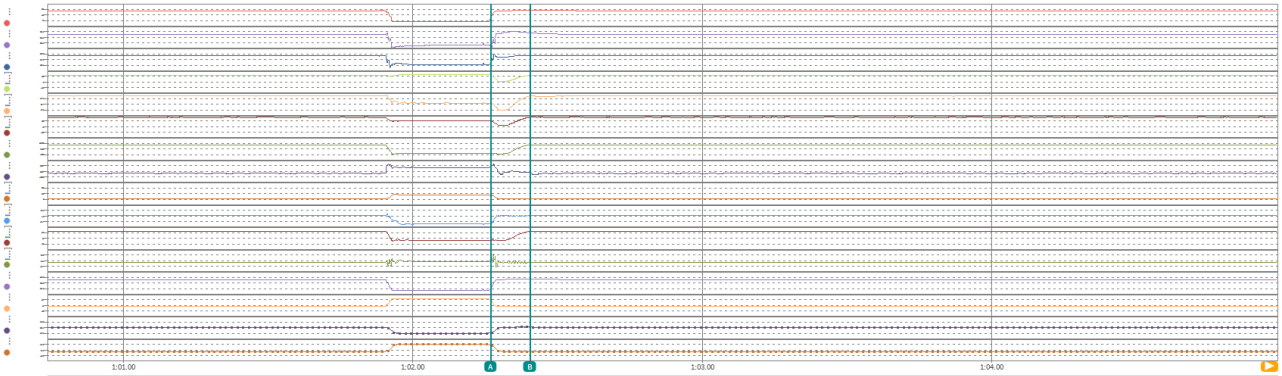
时间 [s]	A 1:01.907990	B 1:01.938931	间隔 0.030941	有效值
U1_tRMS_rc@AC [V]	230.5147	10.62768	-219.8870	145.4327
U2_tRMS_rc@AC [V]	229.7753	193.6825	-36.09273	214.2950
U3_tRMS_rc@AC [V]	229.5664	200.9363	-28.63010	206.3385
I1_tRMS_rc@AC [A]	179.6991	177.2636	-2.435486	169.4904
I2_tRMS_rc@AC [A]	181.4019	117.3827	-64.01918	146.0558
I3_tRMS_rc@AC [A]	183.5063	106.4238	-77.08246	136.0335
P_t_rc@AC [W]	125208.9	-1086.119	-126295.0	68423.65
Q_t_rc@AC [var]	2393.997	45990.47	43596.47	50822.77
I_fund_Q_SYM+_rc@AC [A]	0.521852	112.5497	112.0279	57.71110
I_fund_Q_SYM-_rc@AC [A]	0.255247	-62.86424	-63.11949	34.01702
I_fund_P_SYM+_rc@AC [A]	181.5039	-8.978258	-190.4822	104.3547
I_fund_P_SYM-_rc@AC [A]	-0.797972	7.074426	7.872398	10.60116
U_fund_SYM+_rc@AC [V]	398.2823	206.1650	-192.1173	289.0353
U_fund_SYM-_rc@AC [V]	1.126073	188.3156	187.1896	133.4913
U+ [V]	229.9393	214.5095	-15.42980	222.3583
U- [V]	0.737051	16.21588	15.47883	11.47820

Injected reactive current at 60ms



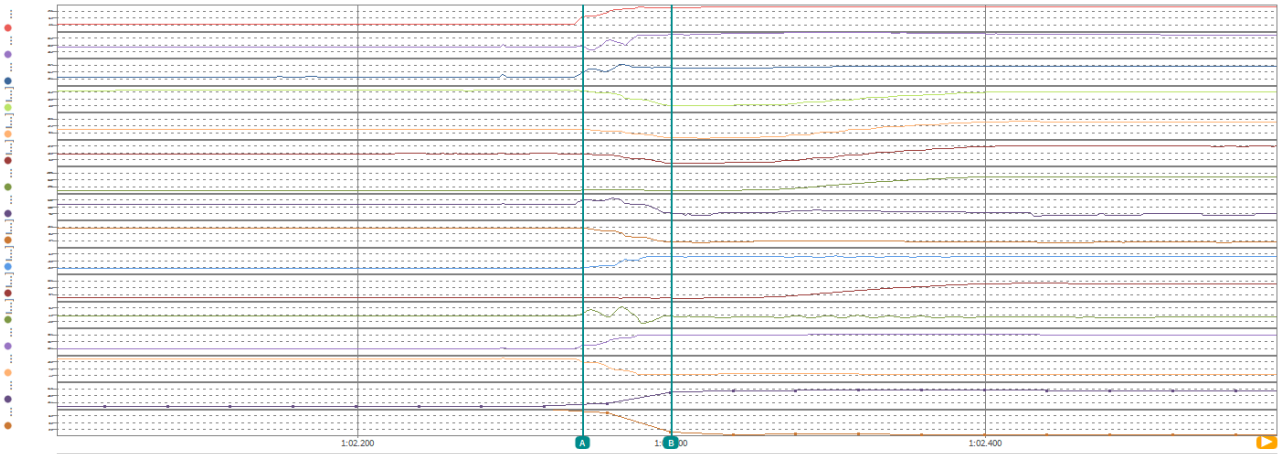
时间 [s]	A 1:01.907990	B 1:01.968255	间隔 0.060266	有效值
U1_tRMS_rc@AC [V]	230.5147	9.987732	-220.5270	105.5783
U2_tRMS_rc@AC [V]	229.7753	196.7070	-33.06822	205.8522
U3_tRMS_rc@AC [V]	229.5664	202.6205	-26.94598	204.9035
I1_tRMS_rc@AC [A]	179.6991	202.0358	22.33675	179.8147
I2_tRMS_rc@AC [A]	181.4019	104.2630	-77.13885	127.2994
I3_tRMS_rc@AC [A]	183.5063	109.4369	-74.06937	122.7533
P_t_rc@AC [W]	125208.9	2616.032	-122592.9	49622.96
Q_t_rc@AC [var]	2393.997	44624.69	42230.69	47465.26
I_fund_Q_SYM+_rc@AC [A]	0.521852	97.87431	97.35245	84.09534
I_fund_Q_SYM-_rc@AC [A]	0.255247	-106.4439	-106.6991	63.69243
I_fund_P_SYM+_rc@AC [A]	181.5039	0.623419	-180.8805	75.65698
I_fund_P_SYM-_rc@AC [A]	-0.797972	7.277145	8.075117	9.207573
U_fund_SYM+_rc@AC [V]	398.2823	209.0109	-189.2715	254.1430
U_fund_SYM-_rc@AC [V]	1.126073	190.1160	188.9899	162.8979
U+ [V]	229.9393	120.7082	-109.2311	180.7508
U- [V]	0.737051	109.7893	109.0522	73.53635

Recover time – Active power



时间 [s]	A 1:02.270457	B 1:02.405918	间隔 0.135460	有效值
U1_tRMS_rc@AC [V]	10.12896	231.7811	221.6522	221.1560
U2_tRMS_rc@AC [V]	198.9863	234.4895	35.50322	231.6883
U3_tRMS_rc@AC [V]	199.3753	230.0637	30.68842	226.8979
I1_tRMS_rc@AC [A]	198.9999	178.4541	-20.54579	110.4651
I2_tRMS_rc@AC [A]	95.90567	179.7225	83.81686	95.77022
I3_tRMS_rc@AC [A]	105.1017	184.2445	79.14288	98.58184
P_t_rc@AC [W]	2604.520	125712.1	123107.6	62483.47
Q_t_rc@AC [var]	41973.52	6751.484	-35222.04	25424.97
I_fund_Q_SYM+_rc@AC [A]	98.96721	2.583491	-96.38372	31.22952
I_fund_Q_SYM-_rc@AC [A]	-100.5145	-1.446904	99.06758	28.85430
I_fund_P_SYM+_rc@AC [A]	4.959822	180.5342	175.5744	89.52711
I_fund_P_SYM-_rc@AC [A]	2.467233	-1.522604	-3.989837	9.649336
U_fund_SYM+_rc@AC [V]	208.5774	402.0180	193.4406	387.7448
U_fund_SYM-_rc@AC [V]	189.5377	2.555239	-186.9824	43.97133
U+ [V]	120.5359	232.4901	111.9543	208.4757
U- [V]	109.5919	1.734042	-107.8579	51.60160

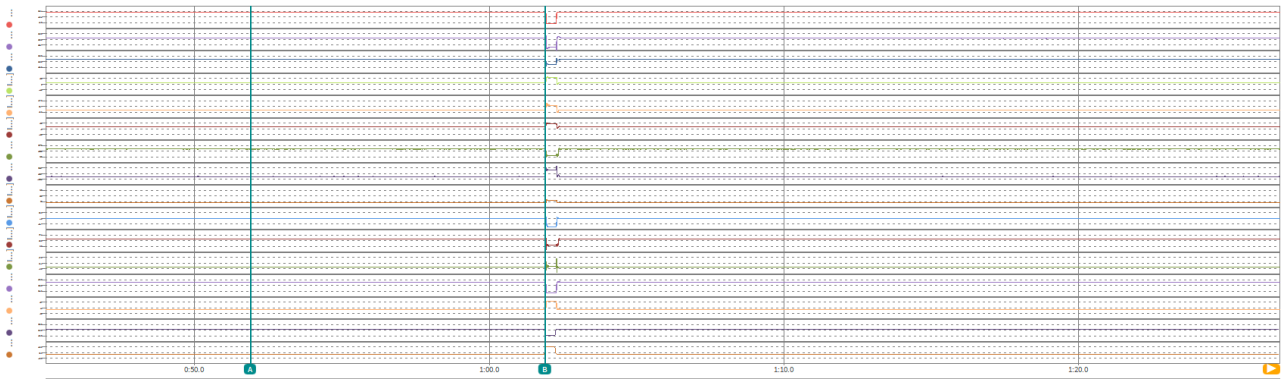
Recover time – Reactive power



时间 [s]	A 1:02.271942	B 1:02.300042	间隔 0.028101	有效值
U1_tRMS_rc@AC [V]	91.25432	226.8036	135.5493	191.2029
U2_tRMS_rc@AC [V]	200.6712	232.1798	31.50864	216.8202
U3_tRMS_rc@AC [V]	208.3117	226.3379	18.02618	224.0352
I1_tRMS_rc@AC [A]	198.6470	13.75823	-184.8887	130.1074
I2_tRMS_rc@AC [A]	96.81979	8.697648	-88.12214	65.67635
I3_tRMS_rc@AC [A]	105.1018	5.377687	-99.72412	70.87391
P_t_rc@AC [W]	2393.929	185.6685	-2208.261	4251.789
Q_t_rc@AC [var]	59402.05	6354.296	-53047.76	49383.97
I_fund_Q_SYM+_rc@AC [A]	98.29912	2.299828	-95.99929	61.18530
I_fund_Q_SYM-_rc@AC [A]	-98.82941	0.749673	99.57908	56.66658
I_fund_P_SYM+_rc@AC [A]	4.359058	0.212993	-4.146066	4.946494
I_fund_P_SYM-_rc@AC [A]	10.96328	1.855848	-9.107427	20.36849
U_fund_SYM+_rc@AC [V]	238.3301	395.6577	157.3276	344.6652
U_fund_SYM-_rc@AC [V]	159.6235	2.664953	-156.9585	82.19017
U+ [V]	120.5359	216.3233	95.78742	162.8114
U- [V]	109.5919	14.02633	-95.56557	84.19867

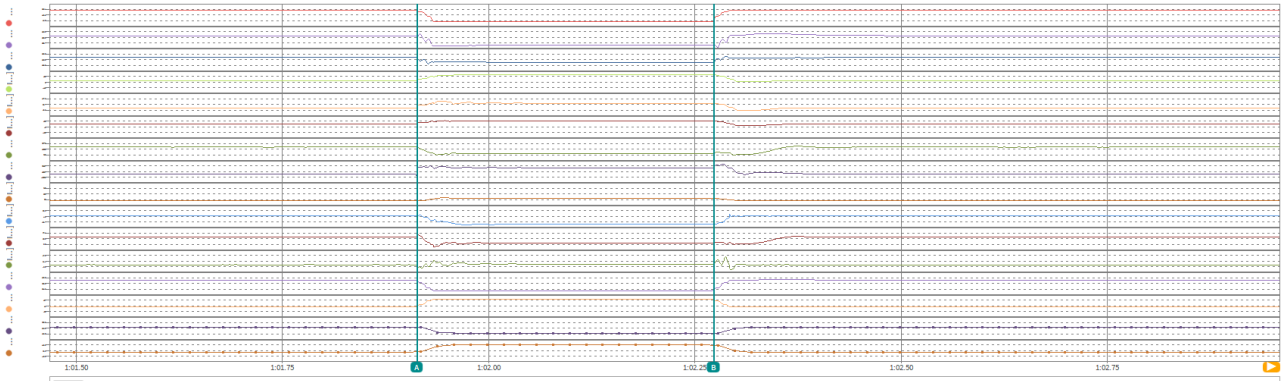
Test – VD6.2

Before fault



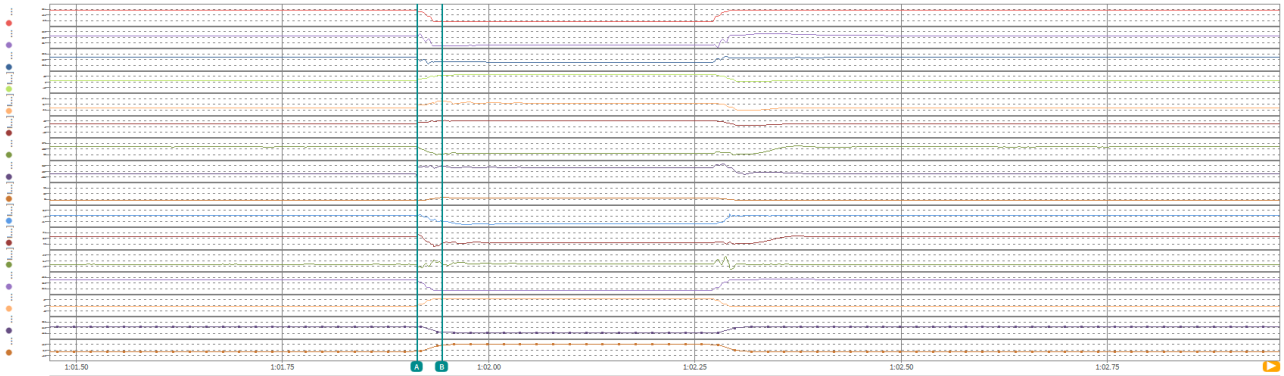
时间 [s]	A 0:51.910672	B 1:01.911508	间隔 0:10.000837	有效值
U1_tRMS_rc@AC [V]	230.2183	230.2404	0.022110	230.2650
U2_tRMS_rc@AC [V]	229.6525	229.6250	-0.027573	229.6376
U3_tRMS_rc@AC [V]	229.3062	229.3429	0.036713	229.3420
I1_tRMS_rc@AC [A]	36.78401	36.62703	-0.156975	36.47473
I2_tRMS_rc@AC [A]	36.09174	36.50266	0.410919	36.60769
I3_tRMS_rc@AC [A]	37.38226	37.21635	-0.165909	37.32724
P_t_rc@AC [W]	25270.67	25291.70	21.03516	25311.26
Q_t_rc@AC [var]	-1716.542	-1721.998	-5.455688	1656.463
I_fund_Q_SYM+_rc@AC [A]	-0.669976	-0.751325	-0.081349	0.650184
I_fund_Q_SYM-_rc@AC [A]	0.268754	0.112305	-0.156449	0.210385
I_fund_P_SYM+_rc@AC [A]	36.66876	36.69641	0.027645	36.72354
I_fund_P_SYM-_rc@AC [A]	-0.035306	0.013612	0.048918	0.234012
U_fund_SYM+_rc@AC [V]	397.8937	397.9117	0.018036	397.9325
U_fund_SYM-_rc@AC [V]	1.075999	1.109271	0.033272	1.098835
U+ [V]	229.7221	229.7360	0.013937	229.7531
U- [V]	0.615401	0.670091	0.054690	0.634063

Duration fault time



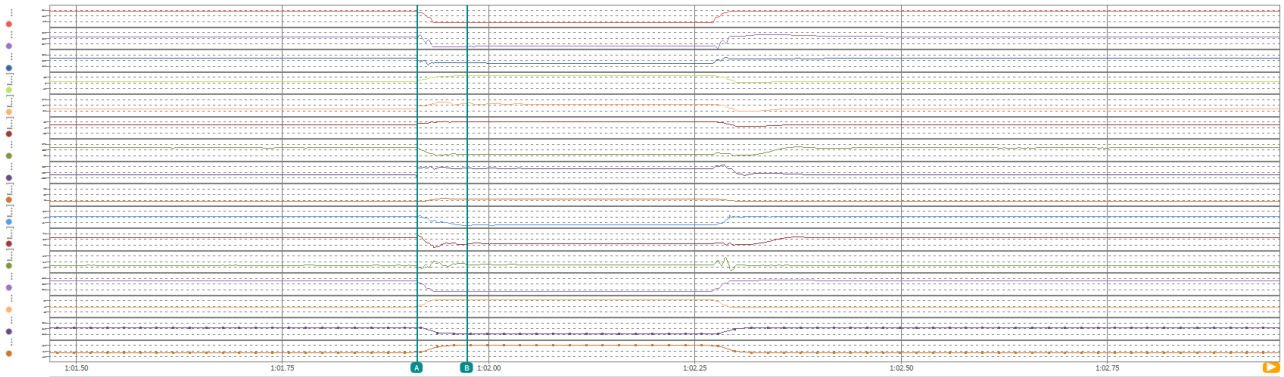
时间 [s]	A 1:01.913791	B 1:02.273043	间隔 0.359252	有效值
U1_tRMS_rc@AC [V]	230.2706	10.26957	-220.0011	41.57024
U2_tRMS_rc@AC [V]	229.6446	199.0183	-30.62630	199.8400
U3_tRMS_rc@AC [V]	229.3478	199.3313	-30.01654	200.6000
I1_tRMS_rc@AC [A]	36.61058	200.1136	163.5030	194.6605
I2_tRMS_rc@AC [A]	36.62822	95.51905	58.89083	95.75401
I3_tRMS_rc@AC [A]	37.21418	105.5358	68.32158	104.8505
P_t_rc@AC [W]	25319.49	2777.424	-22542.07	4848.278
Q_t_rc@AC [var]	-1704.597	42009.99	43714.59	42593.31
I_fund_Q_SYM+_rc@AC [A]	-0.684205	99.97591	100.6601	97.62156
I_fund_Q_SYM-_rc@AC [A]	0.049345	-100.2563	-100.3057	95.75117
I_fund_P_SYM+_rc@AC [A]	36.73394	5.164905	-31.56904	9.096222
I_fund_P_SYM-_rc@AC [A]	5.337e-3	2.755567	2.750230	4.820262
U_fund_SYM+_rc@AC [V]	397.9432	208.6812	-189.2620	216.0401
U_fund_SYM-_rc@AC [V]	1.140500	189.4169	188.2764	185.7814
U+ [V]	229.7360	120.4660	-109.2700	136.7095
U- [V]	0.670091	109.3907	108.7206	102.3746

Injected reactive current at 30ms



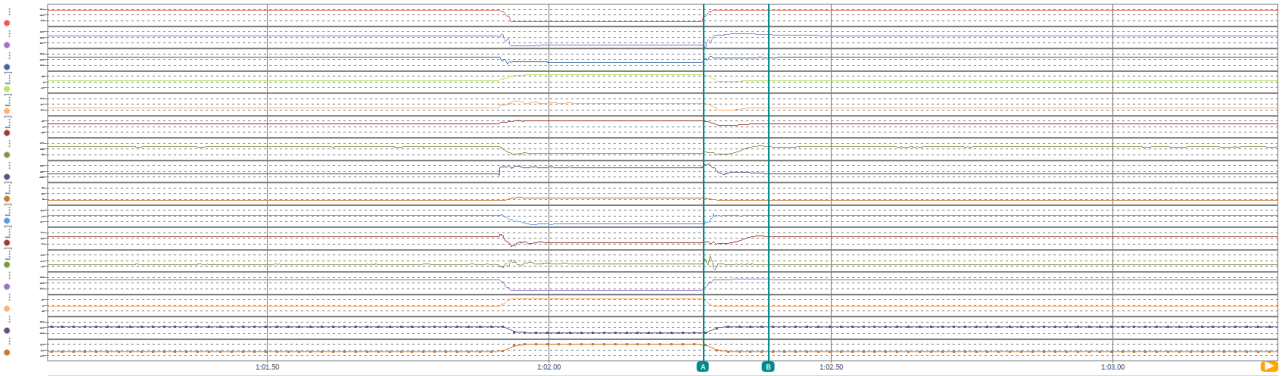
时间 [s]	A 1:01.913791	B 1:01.943956	间隔 0.030164	有效值
U1_tRMS_rc@AC [V]	230.2706	12.34088	-217.9298	135.6806
U2_tRMS_rc@AC [V]	229.6446	194.8956	-34.74907	213.5627
U3_tRMS_rc@AC [V]	229.3478	203.2689	-26.07892	206.2919
I1_tRMS_rc@AC [A]	36.61058	182.4067	145.7961	133.8846
I2_tRMS_rc@AC [A]	36.62822	116.0824	79.45415	88.68055
I3_tRMS_rc@AC [A]	37.21418	114.5212	77.30706	89.80948
P_t_rc@AC [W]	25319.49	931.6750	-24387.82	13177.88
Q_t_rc@AC [var]	-1704.597	48144.59	49849.19	45362.74
I_fund_Q_SYM+_rc@AC [A]	-0.684205	116.9533	117.6375	63.15032
I_fund_Q_SYM-_rc@AC [A]	0.049345	-62.91864	-62.96799	38.82801
I_fund_P_SYM+_rc@AC [A]	36.73394	-5.295741	-42.02968	25.16793
I_fund_P_SYM-_rc@AC [A]	5.337e-3	8.179877	8.174541	11.25353
U_fund_SYM+_rc@AC [V]	397.9432	208.2259	-189.7173	280.7820
U_fund_SYM-_rc@AC [V]	1.140500	189.6001	188.4596	141.0726
U+ [V]	229.7360	143.9098	-85.82623	202.3743
U- [V]	0.670091	85.76526	85.09517	49.78021

Injected reactive current at 60ms



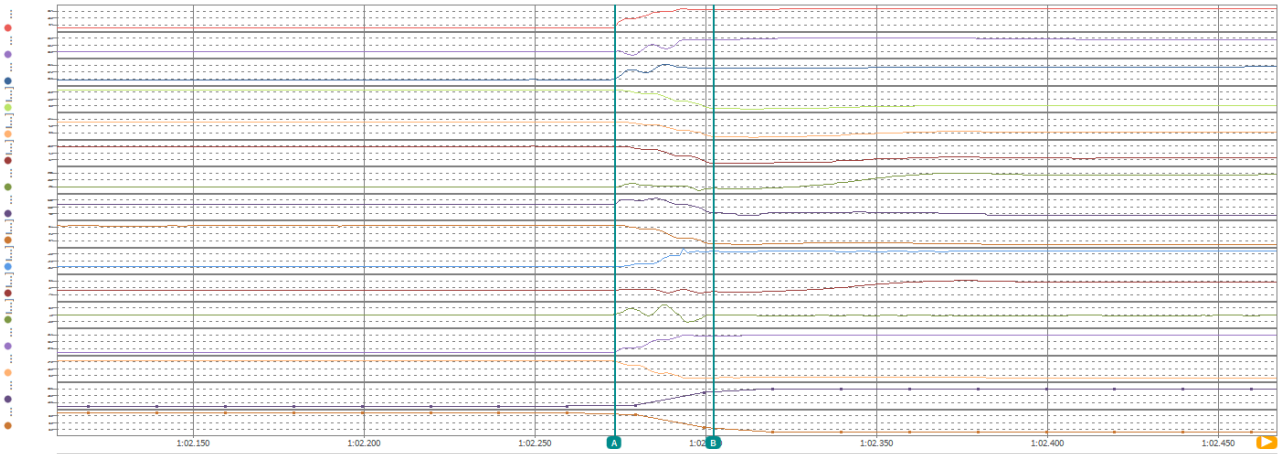
时间 [s]	A 1:01.913791	B 1:01.974206	间隔 0.060415	有效值
U1_tRMS_rc@AC [V]	230.2706	10.14152	-220.1291	97.79080
U2_tRMS_rc@AC [V]	229.6446	195.9793	-33.66531	205.2792
U3_tRMS_rc@AC [V]	229.3478	202.4031	-26.94469	205.1831
I1_tRMS_rc@AC [A]	36.61058	201.1485	164.5379	166.1895
I2_tRMS_rc@AC [A]	36.62822	104.3844	67.75620	95.99314
I3_tRMS_rc@AC [A]	37.21418	110.3711	73.15689	98.92199
P_t_rc@AC [W]	25319.49	2918.850	-22400.64	9757.259
Q_t_rc@AC [var]	-1704.597	44741.48	46446.07	44825.15
I_fund_Q_SYM+_rc@AC [A]	-0.684205	99.55122	100.2354	86.86619
I_fund_Q_SYM-_rc@AC [A]	0.049345	-104.1780	-104.2273	67.58360
I_fund_P_SYM+_rc@AC [A]	36.73394	1.255348	-35.47860	18.42705
I_fund_P_SYM-_rc@AC [A]	5.337e-3	7.494963	7.489626	9.433606
U_fund_SYM+_rc@AC [V]	397.9432	208.7084	-189.2348	248.8284
U_fund_SYM-_rc@AC [V]	1.140500	189.3345	188.1940	166.7732
U+ [V]	229.7360	120.8718	-108.8642	185.3889
U- [V]	0.670091	109.9559	109.2858	69.86506

Recover time – Active power



时间 [s]	A 1:02.273736	B 1:02.389753	间隔 0.116017	有效值
U1_tRMS_rc@AC [V]	10.26957	229.9261	219.6565	218.0539
U2_tRMS_rc@AC [V]	199.0183	234.1046	35.08626	230.3229
U3_tRMS_rc@AC [V]	199.3313	228.2474	28.91609	225.5617
I1_tRMS_rc@AC [A]	200.1136	37.69880	-162.4148	75.49436
I2_tRMS_rc@AC [A]	95.51905	36.72287	-58.79618	42.52330
I3_tRMS_rc@AC [A]	105.5358	38.94017	-66.59558	45.73821
P_t_rc@AC [W]	2777.424	25949.99	23172.57	15931.01
Q_t_rc@AC [var]	42009.99	-3251.681	-45261.67	26090.19
I_fund_Q_SYM+_rc@AC [A]	99.97591	-0.897993	-100.8739	34.44528
I_fund_Q_SYM-_rc@AC [A]	-100.2563	-0.254622	100.0017	32.16956
I_fund_P_SYM+_rc@AC [A]	5.164905	37.49128	32.32638	22.87787
I_fund_P_SYM-_rc@AC [A]	2.755567	-0.533546	-3.289113	10.02569
U_fund_SYM+_rc@AC [V]	208.6812	399.6838	191.0026	383.3410
U_fund_SYM-_rc@AC [V]	189.4169	3.192971	-186.2239	49.17641
U+ [V]	120.4660	231.3114	110.8454	201.8010
U- [V]	109.3907	2.297391	-107.0933	57.48815

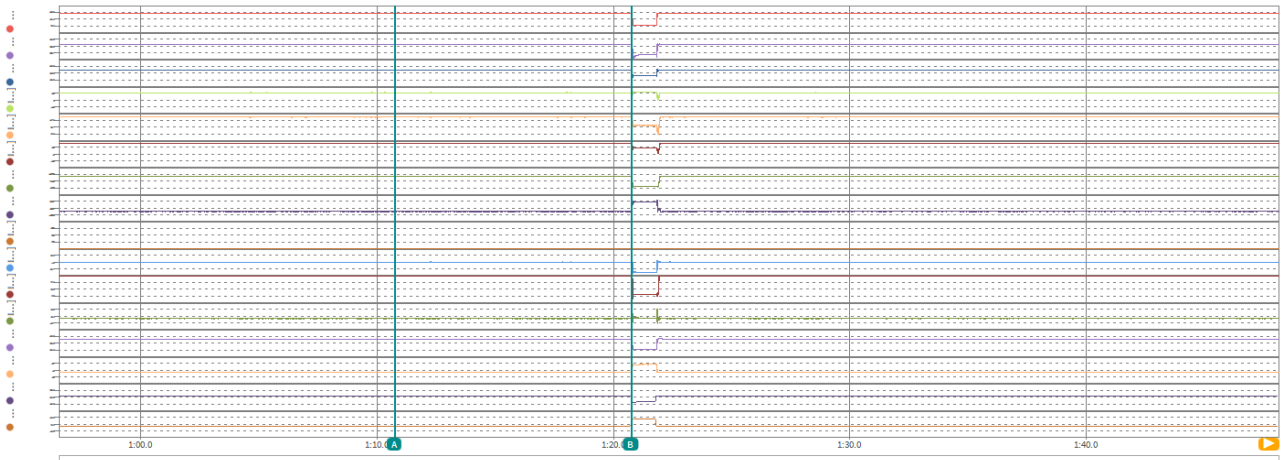
Recover time – Reactive power



时间 [s]	A 1:02.273404	B 1:02.302402	间隔 0.028998	有效值
U1_tRMS_rc@AC [V]	10.26957	227.3971	217.1275	181.3160
U2_tRMS_rc@AC [V]	199.0183	231.8395	32.82117	214.8357
U3_tRMS_rc@AC [V]	199.3313	226.4095	27.07823	222.0175
I1_tRMS_rc@AC [A]	200.1136	12.87210	-187.2415	141.3829
I2_tRMS_rc@AC [A]	95.51905	11.52028	-83.99877	69.99424
I3_tRMS_rc@AC [A]	105.5358	8.080202	-97.45556	76.22267
P_t_rc@AC [W]	2777.424	507.5772	-2269.846	5081.367
Q_t_rc@AC [var]	42009.99	7410.005	-34599.98	50415.88
I_fund_Q_SYM+_rc@AC [A]	99.97591	3.310964	-96.66495	67.53332
I_fund_Q_SYM-_rc@AC [A]	-100.2563	0.363039	100.6194	63.48399
I_fund_P_SYM+_rc@AC [A]	5.164905	0.686835	-4.478070	6.108755
I_fund_P_SYM-_rc@AC [A]	2.755567	2.540056	-0.215511	19.69294
U_fund_SYM+_rc@AC [V]	208.6812	395.8413	187.1601	332.8840
U_fund_SYM-_rc@AC [V]	189.4169	1.353222	-188.0637	96.79139
U+ [V]	120.4660	204.4631	83.99706	155.6397
U- [V]	109.3907	26.00803	-83.38270	87.75865

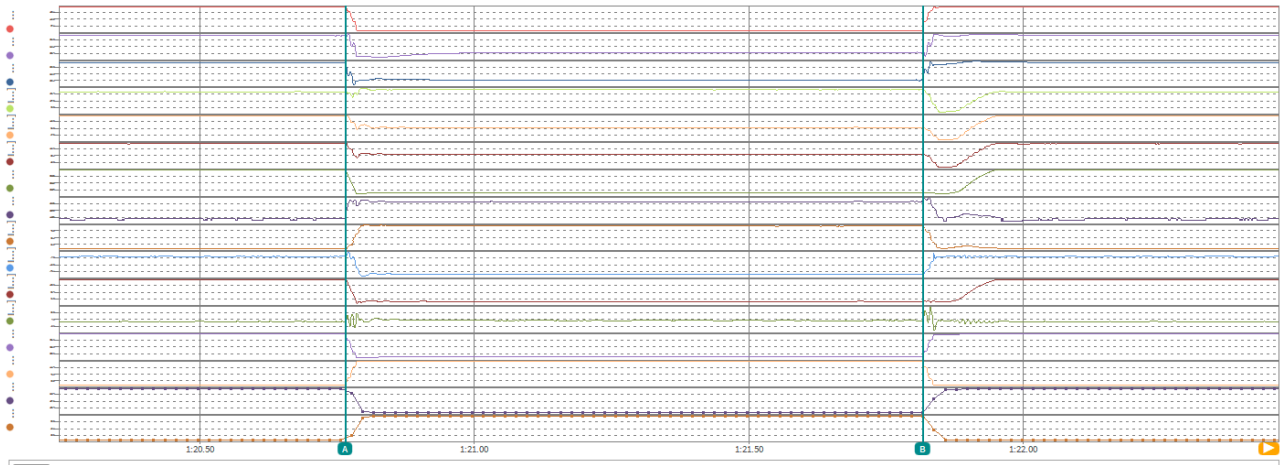
Test – VD7.1

Before fault



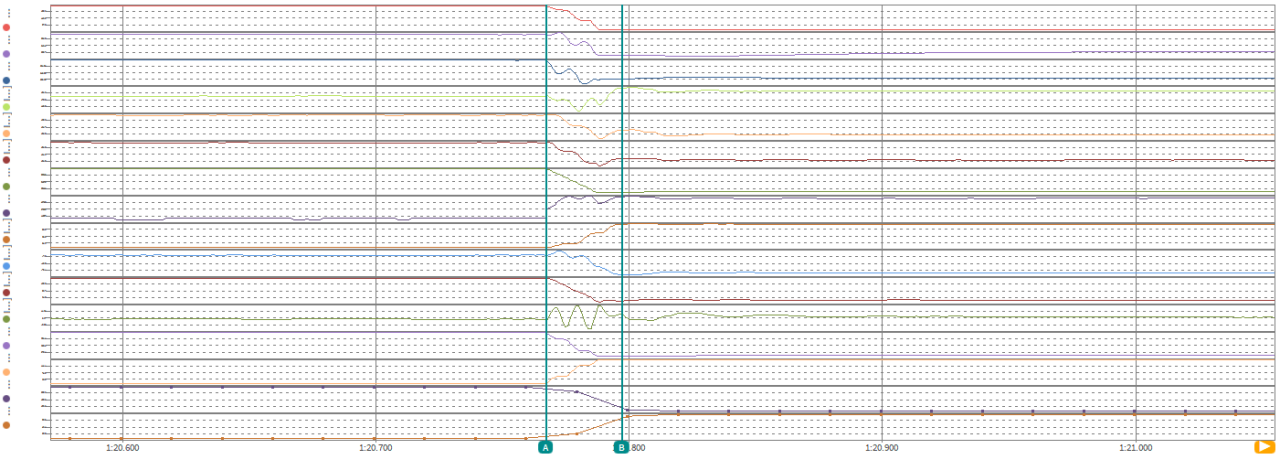
时间 [s]	A 1:10.76554	B 1:20.76766	间隔 0:10.00213	有效值
U1_tRMS_rc@AC [V]	230.4936	230.4585	-0.035095	230.4854
U2_tRMS_rc@AC [V]	229.8983	229.8951	-3.220e-3	229.8792
U3_tRMS_rc@AC [V]	229.7905	229.7739	-0.016556	229.7787
I1_tRMS_rc@AC [A]	179.5987	179.8369	0.238235	179.7393
I2_tRMS_rc@AC [A]	182.6935	181.3058	-1.387680	181.1859
I3_tRMS_rc@AC [A]	183.7288	184.1183	0.389496	183.7774
P_t_rc@AC [W]	125593.2	125407.1	-186.0859	125282.2
Q_t_rc@AC [var]	2414.939	2491.736	76.79736	2421.426
I_fund_Q_SYM+_rc@AC [A]	1.252537	0.180176	-1.072361	0.606964
I_fund_Q_SYM-_rc@AC [A]	-0.528535	0.503590	1.032125	0.604397
I_fund_P_SYM+_rc@AC [A]	181.9735	181.7181	-0.255386	181.5333
I_fund_P_SYM-_rc@AC [A]	-1.087197	-0.878342	0.208854	1.007217
U_fund_SYM+_rc@AC [V]	398.4714	398.4378	-0.033600	398.4485
U_fund_SYM-_rc@AC [V]	1.015306	0.726736	-0.288571	1.030122
U+ [V]	230.0522	230.0442	-8.008e-3	230.0511
U- [V]	0.585692	0.776866	0.191174	0.594501

Duration fault time



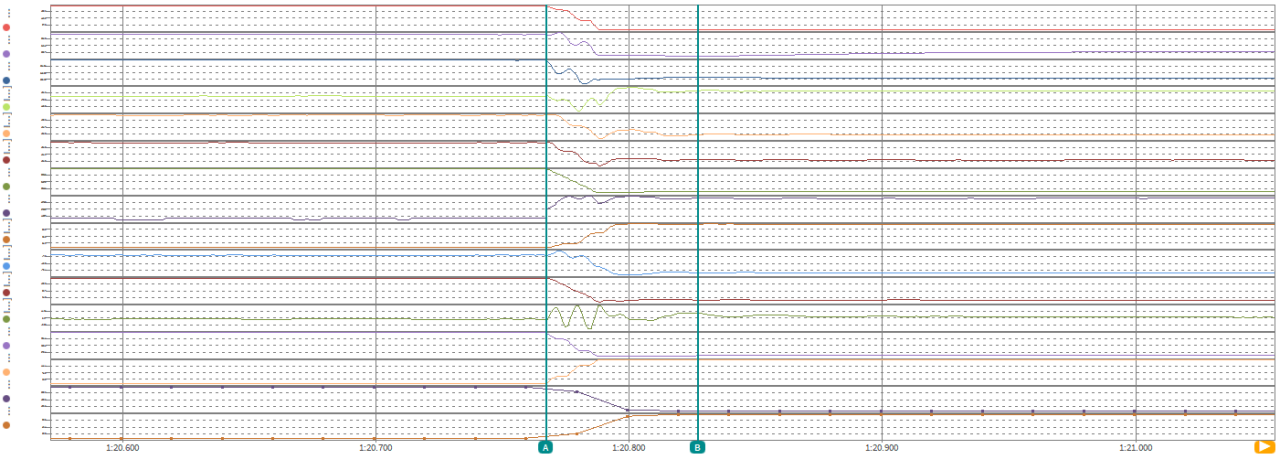
时间 [s]	A 1:20.766300	B 1:21.817300	间隔 1.051000	有效值
U1_tRMS_rc@AC [V]	230.5036	57.58035	-172.9232	62.58768
U2_tRMS_rc@AC [V]	229.8988	202.2505	-27.64833	201.0390
U3_tRMS_rc@AC [V]	229.7760	202.8220	-26.95395	202.1376
I1_tRMS_rc@AC [A]	179.4139	197.9086	18.49469	196.7744
I2_tRMS_rc@AC [A]	181.1438	97.87243	-83.27135	98.62788
I3_tRMS_rc@AC [A]	184.1192	104.2591	-79.86011	104.7168
P_t_rc@AC [W]	125281.5	2268.822	-123012.6	11819.91
Q_t_rc@AC [var]	2501.701	52287.23	49785.53	51750.20
I_fund_Q_SYM+_rc@AC [A]	0.213830	99.15376	98.93993	97.98730
I_fund_Q_SYM-_rc@AC [A]	0.813338	-99.72782	-100.5412	98.37647
I_fund_P_SYM+_rc@AC [A]	181.5232	4.293937	-177.2293	17.50386
I_fund_P_SYM-_rc@AC [A]	-0.913922	1.505715	2.419637	2.920508
U_fund_SYM+_rc@AC [V]	398.4669	250.0876	-148.3792	251.2458
U_fund_SYM-_rc@AC [V]	0.844397	150.3309	149.4865	147.9809
U+ [V]	230.0442	144.1002	-85.94399	147.7215
U- [V]	0.776866	86.34309	85.56623	84.32842

Injected reactive current at 30ms



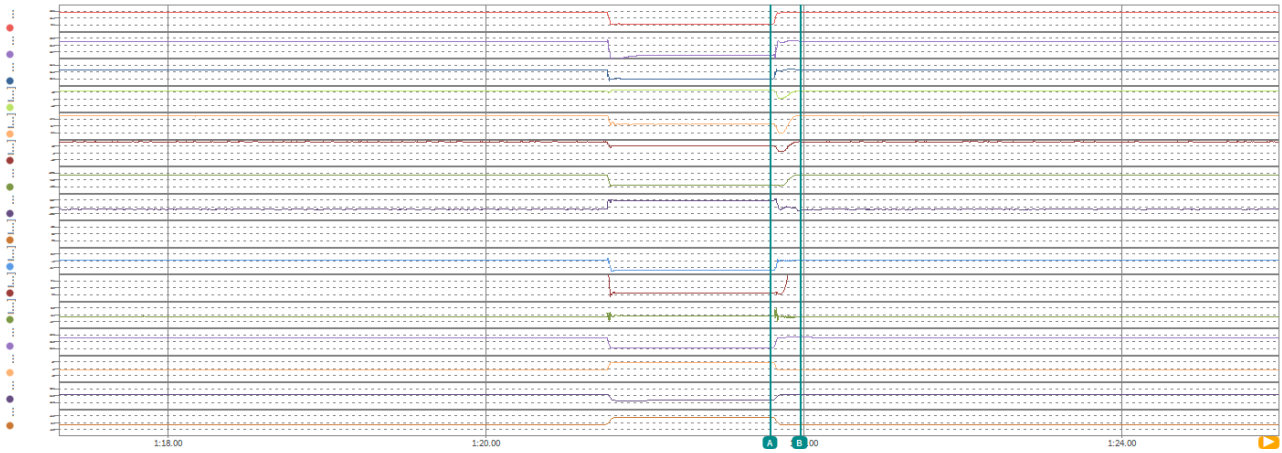
	A	B	间隔	有效值
时间 [s]	1:20.767300	1:20.797300	0.030000	
U1_tRMS_rc@AC [V]	230.4585	57.34426	-173.1142	143.9949
U2_tRMS_rc@AC [V]	229.8951	195.0415	-34.85359	212.6391
U3_tRMS_rc@AC [V]	229.7739	201.2699	-28.50406	206.7884
I1_tRMS_rc@AC [A]	179.8369	205.8774	26.04053	169.0922
I2_tRMS_rc@AC [A]	181.3058	115.0427	-66.26308	135.9352
I3_tRMS_rc@AC [A]	184.1183	108.5990	-75.51931	126.5884
P_t_rc@AC [W]	125407.1	-800.9205	-126208.0	63685.60
Q_t_rc@AC [var]	2491.736	56095.97	53604.23	48745.54
I_fund_Q_SYM+_rc@AC [A]	0.180176	100.6212	100.4410	54.62699
I_fund_Q_SYM-_rc@AC [A]	0.503590	-108.0192	-108.5228	55.01545
I_fund_P_SYM+_rc@AC [A]	181.7181	-5.869673	-187.5878	93.62778
I_fund_P_SYM-_rc@AC [A]	-0.878342	6.459157	7.337499	11.05305
U_fund_SYM+_rc@AC [V]	398.4378	245.6265	-152.8113	302.4387
U_fund_SYM-_rc@AC [V]	0.726736	146.5902	145.8634	108.8234
U+ [V]	230.0442	213.0488	-16.99545	221.7094
U- [V]	0.776866	17.15267	16.37581	12.14120

Injected reactive current at 60ms



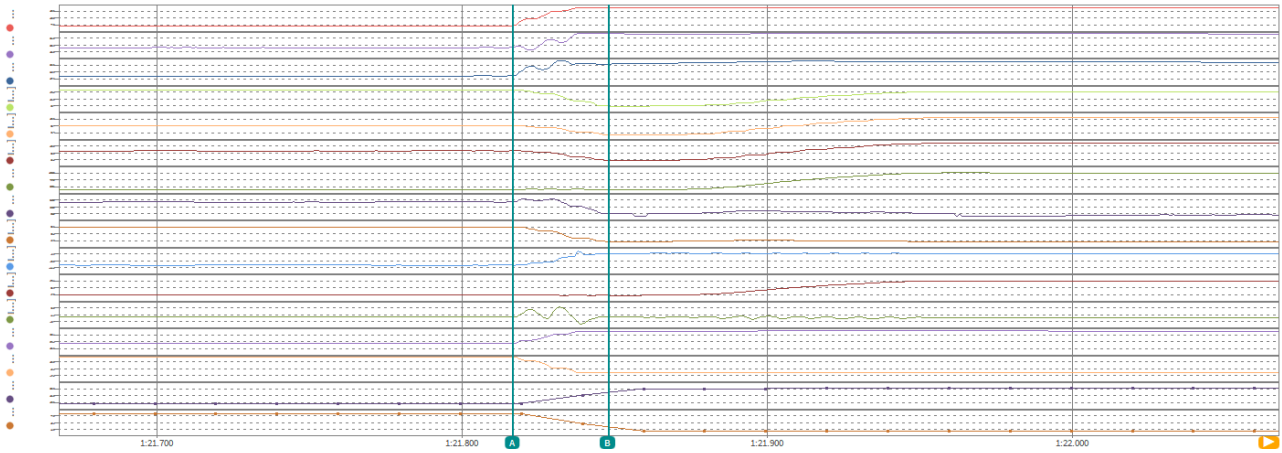
	A	B	间隔	有效值
时间 [s]	1:20.767300	1:20.827300	0.060000	
U1_tRMS_rc@AC [V]	230.4585	58.82137	-171.6371	110.4659
U2_tRMS_rc@AC [V]	229.8951	193.4728	-36.42229	203.9273
U3_tRMS_rc@AC [V]	229.7739	204.1076	-25.66638	204.8516
I1_tRMS_rc@AC [A]	179.8369	198.8499	19.01305	185.1201
I2_tRMS_rc@AC [A]	181.3058	97.58498	-83.72083	120.8498
I3_tRMS_rc@AC [A]	184.1183	107.2259	-76.89237	117.3502
P_t_rc@AC [W]	125407.1	3275.300	-122131.8	45451.40
Q_t_rc@AC [var]	2491.736	52359.94	49868.20	51015.57
I_fund_Q_SYM+_rc@AC [A]	0.180176	101.3614	101.1812	81.24528
I_fund_Q_SYM-_rc@AC [A]	0.503590	-98.85084	-99.35443	80.66481
I_fund_P_SYM+_rc@AC [A]	181.7181	2.833517	-178.8846	66.85062
I_fund_P_SYM-_rc@AC [A]	-0.878342	8.060828	8.939171	8.608919
U_fund_SYM+_rc@AC [V]	398.4378	247.2653	-151.1724	276.4229
U_fund_SYM-_rc@AC [V]	0.726736	146.3492	145.6225	128.7945
U+ [V]	230.0442	142.3901	-87.65412	187.4774
U- [V]	0.776866	84.70251	83.92564	58.38862

Recover time – Active power



时间 [s]	A 1:21.79111	B 1:21.97811	间隔 0.18700	有效值
U1_tRMS_rc@AC [V]	57.71772	231.6921	173.9744	207.3676
U2_tRMS_rc@AC [V]	201.4456	231.0789	29.63332	224.5186
U3_tRMS_rc@AC [V]	201.8412	231.1640	29.32283	225.3565
I1_tRMS_rc@AC [A]	197.9759	179.3136	-18.66232	135.5399
I2_tRMS_rc@AC [A]	97.40031	180.2751	82.87476	110.4283
I3_tRMS_rc@AC [A]	104.2559	184.6752	80.41930	113.0022
P_t_rc@AC [W]	2254.776	125820.3	123565.6	69376.94
Q_t_rc@AC [var]	52041.89	-4292.906	-56334.80	29129.24
I_fund_Q_SYM+_rc@AC [A]	99.11651	-0.581684	-99.69819	45.56470
I_fund_Q_SYM-_rc@AC [A]	-99.94109	1.238881	101.1800	45.12294
I_fund_P_SYM+_rc@AC [A]	4.067351	181.3027	177.2354	99.80933
I_fund_P_SYM-_rc@AC [A]	1.788107	-0.846174	-2.634281	7.326617
U_fund_SYM+_rc@AC [V]	249.5917	400.6345	151.0428	373.1480
U_fund_SYM-_rc@AC [V]	149.5361	0.962648	-148.5734	64.27730
U+ [V]	144.0800	231.6095	87.52945	204.6281
U- [V]	86.33495	0.487105	-85.84784	48.57590

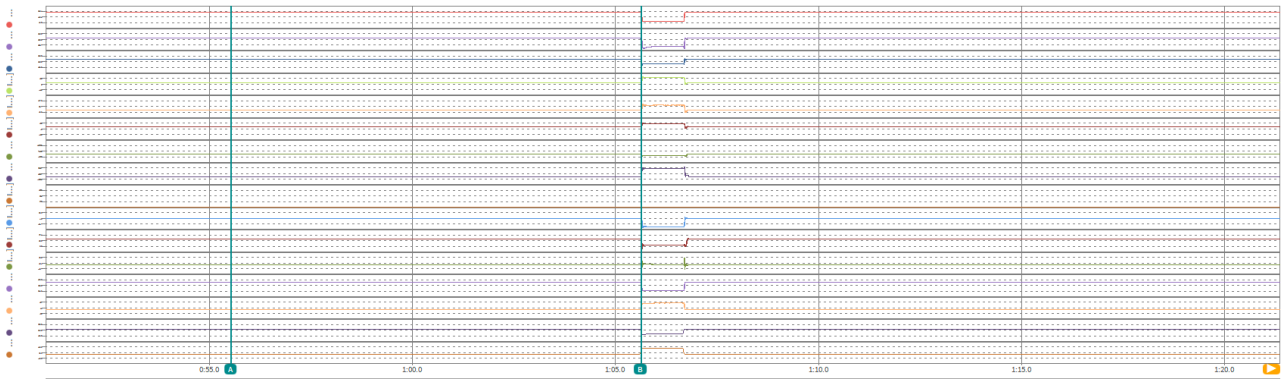
Recover time – Reactive power



时间 [s]	A 1:21.8168	B 1:21.8480	间隔 0.0312	有效值
U1_tRMS_rc@AC [V]	57.68425	226.9553	169.2711	182.7143
U2_tRMS_rc@AC [V]	201.7211	231.0201	29.29898	216.8712
U3_tRMS_rc@AC [V]	202.5556	226.4424	23.88683	221.8877
I1_tRMS_rc@AC [A]	197.5429	15.32093	-182.2220	134.7268
I2_tRMS_rc@AC [A]	97.61678	8.695770	-88.92101	67.17236
I3_tRMS_rc@AC [A]	104.0498	7.188588	-96.86120	73.46085
P_t_rc@AC [W]	2354.480	1229.401	-1125.078	3971.706
Q_t_rc@AC [var]	52109.18	7006.829	-45102.35	48569.05
I_fund_Q_SYM+_rc@AC [A]	99.04002	3.794183	-95.24584	63.56206
I_fund_Q_SYM-_rc@AC [A]	-99.54200	0.090468	99.63247	62.17664
I_fund_P_SYM+_rc@AC [A]	4.377734	1.744884	-2.632850	4.644053
I_fund_P_SYM-_rc@AC [A]	1.636314	2.072776	0.436462	17.11731
U_fund_SYM+_rc@AC [V]	249.8493	395.1378	145.2886	344.5841
U_fund_SYM-_rc@AC [V]	149.9339	2.736577	-147.1973	78.21790
U+ [V]	144.1002	193.8814	49.78116	162.6084
U- [V]	86.34309	36.65275	-49.69034	73.34800

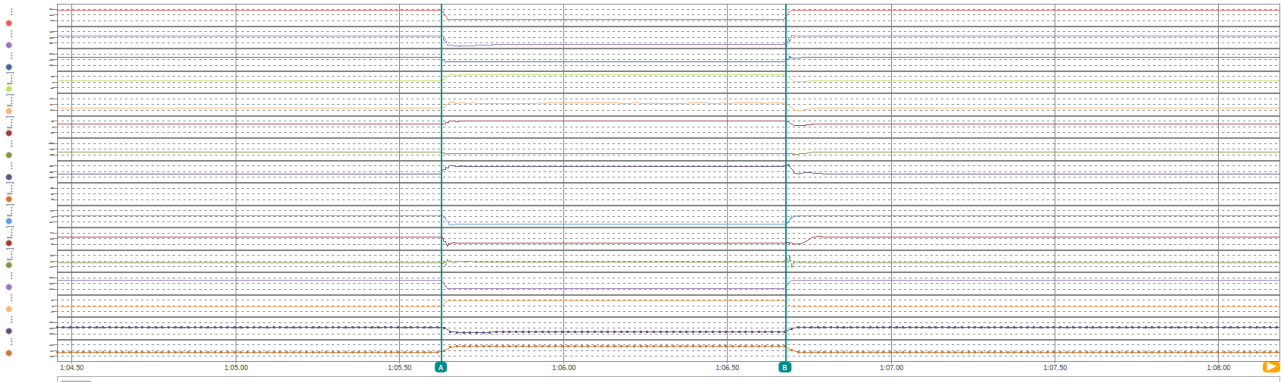
Test – VD7.2

Before fault



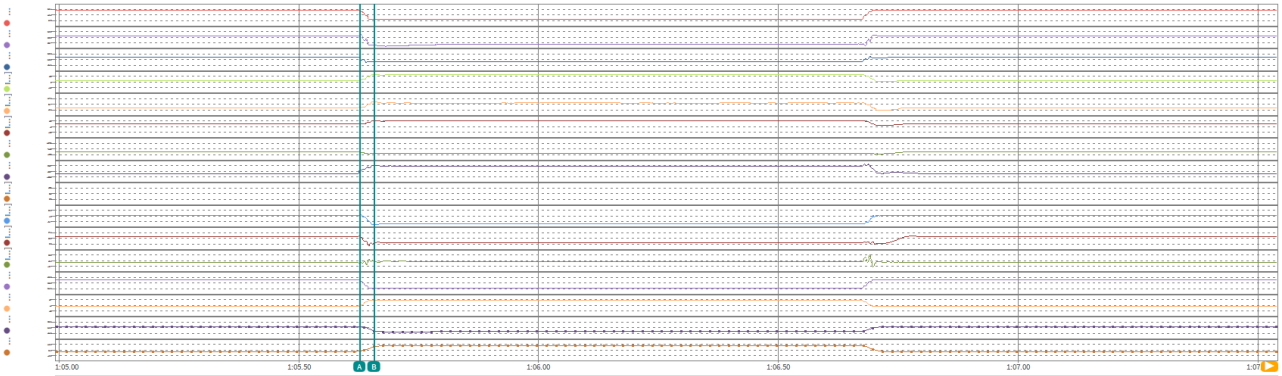
时间 [s]	A 0:55.54789	B 1:05.62880	间隔 0:10.08092	有效值
U1_tRMS_rc@AC [V]	230.2363	230.1780	-0.058228	230.2502
U2_tRMS_rc@AC [V]	229.8449	229.7141	-0.130844	229.7677
U3_tRMS_rc@AC [V]	229.6340	229.5771	-0.056976	229.5835
I1_tRMS_rc@AC [A]	36.20864	36.81898	0.610344	36.35525
I2_tRMS_rc@AC [A]	36.69894	36.81901	0.120071	36.76620
I3_tRMS_rc@AC [A]	37.35284	37.42240	0.069553	37.26957
P_t_rc@AC [W]	25297.92	25468.54	170.6191	25314.88
Q_t_rc@AC [var]	-1609.892	-1683.085	-73.19287	1735.462
I_fund_Q_SYM+_rc@AC [A]	-0.552628	-0.326619	0.226009	0.692008
I_fund_Q_SYM-_rc@AC [A]	-0.128456	0.128616	0.257072	0.173270
I_fund_P_SYM+_rc@AC [A]	36.67896	36.94127	0.262310	36.70994
I_fund_P_SYM-_rc@AC [A]	-0.150697	-0.046962	0.103735	0.288676
U_fund_SYM+_rc@AC [V]	398.2044	398.0608	-0.143555	398.1385
U_fund_SYM-_rc@AC [V]	0.951141	0.865594	-0.085547	0.985196
U+ [V]	229.9026	229.8799	-0.022689	229.8722
U- [V]	0.559808	0.748264	0.188456	0.568606

Duration fault time



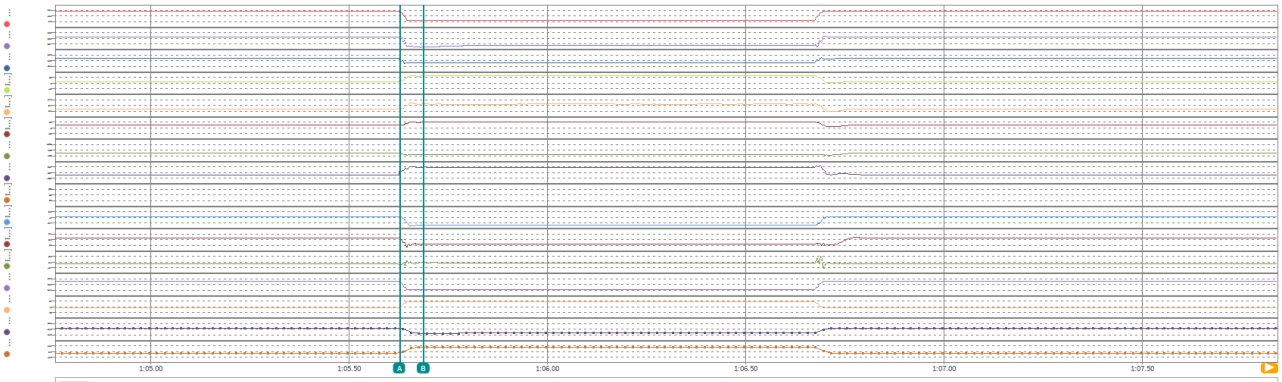
时间 [s]	A 1:05.62831	B 1:06.67792	间隔 1.04960	有效值
U1_tRMS_rc@AC [V]	230.1780	57.52966	-172.6484	62.12741
U2_tRMS_rc@AC [V]	229.7141	202.4389	-27.27513	201.1973
U3_tRMS_rc@AC [V]	229.5771	202.8548	-26.72231	202.2800
I1_tRMS_rc@AC [A]	36.81898	198.8148	161.9958	196.0536
I2_tRMS_rc@AC [A]	36.81901	96.91074	60.09173	95.79832
I3_tRMS_rc@AC [A]	37.42240	104.8571	67.43474	103.3708
P_t_rc@AC [W]	25468.54	2489.505	-22979.03	3329.379
Q_t_rc@AC [var]	-1683.085	52267.77	53950.85	51489.71
I_fund_Q_SYM+_rc@AC [A]	-0.326619	99.21796	99.54458	97.72053
I_fund_Q_SYM-_rc@AC [A]	0.128616	-100.1246	-100.2532	98.71575
I_fund_P_SYM+_rc@AC [A]	36.94127	4.399272	-32.54199	5.584547
I_fund_P_SYM-_rc@AC [A]	-0.046962	2.208382	2.255344	2.734334
U_fund_SYM+_rc@AC [V]	398.0608	250.1725	-147.8883	251.2609
U_fund_SYM-_rc@AC [V]	0.865594	150.3968	149.5312	148.2076
U+ [V]	229.8799	144.0875	-85.79234	147.8251
U- [V]	0.748264	86.32813	85.57986	84.41653

Injected reactive current at 30ms



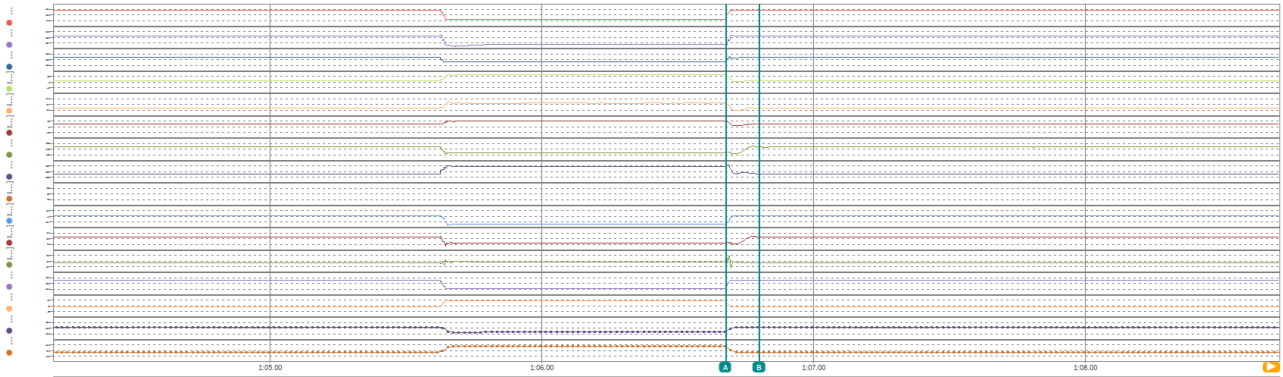
时间 [s]	A 1:05.62831	B 1:05.65834	间隔 0.03003	有效值
U1_tRMS_rc@AC [V]	230.1780	59.76106	-170.4170	142.3180
U2_tRMS_rc@AC [V]	229.7141	197.4663	-32.24771	213.7217
U3_tRMS_rc@AC [V]	229.5771	203.4913	-26.08582	207.8429
I1_tRMS_rc@AC [A]	36.81898	205.0075	168.1885	130.7705
I2_tRMS_rc@AC [A]	36.81901	109.0123	72.19332	69.53064
I3_tRMS_rc@AC [A]	37.42240	112.2321	74.80975	72.05954
P_t_rc@AC [W]	25468.54	1229.059	-24239.48	12915.55
Q_t_rc@AC [var]	-1683.085	56602.65	58285.73	38699.02
I_fund_Q_SYM+_rc@AC [A]	-0.326619	98.44947	98.77609	53.31560
I_fund_Q_SYM-_rc@AC [A]	0.128616	-108.6210	-108.7496	57.80370
I_fund_P_SYM+_rc@AC [A]	36.94127	-2.405567	-39.34683	20.10524
I_fund_P_SYM-_rc@AC [A]	-0.046962	8.705914	8.752876	7.713461
U_fund_SYM+_rc@AC [V]	398.0608	249.5228	-148.5380	303.2481
U_fund_SYM-_rc@AC [V]	0.865594	147.3108	146.4452	110.2882
U+ [V]	229.8799	212.4088	-17.47103	221.3168
U- [V]	0.748264	18.15988	17.41162	12.85187

Injected reactive current at 60ms



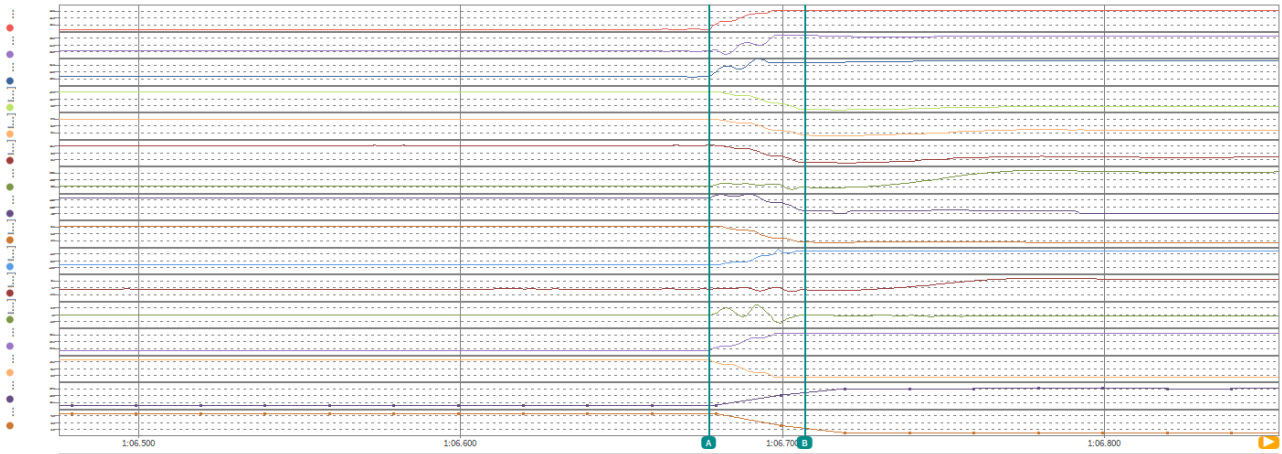
时间 [s]	A 1:05.62831	B 1:05.68920	间隔 0.06088	有效值
U1_tRMS_rc@AC [V]	230.1780	58.95811	-171.2199	109.0102
U2_tRMS_rc@AC [V]	229.7141	194.6162	-35.09781	205.0809
U3_tRMS_rc@AC [V]	229.5771	205.1950	-24.38206	206.1215
I1_tRMS_rc@AC [A]	36.81898	199.3825	162.5635	168.3782
I2_tRMS_rc@AC [A]	36.81901	97.20152	60.38251	86.37213
I3_tRMS_rc@AC [A]	37.42240	105.7169	68.29451	90.66411
P_t_rc@AC [W]	25468.54	3109.256	-22359.28	9356.980
Q_t_rc@AC [var]	-1683.085	52272.40	53955.48	46454.10
I_fund_Q_SYM+_rc@AC [A]	-0.326619	100.6368	100.9634	79.56366
I_fund_Q_SYM-_rc@AC [A]	0.128616	-99.34023	-99.46885	82.36468
I_fund_P_SYM+_rc@AC [A]	36.94127	2.713859	-34.22741	14.62761
I_fund_P_SYM-_rc@AC [A]	-0.046962	7.524613	7.571576	6.408959
U_fund_SYM+_rc@AC [V]	398.0608	248.5274	-149.5334	277.4166
U_fund_SYM-_rc@AC [V]	0.865594	147.2691	146.4035	130.2019
U+ [V]	229.8799	143.8534	-86.02650	187.8940
U- [V]	0.748264	85.13134	84.38308	58.85602

Recover time – Active power



时间 [s]	A 1:06.67668	B 1:06.80101	间隔 0.12433	有效值
U1_tRMS_rc@AC [V]	57.72838	230.0949	172.3665	218.0180
U2_tRMS_rc@AC [V]	201.4908	229.7211	28.23026	226.1954
U3_tRMS_rc@AC [V]	202.4142	230.0791	27.66490	227.4160
I1_tRMS_rc@AC [A]	198.0955	37.05194	-161.0435	73.84076
I2_tRMS_rc@AC [A]	96.51379	37.69107	-58.82272	41.94134
I3_tRMS_rc@AC [A]	104.5074	38.47935	-66.02802	45.53895
P_t_rc@AC [W]	2657.599	25824.46	23166.86	16452.47
Q_t_rc@AC [var]	51968.25	-3321.513	-55289.76	25244.23
I_fund_Q_SYM+_rc@AC [A]	98.97489	-0.632948	-99.60784	33.17254
I_fund_Q_SYM-_rc@AC [A]	-99.79803	0.266948	100.0650	32.35618
I_fund_P_SYM+_rc@AC [A]	4.614377	37.42763	32.81325	23.74243
I_fund_P_SYM-_rc@AC [A]	2.377923	-0.315330	-2.693253	8.660256
U_fund_SYM+_rc@AC [V]	249.7427	398.3083	148.5656	384.0779
U_fund_SYM-_rc@AC [V]	149.7599	0.638225	-149.1216	40.82972
U+ [V]	144.0875	230.1738	86.08631	207.0463
U- [V]	86.32813	0.354657	-85.97347	44.69530

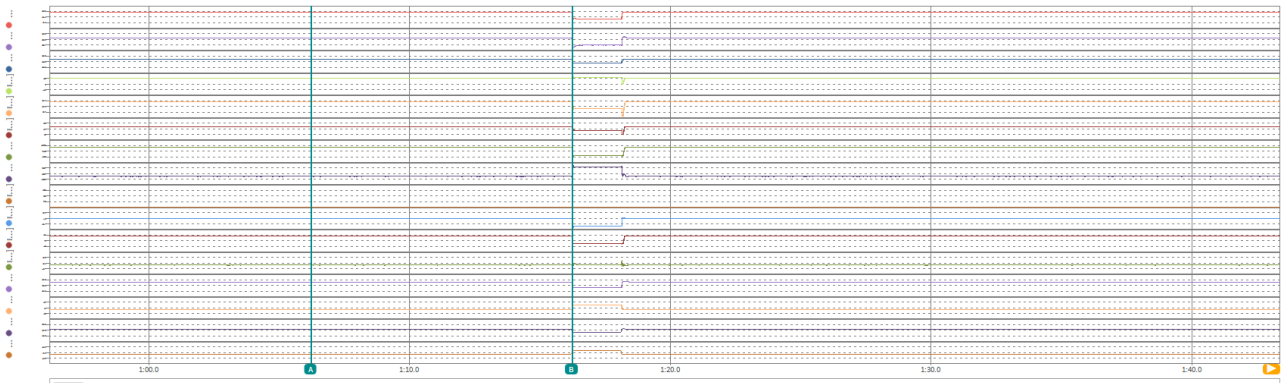
Recover time – Reactive power



时间 [s]	A 1:06.67736	B 1:06.70713	间隔 0.02978	有效值
U1_tRMS_rc@AC [V]	57.56421	226.8390	169.2748	182.7682
U2_tRMS_rc@AC [V]	202.0638	231.0508	28.98703	216.6877
U3_tRMS_rc@AC [V]	202.8063	226.4769	23.67067	221.9870
I1_tRMS_rc@AC [A]	198.6045	11.65303	-186.9515	135.8923
I2_tRMS_rc@AC [A]	96.79231	8.977223	-87.81509	66.63546
I3_tRMS_rc@AC [A]	104.7445	7.395590	-97.34886	74.04671
P_t_rc@AC [W]	2597.930	1198.520	-1399.410	4684.050
Q_t_rc@AC [var]	52168.92	6279.127	-45889.79	49028.49
I_fund_Q_SYM+_rc@AC [A]	99.14646	3.884233	-95.26223	63.97094
I_fund_Q_SYM-_rc@AC [A]	-100.0145	0.698479	100.7130	62.67588
I_fund_P_SYM+_rc@AC [A]	4.544399	1.703310	-2.841089	5.455315
I_fund_P_SYM-_rc@AC [A]	2.295604	2.541946	0.246342	17.34476
U_fund_SYM+_rc@AC [V]	250.0139	395.1096	145.0958	344.3770
U_fund_SYM-_rc@AC [V]	150.2384	2.769449	-147.4690	77.77927
U+ [V]	144.0875	195.0308	50.94323	163.1619
U- [V]	86.32813	35.38901	-50.93912	72.98215

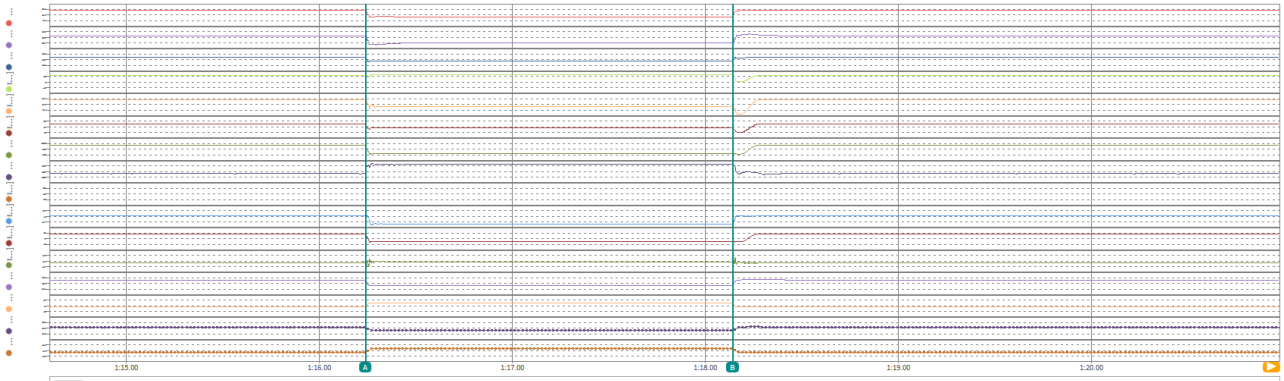
Test – VD8.1

Before fault



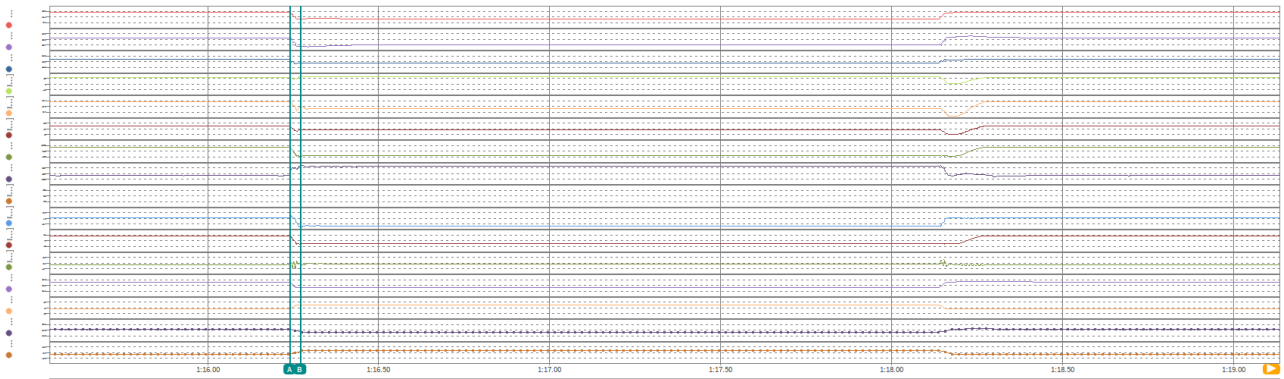
	A	B	间隔	有效值
时间 [s]	1:06.235804	1:16.240562	0:10.004758	
U1_tRMS_rc@AC [V]	230.4771	230.4839	6.760e-3	230.4976
U2_tRMS_rc@AC [V]	229.9047	229.8968	-7.904e-3	229.8846
U3_tRMS_rc@AC [V]	229.8749	229.7339	-0.140976	229.7886
I1_tRMS_rc@AC [A]	179.3906	180.1796	0.789001	179.7037
I2_tRMS_rc@AC [A]	181.1181	181.4283	0.310196	181.4060
I3_tRMS_rc@AC [A]	182.8792	184.5742	1.695007	183.8757
P_t_rc@AC [W]	125005.3	125620.0	614.6719	125355.4
Q_t_rc@AC [var]	2202.730	2313.749	111.0186	2275.888
I_fund_Q_SYM+_rc@AC [A]	0.614348	0.681523	0.067175	0.493409
I_fund_Q_SYM-_rc@AC [A]	0.162608	0.913323	0.750715	0.407480
I_fund_P_SYM+_rc@AC [A]	181.1024	182.0334	0.930923	181.6329
I_fund_P_SYM-_rc@AC [A]	-0.709708	-0.908072	-0.198364	0.955462
U_fund_SYM+_rc@AC [V]	398.5138	398.4314	-0.082367	398.4644
U_fund_SYM-_rc@AC [V]	0.984453	0.997155	0.012702	1.042467
U+ [V]	230.0396	230.0451	5.508e-3	230.0603
U- [V]	0.579084	0.851914	0.272829	0.601440

Duration fault time



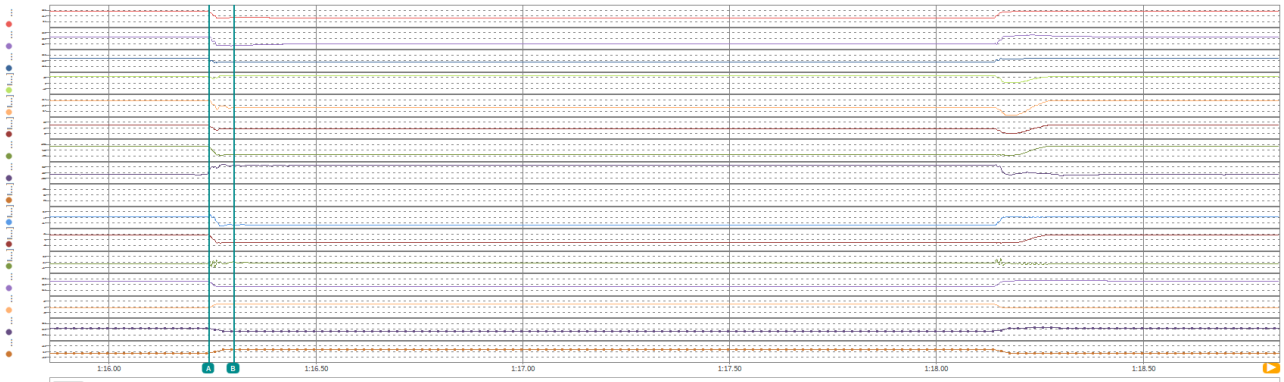
	A	B	间隔	有效值
时间 [s]	1:16.241894	1:18.143204	1.901310	
U1_tRMS_rc@AC [V]	230.4945	115.7368	-114.7577	116.4566
U2_tRMS_rc@AC [V]	229.9093	205.8870	-24.02235	205.9904
U3_tRMS_rc@AC [V]	229.7345	205.9977	-23.73680	206.5871
I1_tRMS_rc@AC [A]	180.1812	195.6985	15.51730	195.3247
I2_tRMS_rc@AC [A]	181.5355	97.28925	-84.24628	98.16026
I3_tRMS_rc@AC [A]	184.5768	101.1535	-83.42326	101.6389
P_t_rc@AC [W]	125650.4	1627.674	-124022.7	8744.112
Q_t_rc@AC [var]	2283.553	63496.64	61213.09	63341.07
I_fund_Q_SYM+_rc@AC [A]	0.745088	99.72306	98.97797	99.44137
I_fund_Q_SYM-_rc@AC [A]	0.750261	-96.77419	-97.52445	95.88030
I_fund_P_SYM+_rc@AC [A]	182.0705	2.721705	-179.3488	12.99955
I_fund_P_SYM-_rc@AC [A]	-1.022634	1.283948	2.306582	2.246943
U_fund_SYM+_rc@AC [V]	398.4451	297.7921	-100.6530	298.4188
U_fund_SYM-_rc@AC [V]	0.935166	97.66775	96.73258	97.81890
U+ [V]	230.0451	172.0581	-57.98702	173.0249
U- [V]	0.851914	56.83617	55.98426	56.14499

Injected reactive current at 30ms



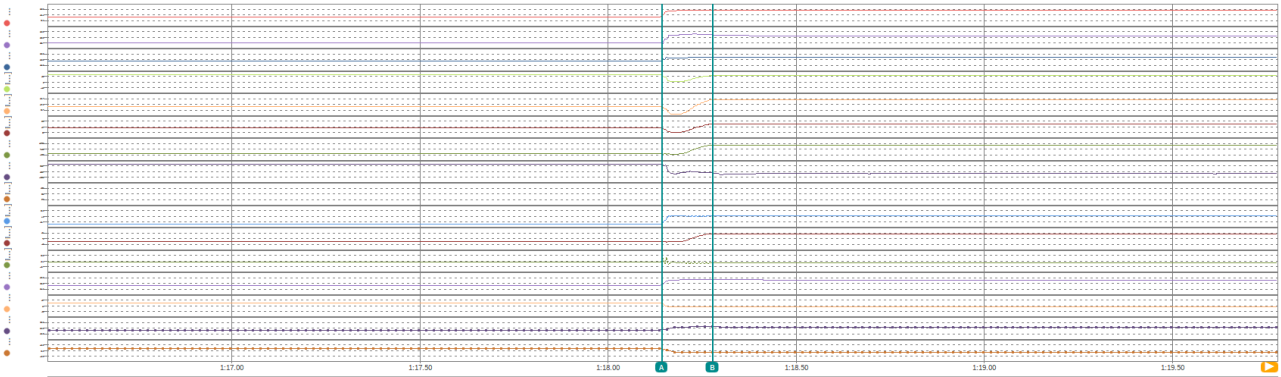
时间 [s]	A 1:16.241894	B 1:16.272419	间隔 0.030525	有效值
U1_tRMS_rc@AC [V]	230.4945	114.1531	-116.3414	166.1472
U2_tRMS_rc@AC [V]	229.9093	200.0198	-29.88956	215.0474
U3_tRMS_rc@AC [V]	229.7345	205.7305	-24.00406	211.2574
I1_tRMS_rc@AC [A]	180.1812	204.5199	24.33871	162.7551
I2_tRMS_rc@AC [A]	181.5355	113.8143	-67.72125	135.9172
I3_tRMS_rc@AC [A]	184.5768	106.4648	-78.11198	126.9239
P_t_rc@AC [W]	125650.4	-2876.718	-128527.1	67212.38
Q_t_rc@AC [var]	2283.553	67953.87	65670.31	51031.39
I_fund_Q_SYM+_rc@AC [A]	0.745088	102.2183	101.4733	48.84152
I_fund_Q_SYM-_rc@AC [A]	0.750261	-104.1073	-104.8576	47.26702
I_fund_P_SYM+_rc@AC [A]	182.0705	-9.069770	-191.1403	99.55430
I_fund_P_SYM-_rc@AC [A]	-1.022634	10.05708	11.07972	10.55964
U_fund_SYM+_rc@AC [V]	398.4451	293.3041	-105.1410	333.1543
U_fund_SYM-_rc@AC [V]	0.935166	96.44974	95.51457	70.66851
U+ [V]	230.0451	205.6652	-24.37984	218.1959
U- [V]	0.851914	23.11160	22.25969	16.35347

Injected reactive current at 60ms



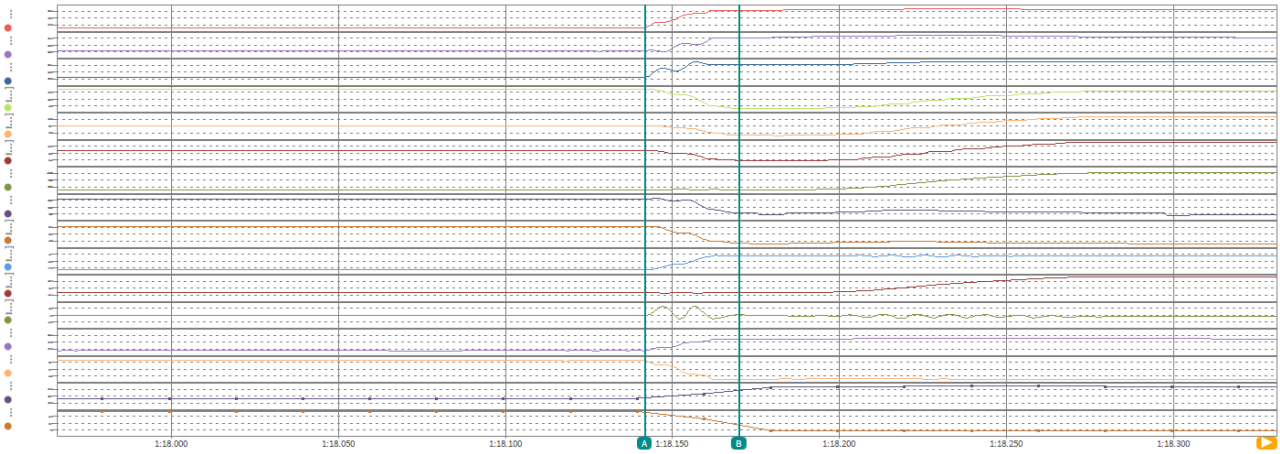
时间 [s]	A 1:16.241894	B 1:16.302228	间隔 0.060334	有效值
U1_tRMS_rc@AC [V]	230.4945	116.0185	-114.4759	143.4362
U2_tRMS_rc@AC [V]	229.9093	199.7540	-30.15530	207.8596
U3_tRMS_rc@AC [V]	229.7345	208.1380	-21.59653	209.1450
I1_tRMS_rc@AC [A]	180.1812	197.0595	16.87830	182.5165
I2_tRMS_rc@AC [A]	181.5355	97.59725	-83.93827	121.9728
I3_tRMS_rc@AC [A]	184.5768	104.6456	-79.93121	117.0323
P_t_rc@AC [W]	125650.4	2074.174	-123576.2	47950.89
Q_t_rc@AC [var]	2283.553	64105.17	61821.62	58939.51
I_fund_Q_SYM+_rc@AC [A]	0.745088	103.6118	102.8667	81.69706
I_fund_Q_SYM-_rc@AC [A]	0.750261	-94.26025	-95.01051	76.20632
I_fund_P_SYM+_rc@AC [A]	182.0705	1.297051	-180.7734	71.04308
I_fund_P_SYM-_rc@AC [A]	-1.022634	8.360235	9.382869	8.319808
U_fund_SYM+_rc@AC [V]	398.4451	295.6587	-102.7864	314.8900
U_fund_SYM-_rc@AC [V]	0.935166	96.15157	95.21641	84.19645
U+ [V]	230.0451	170.3512	-59.69385	195.6882
U- [V]	0.851914	55.56848	54.71657	40.79123

Recover time – Active power



时间 [s]	A 1:18.143131	B 1:18.277900	间隔 0.134769	有效值
U1_tRMS_rc@AC [V]	115.7368	233.9728	118.2360	225.4870
U2_tRMS_rc@AC [V]	205.8870	233.5671	27.68015	231.4507
U3_tRMS_rc@AC [V]	205.9977	230.6297	24.63199	227.6715
I1_tRMS_rc@AC [A]	195.6985	177.1442	-18.55432	106.6635
I2_tRMS_rc@AC [A]	97.28925	179.0259	81.73666	95.99156
I3_tRMS_rc@AC [A]	101.1535	184.2244	83.07084	97.31509
P_t_rc@AC [W]	1627.674	125583.9	123956.2	63213.05
Q_t_rc@AC [var]	63496.64	6443.179	-57053.46	24018.38
I_fund_Q_SYM+_rc@AC [A]	99.72306	2.544823	-97.17824	27.92662
I_fund_Q_SYM-_rc@AC [A]	-96.77419	0.120270	96.89446	24.23321
I_fund_P_SYM+_rc@AC [A]	2.721705	179.8788	177.1571	90.27844
I_fund_P_SYM-_rc@AC [A]	1.283948	-2.275422	-3.559371	5.946163
U_fund_SYM+_rc@AC [V]	297.7921	403.0773	105.2852	393.9794
U_fund_SYM-_rc@AC [V]	97.66775	2.396959	-95.27079	22.89145
U+ [V]	172.0581	233.7900	61.73196	218.8665
U- [V]	56.83617	1.690503	-55.14567	25.37546

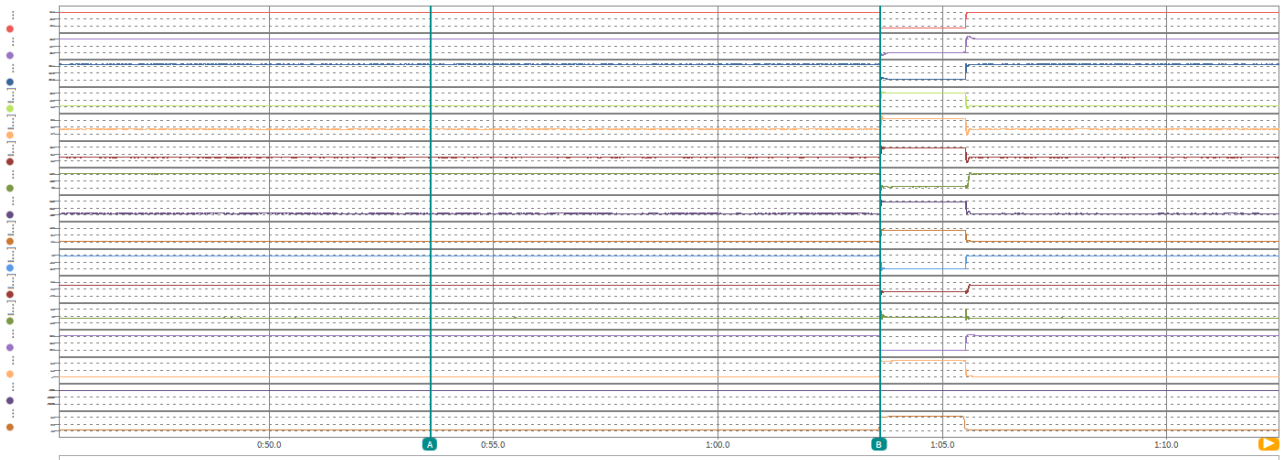
Recover time – Reactive power



时间 [s]	A 1:18.141844	B 1:18.170115	间隔 0.028271	有效值
U1_tRMS_rc@AC [V]	115.6001	227.0283	111.4282	190.4552
U2_tRMS_rc@AC [V]	206.1534	231.7757	25.62225	219.0621
U3_tRMS_rc@AC [V]	206.0025	226.3861	20.38361	221.5719
I1_tRMS_rc@AC [A]	195.8775	7.734369	-188.1432	128.6580
I2_tRMS_rc@AC [A]	97.37422	7.452763	-89.92146	66.84168
I3_tRMS_rc@AC [A]	101.2508	10.96241	-90.28836	66.91686
P_t_rc@AC [W]	1527.176	96.53168	-1430.644	1847.009
Q_t_rc@AC [var]	63557.06	5964.247	-57592.82	48947.41
I_fund_Q_SYM+_rc@AC [A]	99.81443	3.224375	-96.59005	61.68994
I_fund_Q_SYM-_rc@AC [A]	-96.86071	-1.475398	95.38531	55.28359
I_fund_P_SYM+_rc@AC [A]	2.587136	0.103150	-2.483985	3.914296
I_fund_P_SYM-_rc@AC [A]	1.146702	2.853383	1.706680	11.96378
U_fund_SYM+_rc@AC [V]	297.8345	395.5907	97.75626	358.1856
U_fund_SYM-_rc@AC [V]	97.91558	3.116863	-94.79872	52.37523
U+ [V]	172.0581	193.7875	21.72941	183.2451
U- [V]	56.83617	35.40237	-21.43380	47.34807

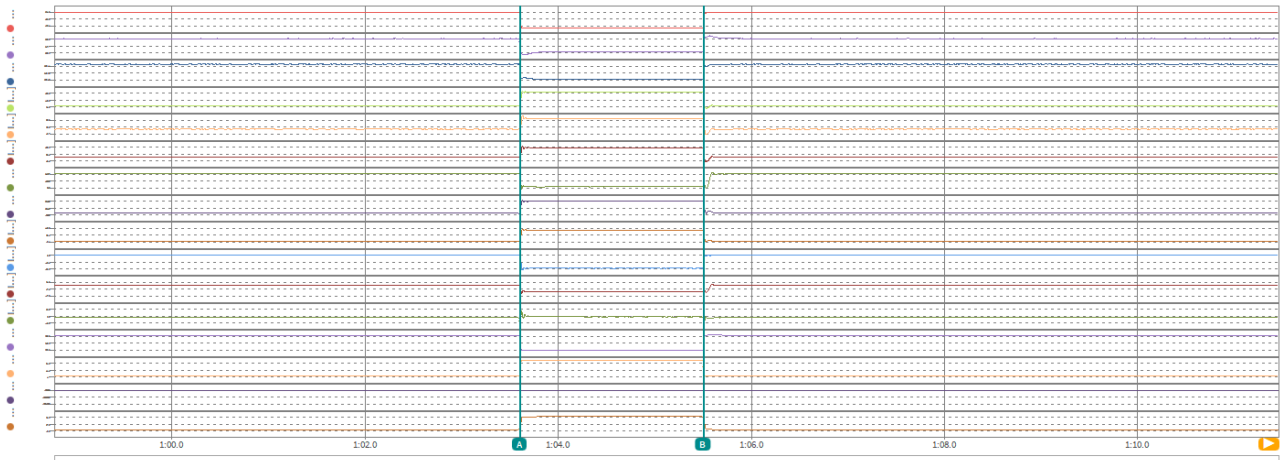
Test – VD8.2

Before fault



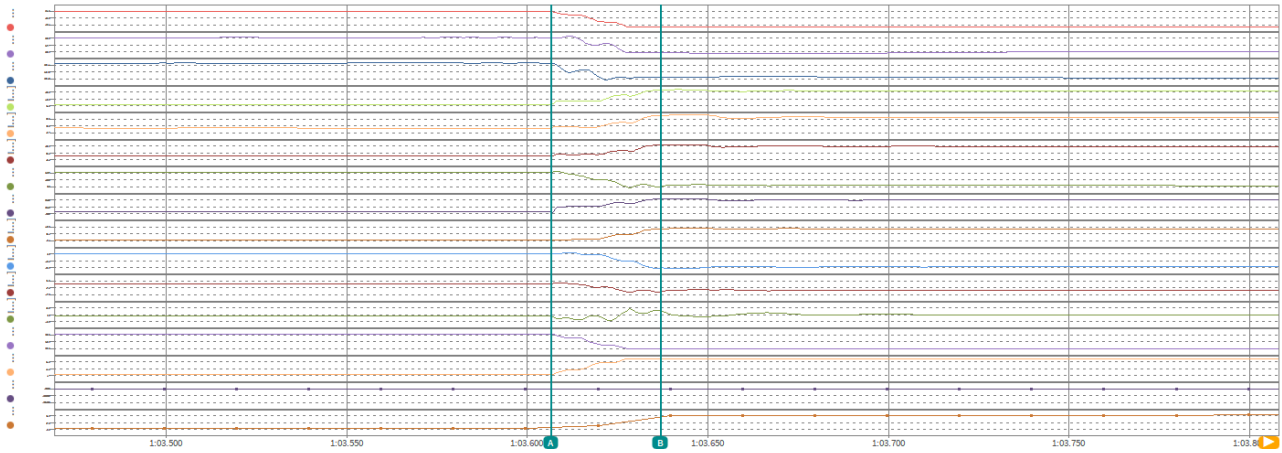
时间 [s]	A 0:53.59782	B 1:03.60655	间隔 0:10.00872	有效值
U1_tRMS_rc@AC [V]	230.2274	230.2167	-0.010666	230.2554
U2_tRMS_rc@AC [V]	229.8070	229.7569	-0.050156	229.7710
U3_tRMS_rc@AC [V]	229.5955	229.5846	-0.010864	229.5902
I1_tRMS_rc@AC [A]	37.13097	36.58398	-0.546989	36.90735
I2_tRMS_rc@AC [A]	37.27411	36.65584	-0.618271	37.25190
I3_tRMS_rc@AC [A]	37.69750	37.28230	-0.415203	37.72162
P_t_rc@AC [W]	25704.43	25328.84	-375.5918	25654.38
Q_t_rc@AC [var]	-1831.442	-1947.735	-116.2932	1798.628
I_fund_Q_SYM+_rc@AC [A]	-0.283281	-0.622335	-0.339053	0.706859
I_fund_Q_SYM-_rc@AC [A]	0.012791	-0.021651	-0.034442	0.191204
I_fund_P_SYM+_rc@AC [A]	37.27249	36.73137	-0.541122	37.20144
I_fund_P_SYM-_rc@AC [A]	0.055748	0.093939	0.038191	0.272005
U_fund_SYM+_rc@AC [V]	398.1548	398.1136	-0.041290	398.1471
U_fund_SYM-_rc@AC [V]	0.982587	1.045070	0.062483	0.995464
U+ [V]	229.8633	229.8691	5.779e-3	229.8771
U- [V]	0.574649	0.910092	0.335442	0.574499

Duration fault time



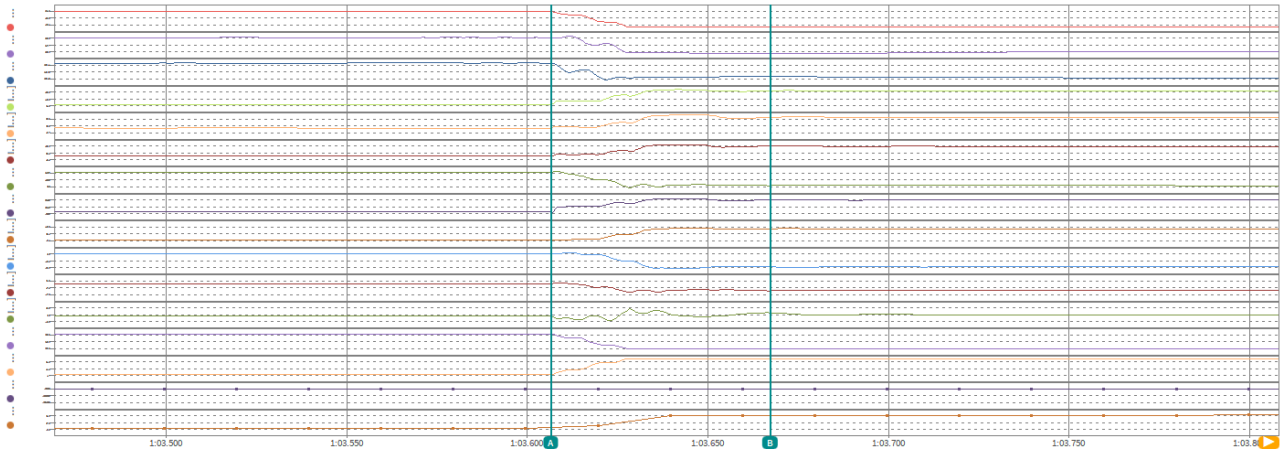
时间 [s]	A 1:03.60672	B 1:05.50609	间隔 1.89937	有效值
U1_tRMS_rc@AC [V]	230.2038	115.4879	-114.7159	116.4601
U2_tRMS_rc@AC [V]	229.7616	206.3048	-23.45682	206.0915
U3_tRMS_rc@AC [V]	229.5903	206.0629	-23.52740	206.6865
I1_tRMS_rc@AC [A]	36.68522	196.2527	159.5675	195.0653
I2_tRMS_rc@AC [A]	36.59784	97.40285	60.80501	96.82123
I3_tRMS_rc@AC [A]	37.28122	102.8997	65.61850	101.8599
P_t_rc@AC [W]	25338.01	1882.932	-23455.07	2714.589
Q_t_rc@AC [var]	-1954.288	63935.57	65889.86	63478.29
I_fund_Q_SYM+_rc@AC [A]	-0.646541	100.5806	101.2271	99.76460
I_fund_Q_SYM-_rc@AC [A]	-5.662e-3	-96.83977	-96.83411	95.98783
I_fund_P_SYM+_rc@AC [A]	36.74490	3.169697	-33.57521	4.348228
I_fund_P_SYM-_rc@AC [A]	0.118818	1.438224	1.319406	2.486606
U_fund_SYM+_rc@AC [V]	398.1122	297.8582	-100.2540	298.5433
U_fund_SYM-_rc@AC [V]	1.070124	98.10101	97.03089	97.88286
U+ [V]	229.8691	172.0093	-57.85973	173.2703
U- [V]	0.910092	56.84737	55.93728	56.11299

Injected reactive current at 30ms



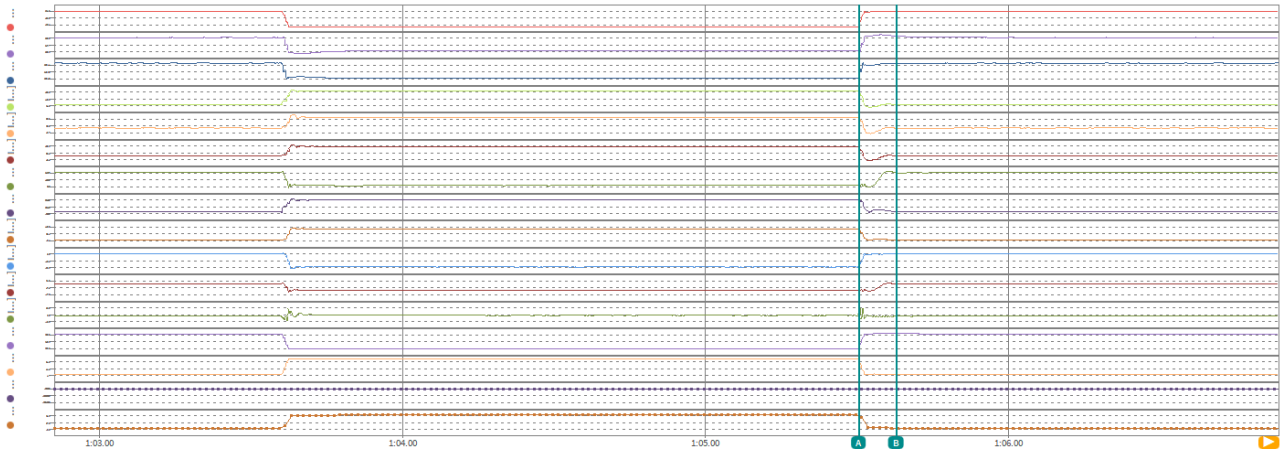
时间 [s]	A 1:03.60672	B 1:03.63695	间隔 0.03023	有效值
U1_tRMS_rc@AC [V]	230.2038	116.3857	-113.8180	165.6920
U2_tRMS_rc@AC [V]	229.7616	202.3698	-27.39188	216.1744
U3_tRMS_rc@AC [V]	229.5903	207.9104	-21.67981	212.3758
I1_tRMS_rc@AC [A]	36.68522	203.8701	167.1849	124.9021
I2_tRMS_rc@AC [A]	36.59784	106.1339	69.53611	63.47306
I3_tRMS_rc@AC [A]	37.28122	111.1100	73.82877	68.38267
P_t_rc@AC [W]	25338.01	-1208.885	-26546.89	15003.99
Q_t_rc@AC [var]	-1954.288	68296.10	70250.39	41995.52
I_fund_Q_SYM+_rc@AC [A]	-0.646541	98.27093	98.91747	46.96653
I_fund_Q_SYM-_rc@AC [A]	-5.662e-3	-104.0014	-103.9958	48.47300
I_fund_P_SYM+_rc@AC [A]	36.74490	-7.630870	-44.37577	24.09883
I_fund_P_SYM-_rc@AC [A]	0.118818	15.75165	15.63283	9.657071
U_fund_SYM+_rc@AC [V]	398.1122	297.1096	-101.0026	334.5046
U_fund_SYM-_rc@AC [V]	1.070124	96.91049	95.84037	71.64705
U+ [V]	229.8691	217.1129	-12.75619	223.5820
U- [V]	0.910092	12.89535	11.98526	9.141073

Injected reactive current at 60ms



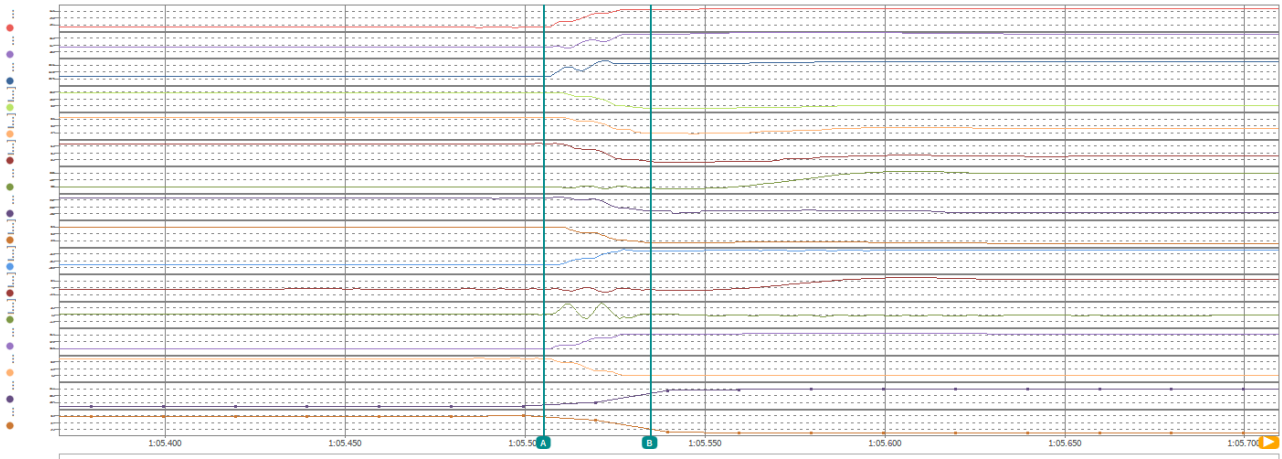
时间 [s]	A 1:03.60672	B 1:03.66737	间隔 0.06065	有效值
U1_tRMS_rc@AC [V]	230.2038	115.7587	-114.4450	143.5494
U2_tRMS_rc@AC [V]	229.7616	200.8146	-28.94705	209.1932
U3_tRMS_rc@AC [V]	229.5903	209.0715	-20.51874	210.4767
I1_tRMS_rc@AC [A]	36.68522	198.6806	161.9954	166.4333
I2_tRMS_rc@AC [A]	36.59784	97.81682	61.21898	85.18993
I3_tRMS_rc@AC [A]	37.28122	104.8925	67.61131	88.77655
P_t_rc@AC [W]	25338.01	1565.803	-23772.20	10845.77
Q_t_rc@AC [var]	-1954.288	64553.11	66507.40	55178.44
I_fund_Q_SYM+_rc@AC [A]	-0.646541	103.3059	103.9525	79.13667
I_fund_Q_SYM-_rc@AC [A]	-5.662e-3	-95.64567	-95.64001	77.55818
I_fund_P_SYM+_rc@AC [A]	36.74490	-0.108250	-36.85315	17.47768
I_fund_P_SYM-_rc@AC [A]	0.118818	9.568091	9.449273	7.909809
U_fund_SYM+_rc@AC [V]	398.1122	296.6232	-101.4890	316.6694
U_fund_SYM-_rc@AC [V]	1.070124	97.17383	96.10370	85.03013
U+ [V]	229.8691	171.6239	-58.24522	200.1174
U- [V]	0.910092	55.93702	55.02693	38.93867

Recover time – Active power



时间 [s]	A 1:05.50647	B 1:05.62995	间隔 0.12347	有效值
U1_tRMS_rc@AC [V]	115.4879	232.1640	116.6761	222.7578
U2_tRMS_rc@AC [V]	206.3048	232.4017	26.09689	230.1966
U3_tRMS_rc@AC [V]	206.0629	229.0339	22.97104	226.4370
I1_tRMS_rc@AC [A]	196.2527	35.32957	-160.9232	68.28636
I2_tRMS_rc@AC [A]	97.40285	36.09116	-61.31169	40.79962
I3_tRMS_rc@AC [A]	102.8997	38.10954	-64.79018	42.31393
P_t_rc@AC [W]	1882.932	25134.13	23251.20	16894.61
Q_t_rc@AC [var]	63935.57	-3048.064	-66983.64	24498.49
I_fund_Q_SYM+_rc@AC [A]	100.5806	-1.080182	-101.6608	30.82166
I_fund_Q_SYM-_rc@AC [A]	-96.83977	-0.037762	96.80201	27.48722
I_fund_P_SYM+_rc@AC [A]	3.169697	36.24156	33.07186	24.28122
I_fund_P_SYM-_rc@AC [A]	1.438224	-0.835704	-2.273927	5.838641
U_fund_SYM+_rc@AC [V]	297.8582	400.4466	102.5885	390.6977
U_fund_SYM-_rc@AC [V]	98.10101	2.322731	-95.77828	26.35435
U+ [V]	172.0093	232.1679	60.15854	216.4830
U- [V]	56.84737	1.663568	-55.18381	27.51027

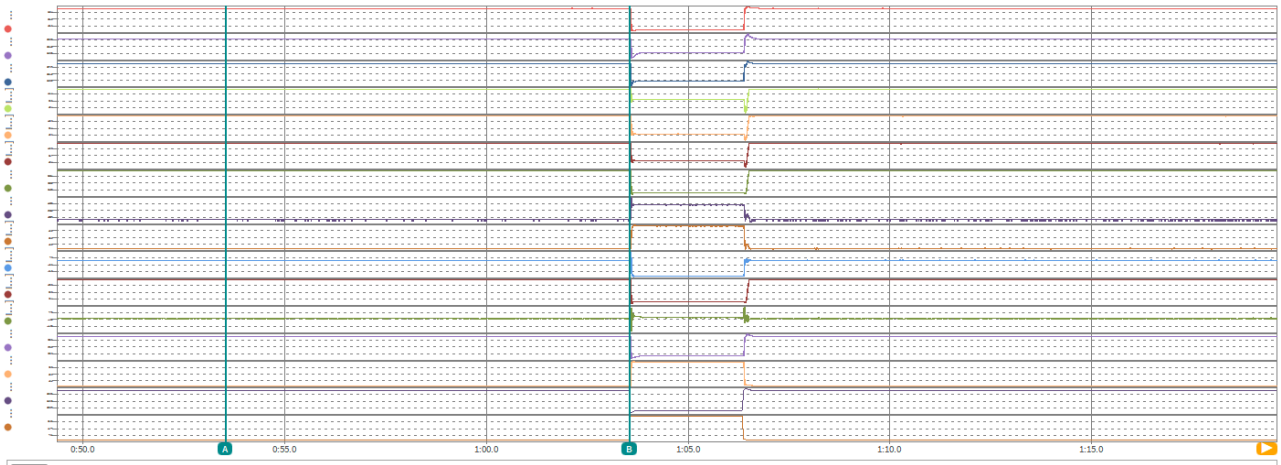
Recover time – Reactive power



时间 [s]	A 1:05.50540	B 1:05.53491	间隔 0.02951	有效值
U1_tRMS_rc@AC [V]	115.3259	227.0029	111.6770	187.8534
U2_tRMS_rc@AC [V]	206.6129	231.7273	25.11449	218.5710
U3_tRMS_rc@AC [V]	206.3243	226.4157	20.09137	220.8420
I1_tRMS_rc@AC [A]	196.5212	8.370122	-188.1511	132.1465
I2_tRMS_rc@AC [A]	97.53191	8.020108	-89.51180	67.60643
I3_tRMS_rc@AC [A]	103.0675	10.47722	-92.59024	69.58155
P_t_rc@AC [W]	1885.098	223.5981	-1661.500	2205.722
Q_t_rc@AC [var]	64052.91	6126.648	-57926.27	49483.69
I_fund_Q_SYM+_rc@AC [A]	100.7227	3.094984	-97.62768	64.00792
I_fund_Q_SYM-_rc@AC [A]	-96.97296	-1.437192	95.53577	57.84826
I_fund_P_SYM+_rc@AC [A]	3.195417	0.288228	-2.907189	3.804180
I_fund_P_SYM-_rc@AC [A]	1.375654	3.143714	1.768060	11.56165
U_fund_SYM+_rc@AC [V]	298.0395	395.5660	97.52655	355.7949
U_fund_SYM-_rc@AC [V]	98.55904	3.158378	-95.40067	55.45559
U+ [V]	172.0093	183.9123	11.90300	178.0603
U- [V]	56.84737	44.90443	-11.94295	51.22515

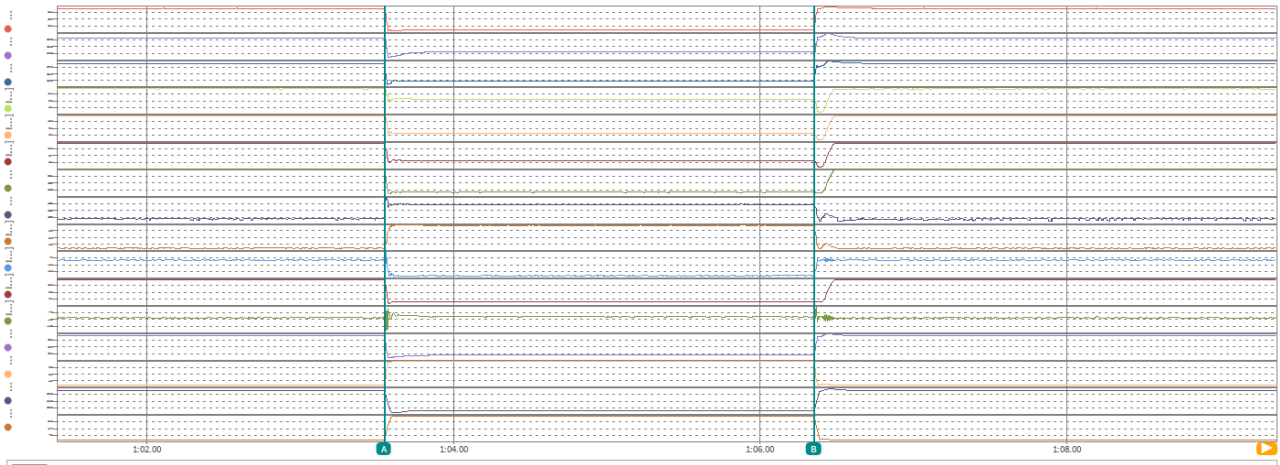
Test – VD9.1

Before fault



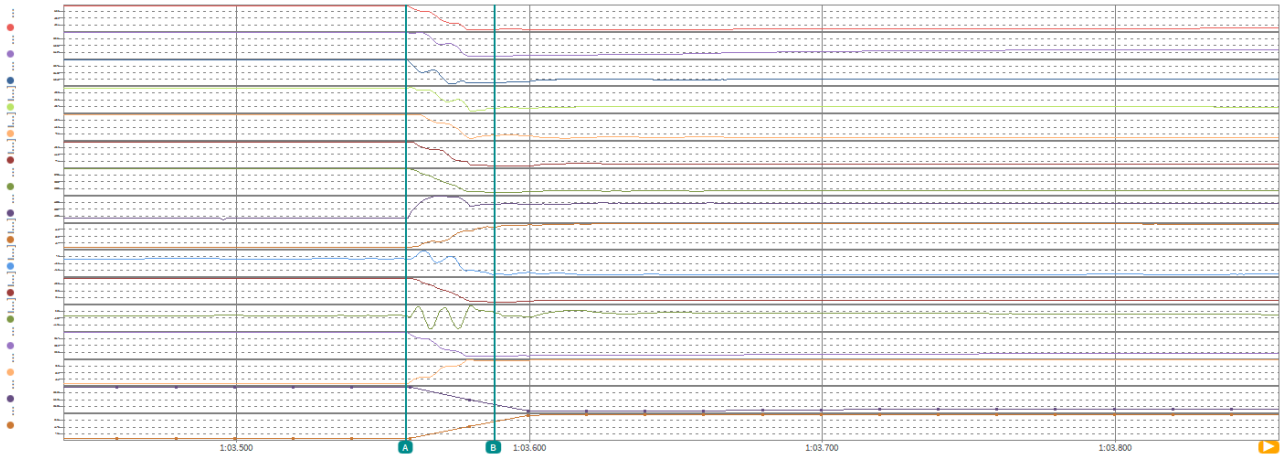
	A	B	间隔	有效值
时间 [s]	0:53.5480	1:03.5590	0:10.0110	
U1_tRMS_rc@AC [V]	230.6149	230.2947	-0.320206	230.5986
U2_tRMS_rc@AC [V]	229.9506	229.7732	-0.177460	229.9250
U3_tRMS_rc@AC [V]	229.8424	229.8470	4.578e-3	229.8509
I1_tRMS_rc@AC [A]	178.8657	179.8931	1.027420	179.3430
I2_tRMS_rc@AC [A]	181.3124	181.5085	0.196106	181.0595
I3_tRMS_rc@AC [A]	183.6402	183.4773	-0.162842	183.4565
P_t_rc@AC [W]	125131.6	125256.4	124.7891	125133.1
Q_t_rc@AC [var]	2161.667	3521.980	1360.313	2276.229
I_fund_Q_SYM+_rc@AC [A]	0.597312	0.259096	-0.338215	0.474067
I_fund_Q_SYM-_rc@AC [A]	0.039980	0.206341	0.166361	0.417489
I_fund_P_SYM+_rc@AC [A]	181.2448	181.5795	0.334747	181.2568
I_fund_P_SYM-_rc@AC [A]	-1.016000	-0.755783	0.260218	0.976523
U_fund_SYM+_rc@AC [V]	398.6017	398.3018	-0.299866	398.5822
U_fund_SYM-_rc@AC [V]	1.059868	0.588264	-0.471604	1.064860
U+ [V]	230.1445	230.1475	2.994e-3	230.1283
U- [V]	0.626836	0.595064	-0.031772	0.614618

Duration fault time



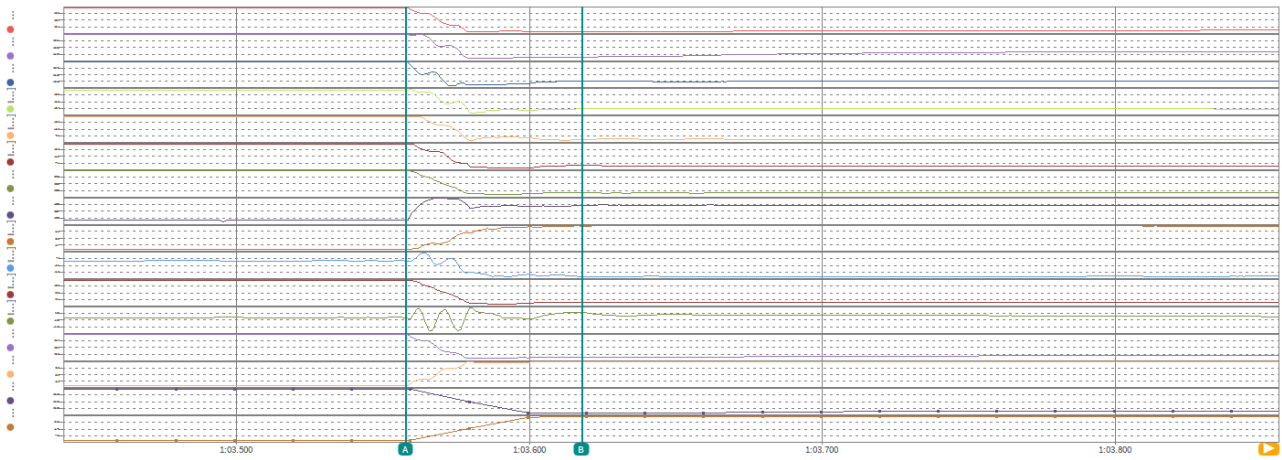
	A	B	间隔	有效值
时间 [s]	1:03.5500	1:06.3540	2.8040	
U1_tRMS_rc@AC [V]	230.6475	172.7940	-57.85349	173.0794
U2_tRMS_rc@AC [V]	229.9482	215.7858	-14.16241	215.6044
U3_tRMS_rc@AC [V]	229.8690	215.7197	-14.14925	215.7668
I1_tRMS_rc@AC [A]	179.6161	102.2316	-77.38453	103.4432
I2_tRMS_rc@AC [A]	181.4999	50.59195	-130.9080	52.90647
I3_tRMS_rc@AC [A]	183.5960	54.06495	-129.5310	56.62373
P_t_rc@AC [W]	125344.2	1522.125	-123822.0	9942.247
Q_t_rc@AC [var]	2372.428	40216.12	37843.69	40431.21
I_fund_Q_SYM+_rc@AC [A]	0.120775	55.23767	55.11689	55.33303
I_fund_Q_SYM-_rc@AC [A]	-0.185957	-47.42422	-47.23826	47.17172
I_fund_P_SYM+_rc@AC [A]	181.5410	2.463587	-179.0774	14.55784
I_fund_P_SYM-_rc@AC [A]	-0.948427	0.400352	1.348779	1.449700
U_fund_SYM+_rc@AC [V]	398.6306	347.2017	-51.42886	347.2249
U_fund_SYM-_rc@AC [V]	0.933930	49.72669	48.79276	49.15494
U+ [V]	230.1475	200.4108	-29.73673	200.8137
U- [V]	0.595064	28.46223	27.86717	28.22139

Injected reactive current at 30ms



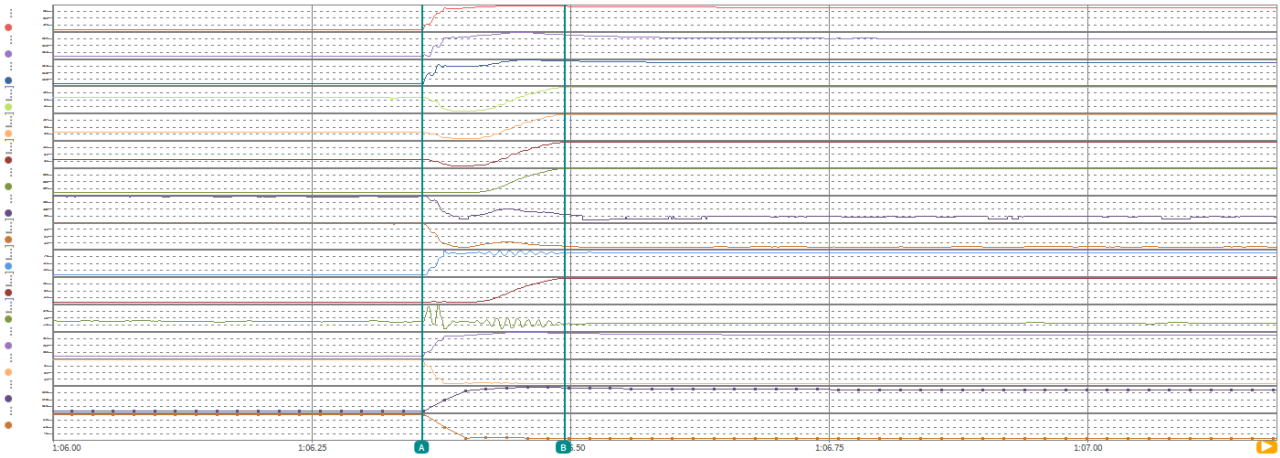
	A	B	间隔	有效值
时间 [s]	1:03.5580	1:03.5880	0.0300	
U1_tRMS_rc@AC [V]	230.6361	169.6994	-60.93671	194.0538
U2_tRMS_rc@AC [V]	229.8599	210.0179	-19.84206	219.4742
U3_tRMS_rc@AC [V]	229.9633	213.1260	-16.83727	217.7323
I1_tRMS_rc@AC [A]	179.4840	98.87427	-80.60976	138.3603
I2_tRMS_rc@AC [A]	181.4884	62.64013	-118.8482	124.5294
I3_tRMS_rc@AC [A]	183.3349	43.54729	-139.7876	117.7485
P_t_rc@AC [W]	125247.9	-7737.627	-132985.5	68188.11
Q_t_rc@AC [var]	2493.540	38444.57	35951.03	45777.15
I_fund_Q_SYM+_rc@AC [A]	0.352616	48.83674	48.48413	30.37169
I_fund_Q_SYM-_rc@AC [A]	0.444032	-47.60665	-48.05068	25.93412
I_fund_P_SYM+_rc@AC [A]	181.4022	-13.88718	-195.2894	100.3046
I_fund_P_SYM-_rc@AC [A]	-0.795909	4.957764	5.753673	9.920642
U_fund_SYM+_rc@AC [V]	398.6300	340.5192	-58.11084	362.2778
U_fund_SYM-_rc@AC [V]	0.882919	48.50589	47.62297	35.43916
U+ [V]	230.1475	212.2346	-17.91289	224.3321
U- [V]	0.595064	15.31046	14.71540	8.854010

Injected reactive current at 60ms



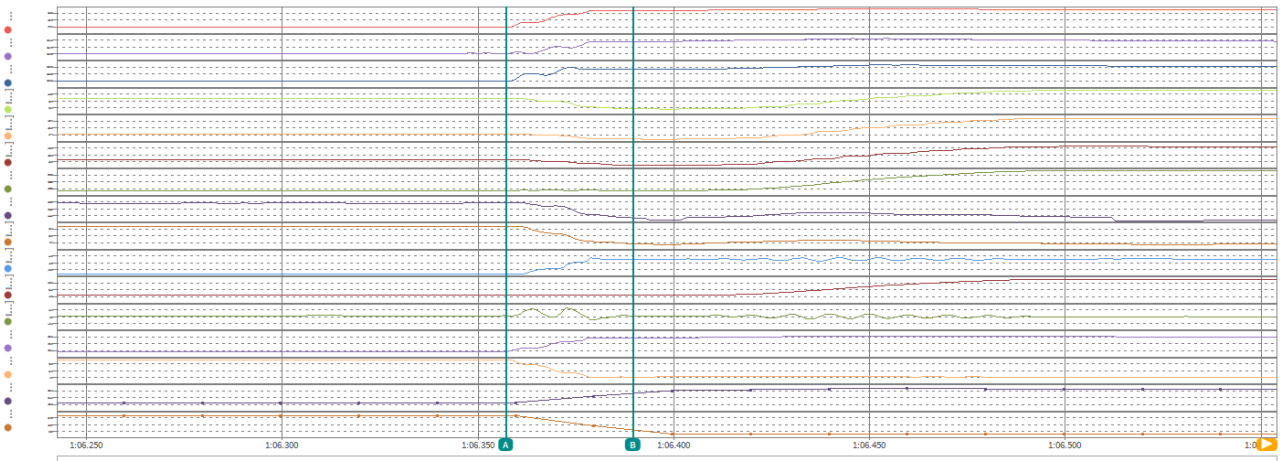
	A	B	间隔	有效值
时间 [s]	1:03.5580	1:03.6180	0.0600	
U1_tRMS_rc@AC [V]	230.6361	168.3966	-62.23952	182.4018
U2_tRMS_rc@AC [V]	229.8599	211.2022	-18.65773	215.3262
U3_tRMS_rc@AC [V]	229.9633	215.9363	-14.02696	216.2476
I1_tRMS_rc@AC [A]	179.4840	103.2721	-76.21196	121.1866
I2_tRMS_rc@AC [A]	181.4884	49.34228	-132.1461	96.73349
I3_tRMS_rc@AC [A]	183.3349	59.63809	-123.6968	91.22069
P_t_rc@AC [W]	125247.9	2093.039	-123154.8	48680.59
Q_t_rc@AC [var]	2493.540	40636.02	38142.48	42643.01
I_fund_Q_SYM+_rc@AC [A]	0.352616	55.98995	55.63734	43.70792
I_fund_Q_SYM-_rc@AC [A]	0.444032	-47.85012	-48.29415	36.74302
I_fund_P_SYM+_rc@AC [A]	181.4022	2.618921	-178.7833	71.63253
I_fund_P_SYM-_rc@AC [A]	-0.795909	6.006862	6.802772	7.565733
U_fund_SYM+_rc@AC [V]	398.6300	342.1072	-56.52283	352.3971
U_fund_SYM-_rc@AC [V]	0.882919	50.38665	49.50374	42.82842
U+ [V]	230.1475	196.9067	-33.24084	217.7998
U- [V]	0.595064	28.03706	27.44200	15.97856

Recover time – Active power



	A	B	间隔	有效值
时间 [s]	1:06.3570	1:06.4940	0.1370	
U1_tRMS_rc@AC [V]	172.7810	233.4064	60.62532	227.5468
U2_tRMS_rc@AC [V]	215.7724	232.9557	17.18332	231.0811
U3_tRMS_rc@AC [V]	215.7298	231.1387	15.40887	228.8194
I1_tRMS_rc@AC [A]	102.8155	176.2352	73.41972	93.85219
I2_tRMS_rc@AC [A]	50.61560	179.7847	129.1691	90.68090
I3_tRMS_rc@AC [A]	54.83154	182.9716	128.1400	92.34941
P_t_rc@AC [W]	1568.953	125141.7	123572.7	61790.31
Q_t_rc@AC [var]	40484.42	6456.565	-34027.86	16423.00
I_fund_Q_SYM+_rc@AC [A]	55.65122	2.424736	-53.22648	16.83802
I_fund_Q_SYM-_rc@AC [A]	-47.57411	-0.208302	47.36581	13.80485
I_fund_P_SYM+_rc@AC [A]	2.520622	179.4095	176.8889	88.33243
I_fund_P_SYM-_rc@AC [A]	1.042861	-2.147418	-3.190279	4.218283
U_fund_SYM+_rc@AC [V]	347.1514	402.6911	55.53964	396.5333
U_fund_SYM-_rc@AC [V]	49.44521	1.723948	-47.72127	12.77780
U+ [V]	200.4108	233.4367	33.02596	222.2925
U- [V]	28.46223	1.177004	-27.28523	15.06711

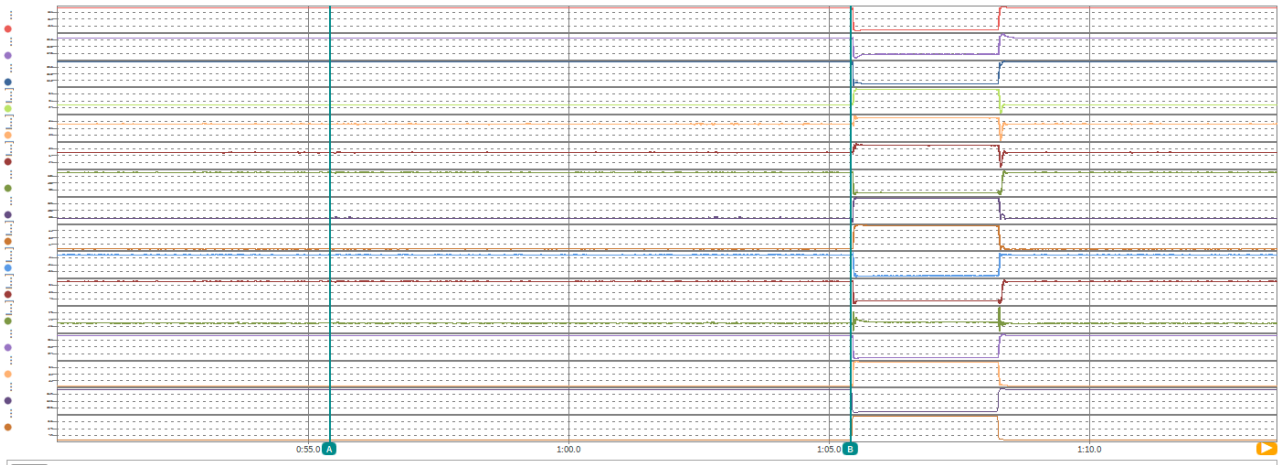
Recover time – Reactive power



	A	B	间隔	有效值
时间 [s]	1:06.35729	1:06.38972	0.03243	
U1_tRMS_rc@AC [V]	172.7810	228.4077	55.62671	209.1413
U2_tRMS_rc@AC [V]	215.7724	230.7425	14.97009	223.9941
U3_tRMS_rc@AC [V]	215.7298	227.5529	11.82306	224.6967
I1_tRMS_rc@AC [A]	102.8155	5.450466	-97.36500	65.44677
I2_tRMS_rc@AC [A]	50.61560	5.824496	-44.79111	31.94337
I3_tRMS_rc@AC [A]	54.83154	4.720505	-50.11104	37.16402
P_t_rc@AC [W]	1568.953	427.1169	-1141.836	1754.267
Q_t_rc@AC [var]	40484.42	3638.066	-36846.36	27641.32
I_fund_Q_SYM+_rc@AC [A]	55.65122	2.225566	-53.42565	32.04577
I_fund_Q_SYM-_rc@AC [A]	-47.57411	-0.132568	47.44154	27.90939
I_fund_P_SYM+_rc@AC [A]	2.520622	0.607031	-1.913592	2.460791
I_fund_P_SYM-_rc@AC [A]	1.042861	0.739199	-0.303662	7.480436
U_fund_SYM+_rc@AC [V]	347.1514	396.4645	49.31311	378.4285
U_fund_SYM-_rc@AC [V]	49.44521	1.788877	-47.65634	25.78104
U+ [V]	200.4108	215.5561	15.14534	205.5916
U- [V]	28.46223	13.57626	-14.88597	24.53959

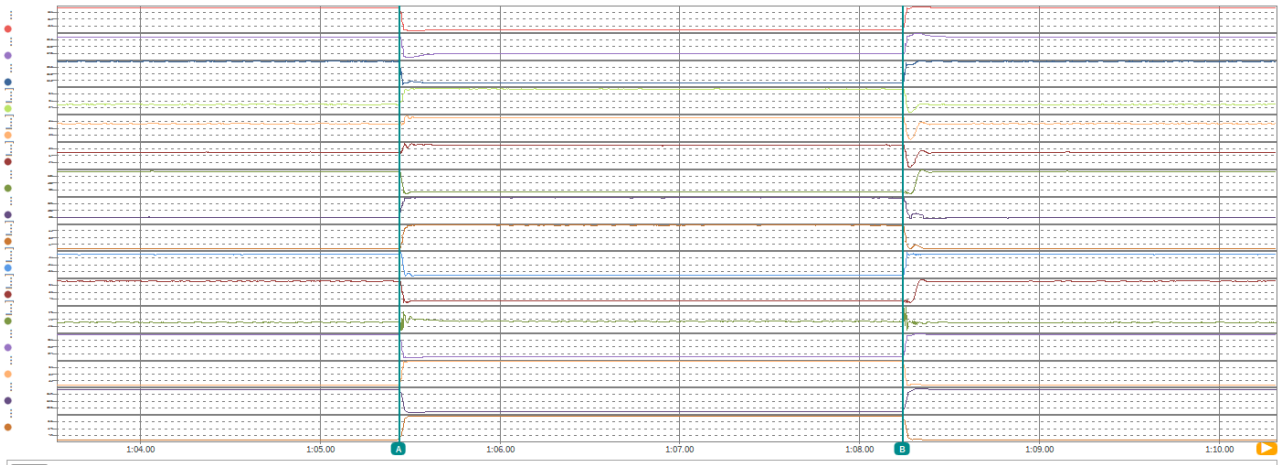
Test – VD9.2.a

Before fault



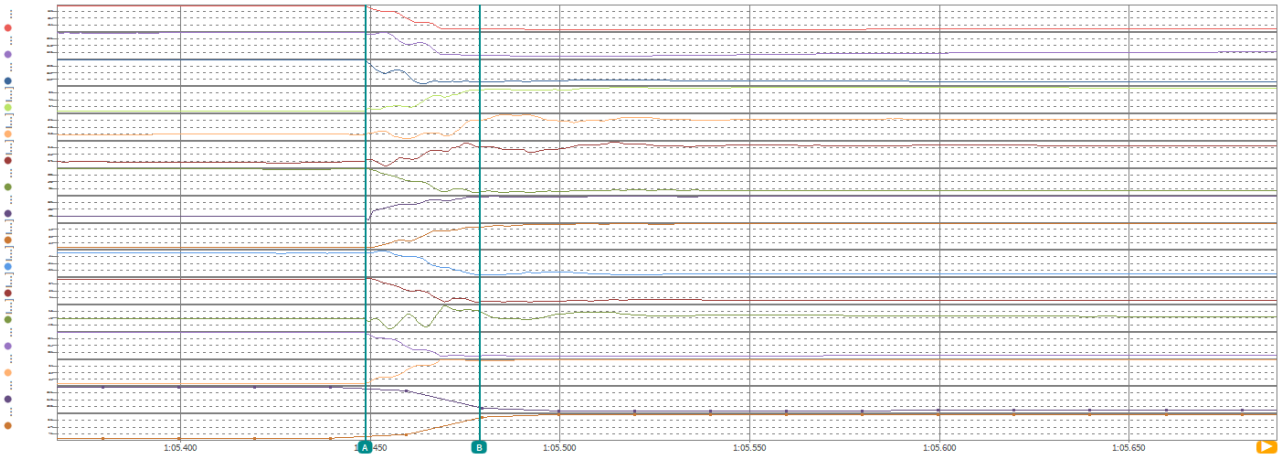
	A	B	间隔	有效值
时间 [s]	0:55.41590	1:05.41890	0:10.00300	
U1_tRMS_rc@AC [V]	230.3635	230.2822	-0.081390	230.2945
U2_tRMS_rc@AC [V]	229.7788	229.9001	0.121262	229.8081
U3_tRMS_rc@AC [V]	229.6485	229.6283	-0.020218	229.6170
I1_tRMS_rc@AC [A]	37.70425	37.62704	-0.077213	37.37003
I2_tRMS_rc@AC [A]	37.16777	37.51709	0.349316	37.46475
I3_tRMS_rc@AC [A]	38.85041	37.70475	-1.145664	38.09256
P_t_rc@AC [W]	26069.12	25897.51	-171.6094	25895.39
Q_t_rc@AC [var]	-2029.327	-1619.330	409.9972	1852.732
I_fund_Q_SYM+_rc@AC [A]	-0.297196	-0.755032	-0.457836	0.670376
I_fund_Q_SYM-_rc@AC [A]	0.537276	-0.062523	-0.599799	0.253082
I_fund_P_SYM+_rc@AC [A]	37.79395	37.54067	-0.253277	37.54495
I_fund_P_SYM-_rc@AC [A]	-0.060705	0.177760	0.238465	0.254189
U_fund_SYM+_rc@AC [V]	398.2473	398.2589	0.011566	398.2068
U_fund_SYM-_rc@AC [V]	1.026128	0.965858	-0.060270	0.989549
U+ [V]	229.9237	229.8965	-0.027265	229.9116
U- [V]	0.576062	0.576141	7.868e-5	0.571299

Duration fault time



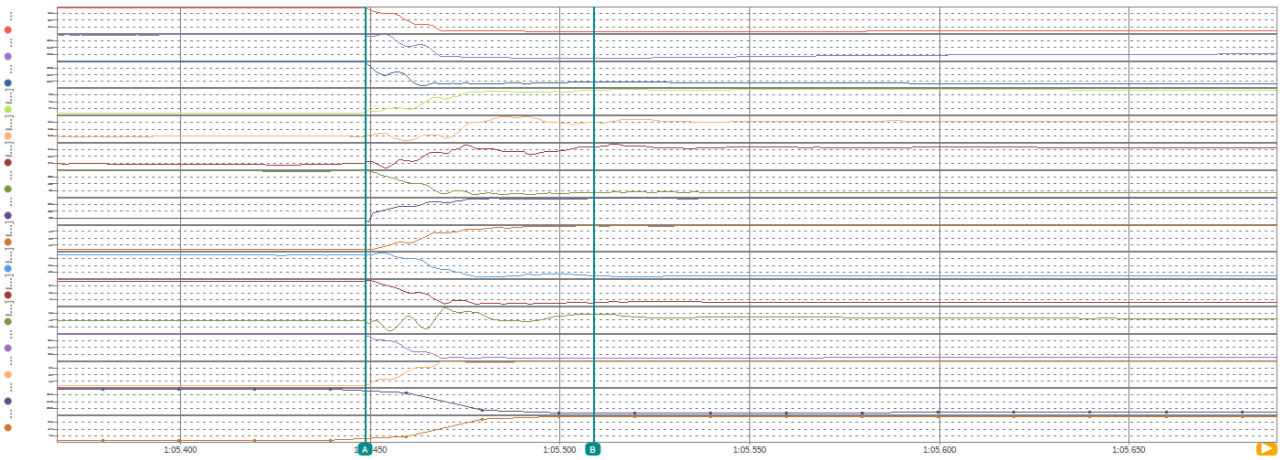
	A	B	间隔	有效值
时间 [s]	1:05.43890	1:08.24000	2.80110	
U1_tRMS_rc@AC [V]	230.2496	172.7251	-57.52455	173.1832
U2_tRMS_rc@AC [V]	229.8030	215.6678	-14.13521	215.6770
U3_tRMS_rc@AC [V]	229.6374	215.6857	-13.95164	215.8359
I1_tRMS_rc@AC [A]	37.10484	102.6064	65.50161	103.1257
I2_tRMS_rc@AC [A]	37.53855	49.82769	12.28914	49.96273
I3_tRMS_rc@AC [A]	37.61288	53.42144	15.80857	54.44156
P_t_rc@AC [W]	25740.96	1635.666	-24105.29	2705.594
Q_t_rc@AC [var]	-1847.422	39957.71	41805.13	40245.70
I_fund_Q_SYM+_rc@AC [A]	-0.710765	52.23705	52.94782	53.07005
I_fund_Q_SYM-_rc@AC [A]	-0.368038	-50.26819	-49.90015	50.02619
I_fund_P_SYM+_rc@AC [A]	37.32089	2.692664	-34.62823	4.080777
I_fund_P_SYM-_rc@AC [A]	5.004e-3	0.468849	0.463846	1.207107
U_fund_SYM+_rc@AC [V]	398.1870	346.9734	-51.21365	347.3680
U_fund_SYM-_rc@AC [V]	0.640076	48.98492	48.34484	49.14094
U+ [V]	229.9365	200.3810	-29.55548	200.9794
U- [V]	0.558558	28.44676	27.88821	28.17753

Injected reactive current at 30ms



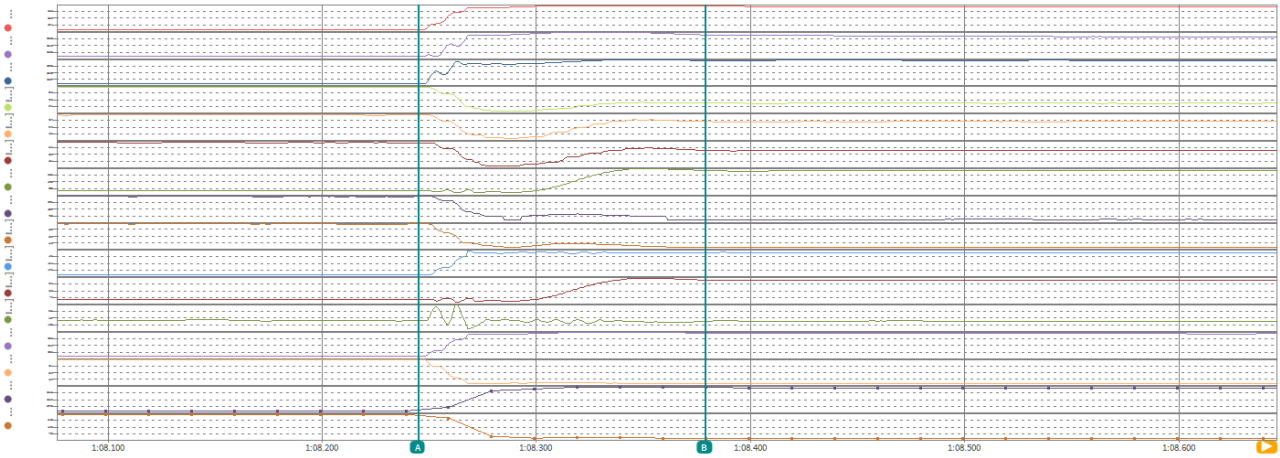
	A	B	间隔	有效值
时间 [s]	1:05.44890	1:05.47890	0.03000	
U1_tRMS_rc@AC [V]	230.0902	172.5781	-57.51205	193.6247
U2_tRMS_rc@AC [V]	229.7959	212.6938	-17.10214	220.6911
U3_tRMS_rc@AC [V]	229.6555	216.0130	-13.64249	218.9334
I1_tRMS_rc@AC [A]	37.34706	98.74870	61.40163	70.51644
I2_tRMS_rc@AC [A]	37.23151	49.67933	12.44782	39.38024
I3_tRMS_rc@AC [A]	38.56322	54.47949	15.91627	46.16581
P_t_rc@AC [W]	25949.59	-111.3532	-26060.95	14062.57
Q_t_rc@AC [var]	-1698.132	39376.47	41074.60	28280.04
I_fund_Q_SYM+_rc@AC [A]	-0.544005	44.91389	45.45790	29.39230
I_fund_Q_SYM-_rc@AC [A]	0.164996	-52.40484	-52.56984	28.02704
I_fund_P_SYM+_rc@AC [A]	37.63408	-1.131688	-38.76576	20.74668
I_fund_P_SYM-_rc@AC [A]	-0.091713	6.300958	6.392671	5.520208
U_fund_SYM+_rc@AC [V]	398.1019	345.4057	-52.69617	363.5838
U_fund_SYM-_rc@AC [V]	0.944348	48.62010	47.67575	36.50399
U+ [V]	229.9193	224.7302	-5.189115	227.3395
U- [V]	0.559824	5.247704	4.687881	3.731743

Injected reactive current at 60ms



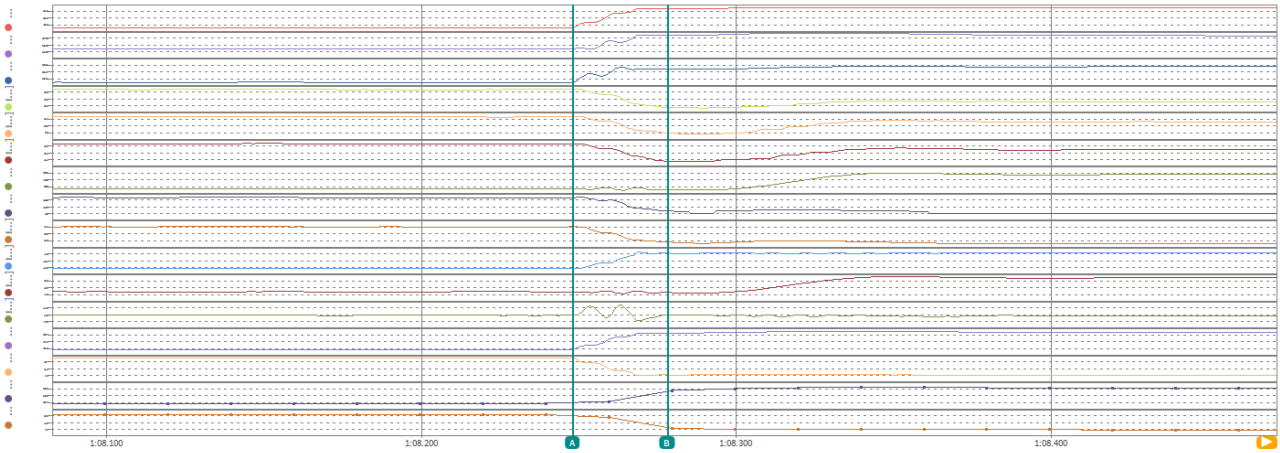
	A	B	间隔	有效值
时间 [s]	1:05.44890	1:05.50890	0.06000	
U1_tRMS_rc@AC [V]	230.0902	169.9014	-60.18875	182.9964
U2_tRMS_rc@AC [V]	229.7959	212.2344	-17.56154	216.6683
U3_tRMS_rc@AC [V]	229.6555	216.7498	-12.90570	217.6643
I1_tRMS_rc@AC [A]	37.34706	103.5076	66.16054	86.44256
I2_tRMS_rc@AC [A]	37.23151	49.11036	11.87885	45.40408
I3_tRMS_rc@AC [A]	38.56322	55.76251	17.19928	49.18807
P_t_rc@AC [W]	25949.59	1067.583	-24882.01	10040.80
Q_t_rc@AC [var]	-1698.132	40081.29	41779.42	34112.08
I_fund_Q_SYM+_rc@AC [A]	-0.544005	53.49175	54.03575	41.51764
I_fund_Q_SYM-_rc@AC [A]	0.164996	-49.05526	-49.22026	39.40488
I_fund_P_SYM+_rc@AC [A]	37.63408	1.005268	-36.62881	14.80433
I_fund_P_SYM-_rc@AC [A]	-0.091713	5.210251	5.301964	4.498091
U_fund_SYM+_rc@AC [V]	398.1019	344.0208	-54.08102	354.4291
U_fund_SYM-_rc@AC [V]	0.944348	50.17474	49.23039	43.30341
U+ [V]	229.9193	199.2133	-30.70600	214.4405
U- [V]	0.559824	28.27907	27.71925	19.31516

Recover time – Active power



	A	B	间隔	有效值
时间 [s]	1:08.24490	1:08.37890	0.13400	
U1_tRMS_rc@AC [V]	172.7562	231.6508	58.89459	225.7772
U2_tRMS_rc@AC [V]	215.6740	231.2899	15.61591	230.1239
U3_tRMS_rc@AC [V]	215.6506	229.5456	13.89502	227.7702
I1_tRMS_rc@AC [A]	102.7658	38.06221	-64.70355	42.99430
I2_tRMS_rc@AC [A]	50.29880	37.16507	-13.13373	30.77795
I3_tRMS_rc@AC [A]	53.32231	38.00424	-15.31807	32.33880
P_t_rc@AC [W]	1477.665	25954.40	24476.74	17229.21
Q_t_rc@AC [var]	40073.31	-3081.985	-43155.30	15183.29
I_fund_Q_SYM+_rc@AC [A]	52.68254	-1.631806	-54.31434	16.94928
I_fund_Q_SYM-_rc@AC [A]	-50.08282	0.342341	50.42517	15.81381
I_fund_P_SYM+_rc@AC [A]	2.432981	37.47822	35.04524	24.78735
I_fund_P_SYM-_rc@AC [A]	0.322772	-0.176354	-0.499126	3.588911
U_fund_SYM+_rc@AC [V]	346.9961	399.8044	52.80835	394.3008
U_fund_SYM-_rc@AC [V]	49.12310	1.637032	-47.48606	14.26756
U+ [V]	200.3810	231.8958	31.51477	222.7130
U- [V]	28.44676	1.217696	-27.22907	14.10797

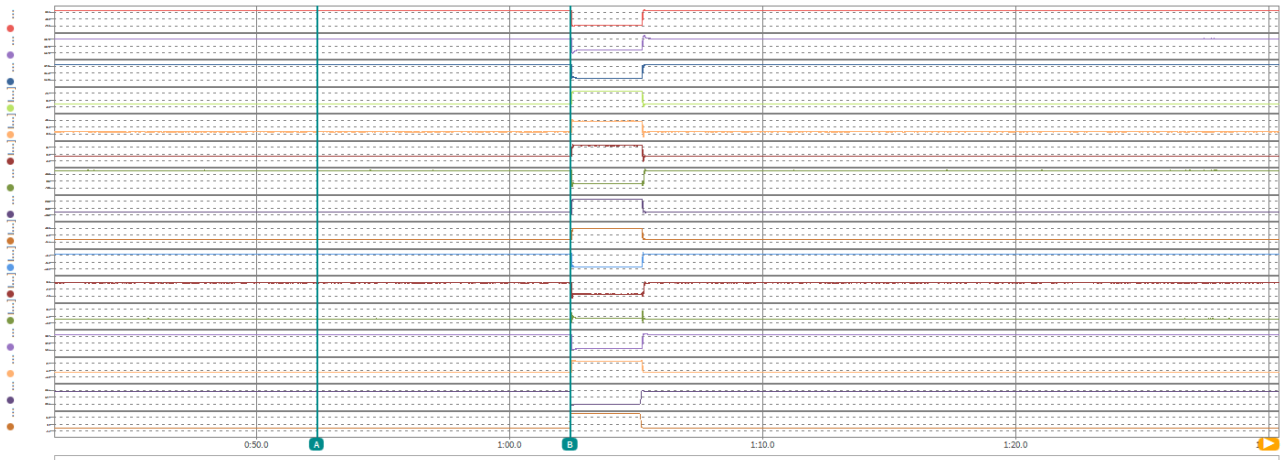
Recover time – Reactive power



	A	B	间隔	有效值
时间 [s]	1:08.24815	1:08.27823	0.03008	
U1_tRMS_rc@AC [V]	172.7557	228.5893	55.83363	209.4668
U2_tRMS_rc@AC [V]	215.6985	231.0296	15.33115	224.1016
U3_tRMS_rc@AC [V]	215.6564	227.4749	11.81845	224.7412
I1_tRMS_rc@AC [A]	102.6568	7.046043	-95.61077	65.44830
I2_tRMS_rc@AC [A]	50.24878	6.700827	-43.54796	32.37571
I3_tRMS_rc@AC [A]	53.52473	5.455148	-48.06958	35.82489
P_t_rc@AC [W]	1534.648	804.1437	-730.5039	1630.962
Q_t_rc@AC [var]	40086.72	4325.536	-35761.18	27580.32
I_fund_Q_SYM+_rc@AC [A]	52.79821	2.872255	-49.92595	30.45232
I_fund_Q_SYM-_rc@AC [A]	-50.06026	0.050355	50.11062	29.04540
I_fund_P_SYM+_rc@AC [A]	2.526055	1.150135	-1.375921	2.371691
I_fund_P_SYM-_rc@AC [A]	0.436253	1.135189	0.698935	7.292770
U_fund_SYM+_rc@AC [V]	347.0692	396.6891	49.61987	378.6881
U_fund_SYM-_rc@AC [V]	49.52578	2.103661	-47.42212	25.16625
U+ [V]	200.3810	205.1672	4.786148	202.7882
U- [V]	28.44676	23.76014	-4.686626	26.20842

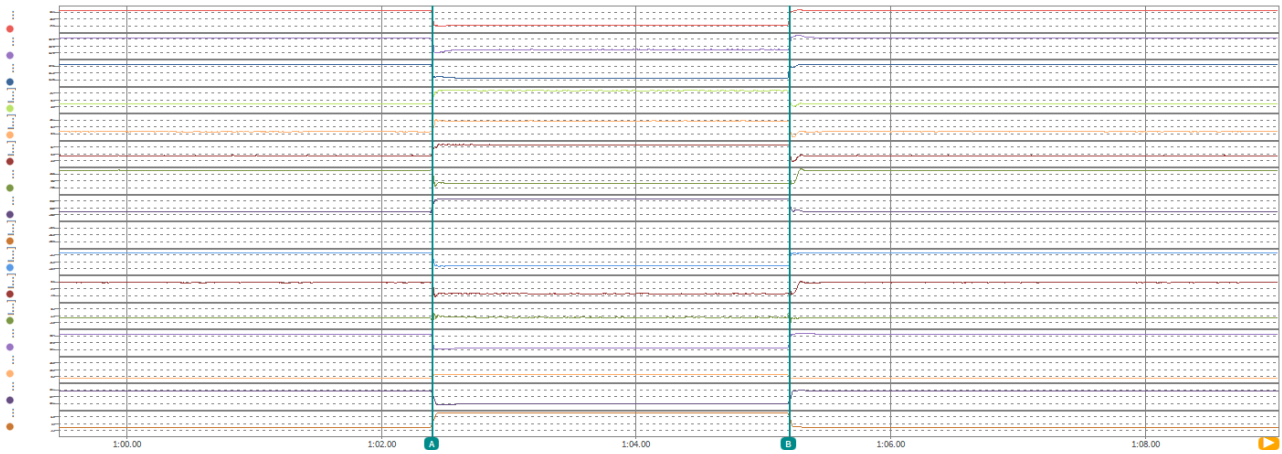
Test – VD9.2.b

Before fault



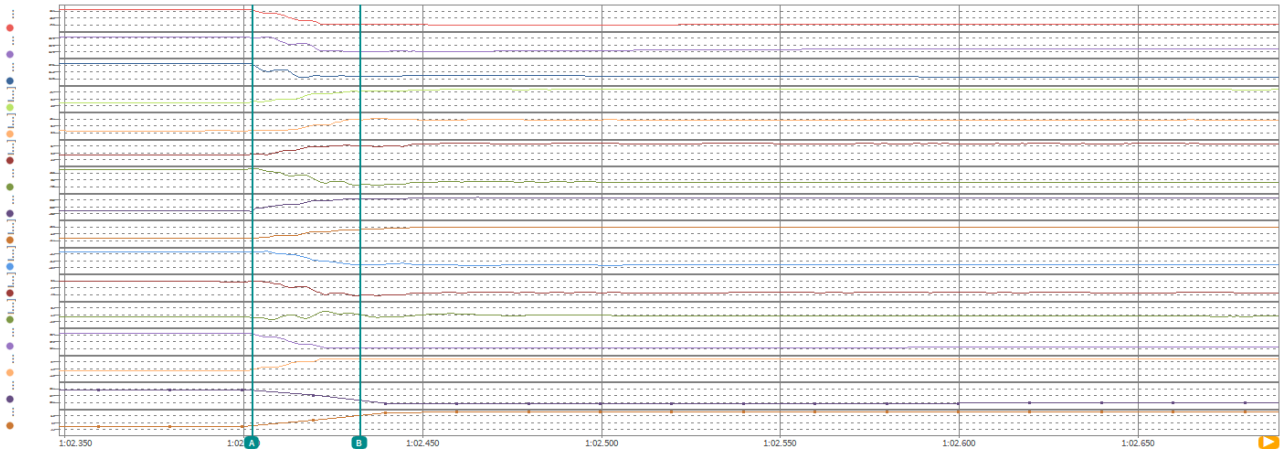
时间 [s]	A 0:52.39206	B 1:02.40158	间隔 0:10.00952	有效值
U1_tRMS_rc@AC [V]	230.3306	230.2904	-0.040161	230.2985
U2_tRMS_rc@AC [V]	229.8319	229.7870	-0.044922	229.8067
U3_tRMS_rc@AC [V]	229.6094	229.5962	-0.013229	229.6187
I1_tRMS_rc@AC [A]	37.12843	36.88528	-0.243156	37.38998
I2_tRMS_rc@AC [A]	37.73955	37.11227	-0.627281	37.42178
I3_tRMS_rc@AC [A]	37.88629	38.07660	0.190304	38.11795
P_t_rc@AC [W]	25863.59	25702.01	-161.5762	25898.74
Q_t_rc@AC [var]	-1777.797	-1793.112	-15.31580	1818.249
I_fund_Q_SYM+_rc@AC [A]	-0.538246	-0.195630	0.342616	0.670696
I_fund_Q_SYM-_rc@AC [A]	-0.111080	0.100387	0.211467	0.209831
I_fund_P_SYM+_rc@AC [A]	37.49661	37.26777	-0.228840	37.54951
I_fund_P_SYM-_rc@AC [A]	-0.260052	-0.328584	-0.068533	0.229865
U_fund_SYM+_rc@AC [V]	398.2372	398.1804	-0.056824	398.2093
U_fund_SYM-_rc@AC [V]	0.974552	1.024217	0.049665	0.989970
U+ [V]	229.9306	229.8984	-0.032216	229.9131
U- [V]	0.587797	0.579992	-7.805e-3	0.571464

Duration fault time



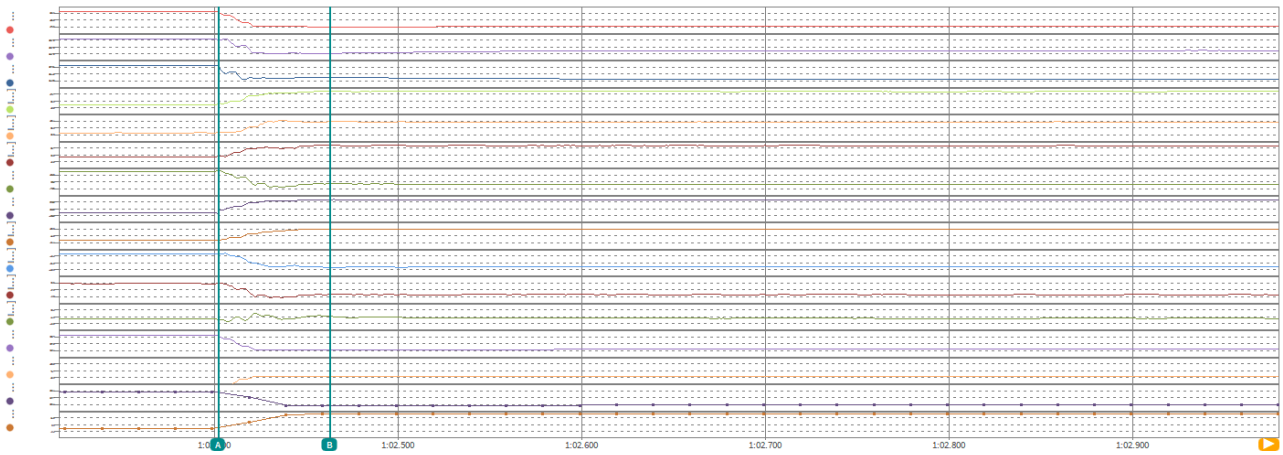
时间 [s]	A 1:02.40252	B 1:05.20211	间隔 2.79959	有效值
U1_tRMS_rc@AC [V]	230.3172	172.9901	-57.32704	173.1260
U2_tRMS_rc@AC [V]	229.7876	215.6410	-14.14659	215.5173
U3_tRMS_rc@AC [V]	229.5968	215.8039	-13.79291	215.8811
I1_tRMS_rc@AC [A]	36.84886	202.2782	165.4294	202.1767
I2_tRMS_rc@AC [A]	37.14042	104.2994	67.15902	104.2678
I3_tRMS_rc@AC [A]	38.07761	104.6662	66.58859	104.8936
P_t_rc@AC [W]	25701.05	633.8566	-25067.19	1713.658
Q_t_rc@AC [var]	-1797.518	80068.24	81865.76	80042.87
I_fund_Q_SYM+_rc@AC [A]	-0.176625	105.4818	105.6584	105.9048
I_fund_Q_SYM-_rc@AC [A]	0.095770	-98.83351	-98.92928	98.02125
I_fund_P_SYM+_rc@AC [A]	37.26494	0.786389	-36.47855	2.492082
I_fund_P_SYM-_rc@AC [A]	-0.332964	2.030653	2.363617	2.945675
U_fund_SYM+_rc@AC [V]	398.1966	347.3307	-50.86584	347.3369
U_fund_SYM-_rc@AC [V]	1.042559	48.98088	47.93833	48.61939
U+ [V]	229.8984	200.4891	-29.40927	200.7742
U- [V]	0.579992	28.09720	27.51721	27.95909

Injected reactive current at 30ms



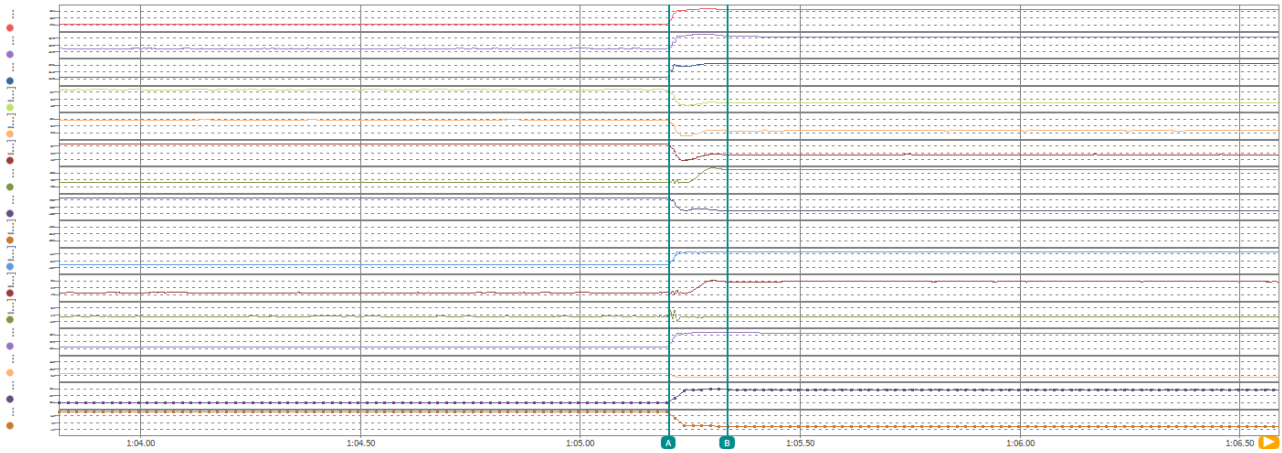
时间 [s]	A 1:02.40252	B 1:02.43265	间隔 0.03013	有效值
U1_tRMS_rc@AC [V]	230.3172	173.4297	-56.88745	194.4798
U2_tRMS_rc@AC [V]	229.7876	211.8233	-17.96428	220.3708
U3_tRMS_rc@AC [V]	229.5968	216.7736	-12.82324	219.5133
I1_tRMS_rc@AC [A]	36.84886	179.6203	142.7715	120.5318
I2_tRMS_rc@AC [A]	37.14042	106.2594	69.11901	65.80343
I3_tRMS_rc@AC [A]	38.07761	93.80661	55.72900	73.78274
P_t_rc@AC [W]	25701.05	-5929.815	-31630.86	15093.80
Q_t_rc@AC [var]	-1797.518	73756.54	75554.06	49724.07
I_fund_Q_SYM+_rc@AC [A]	-0.176625	81.91366	82.09028	50.64869
I_fund_Q_SYM-_rc@AC [A]	0.095770	-96.55568	-96.65145	52.95428
I_fund_P_SYM+_rc@AC [A]	37.26494	-11.88934	-49.15427	22.42069
I_fund_P_SYM-_rc@AC [A]	-0.332964	12.88139	13.21435	11.02238
U_fund_SYM+_rc@AC [V]	398.1966	345.7941	-52.40250	364.2605
U_fund_SYM-_rc@AC [V]	1.042559	47.89837	46.85581	35.78304
U+ [V]	229.8984	217.0963	-12.80212	223.5890
U- [V]	0.579992	12.15839	11.57840	8.607059

Injected reactive current at 60ms



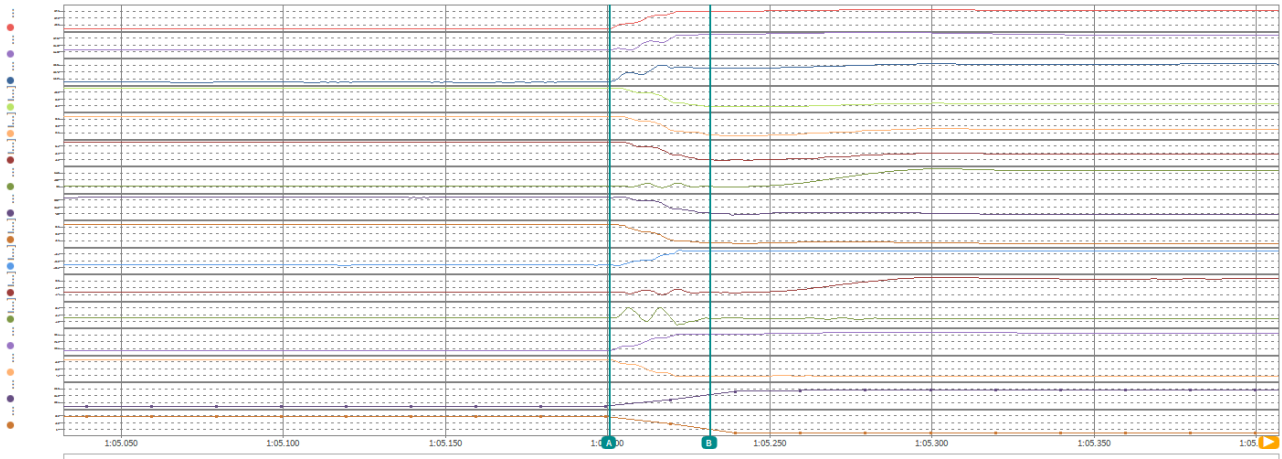
时间 [s]	A 1:02.40252	B 1:02.46330	间隔 0.06078	有效值
U1_tRMS_rc@AC [V]	230.3172	171.2168	-59.10039	183.7912
U2_tRMS_rc@AC [V]	229.7876	211.8761	-17.91148	216.2253
U3_tRMS_rc@AC [V]	229.5968	217.8138	-11.78308	218.3568
I1_tRMS_rc@AC [A]	36.84886	204.0861	167.2372	162.3871
I2_tRMS_rc@AC [A]	37.14042	105.1367	67.99623	88.09481
I3_tRMS_rc@AC [A]	38.07761	111.6149	73.53733	88.08490
P_t_rc@AC [W]	25701.05	1296.980	-24404.07	10902.95
Q_t_rc@AC [var]	-1797.518	81519.87	83317.39	65275.47
I_fund_Q_SYM+_rc@AC [A]	-0.176625	106.3177	106.4944	80.32890
I_fund_Q_SYM-_rc@AC [A]	0.095770	-100.8240	-100.9197	76.44478
I_fund_P_SYM+_rc@AC [A]	37.26494	0.577240	-36.68770	16.31874
I_fund_P_SYM-_rc@AC [A]	-0.332964	10.82915	11.16211	9.780022
U_fund_SYM+_rc@AC [V]	398.1966	345.2803	-52.91626	355.0659
U_fund_SYM-_rc@AC [V]	1.042559	49.23140	48.18884	42.62519
U+ [V]	229.8984	199.4648	-30.43357	211.9845
U- [V]	0.579992	28.17388	27.59389	20.60670

Recover time – Active power



时间 [s]	A 1:05.20172	B 1:05.33552	间隔 0.13380	有效值
U1_tRMS_rc@AC [V]	172.9901	231.1932	58.20303	226.4747
U2_tRMS_rc@AC [V]	215.6410	231.3886	15.74759	230.7577
U3_tRMS_rc@AC [V]	215.8039	229.2603	13.45642	227.5637
I1_tRMS_rc@AC [A]	202.2782	37.36493	-164.9133	65.88002
I2_tRMS_rc@AC [A]	104.2994	37.09684	-67.20260	40.78141
I3_tRMS_rc@AC [A]	104.6662	37.89140	-66.77480	41.84639
P_t_rc@AC [W]	633.8566	25732.68	25098.83	17733.14
Q_t_rc@AC [var]	80068.24	-3020.071	-83088.31	26092.11
I_fund_Q_SYM+_rc@AC [A]	105.4818	-1.579224	-107.0610	28.31039
I_fund_Q_SYM-_rc@AC [A]	-98.83351	0.041454	98.87497	26.60047
I_fund_P_SYM+_rc@AC [A]	0.786389	37.19450	36.40811	25.56265
I_fund_P_SYM-_rc@AC [A]	2.030653	-0.194848	-2.225500	7.049233
U_fund_SYM+_rc@AC [V]	347.3307	399.4326	52.10184	395.0355
U_fund_SYM-_rc@AC [V]	48.98088	1.671069	-47.30982	11.57852
U+ [V]	200.4891	231.4374	30.94824	223.8421
U- [V]	28.09720	1.200932	-26.89627	12.35976

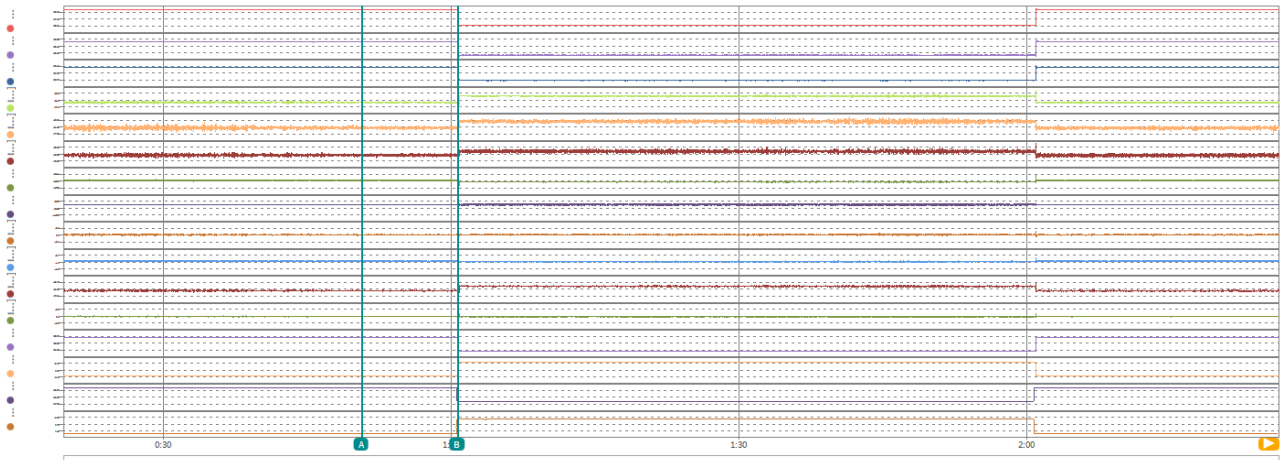
Recover time – Reactive power



时间 [s]	A 1:05.20054	B 1:05.23160	间隔 0.03105	有效值
U1_tRMS_rc@AC [V]	172.9839	227.4004	54.41647	207.6085
U2_tRMS_rc@AC [V]	215.6665	231.3564	15.68985	223.8735
U3_tRMS_rc@AC [V]	215.8105	226.5263	10.71582	223.9924
I1_tRMS_rc@AC [A]	202.5000	11.78595	-190.7141	133.7064
I2_tRMS_rc@AC [A]	104.2003	7.398825	-96.80144	69.07383
I3_tRMS_rc@AC [A]	105.0821	5.171484	-99.91063	70.72057
P_t_rc@AC [W]	619.8517	711.7584	91.90668	2232.955
Q_t_rc@AC [var]	80177.18	5517.654	-74659.53	56228.11
I_fund_Q_SYM+_rc@AC [A]	105.8800	2.975225	-102.9047	63.23838
I_fund_Q_SYM-_rc@AC [A]	-98.50632	0.819456	99.32577	59.72535
I_fund_P_SYM+_rc@AC [A]	0.767387	1.005422	0.238036	3.792157
I_fund_P_SYM-_rc@AC [A]	2.703389	1.422627	-1.280761	14.34995
U_fund_SYM+_rc@AC [V]	347.3100	395.6432	48.33328	377.0263
U_fund_SYM-_rc@AC [V]	48.73452	2.755861	-45.97866	26.21659
U+ [V]	200.4891	212.4050	11.91586	206.5330
U- [V]	28.09720	16.34256	-11.75464	22.98404

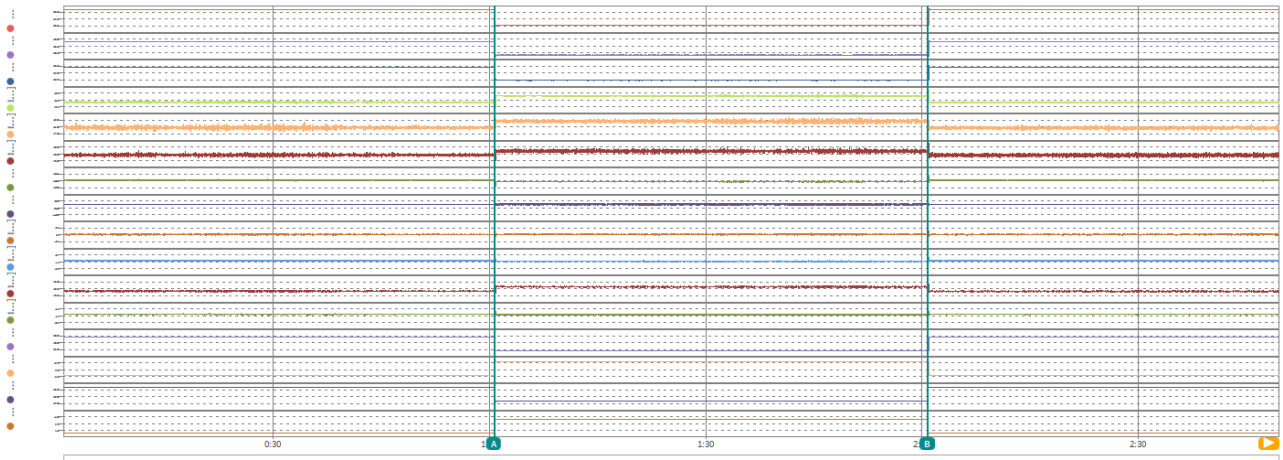
Test – VD10.1

Before fault



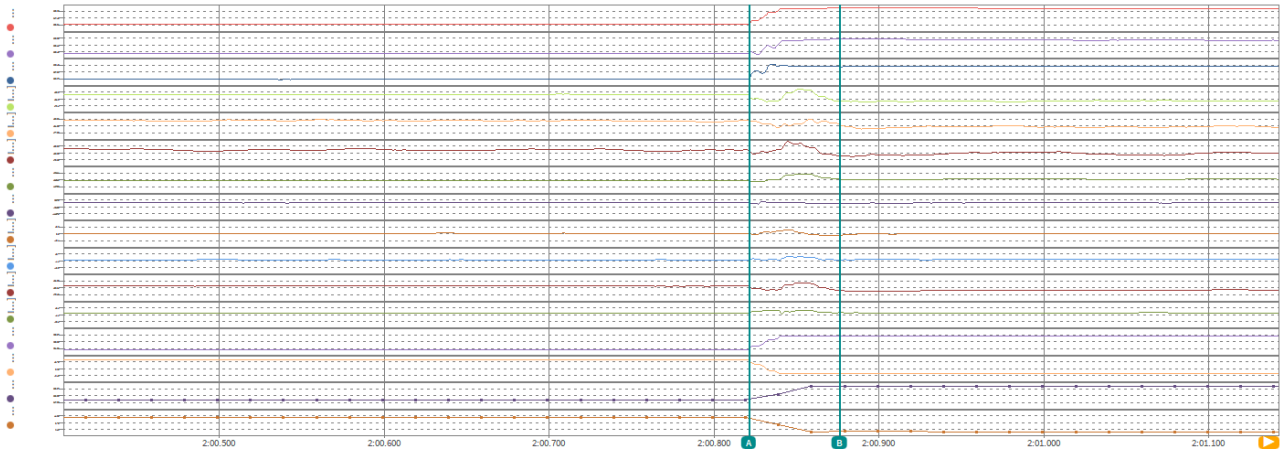
时间 [s]	A	B	间隔	有效值
	0:50.7001	1:00.7024	0:10.0023	
U1_tRMS_rc@AC [V]	230.5268	229.5245	-1.002335	230.5151
U2_tRMS_rc@AC [V]	229.9976	229.4525	-0.545059	229.8718
U3_tRMS_rc@AC [V]	229.7823	229.3250	-0.457306	229.8006
I1_tRMS_rc@AC [A]	180.0797	182.1803	2.100555	179.7181
I2_tRMS_rc@AC [A]	181.3209	181.5196	0.198715	181.2791
I3_tRMS_rc@AC [A]	183.7716	184.9098	1.138138	183.9028
P_t_rc@AC [W]	125426.1	125698.3	272.1641	125339.9
Q_t_rc@AC [var]	2117.143	6559.957	4442.814	2210.655
I_fund_Q_SYM+_rc@AC [A]	0.587677	0.349510	-0.238168	0.513052
I_fund_Q_SYM-_rc@AC [A]	0.430494	0.855997	0.425504	0.472994
I_fund_P_SYM+_rc@AC [A]	181.6976	182.7296	1.031998	181.6053
I_fund_P_SYM-_rc@AC [A]	-0.533011	-0.835790	-0.302779	0.950534
U_fund_SYM+_rc@AC [V]	398.5431	397.3408	-1.202271	398.4742
U_fund_SYM-_rc@AC [V]	0.995570	0.339016	-0.656554	1.019953
U+ [V]	230.0759	230.0552	-0.020635	230.0660
U- [V]	0.582129	0.611706	0.029578	0.588758

Duration fault time



时间 [s]	A	B	间隔	有效值
	1:00.7019	2:00.8211	1:00.1192	
U1_tRMS_rc@AC [V]	229.5245	207.5192	-22.00529	207.5132
U2_tRMS_rc@AC [V]	229.4525	225.1418	-4.310745	225.1771
U3_tRMS_rc@AC [V]	229.3250	225.1344	-4.190582	225.1718
I1_tRMS_rc@AC [A]	182.1803	189.8743	7.694092	190.5668
I2_tRMS_rc@AC [A]	181.5196	185.3660	3.846436	185.2163
I3_tRMS_rc@AC [A]	184.9098	187.1429	2.233185	187.3514
P_t_rc@AC [W]	125698.3	123141.4	-2556.953	123309.5
Q_t_rc@AC [var]	6559.957	5597.453	-962.5039	5617.946
I_fund_Q_SYM+_rc@AC [A]	0.349510	0.355479	5.969e-3	0.632081
I_fund_Q_SYM-_rc@AC [A]	0.855997	-0.364370	-1.220367	0.651347
I_fund_P_SYM+_rc@AC [A]	182.7296	187.4350	4.705353	187.6815
I_fund_P_SYM-_rc@AC [A]	-0.835790	-1.328539	-0.492749	1.643190
U_fund_SYM+_rc@AC [V]	397.3408	379.4685	-17.87225	379.4972
U_fund_SYM-_rc@AC [V]	0.339016	21.27571	20.93669	21.11239
U+ [V]	230.0552	219.1154	-10.93988	219.1131
U- [V]	0.611706	12.17390	11.56220	12.18732

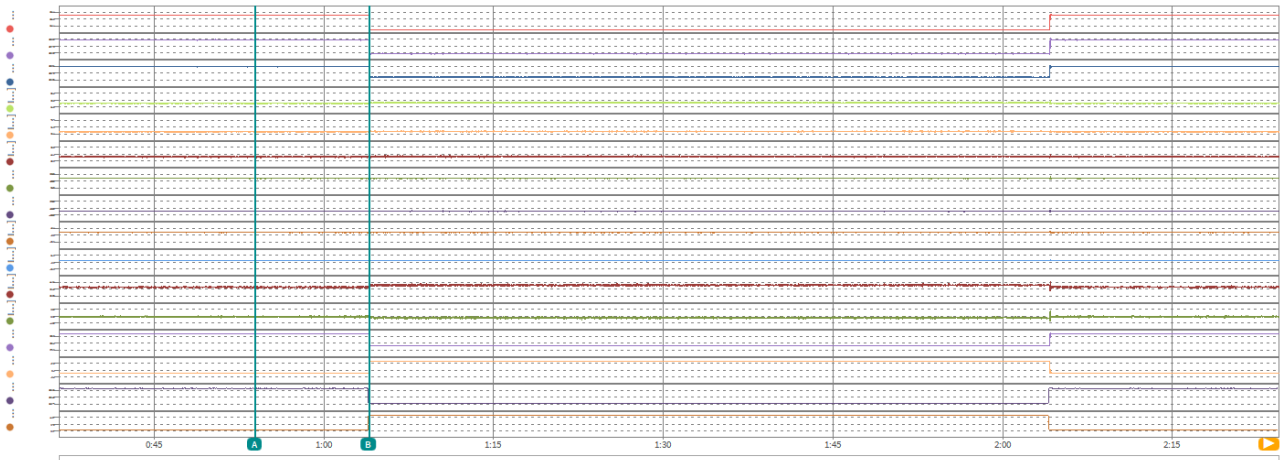
Recover time – Active power



时间 [s]	A 2:00.8212	B 2:00.8762	间隔 0.0550	有效值
U1_tRMS_rc@AC [V]	207.5192	231.4365	23.91734	226.1331
U2_tRMS_rc@AC [V]	225.1418	230.2148	5.073044	228.7289
U3_tRMS_rc@AC [V]	225.1344	229.6136	4.479279	229.2227
I1_tRMS_rc@AC [A]	189.8743	179.2970	-10.57730	187.7701
I2_tRMS_rc@AC [A]	185.3660	183.0682	-2.297791	183.3536
I3_tRMS_rc@AC [A]	187.1429	182.0780	-5.064941	187.4388
P_t_rc@AC [W]	123141.4	125407.9	2266.555	127100.0
Q_t_rc@AC [var]	5597.453	-3190.736	-8788.188	8255.519
I_fund_Q_SYM+_rc@AC [A]	0.355479	-2.396307	-2.751786	2.978786
I_fund_Q_SYM-_rc@AC [A]	-0.364370	-0.807280	-0.442911	2.888362
I_fund_P_SYM+_rc@AC [A]	187.4350	181.4211	-6.013916	185.8696
I_fund_P_SYM-_rc@AC [A]	-1.328539	-0.646356	0.682184	3.517780
U_fund_SYM+_rc@AC [V]	379.4685	399.0963	19.62778	394.8168
U_fund_SYM-_rc@AC [V]	21.27571	1.623584	-19.65212	7.835869
U+ [V]	219.1154	230.0169	10.90158	224.4123
U- [V]	12.17390	0.624994	-11.54891	8.026205

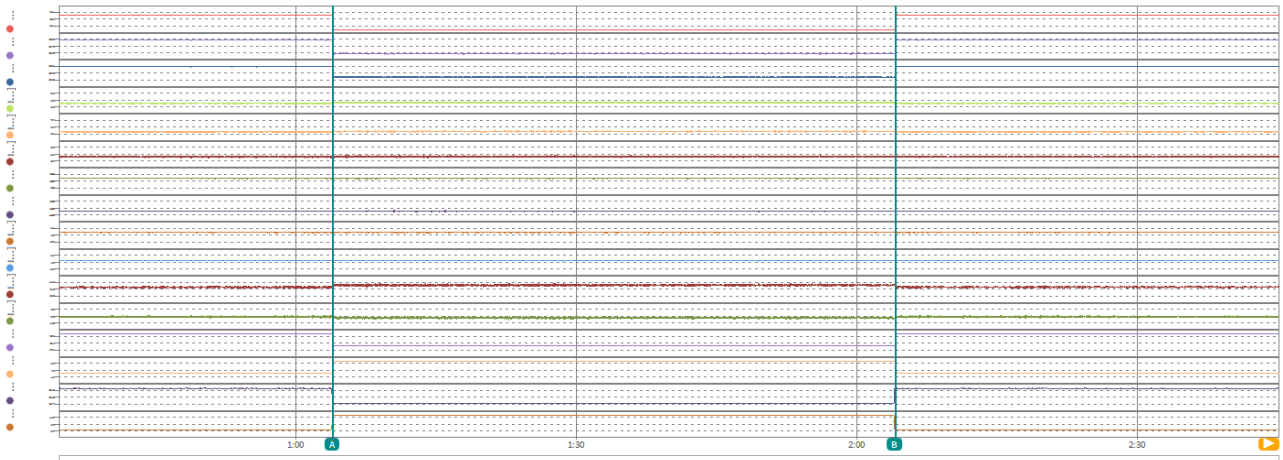
Test – VD10.2

Before fault



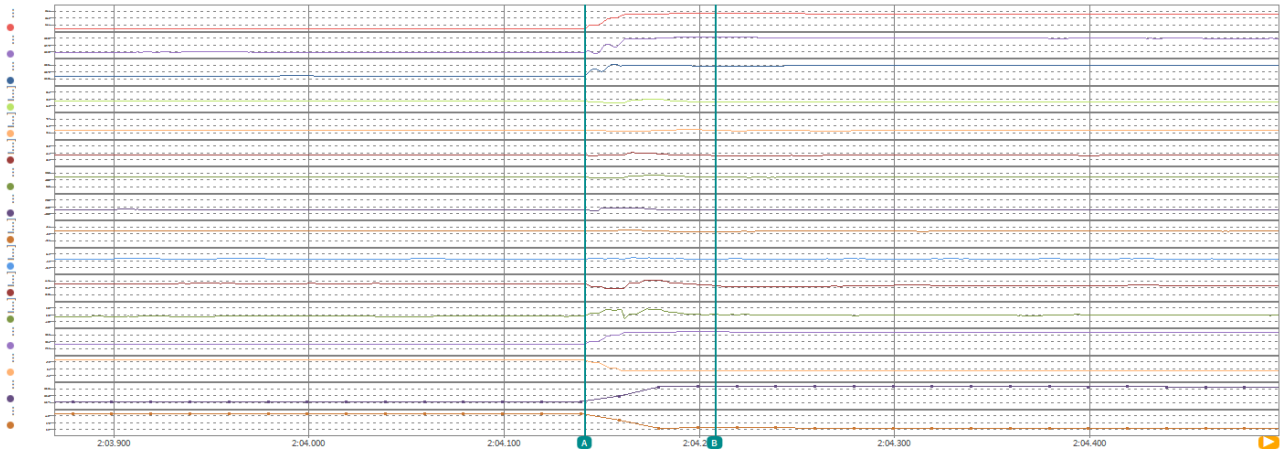
时间 [s]	A 0:53.9534	B 1:04.0176	间隔 0:10.0642	有效值
U1_tRMS_rc@AC [V]	230.2825	230.2386	-0.043961	230.2496
U2_tRMS_rc@AC [V]	229.8655	229.7506	-0.114960	229.7758
U3_tRMS_rc@AC [V]	229.5709	229.5482	-0.022675	229.5669
I1_tRMS_rc@AC [A]	36.97914	36.13060	-0.848537	36.64121
I2_tRMS_rc@AC [A]	37.80442	36.14949	-1.654930	36.86458
I3_tRMS_rc@AC [A]	36.74529	37.38529	0.640007	37.34793
P_t_rc@AC [W]	25575.87	25146.08	-429.7910	25413.15
Q_t_rc@AC [var]	-1829.618	-1733.360	96.25842	1832.106
I_fund_Q_SYM+_rc@AC [A]	-0.850391	-0.312678	0.537713	0.749858
I_fund_Q_SYM-_rc@AC [A]	-0.292164	-0.027221	0.264943	0.283935
I_fund_P_SYM+_rc@AC [A]	37.08307	36.46912	-0.613949	36.85277
I_fund_P_SYM-_rc@AC [A]	0.033216	-0.480025	-0.513241	0.352654
U_fund_SYM+_rc@AC [V]	398.2065	398.1018	-0.104736	398.1334
U_fund_SYM-_rc@AC [V]	0.999959	1.021488	0.021529	0.963687
U+ [V]	229.8533	229.8372	-0.016138	229.8692
U- [V]	0.564519	0.554308	-0.010211	0.556316

Duration fault time



时间 [s]	A 1:04.0225	B 2:04.1430	间隔 1:00.1205	有效值
U1_tRMS_rc@AC [V]	229.5368	207.2363	-22.30054	207.2284
U2_tRMS_rc@AC [V]	229.4925	225.0697	-4.422775	225.0755
U3_tRMS_rc@AC [V]	229.2721	224.9639	-4.308212	224.9465
I1_tRMS_rc@AC [A]	36.53498	41.37860	4.843624	40.82193
I2_tRMS_rc@AC [A]	37.10476	37.49971	0.394947	37.91515
I3_tRMS_rc@AC [A]	37.74583	38.37165	0.625820	37.93256
P_t_rc@AC [W]	25377.44	25563.71	186.2695	25435.15
Q_t_rc@AC [var]	-3011.075	-2070.605	940.4692	2128.087
I_fund_Q_SYM+_rc@AC [A]	-0.145854	-0.345435	-0.199581	0.704085
I_fund_Q_SYM-_rc@AC [A]	-0.061844	-0.157639	-0.095795	0.352629
I_fund_P_SYM+_rc@AC [A]	36.91243	38.99860	2.086170	38.78628
I_fund_P_SYM-_rc@AC [A]	-0.109007	-1.325180	-1.216174	1.075249
U_fund_SYM+_rc@AC [V]	397.3521	379.1609	-18.19116	379.1391
U_fund_SYM-_rc@AC [V]	0.409714	21.41940	21.00969	21.31096
U+ [V]	229.8611	218.8927	-10.96847	218.9066
U- [V]	0.557426	12.28433	11.72690	12.30185

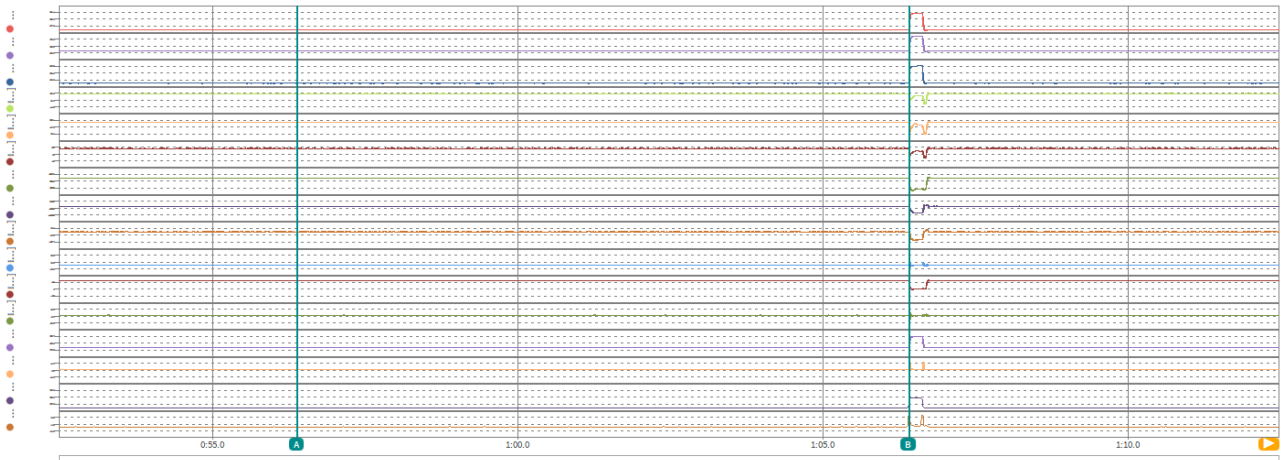
Recover time – Active power



	A	B	间隔	有效值
时间 [s]	2:04.1416	2:04.2083	0.0667	
U1_tRMS_rc@AC [V]	207.2180	231.1721	23.95410	226.6186
U2_tRMS_rc@AC [V]	225.0428	230.2557	5.212860	228.8716
U3_tRMS_rc@AC [V]	224.9374	229.3031	4.365723	229.0402
I1_tRMS_rc@AC [A]	41.36503	37.53907	-3.825962	40.95557
I2_tRMS_rc@AC [A]	37.56142	37.66885	0.107426	37.37915
I3_tRMS_rc@AC [A]	38.35820	36.44672	-1.911476	38.79620
P_t_rc@AC [W]	25570.55	25542.43	-28.12109	26226.82
Q_t_rc@AC [var]	-2051.365	-2920.051	-868.6860	4969.073
I_fund_Q_SYM+_rc@AC [A]	-0.305136	-2.230829	-1.925692	1.855177
I_fund_Q_SYM-_rc@AC [A]	-0.133198	-0.155157	-0.021958	2.184535
I_fund_P_SYM+_rc@AC [A]	39.01373	36.97646	-2.037266	38.31409
I_fund_P_SYM-_rc@AC [A]	-1.320440	0.519378	1.839818	2.599624
U_fund_SYM+_rc@AC [V]	379.1147	398.7907	19.67606	395.0976
U_fund_SYM-_rc@AC [V]	21.42906	1.553189	-19.87588	7.452101
U+ [V]	218.8927	230.1945	11.30186	225.4790
U- [V]	12.28433	0.812445	-11.47189	7.241559

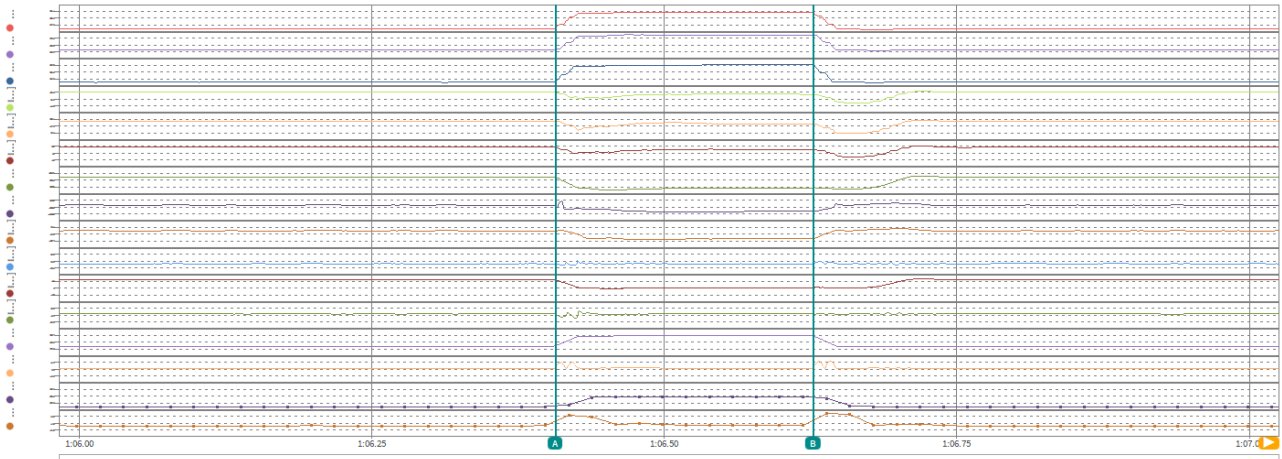
Test – VS1.1

Before fault



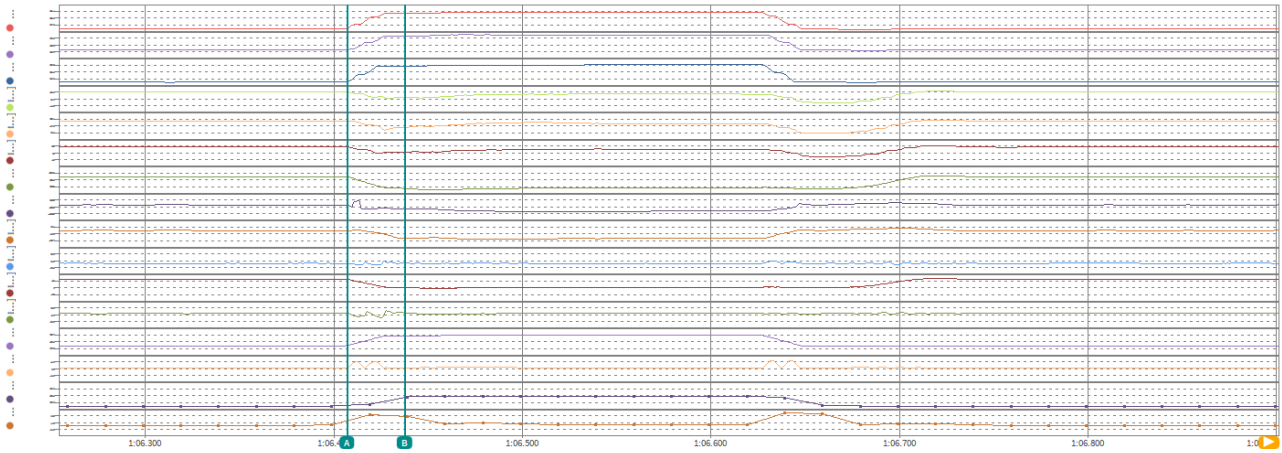
时间 [s]	A 0:56.383858	B 1:06.408088	间隔 0:10.024230	有效值
U1_tRMS_rc@AC [V]	230.2955	230.3304	0.034943	230.3270
U2_tRMS_rc@AC [V]	229.7677	229.7738	6.104e-3	229.7807
U3_tRMS_rc@AC [V]	229.6735	229.7071	0.033615	229.6791
I1_tRMS_rc@AC [A]	179.3701	182.3386	2.968491	180.7292
I2_tRMS_rc@AC [A]	183.8990	182.1696	-1.729401	182.3467
I3_tRMS_rc@AC [A]	185.9952	183.2867	-2.708542	185.3030
P_t_rc@AC [W]	126197.5	125881.0	-316.4375	126012.4
Q_t_rc@AC [var]	-4573.701	-4407.280	166.4209	4262.517
I_fund_Q_SYM+_rc@AC [A]	-0.232792	-0.694890	-0.462098	1.015925
I_fund_Q_SYM-_rc@AC [A]	0.163006	0.337067	0.174060	0.921343
I_fund_P_SYM+_rc@AC [A]	182.9682	182.4832	-0.485031	182.6839
I_fund_P_SYM-_rc@AC [A]	-2.127809	1.108628	3.236437	1.322375
U_fund_SYM+_rc@AC [V]	398.2155	398.2578	0.042328	398.2446
U_fund_SYM-_rc@AC [V]	0.971934	0.865803	-0.106131	1.002140
U+ [V]	229.8997	229.9400	0.040311	229.9333
U- [V]	0.585383	0.631996	0.046614	0.578473

Duration fault time



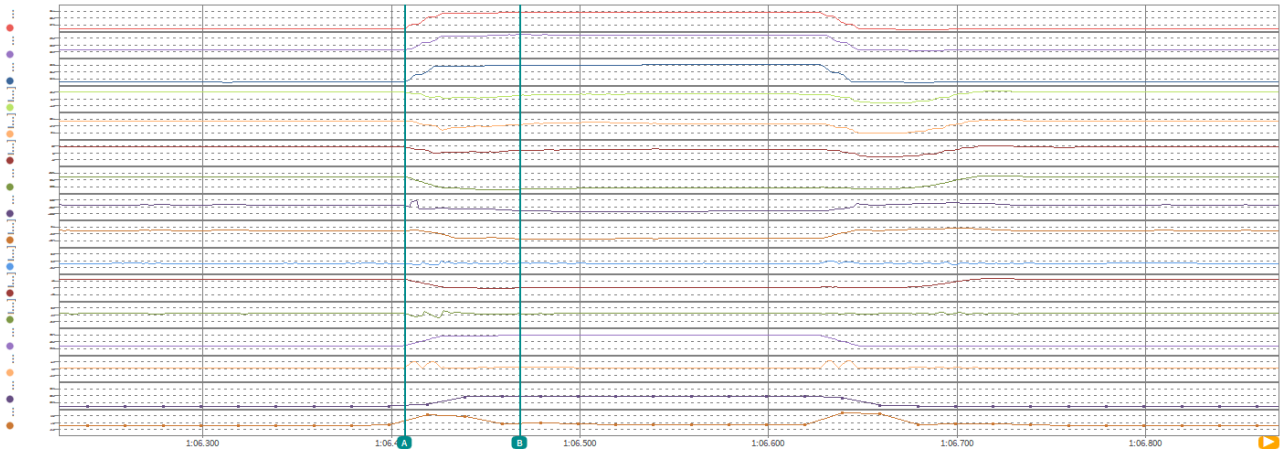
时间 [s]	A 1:06.407499	B 1:06.627660	间隔 0.220161	有效值
U1_tRMS_rc@AC [V]	230.3304	287.7308	57.40039	284.6239
U2_tRMS_rc@AC [V]	229.7738	287.4606	57.68678	284.5545
U3_tRMS_rc@AC [V]	229.7071	287.2038	57.49666	283.9804
I1_tRMS_rc@AC [A]	182.3386	147.7345	-34.60410	140.1297
I2_tRMS_rc@AC [A]	182.1696	139.8836	-42.28593	140.8289
I3_tRMS_rc@AC [A]	183.2867	141.3991	-41.88759	131.6441
P_t_rc@AC [W]	125881.0	9443.763	-116437.3	25375.72
Q_t_rc@AC [var]	-4407.280	-122967.0	-118559.8	114293.7
I_fund_Q_SYM+_rc@AC [A]	-0.694890	-90.02471	-89.32982	85.77280
I_fund_Q_SYM-_rc@AC [A]	0.337067	-0.452153	-0.789219	4.014021
I_fund_P_SYM+_rc@AC [A]	182.4832	10.04113	-172.4420	35.67934
I_fund_P_SYM-_rc@AC [A]	1.108628	0.782275	-0.326353	7.632469
U_fund_SYM+_rc@AC [V]	398.2578	497.8489	99.59103	492.3929
U_fund_SYM-_rc@AC [V]	0.865803	0.916013	0.050210	3.256225
U+ [V]	229.9400	287.4354	57.49537	278.5756
U- [V]	0.631996	0.623001	-8.995e-3	1.383971

Injected reactive current at 30ms



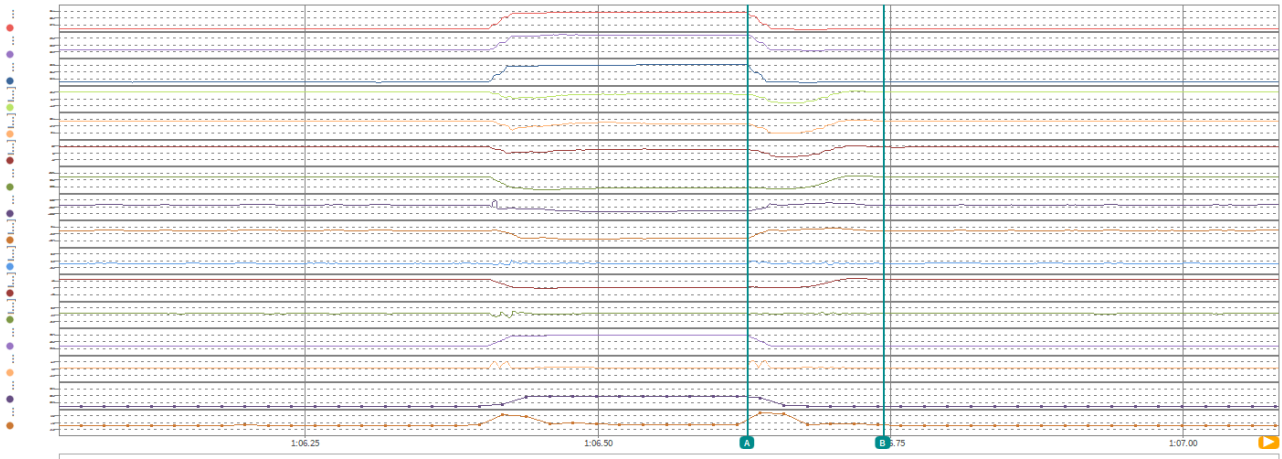
时间 [s]	A 1:06.407499	B 1:06.438050	间隔 0.030551	有效值
U1_tRMS_rc@AC [V]	230.3304	283.4253	53.09485	266.3929
U2_tRMS_rc@AC [V]	229.7738	283.1534	53.37962	263.2378
U3_tRMS_rc@AC [V]	229.7071	283.1124	53.40526	267.2293
I1_tRMS_rc@AC [A]	182.3386	94.87134	-87.46722	125.9297
I2_tRMS_rc@AC [A]	182.1696	92.13628	-90.03329	125.6290
I3_tRMS_rc@AC [A]	183.2867	94.01881	-89.26786	120.6912
P_t_rc@AC [W]	125881.0	5231.525	-120649.5	63878.64
Q_t_rc@AC [var]	-4407.280	-79423.42	-75016.14	69770.97
I_fund_Q_SYM+_rc@AC [A]	-0.694890	-83.33520	-82.64031	44.39727
I_fund_Q_SYM-_rc@AC [A]	0.337067	2.892604	2.555538	10.19289
I_fund_P_SYM+_rc@AC [A]	182.4832	6.027028	-176.4561	92.04434
I_fund_P_SYM-_rc@AC [A]	1.108628	5.897192	4.788565	19.67147
U_fund_SYM+_rc@AC [V]	398.2578	490.5561	92.29825	459.0792
U_fund_SYM-_rc@AC [V]	0.865803	1.062494	0.196691	7.965845
U+ [V]	229.9400	239.5293	9.589308	234.7836
U- [V]	0.631996	3.101195	2.469199	2.237949

Injected reactive current at 60ms



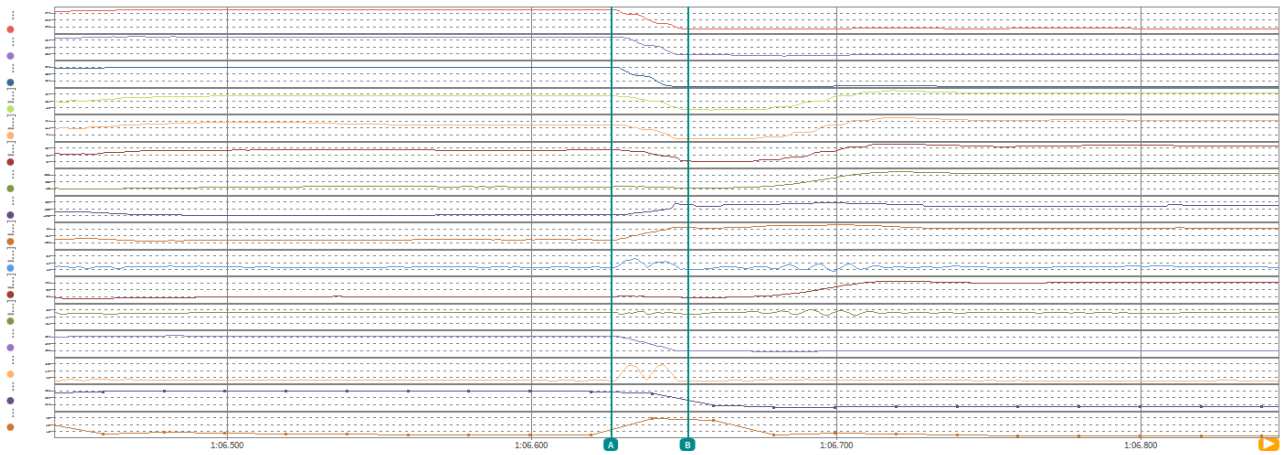
时间 [s]	A 1:06.407499	B 1:06.468384	间隔 0.060885	有效值
U1_tRMS_rc@AC [V]	230.3304	287.8120	57.48154	276.1120
U2_tRMS_rc@AC [V]	229.7738	289.2507	59.47688	275.0174
U3_tRMS_rc@AC [V]	229.7071	286.4507	56.74355	276.0734
I1_tRMS_rc@AC [A]	182.3386	130.5425	-51.79607	116.9728
I2_tRMS_rc@AC [A]	182.1696	136.2610	-45.90862	119.9274
I3_tRMS_rc@AC [A]	183.2867	121.7551	-61.53157	112.1821
P_t_rc@AC [W]	125881.0	-4323.973	-130205.0	45632.58
Q_t_rc@AC [var]	-4407.280	-111778.5	-107371.2	81734.18
I_fund_Q_SYM+_rc@AC [A]	-0.694890	-94.87005	-94.17516	68.74546
I_fund_Q_SYM-_rc@AC [A]	0.337067	1.879552	1.542486	7.360580
I_fund_P_SYM+_rc@AC [A]	182.4832	-5.578873	-188.0620	65.54381
I_fund_P_SYM-_rc@AC [A]	1.108628	-2.097717	-3.206345	14.24755
U_fund_SYM+_rc@AC [V]	398.2578	498.5103	100.2524	477.0902
U_fund_SYM-_rc@AC [V]	0.865803	1.985917	1.120114	5.760930
U+ [V]	229.9400	284.7366	54.79661	259.4288
U- [V]	0.631996	0.884506	0.252510	2.112981

Recover time – Active power



时间 [s]	A 1:06.627830	B 1:06.743851	间隔 0.116021	有效值
U1_tRMS_rc@AC [V]	287.7308	230.4620	-57.26883	236.3757
U2_tRMS_rc@AC [V]	287.4606	229.0559	-58.40468	235.7893
U3_tRMS_rc@AC [V]	287.2038	230.4917	-56.71214	235.7089
I1_tRMS_rc@AC [A]	147.7345	180.3445	32.61005	127.5003
I2_tRMS_rc@AC [A]	139.8836	182.5602	42.67653	127.5089
I3_tRMS_rc@AC [A]	141.3991	183.8612	42.46208	130.2588
P_t_rc@AC [W]	9443.763	125399.3	115955.6	81072.35
Q_t_rc@AC [var]	-122967.0	-9484.467	113482.6	40925.17
I_fund_Q_SYM+_rc@AC [A]	-90.02471	-2.909112	87.11560	25.91552
I_fund_Q_SYM-_rc@AC [A]	-0.452153	0.426289	0.878441	7.071044
I_fund_P_SYM+_rc@AC [A]	10.04113	181.7104	171.6692	117.2240
I_fund_P_SYM-_rc@AC [A]	0.782275	-1.407908	-2.190183	4.010756
U_fund_SYM+_rc@AC [V]	497.8489	398.3715	-99.47736	408.3352
U_fund_SYM-_rc@AC [V]	0.916013	1.042355	0.126342	5.040537
U+ [V]	287.4354	230.4123	-57.02309	246.6734
U- [V]	0.623001	0.691883	0.068882	1.905365

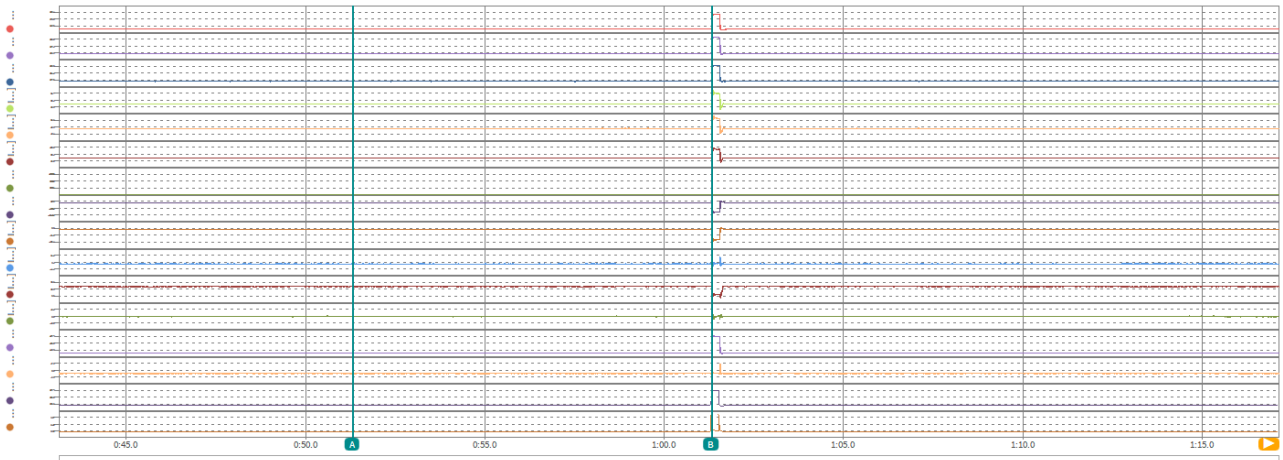
Recover time – Reactive power



时间 [s]	A 1:06.626217	B 1:06.651362	间隔 0.025145	有效值
U1_tRMS_rc@AC [V]	287.7302	230.3710	-57.35927	260.1308
U2_tRMS_rc@AC [V]	287.4695	230.4711	-56.99834	262.7439
U3_tRMS_rc@AC [V]	287.1955	229.9541	-57.24142	256.4541
I1_tRMS_rc@AC [A]	147.6690	22.37432	-125.2947	108.1480
I2_tRMS_rc@AC [A]	140.2484	17.55733	-122.6911	98.28976
I3_tRMS_rc@AC [A]	141.4510	20.24627	-121.2048	106.7232
P_t_rc@AC [W]	9297.182	-2948.339	-12245.52	8577.656
Q_t_rc@AC [var]	-123079.4	13539.26	136618.7	84776.44
I_fund_Q_SYM+_rc@AC [A]	-90.10319	3.100404	93.20359	54.32879
I_fund_Q_SYM-_rc@AC [A]	-0.390423	-6.045034	-5.654611	12.50382
I_fund_P_SYM+_rc@AC [A]	9.870131	-4.283406	-14.15354	10.19757
I_fund_P_SYM-_rc@AC [A]	0.648711	-7.627274	-8.275985	3.894885
U_fund_SYM+_rc@AC [V]	497.8483	398.8270	-99.02127	448.5929
U_fund_SYM-_rc@AC [V]	1.022542	0.698132	-0.324410	10.19382
U+ [V]	287.4354	277.4908	-9.944540	282.5069
U- [V]	0.623001	3.542758	2.919757	2.543547

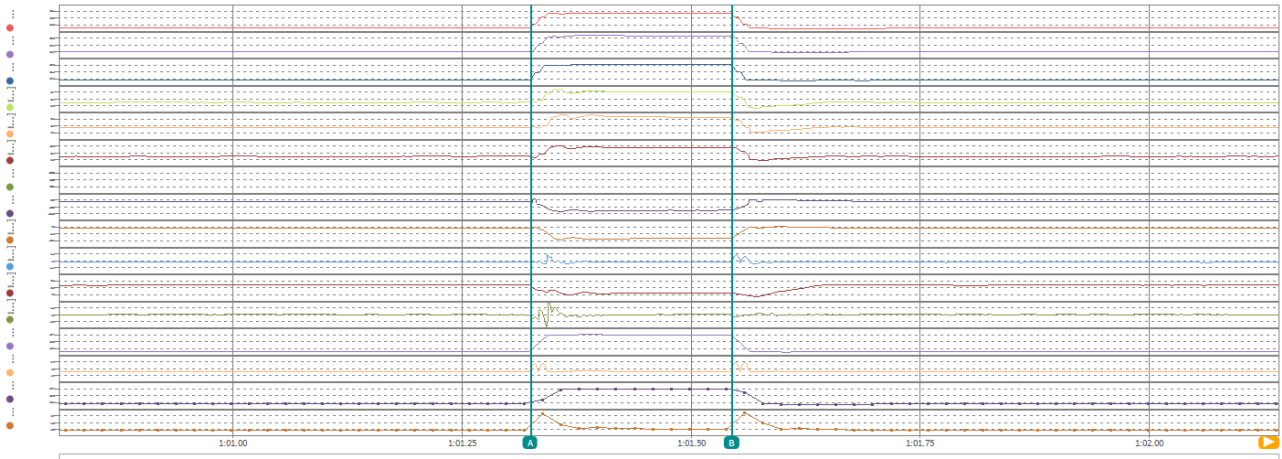
Test – VS1.2

Before fault



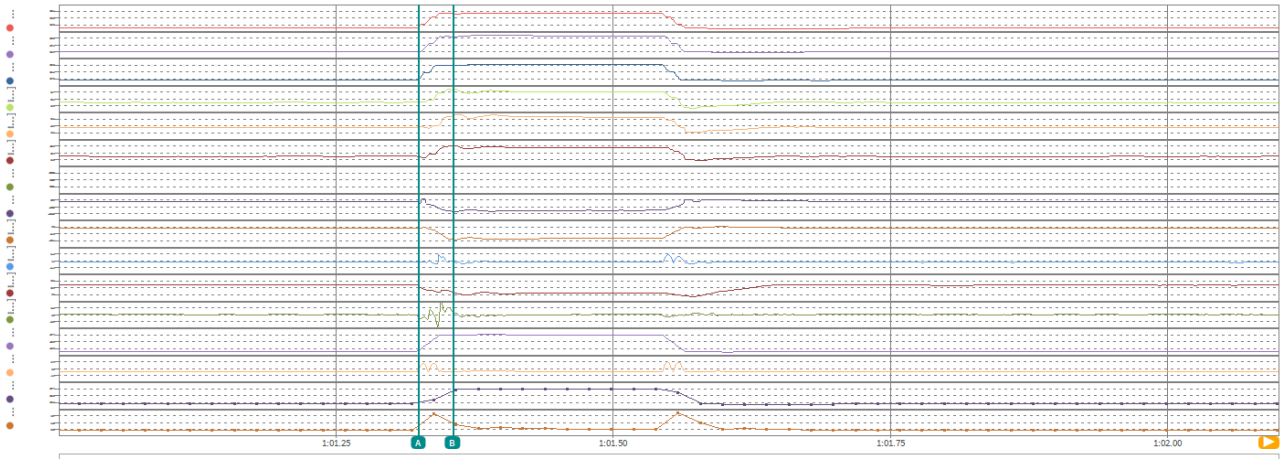
时间 [s]	A 0:51.321092	B 1:01.324859	间隔 0:10.003767	有效值
U1_tRMS_rc@AC [V]	230.2448	230.1794	-0.065399	230.1927
U2_tRMS_rc@AC [V]	229.6675	229.6740	6.531e-3	229.6979
U3_tRMS_rc@AC [V]	229.5196	229.4959	-0.023773	229.5298
I1_tRMS_rc@AC [A]	37.41420	38.02286	0.608658	37.37399
I2_tRMS_rc@AC [A]	36.10607	37.42610	1.320034	37.03926
I3_tRMS_rc@AC [A]	39.52676	38.64857	-0.878181	38.18631
P_t_rc@AC [W]	25758.52	25993.43	234.9141	25667.55
Q_t_rc@AC [var]	-3377.304	-3420.880	-43.57617	3263.425
I_fund_Q_SYM+_rc@AC [A]	-1.833850	-1.672999	0.160852	1.760724
I_fund_Q_SYM-_rc@AC [A]	0.820797	0.248839	-0.571958	0.305332
I_fund_P_SYM+_rc@AC [A]	37.35984	37.70793	0.348083	37.22974
I_fund_P_SYM-_rc@AC [A]	0.043559	-0.214746	-0.258305	0.269115
U_fund_SYM+_rc@AC [V]	398.0405	397.9934	-0.047119	398.0340
U_fund_SYM-_rc@AC [V]	1.032808	0.925930	-0.106878	0.986401
U+ [V]	229.8209	229.7765	-0.044399	229.8118
U- [V]	0.567422	0.594110	0.026688	0.569403

Duration fault time



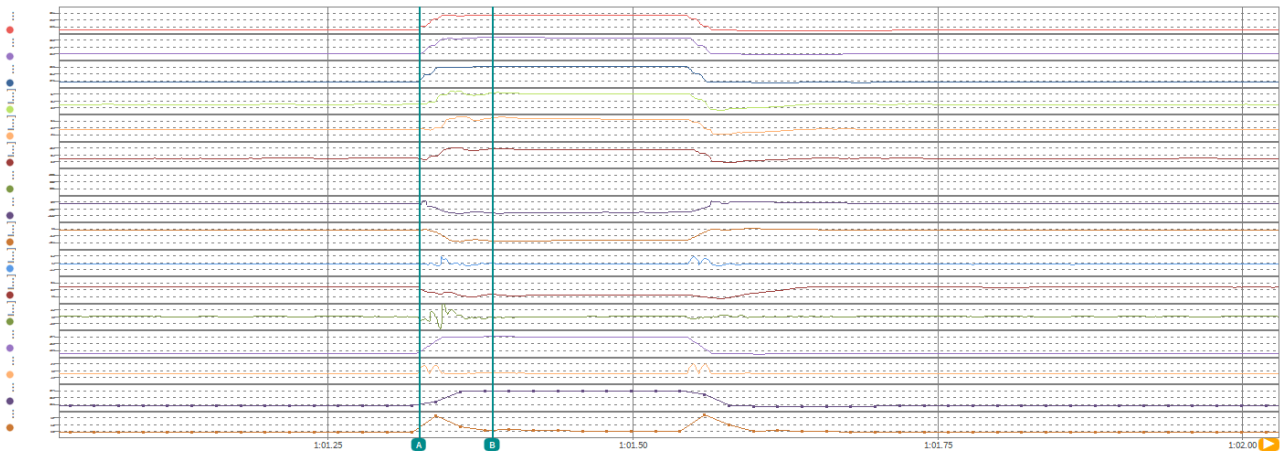
时间 [s]	A 1:01.325039	B 1:01.545037	间隔 0.219998	有效值
U1_tRMS_rc@AC [V]	230.1794	287.9337	57.75436	285.6436
U2_tRMS_rc@AC [V]	229.6740	287.6357	57.96162	285.5074
U3_tRMS_rc@AC [V]	229.4959	287.2107	57.71486	284.8000
I1_tRMS_rc@AC [A]	38.02286	93.94976	55.92690	92.94451
I2_tRMS_rc@AC [A]	37.42610	94.01622	56.59012	92.28824
I3_tRMS_rc@AC [A]	38.64857	95.98090	57.33232	94.70196
P_t_rc@AC [W]	25993.43	9300.426	-16693.01	10650.29
Q_t_rc@AC [var]	-3420.880	-81129.12	-77708.24	79708.15
I_fund_Q_SYM+_rc@AC [A]	-1.672999	-93.78434	-92.11134	90.69814
I_fund_Q_SYM-_rc@AC [A]	0.248839	0.941863	0.693024	2.753688
I_fund_P_SYM+_rc@AC [A]	37.70793	10.77433	-26.93360	12.98246
I_fund_P_SYM-_rc@AC [A]	-0.214746	0.609017	0.823762	4.345430
U_fund_SYM+_rc@AC [V]	397.9934	498.1209	100.1275	494.0318
U_fund_SYM-_rc@AC [V]	0.925930	1.219249	0.293320	3.435903
U+ [V]	229.7765	287.6277	57.85117	280.1046
U- [V]	0.594110	0.668269	0.074159	1.558464

Injected reactive current at 30ms



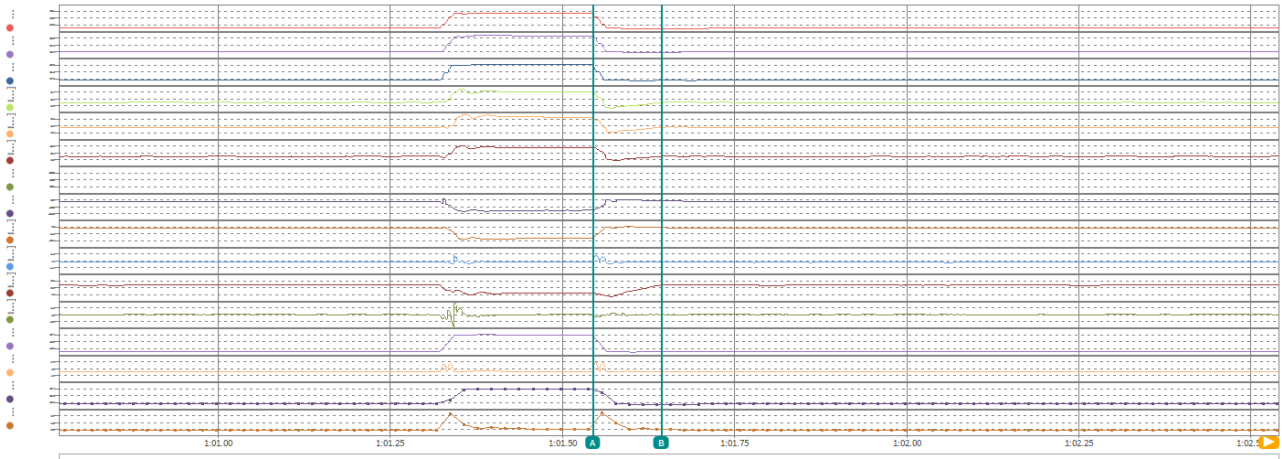
时间 [s]	A 1:01.325039	B 1:01.355871	间隔 0.030833	有效值
U1_tRMS_rc@AC [V]	230.1794	286.5701	56.39072	268.8667
U2_tRMS_rc@AC [V]	229.6740	285.9466	56.27260	265.7672
U3_tRMS_rc@AC [V]	229.4959	285.7478	56.25191	269.7913
I1_tRMS_rc@AC [A]	38.02286	107.0047	68.98186	74.56894
I2_tRMS_rc@AC [A]	37.42610	99.36335	61.93725	60.48106
I3_tRMS_rc@AC [A]	38.64857	107.3621	68.71349	72.06846
P_t_rc@AC [W]	25993.43	12941.58	-13051.86	16651.49
Q_t_rc@AC [var]	-3420.880	-88817.53	-85396.65	55228.53
I_fund_Q_SYM+_rc@AC [A]	-1.672999	-98.54361	-96.87061	52.23110
I_fund_Q_SYM-_rc@AC [A]	0.248839	3.649247	3.400409	6.464748
I_fund_P_SYM+_rc@AC [A]	37.70793	14.98124	-22.72669	22.08397
I_fund_P_SYM-_rc@AC [A]	-0.214746	7.881074	8.095820	10.97607
U_fund_SYM+_rc@AC [V]	397.9934	495.5107	97.51733	463.3759
U_fund_SYM-_rc@AC [V]	0.925930	1.188641	0.262711	8.250636
U+ [V]	229.7765	245.6181	15.84160	237.8292
U- [V]	0.594110	4.321880	3.727770	3.084770

Injected reactive current at 60ms



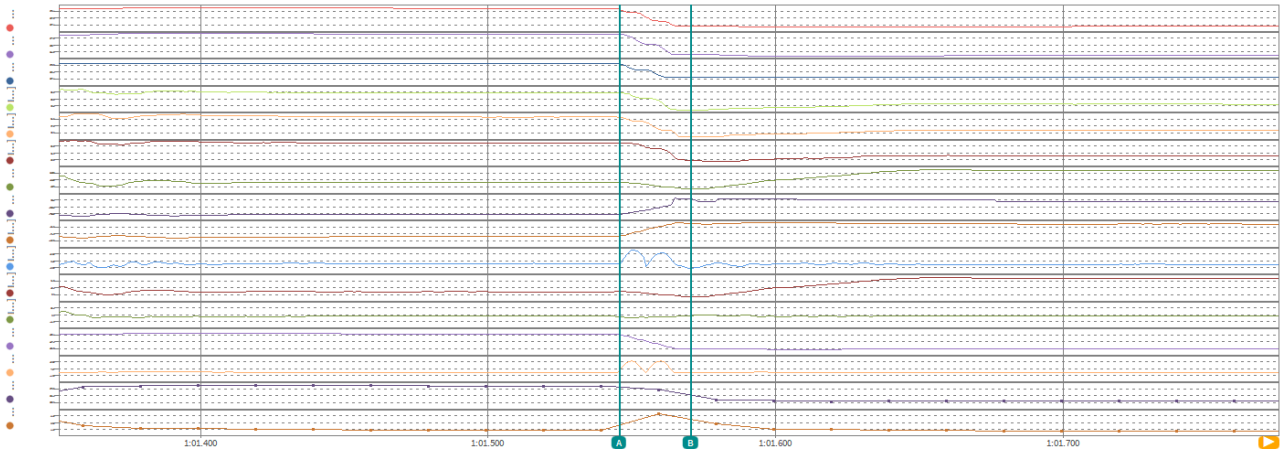
时间 [s]	A 1:01.325039	B 1:01.385140	间隔 0.060101	有效值
U1_tRMS_rc@AC [V]	230.1794	289.4518	59.27240	278.0523
U2_tRMS_rc@AC [V]	229.6740	290.5541	60.88005	276.8155
U3_tRMS_rc@AC [V]	229.4959	287.5743	58.07845	277.9055
I1_tRMS_rc@AC [A]	38.02286	100.4707	62.44787	85.40315
I2_tRMS_rc@AC [A]	37.42610	99.09390	61.66780	80.50993
I3_tRMS_rc@AC [A]	38.64857	104.6666	66.01801	85.58591
P_t_rc@AC [W]	25993.43	12365.10	-13628.33	13406.30
Q_t_rc@AC [var]	-3420.880	-87099.66	-83678.78	70158.82
I_fund_Q_SYM+_rc@AC [A]	-1.672999	-99.79662	-98.12362	75.77565
I_fund_Q_SYM-_rc@AC [A]	0.248839	2.982566	2.733727	4.944234
I_fund_P_SYM+_rc@AC [A]	37.70793	14.24852	-23.45940	17.36524
I_fund_P_SYM-_rc@AC [A]	-0.214746	-0.743076	-0.528330	8.168443
U_fund_SYM+_rc@AC [V]	397.9934	500.8918	102.8984	480.2550
U_fund_SYM-_rc@AC [V]	0.925930	2.048779	1.122849	6.104888
U+ [V]	229.7765	287.5918	57.81531	263.0307
U- [V]	0.594110	1.029725	0.435615	2.416318

Recover time – Active power



时间 [s]	A 1:01.545204	B 1:01.644404	间隔 0.099200	有效值
U1_tRMS_rc@AC [V]	287.9337	228.8729	-59.06087	236.4823
U2_tRMS_rc@AC [V]	287.6357	227.3589	-60.27672	236.0688
U3_tRMS_rc@AC [V]	287.2107	229.4194	-57.79132	235.7110
I1_tRMS_rc@AC [A]	93.94976	37.75829	-56.19147	38.39320
I2_tRMS_rc@AC [A]	94.01622	37.16617	-56.85005	37.91781
I3_tRMS_rc@AC [A]	95.98090	37.71937	-58.26152	44.04488
P_t_rc@AC [W]	9300.426	25363.92	16063.50	13662.73
Q_t_rc@AC [var]	-81129.12	4415.923	85545.04	27785.59
I_fund_Q_SYM+_rc@AC [A]	-93.78434	2.795816	96.58016	27.37301
I_fund_Q_SYM-_rc@AC [A]	0.941863	-0.298261	-1.240124	5.540034
I_fund_P_SYM+_rc@AC [A]	10.77433	36.99269	26.21837	19.79872
I_fund_P_SYM-_rc@AC [A]	0.609017	-0.139117	-0.748133	1.563842
U_fund_SYM+_rc@AC [V]	498.1209	395.8574	-102.2635	408.5082
U_fund_SYM-_rc@AC [V]	1.219249	1.119834	-0.099416	5.409221
U+ [V]	287.6277	228.1131	-59.51460	247.2982
U- [V]	0.668269	0.779228	0.110959	2.191837

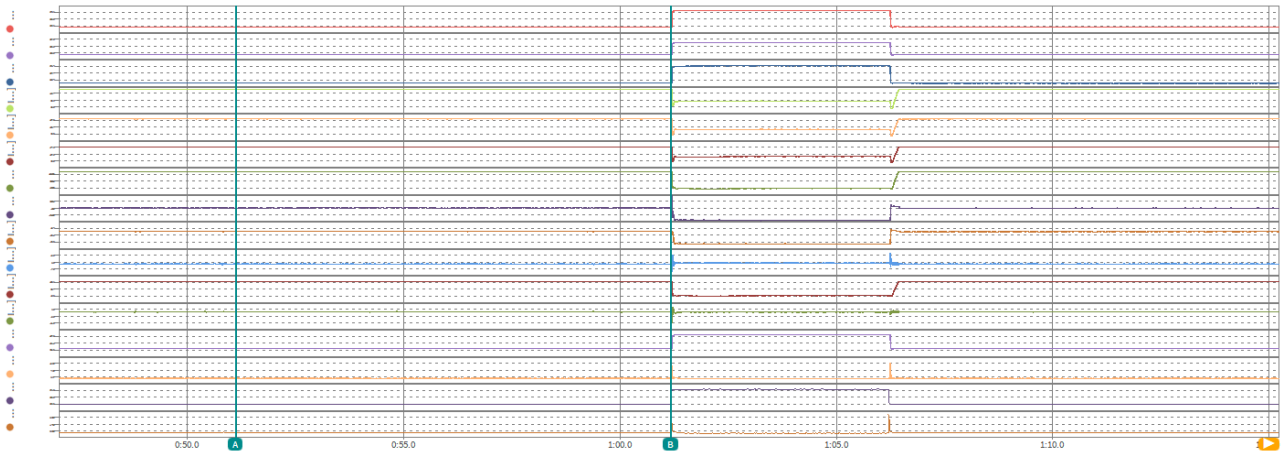
Recover time – Reactive power



时间 [s]	A 1:01.545753	B 1:01.570664	间隔 0.024912	有效值
U1_tRMS_rc@AC [V]	286.1898	230.9068	-55.28310	254.7594
U2_tRMS_rc@AC [V]	287.3707	230.6901	-56.68059	257.4852
U3_tRMS_rc@AC [V]	286.6206	230.0949	-56.52568	250.5882
I1_tRMS_rc@AC [A]	94.31586	8.142951	-86.17291	60.75620
I2_tRMS_rc@AC [A]	93.49335	10.26115	-83.23219	59.49820
I3_tRMS_rc@AC [A]	97.22801	17.71775	-79.51026	72.05693
P_t_rc@AC [W]	9886.146	987.8126	-8898.333	5937.254
Q_t_rc@AC [var]	-81126.90	8265.355	89392.25	50929.45
I_fund_Q_SYM+_rc@AC [A]	-93.87772	3.140167	97.01788	49.41556
I_fund_Q_SYM-_rc@AC [A]	1.248999	-4.730462	-5.979461	10.66585
I_fund_P_SYM+_rc@AC [A]	11.62343	1.404667	-10.21877	7.221120
I_fund_P_SYM-_rc@AC [A]	-1.513828	0.183476	1.697304	2.358004
U_fund_SYM+_rc@AC [V]	496.4853	399.3437	-97.14166	439.0043
U_fund_SYM-_rc@AC [V]	1.072928	1.048663	-0.024265	10.38886
U+ [V]	287.6277	271.8186	-15.80908	279.8348
U- [V]	0.668269	4.655612	3.987343	3.325756

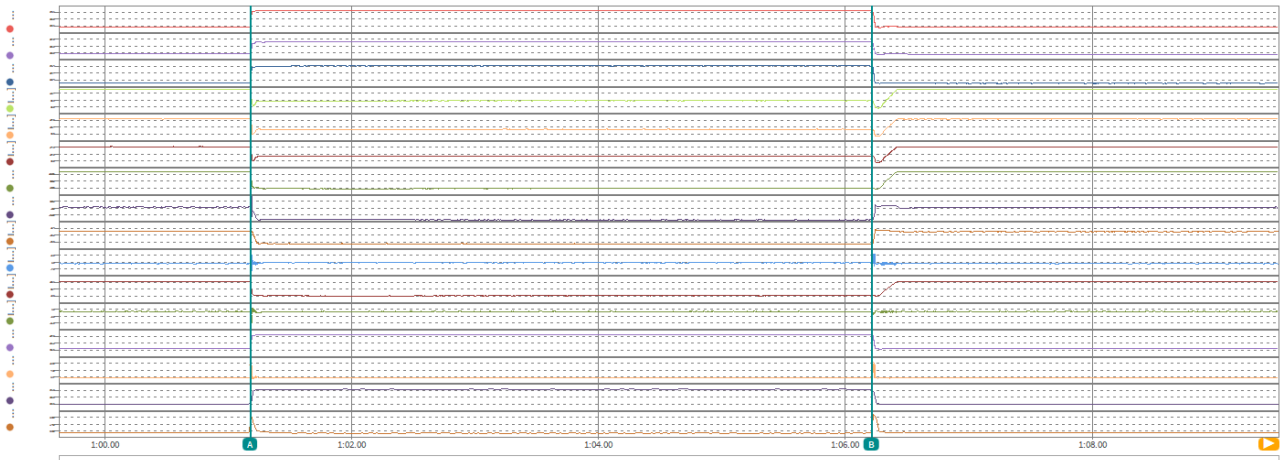
Test – VS2.1.1.a

Before fault



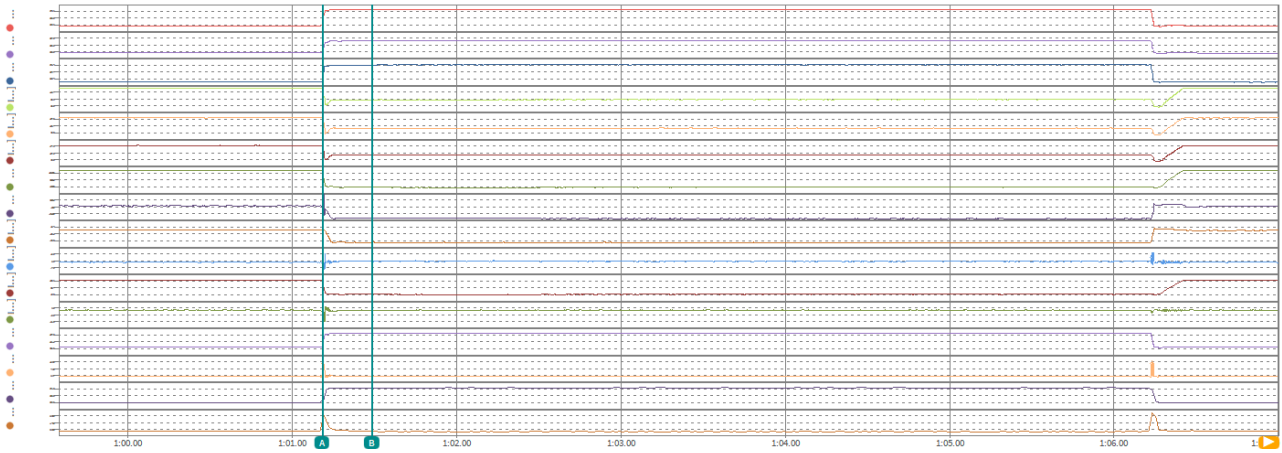
时间 [s]	A 0:51.134530	B 1:01.187591	间隔 0:10.053061	有效值
U1_tRMS_rc@AC [V]	231.4195	231.3810	-0.038467	231.3642
U2_tRMS_rc@AC [V]	230.7645	230.7808	0.016251	230.7513
U3_tRMS_rc@AC [V]	230.7497	230.7509	1.282e-3	230.7547
I1_tRMS_rc@AC [A]	179.2465	178.7900	-0.456497	178.8555
I2_tRMS_rc@AC [A]	183.3083	183.8524	0.544174	182.6594
I3_tRMS_rc@AC [A]	182.1119	181.7251	-0.386780	181.3882
P_t_rc@AC [W]	125780.8	125708.1	-72.67188	125366.9
Q_t_rc@AC [var]	2438.054	2422.021	-16.03345	2162.790
I_fund_Q_SYM+_rc@AC [A]	0.684367	0.031572	-0.652795	0.332886
I_fund_Q_SYM-_rc@AC [A]	-0.391892	-0.824253	-0.432361	0.686561
I_fund_P_SYM+_rc@AC [A]	181.5219	181.4219	-0.100082	180.9411
I_fund_P_SYM-_rc@AC [A]	-0.811885	-1.593217	-0.781332	0.873802
U_fund_SYM+_rc@AC [V]	400.0599	400.0437	-0.016235	400.0234
U_fund_SYM-_rc@AC [V]	0.911121	0.368585	-0.542536	0.891414
U+ [V]	230.9400	230.9509	0.010902	230.9604
U- [V]	0.535515	0.537778	2.262e-3	0.514620

Duration fault time



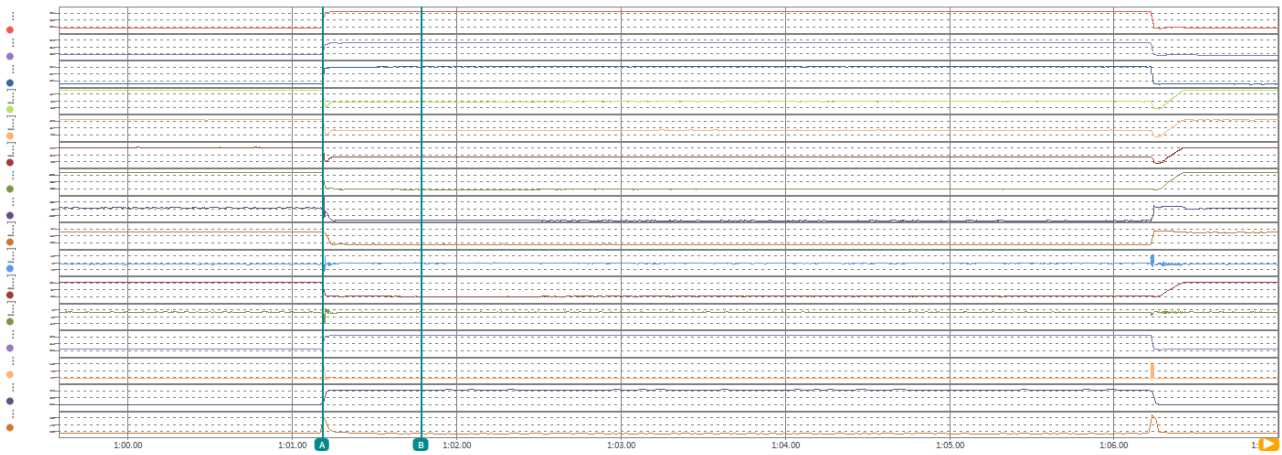
时间 [s]	A 1:01.186007	B 1:06.215026	间隔 5.029019	有效值
U1_tRMS_rc@AC [V]	231.4032	276.2090	44.80576	276.0559
U2_tRMS_rc@AC [V]	230.7856	275.7442	44.95863	275.7078
U3_tRMS_rc@AC [V]	230.7454	275.8759	45.13045	275.7718
I1_tRMS_rc@AC [A]	178.6639	74.16976	-104.4941	74.77290
I2_tRMS_rc@AC [A]	183.9220	77.57029	-106.3517	78.95961
I3_tRMS_rc@AC [A]	181.7045	77.27055	-104.4340	77.65253
P_t_rc@AC [W]	125693.8	3694.484	-121999.3	6942.899
Q_t_rc@AC [var]	2435.617	-63084.90	-65520.52	63372.46
I_fund_Q_SYM+_rc@AC [A]	0.094363	-73.73103	-73.82539	74.69616
I_fund_Q_SYM-_rc@AC [A]	0.126987	1.068342	0.941356	1.096476
I_fund_P_SYM+_rc@AC [A]	181.3943	4.422993	-176.9714	9.406907
I_fund_P_SYM-_rc@AC [A]	-1.752652	-0.743786	1.008865	1.628732
U_fund_SYM+_rc@AC [V]	400.0553	477.9361	77.88080	477.7659
U_fund_SYM-_rc@AC [V]	0.555925	0.791396	0.235471	0.895261
U+ [V]	230.9509	275.9832	45.03233	275.6407
U- [V]	0.537778	0.437575	-0.100203	0.477652

Injected reactive current at 30ms



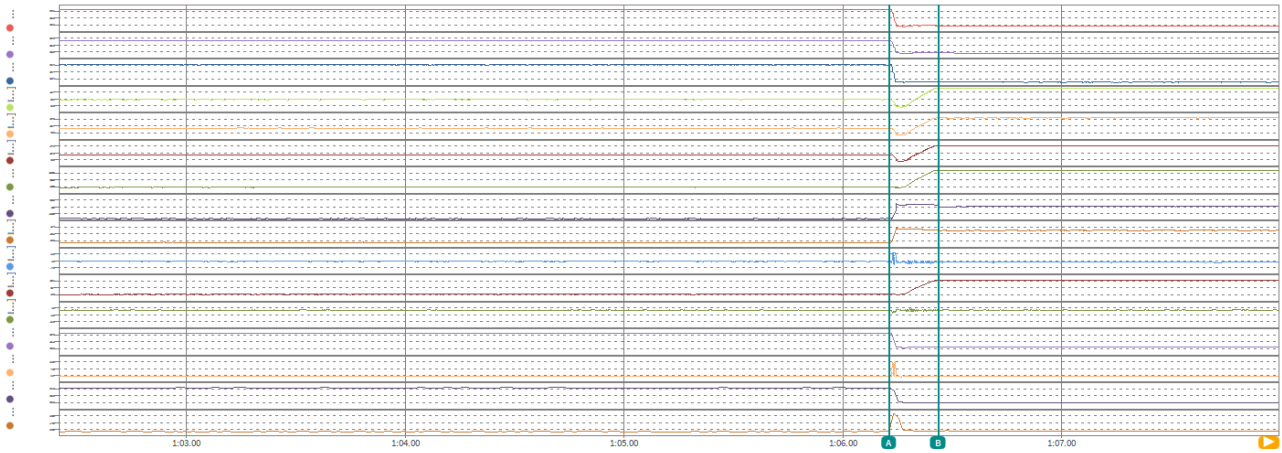
时间 [s]	A 1:01.186007	B 1:01.489474	间隔 0.303467	有效值
U1_tRMS_rc@AC [V]	231.4032	276.1412	44.73804	273.7776
U2_tRMS_rc@AC [V]	230.7856	275.8130	45.02745	273.6315
U3_tRMS_rc@AC [V]	230.7454	275.8085	45.06313	273.3279
I1_tRMS_rc@AC [A]	178.6639	72.94798	-105.7159	76.11761
I2_tRMS_rc@AC [A]	183.9220	77.57705	-106.3449	80.97675
I3_tRMS_rc@AC [A]	181.7045	74.00853	-107.6960	77.78748
P_t_rc@AC [W]	125693.8	3852.321	-121841.5	24000.62
Q_t_rc@AC [var]	2435.617	-61833.01	-64268.62	58332.78
I_fund_Q_SYM+_rc@AC [A]	0.094363	-74.54932	-74.64369	68.23922
I_fund_Q_SYM-_rc@AC [A]	0.126987	0.664332	0.537346	2.596003
I_fund_P_SYM+_rc@AC [A]	181.3943	4.656591	-176.7378	33.84321
I_fund_P_SYM-_rc@AC [A]	-1.752652	-1.590140	0.162512	4.452548
U_fund_SYM+_rc@AC [V]	400.0553	477.9046	77.84930	473.7869
U_fund_SYM-_rc@AC [V]	0.555925	0.714419	0.158494	2.209812
U+ [V]	230.9509	275.9662	45.01531	270.3836
U- [V]	0.537778	0.470366	-0.067412	0.975930

Injected reactive current at 60ms



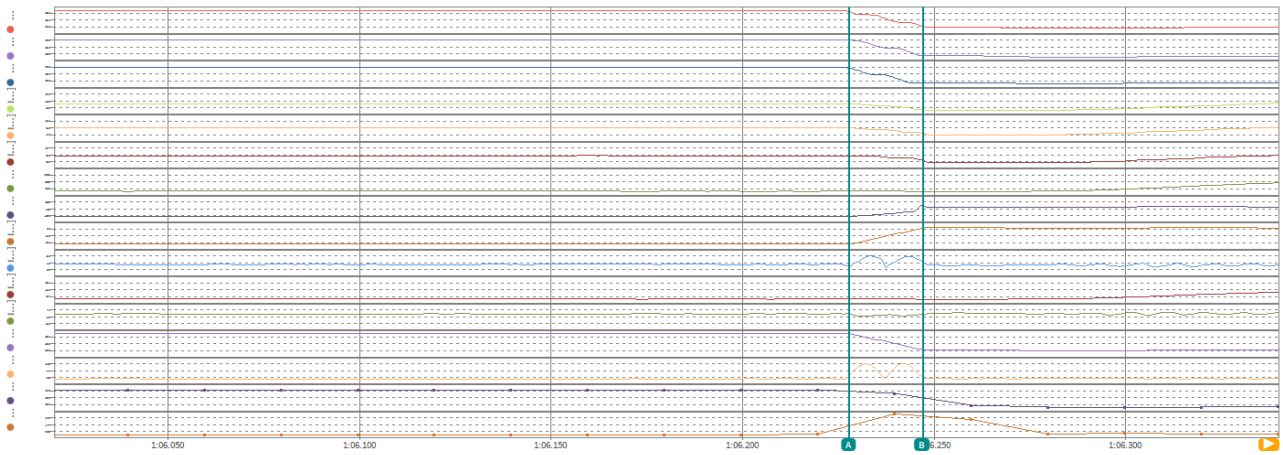
时间 [s]	A 1:01.186007	B 1:01.787314	间隔 0.601307	有效值
U1_tRMS_rc@AC [V]	231.4032	276.1515	44.74826	274.9671
U2_tRMS_rc@AC [V]	230.7856	275.7774	44.99181	274.7178
U3_tRMS_rc@AC [V]	230.7454	275.8727	45.12727	274.5972
I1_tRMS_rc@AC [A]	178.6639	73.52115	-105.1427	74.50050
I2_tRMS_rc@AC [A]	183.9220	76.49722	-107.4248	79.00955
I3_tRMS_rc@AC [A]	181.7045	75.13319	-106.5713	76.43412
P_t_rc@AC [W]	125693.8	3262.150	-122431.7	17240.86
Q_t_rc@AC [var]	2435.617	-62040.67	-64476.28	60139.49
I_fund_Q_SYM+_rc@AC [A]	0.094363	-74.75584	-74.85020	71.46370
I_fund_Q_SYM-_rc@AC [A]	0.126987	1.027280	0.900293	1.986562
I_fund_P_SYM+_rc@AC [A]	181.3943	3.939439	-177.4549	24.24207
I_fund_P_SYM-_rc@AC [A]	-1.752652	-0.706666	1.045985	3.282295
U_fund_SYM+_rc@AC [V]	400.0553	477.9266	77.87134	475.8641
U_fund_SYM-_rc@AC [V]	0.555925	0.794804	0.238879	1.656455
U+ [V]	230.9509	275.9659	45.01505	273.0990
U- [V]	0.537778	0.463899	-0.073879	0.762511

Recover time – Active power



时间 [s]	A 1:06.213447	B 1:06.437632	间隔 0.224185	有效值
U1_tRMS_rc@AC [V]	276.2137	231.4012	-44.81247	236.5646
U2_tRMS_rc@AC [V]	275.7653	230.5246	-45.24068	235.8892
U3_tRMS_rc@AC [V]	275.8442	230.7910	-45.05321	236.1748
I1_tRMS_rc@AC [A]	74.23318	178.7374	104.5042	98.51788
I2_tRMS_rc@AC [A]	77.56596	181.6412	104.0752	101.2126
I3_tRMS_rc@AC [A]	77.30070	181.8326	104.5319	100.9301
P_t_rc@AC [W]	3792.470	125095.8	121303.3	66678.59
Q_t_rc@AC [var]	-63103.31	5061.771	68165.08	22476.08
I_fund_Q_SYM+_rc@AC [A]	-73.79065	1.364652	75.15530	24.13735
I_fund_Q_SYM-_rc@AC [A]	0.808770	0.249785	-0.558985	3.394635
I_fund_P_SYM+_rc@AC [A]	4.538559	180.5691	176.0305	96.09395
I_fund_P_SYM-_rc@AC [A]	-0.919635	-0.416323	0.503312	1.823965
U_fund_SYM+_rc@AC [V]	477.9332	399.9309	-78.00229	409.0092
U_fund_SYM-_rc@AC [V]	1.048769	0.936624	-0.112145	2.885621
U+ [V]	275.9832	231.3521	-44.63114	242.1868
U- [V]	0.437575	0.522839	0.085264	1.191579

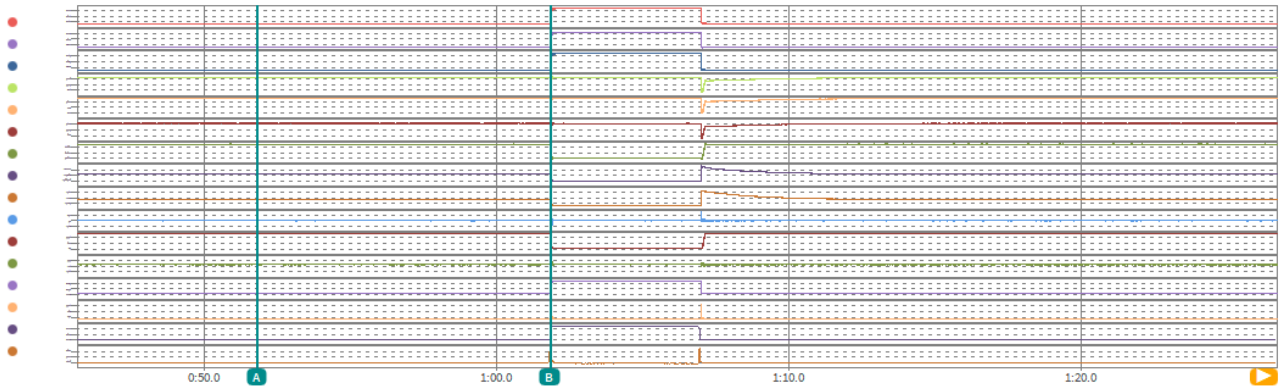
Recover time – Reactive power



时间 [s]	A 1:06.227844	B 1:06.246990	间隔 0.019146	有效值
U1_tRMS_rc@AC [V]	274.8865	234.4572	-40.42937	255.3377
U2_tRMS_rc@AC [V]	275.5763	231.9568	-43.61951	257.6408
U3_tRMS_rc@AC [V]	275.4014	231.2399	-44.16148	251.3413
I1_tRMS_rc@AC [A]	74.82870	12.05251	-62.77619	55.08948
I2_tRMS_rc@AC [A]	78.89127	29.81060	-49.08067	58.28146
I3_tRMS_rc@AC [A]	78.45493	38.28822	-40.16671	67.14258
P_t_rc@AC [W]	4075.270	2891.431	-1183.839	4255.814
Q_t_rc@AC [var]	-63786.51	18368.14	82154.65	46634.90
I_fund_Q_SYM+_rc@AC [A]	-74.80939	1.314440	76.12383	46.05042
I_fund_Q_SYM-_rc@AC [A]	-1.270513	8.451130	9.721643	10.58188
I_fund_P_SYM+_rc@AC [A]	4.930034	4.128726	-0.801309	5.457009
I_fund_P_SYM-_rc@AC [A]	-0.415311	-2.859187	-2.443876	4.032689
U_fund_SYM+_rc@AC [V]	476.7092	402.5686	-74.14053	440.1454
U_fund_SYM-_rc@AC [V]	1.095063	3.227826	2.132763	9.231034
U+ [V]	275.9446	266.6796	-9.265039	271.3516
U- [V]	0.481119	2.984254	2.503134	2.137434

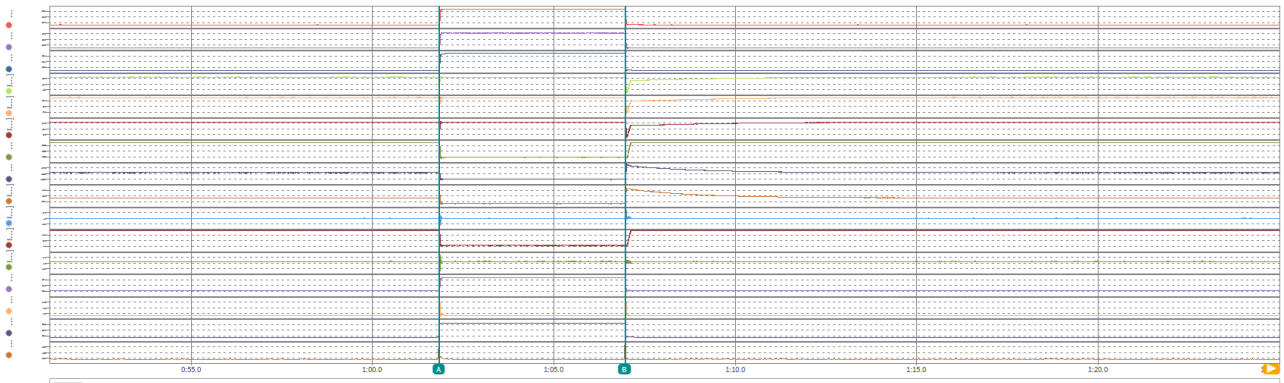
Test – VS2.1.1.b

Before fault



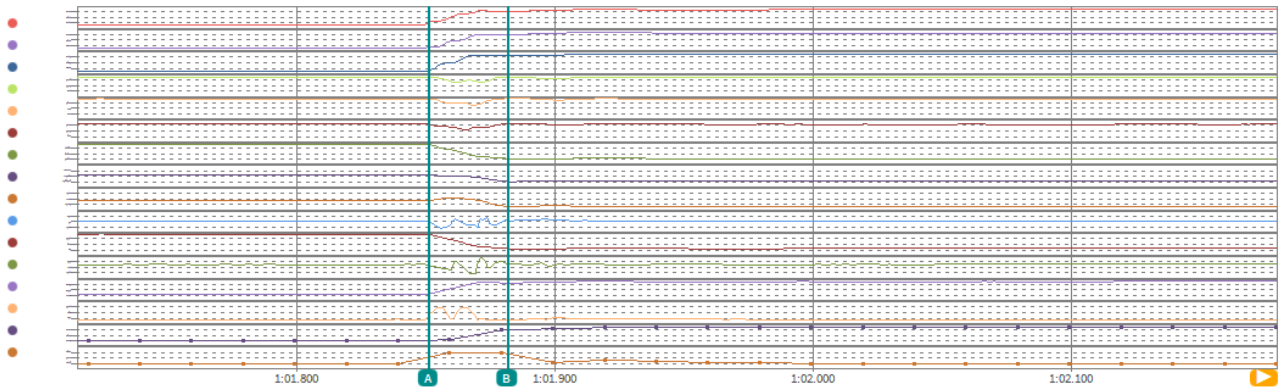
时间 [s]	A 0:51.8471	B 1:01.8497	间隔 0:10.0027	有效值
U1_tRMS_rc@AC [V]	230.4454	230.3107	-0.134689	230.4080
U2_tRMS_rc@AC [V]	229.8174	229.8547	0.037247	229.8028
U3_tRMS_rc@AC [V]	229.7852	229.7360	-0.049255	229.7558
I1_tRMS_rc@AC [A]	197.5510	198.1555	0.604492	197.8551
I2_tRMS_rc@AC [A]	198.5990	197.5242	-1.074738	198.7190
I3_tRMS_rc@AC [A]	201.2059	201.5668	0.360916	201.1722
P_t_rc@AC [W]	110154.3	110318.0	163.6797	110268.2
Q_t_rc@AC [var]	-82127.27	-81816.63	310.6406	82097.47
I_fund_Q_SYM+_rc@AC [A]	-118.9669	-118.5363	0.430618	118.9357
I_fund_Q_SYM-_rc@AC [A]	0.877748	0.693490	-0.184258	0.694666
I_fund_P_SYM+_rc@AC [A]	159.6371	159.9052	0.268143	159.8203
I_fund_P_SYM-_rc@AC [A]	-0.582415	0.131454	0.713869	0.426567
U_fund_SYM+_rc@AC [V]	398.3930	398.3039	-0.089081	398.3457
U_fund_SYM-_rc@AC [V]	0.956584	0.570524	-0.386060	0.995772

Duration fault time



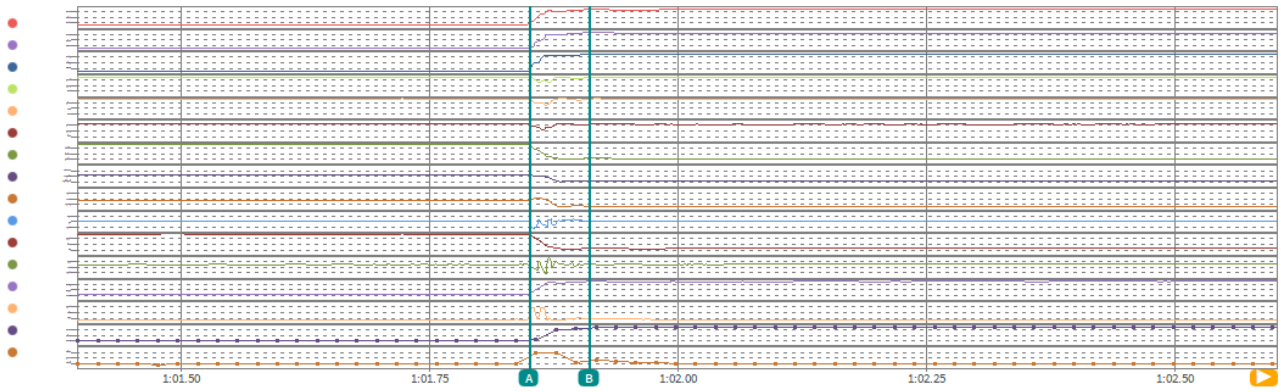
时间 [s]	A 1:01.8510	B 1:06.9672	间隔 5.1162	有效值
U1_tRMS_rc@AC [V]	230.3163	276.1432	45.82700	275.9111
U2_tRMS_rc@AC [V]	229.8605	275.6311	45.77060	275.4272
U3_tRMS_rc@AC [V]	229.7399	275.5889	45.84903	275.4048
I1_tRMS_rc@AC [A]	198.1722	196.4448	-1.727356	195.9700
I2_tRMS_rc@AC [A]	197.5443	196.9322	-0.612045	196.7071
I3_tRMS_rc@AC [A]	201.5532	198.8209	-2.732361	199.0538
P_t_rc@AC [W]	110342.8	5052.724	-105290.1	6992.447
Q_t_rc@AC [var]	-81797.22	-163242.2	-81444.98	162931.2
I_fund_Q_SYM+_rc@AC [A]	-118.5041	-197.2444	-78.74030	196.8794
I_fund_Q_SYM-_rc@AC [A]	0.573236	0.448208	-0.125028	1.386958
I_fund_P_SYM+_rc@AC [A]	159.9357	6.097810	-153.8379	9.151527
I_fund_P_SYM-_rc@AC [A]	-0.061276	-0.067824	-6.548e-3	1.018261
U_fund_SYM+_rc@AC [V]	398.3129	477.6686	79.35574	477.3066
U_fund_SYM-_rc@AC [V]	0.590014	1.269508	0.679494	1.087488
U+ [V]	229.9693	275.7422	45.77287	275.3359
U- [V]	0.587602	0.529410	-0.058192	0.591963

Injected reactive current at 30ms



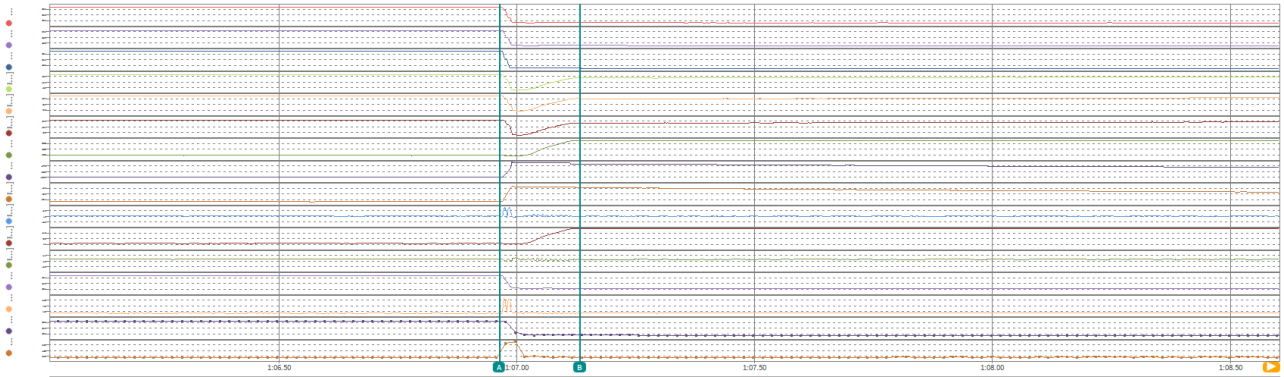
	A	B	间隔	有效值
时间 [s]	1:01.8510	1:01.8817	0.0306	
U1_tRMS_rc@AC [V]	230.3163	271.1978	40.88153	259.0078
U2_tRMS_rc@AC [V]	229.8605	270.6657	40.80524	256.4578
U3_tRMS_rc@AC [V]	229.7399	271.1023	41.36237	259.9657
I1_tRMS_rc@AC [A]	198.1722	201.6569	3.484711	173.0501
I2_tRMS_rc@AC [A]	197.5443	201.2379	3.693588	164.9647
I3_tRMS_rc@AC [A]	201.5532	209.6143	8.061096	167.6696
P_t_rc@AC [W]	110342.8	6178.107	-104164.7	60403.22
Q_t_rc@AC [var]	-81797.22	-165869.0	-84071.78	115057.9
I_fund_Q_SYM+_rc@AC [A]	-118.5041	-202.2682	-83.76407	126.4288
I_fund_Q_SYM-_rc@AC [A]	0.573236	3.039683	2.466447	14.36152
I_fund_P_SYM+_rc@AC [A]	159.9357	7.574629	-152.3611	85.53865
I_fund_P_SYM-_rc@AC [A]	-0.061276	4.528524	4.589801	12.13690
U_fund_SYM+_rc@AC [V]	398.3129	469.3513	71.03845	447.0255
U_fund_SYM-_rc@AC [V]	0.590014	0.688332	0.098319	6.392491

Injected reactive current at 60ms



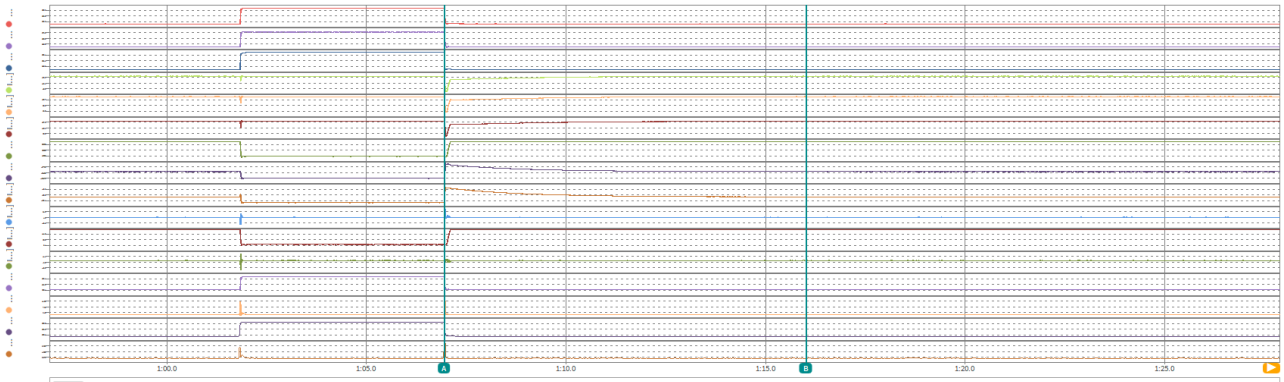
	A	B	间隔	有效值
时间 [s]	1:01.8510	1:01.9115	0.0604	
U1_tRMS_rc@AC [V]	230.3163	275.9174	45.60114	265.9922
U2_tRMS_rc@AC [V]	229.8605	276.9485	47.08798	264.8767
U3_tRMS_rc@AC [V]	229.7399	274.4342	44.69434	266.0519
I1_tRMS_rc@AC [A]	198.1722	196.5009	-1.671280	182.7834
I2_tRMS_rc@AC [A]	197.5443	193.0490	-4.495255	178.9893
I3_tRMS_rc@AC [A]	201.5532	197.8400	-3.713196	184.1089
P_t_rc@AC [W]	110342.8	7500.729	-102842.1	43822.02
Q_t_rc@AC [var]	-81797.22	-161803.0	-80005.73	138430.1
I_fund_Q_SYM+_rc@AC [A]	-118.5041	-195.3730	-76.86885	162.5676
I_fund_Q_SYM-_rc@AC [A]	0.573236	1.560608	0.987372	10.84908
I_fund_P_SYM+_rc@AC [A]	159.9357	9.047287	-150.8884	62.02998
I_fund_P_SYM-_rc@AC [A]	-0.061276	2.237942	2.299218	8.938886
U_fund_SYM+_rc@AC [V]	398.3129	477.6305	79.31760	459.7466
U_fund_SYM-_rc@AC [V]	0.590014	2.050824	1.460810	4.782382

Recover time – Active power



时间 [s]	A 1:06.9641	B 1:07.1338	间隔 0.1697	有效值
U1_tRMS_rc@AC [V]	276.1141	231.8692	-44.24490	237.0098
U2_tRMS_rc@AC [V]	275.6921	230.9272	-44.76495	236.2069
U3_tRMS_rc@AC [V]	275.6154	231.3559	-44.25948	236.4203
I1_tRMS_rc@AC [A]	196.5503	158.2457	-38.30458	108.8445
I2_tRMS_rc@AC [A]	196.8159	161.3442	-35.47174	110.9366
I3_tRMS_rc@AC [A]	198.8437	160.9412	-37.90253	115.4442
P_t_rc@AC [W]	5008.271	111034.7	106026.4	62204.90
Q_t_rc@AC [var]	-163258.5	-5793.884	157464.6	53322.91
I_fund_Q_SYM+_rc@AC [A]	-197.2506	-5.644288	191.6063	59.40923
I_fund_Q_SYM-_rc@AC [A]	0.407083	-0.206620	-0.613703	8.354865
I_fund_P_SYM+_rc@AC [A]	6.043348	159.9468	153.9034	89.48715
I_fund_P_SYM-_rc@AC [A]	0.055099	-0.711400	-0.766499	2.301128
U_fund_SYM+_rc@AC [V]	477.7020	400.7603	-76.94168	409.5515
U_fund_SYM-_rc@AC [V]	1.124243	0.857695	-0.266549	3.440316
U+ [V]	275.7422	231.6375	-44.10467	242.1858
U- [V]	0.529410	0.570192	0.040782	1.440481

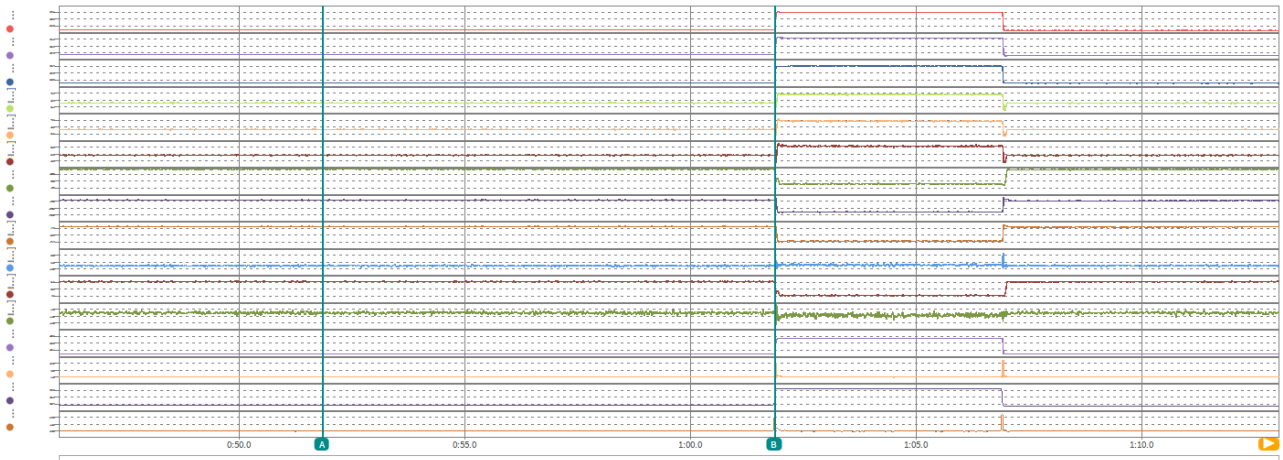
Recover time – Reactive power



时间 [s]	A 1:06.9641	B 1:16.0191	间隔 9.0550	有效值
U1_tRMS_rc@AC [V]	276.1141	230.3519	-45.76222	230.5689
U2_tRMS_rc@AC [V]	275.6921	229.7383	-45.95384	229.9601
U3_tRMS_rc@AC [V]	275.6154	229.7134	-45.90195	229.9007
I1_tRMS_rc@AC [A]	196.5503	198.3955	1.845230	185.6076
I2_tRMS_rc@AC [A]	196.8159	199.8603	3.044373	186.5890
I3_tRMS_rc@AC [A]	198.8437	200.8663	2.022583	188.8456
P_t_rc@AC [W]	5008.271	110589.7	105581.4	109570.7
Q_t_rc@AC [var]	-163258.5	-82141.27	81117.21	68274.63
I_fund_Q_SYM+_rc@AC [A]	-197.2506	-119.0058	78.24483	98.64901
I_fund_Q_SYM-_rc@AC [A]	0.407083	-0.123489	-0.530572	1.303795
I_fund_P_SYM+_rc@AC [A]	6.043348	160.3224	154.2791	158.7799
I_fund_P_SYM-_rc@AC [A]	0.055099	-0.456400	-0.511500	0.618018
U_fund_SYM+_rc@AC [V]	477.7020	398.2515	-79.45044	398.6097
U_fund_SYM-_rc@AC [V]	1.124243	0.991181	-0.133062	1.101744
U+ [V]	275.7422	229.9851	-45.75706	230.2712
U- [V]	0.529410	0.574555	0.045145	0.608929

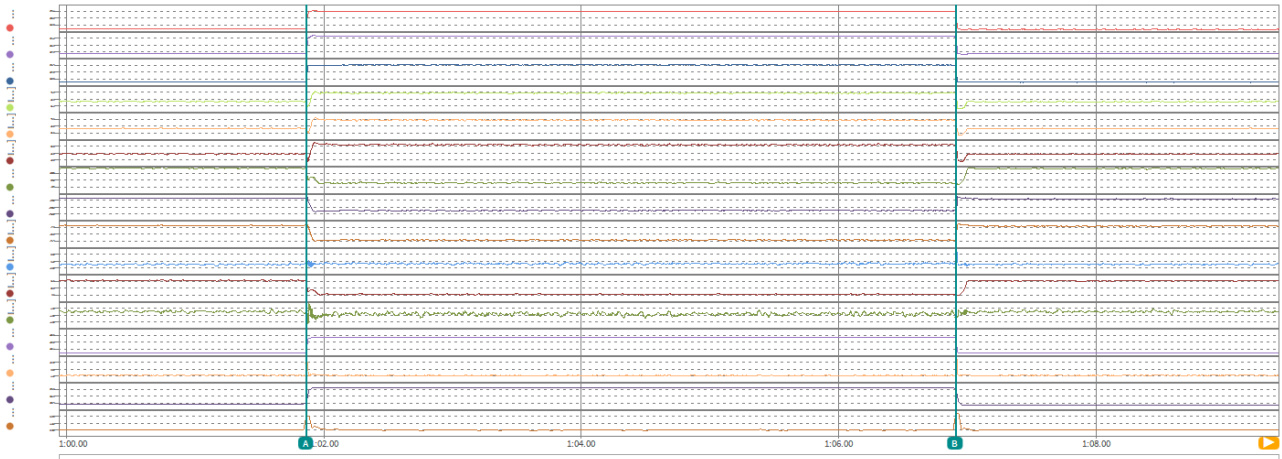
Test – VS2.1.2

Before fault



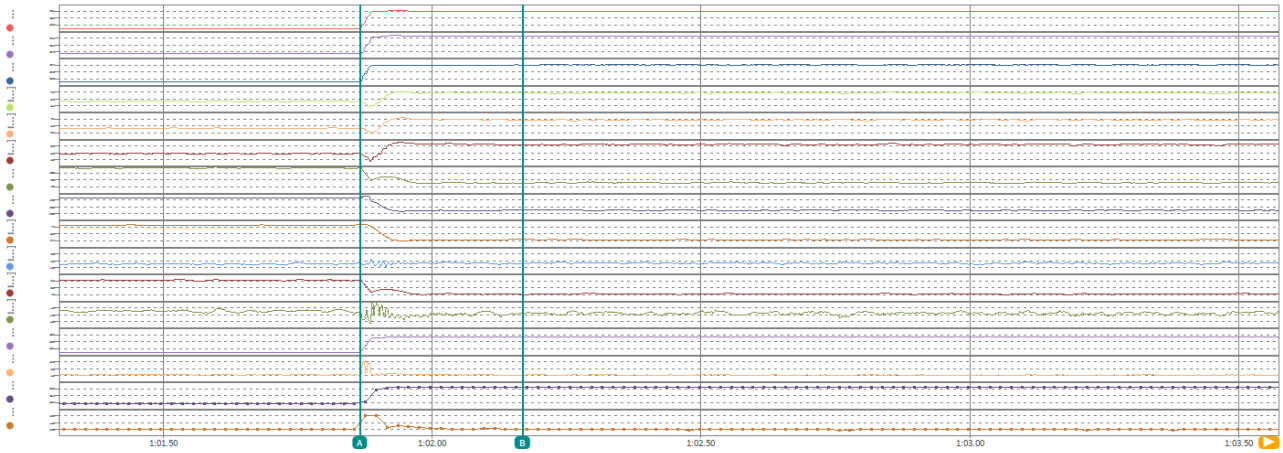
时间 [s]	A 0:51.85016	B 1:01.87040	间隔 0:10.02023	有效值
U1_tRMS_rc@AC [V]	231.1829	231.1922	9.308e-3	231.1694
U2_tRMS_rc@AC [V]	230.7825	230.8058	0.023224	230.8010
U3_tRMS_rc@AC [V]	230.6872	230.7700	0.082825	230.7093
I1_tRMS_rc@AC [A]	37.55792	37.05647	-0.501453	36.87964
I2_tRMS_rc@AC [A]	37.55037	37.98483	0.434464	38.04273
I3_tRMS_rc@AC [A]	36.99622	37.90680	0.910587	37.09662
P_t_rc@AC [W]	25769.90	25839.13	69.23047	25711.18
Q_t_rc@AC [var]	2419.888	3551.347	1131.458	2780.833
I_fund_Q_SYM+_rc@AC [A]	2.098042	4.316726	2.218683	3.060792
I_fund_Q_SYM-_rc@AC [A]	0.134011	-0.033217	-0.167228	0.575686
I_fund_P_SYM+_rc@AC [A]	37.20421	37.29872	0.094509	37.11807
I_fund_P_SYM-_rc@AC [A]	-0.235812	-0.651619	-0.415807	0.418419
U_fund_SYM+_rc@AC [V]	399.9006	399.9658	0.065186	399.9160
U_fund_SYM-_rc@AC [V]	0.743947	0.567675	-0.176273	0.776691
U+ [V]	230.8951	230.8261	-0.069020	230.8984
U- [V]	0.446371	0.461071	0.014700	0.448223

Duration fault time



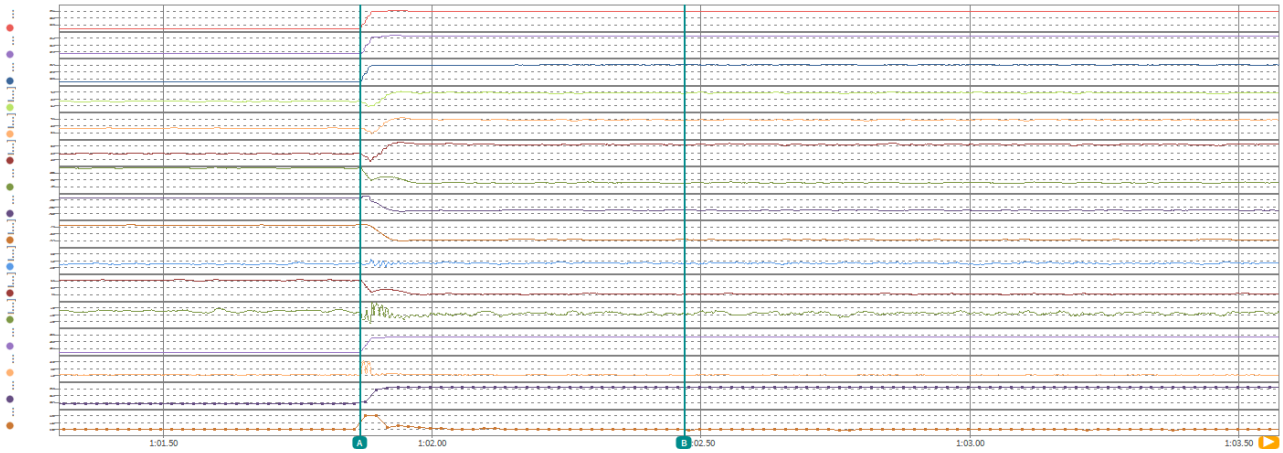
时间 [s]	A 1:01.86755	B 1:06.90738	间隔 5.03983	有效值
U1_tRMS_rc@AC [V]	231.1576	276.1935	45.03589	276.0854
U2_tRMS_rc@AC [V]	230.7338	275.8425	45.10873	275.7232
U3_tRMS_rc@AC [V]	230.7704	275.7855	45.01515	275.7475
I1_tRMS_rc@AC [A]	36.70795	68.25562	31.54767	68.62897
I2_tRMS_rc@AC [A]	36.68036	72.61617	35.93582	72.48311
I3_tRMS_rc@AC [A]	37.94572	69.50468	31.55896	69.61775
P_t_rc@AC [W]	25438.03	3563.733	-21874.29	4611.657
Q_t_rc@AC [var]	3698.371	-57941.28	-61639.65	57962.85
I_fund_Q_SYM+_rc@AC [A]	4.316246	-69.78168	-74.09793	69.81062
I_fund_Q_SYM-_rc@AC [A]	0.713701	0.570598	-0.143103	0.724385
I_fund_P_SYM+_rc@AC [A]	36.72583	4.302351	-32.42348	5.652309
I_fund_P_SYM-_rc@AC [A]	-0.740727	-1.440953	-0.700226	1.394384
U_fund_SYM+_rc@AC [V]	399.9051	477.9375	78.03241	477.7809
U_fund_SYM-_rc@AC [V]	0.855008	0.794380	-0.060628	0.896340
U+ [V]	230.8261	275.9426	45.11652	275.6417
U- [V]	0.461071	0.471746	0.010675	0.475929

Injected reactive current at 30ms



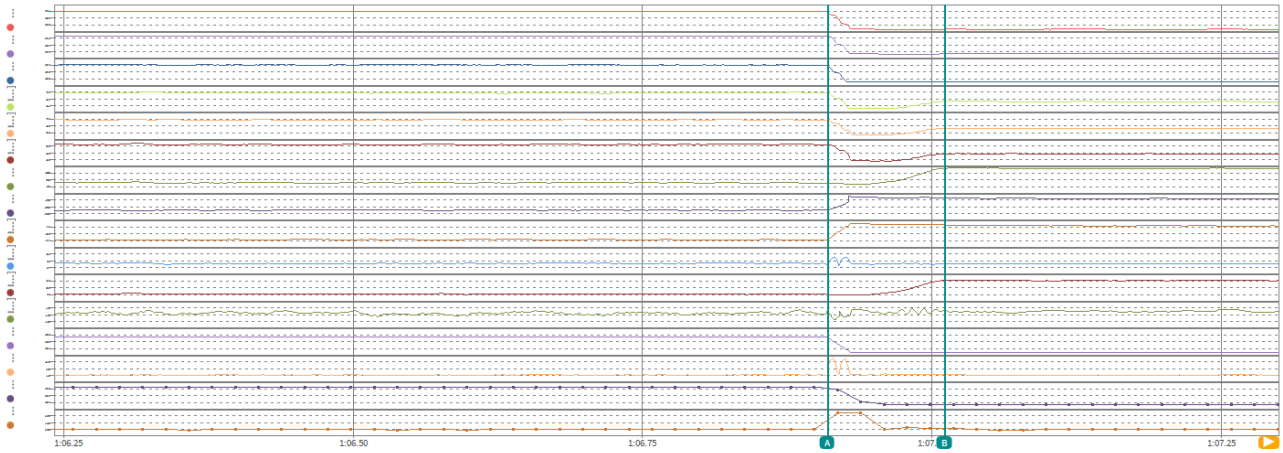
时间 [s]	A 1:01.86755	B 1:02.16959	间隔 0.30204	有效值
U1_tRMS_rc@AC [V]	231.1576	276.1340	44.97641	274.2070
U2_tRMS_rc@AC [V]	230.7338	275.8371	45.10333	274.0035
U3_tRMS_rc@AC [V]	230.7704	275.8560	45.08568	273.6750
I1_tRMS_rc@AC [A]	36.70795	68.98141	32.27345	65.13593
I2_tRMS_rc@AC [A]	36.68036	71.23882	34.55847	69.77229
I3_tRMS_rc@AC [A]	37.94572	67.66606	29.72034	66.95056
P_t_rc@AC [W]	25438.03	3326.968	-22111.06	8102.624
Q_t_rc@AC [var]	3698.371	-57267.96	-60966.33	55022.42
I_fund_Q_SYM+_rc@AC [A]	4.316246	-68.98090	-73.29714	65.88175
I_fund_Q_SYM-_rc@AC [A]	0.713701	-0.362913	-1.076614	0.976608
I_fund_P_SYM+_rc@AC [A]	36.72583	4.019306	-32.70652	10.54947
I_fund_P_SYM-_rc@AC [A]	-0.740727	-1.362521	-0.621794	2.142413
U_fund_SYM+_rc@AC [V]	399.9051	477.9406	78.03558	474.4450
U_fund_SYM-_rc@AC [V]	0.855008	0.739050	-0.115958	2.242945
U+ [V]	230.8261	275.9863	45.16026	270.6141
U- [V]	0.461071	0.425427	-0.035644	0.981221

Injected reactive current at 60ms



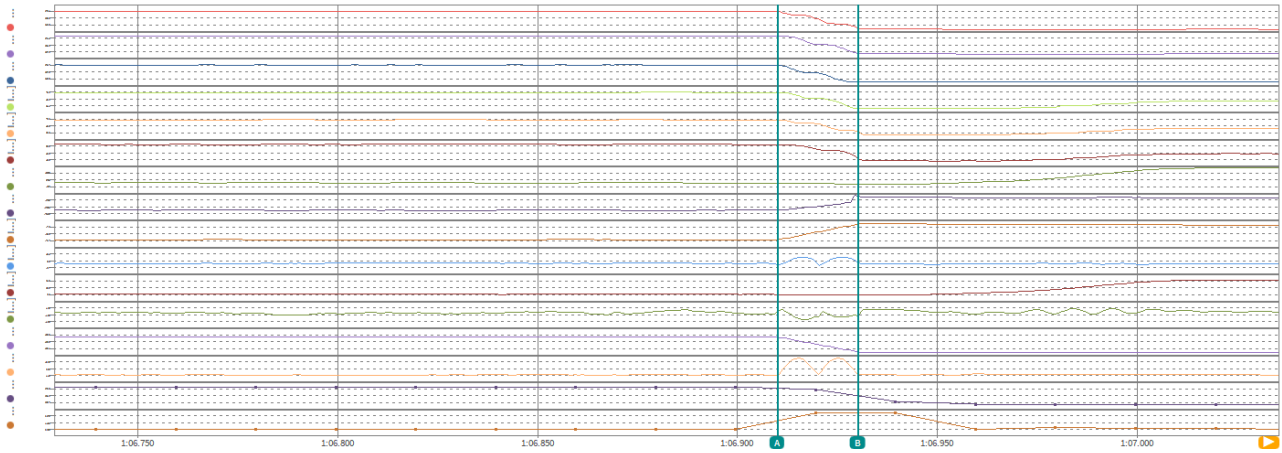
时间 [s]	A 1:01.86755	B 1:02.46947	间隔 0.60192	有效值
U1_tRMS_rc@AC [V]	231.1576	276.1632	45.00555	275.2044
U2_tRMS_rc@AC [V]	230.7338	275.9011	45.16730	274.9195
U3_tRMS_rc@AC [V]	230.7704	275.9315	45.16118	274.7791
I1_tRMS_rc@AC [A]	36.70795	67.12549	30.41753	66.91141
I2_tRMS_rc@AC [A]	36.68036	70.43617	33.75582	71.20460
I3_tRMS_rc@AC [A]	37.94572	67.52097	29.57524	68.37405
P_t_rc@AC [W]	25438.03	3501.839	-21936.19	6480.204
Q_t_rc@AC [var]	3698.371	-56493.74	-60192.11	56569.06
I_fund_Q_SYM+_rc@AC [A]	4.316246	-68.03280	-72.34904	67.95079
I_fund_Q_SYM-_rc@AC [A]	0.713701	0.011299	-0.702402	0.907599
I_fund_P_SYM+_rc@AC [A]	36.72583	4.226254	-32.49958	8.309625
I_fund_P_SYM-_rc@AC [A]	-0.740727	-1.290782	-0.550056	1.771238
U_fund_SYM+_rc@AC [V]	399.9051	478.0394	78.13431	476.2200
U_fund_SYM-_rc@AC [V]	0.855008	0.627239	-0.227769	1.675023
U+ [V]	230.8261	275.9033	45.07719	273.2261
U- [V]	0.461071	0.426823	-0.034248	0.766347

Recover time – Active power



时间 [s]	A 1:06.91009	B 1:07.01132	间隔 0.10124	有效值
U1_tRMS_rc@AC [V]	276.1633	230.3054	-45.85791	235.6005
U2_tRMS_rc@AC [V]	275.7808	229.0855	-46.69522	235.2107
U3_tRMS_rc@AC [V]	275.7876	230.7100	-45.07758	235.0854
I1_tRMS_rc@AC [A]	68.15627	37.75290	-30.40336	28.78124
I2_tRMS_rc@AC [A]	73.00526	37.95890	-35.04636	30.58405
I3_tRMS_rc@AC [A]	68.83991	35.62138	-33.21854	31.32760
P_t_rc@AC [W]	3280.781	25125.64	21844.86	11371.04
Q_t_rc@AC [var]	-57847.94	4950.725	62798.67	19654.82
I_fund_Q_SYM+_rc@AC [A]	-69.70457	4.038696	73.74327	20.36113
I_fund_Q_SYM-_rc@AC [A]	0.167286	-1.176404	-1.343690	3.930262
I_fund_P_SYM+_rc@AC [A]	3.962018	36.40009	32.43807	16.48171
I_fund_P_SYM-_rc@AC [A]	-1.719581	0.089720	1.809300	1.427645
U_fund_SYM+_rc@AC [V]	477.8856	398.4264	-79.45920	407.2982
U_fund_SYM-_rc@AC [V]	0.520824	0.869061	0.348237	4.225104
U+ [V]	275.9426	229.1990	-46.74362	246.0572
U- [V]	0.471746	0.615841	0.144095	1.605101

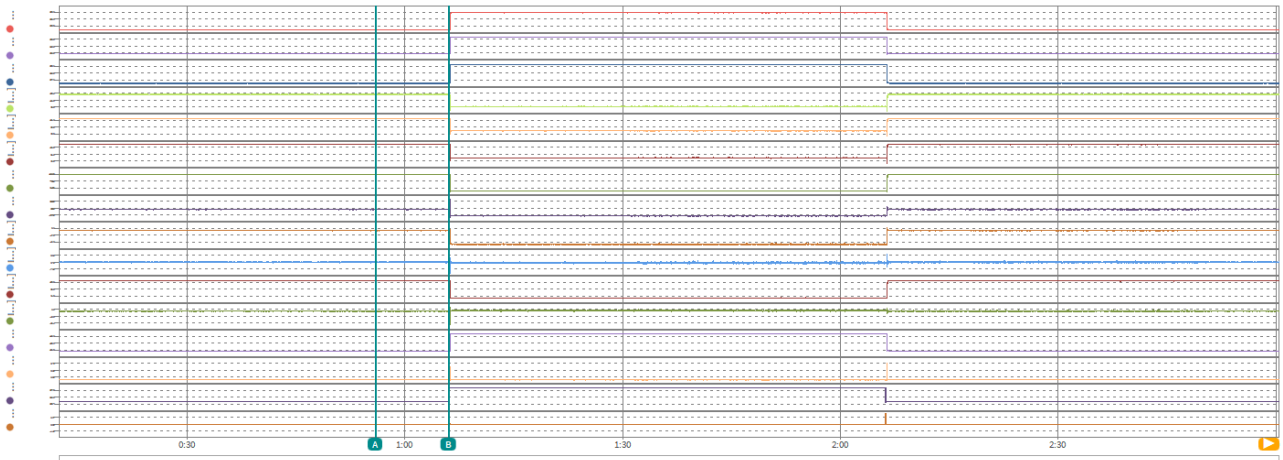
Recover time – Reactive power



时间 [s]	A 1:06.91009	B 1:06.93024	间隔 0.02015	有效值
U1_tRMS_rc@AC [V]	276.1633	234.9398	-41.22346	256.6025
U2_tRMS_rc@AC [V]	275.7808	232.1678	-43.61293	258.7394
U3_tRMS_rc@AC [V]	275.7876	231.2510	-44.53664	252.5969
I1_tRMS_rc@AC [A]	68.15627	11.94321	-56.21305	49.86619
I2_tRMS_rc@AC [A]	73.00526	26.97326	-46.03201	53.69236
I3_tRMS_rc@AC [A]	68.83991	28.58746	-40.25246	56.56838
P_t_rc@AC [W]	3280.781	2707.367	-573.4141	2911.609
Q_t_rc@AC [var]	-57847.94	15443.62	73291.56	41765.00
I_fund_Q_SYM+_rc@AC [A]	-69.70457	3.136077	72.84065	42.91882
I_fund_Q_SYM-_rc@AC [A]	0.167286	6.402864	6.235578	8.501005
I_fund_P_SYM+_rc@AC [A]	3.962018	3.859450	-0.102569	3.721024
I_fund_P_SYM-_rc@AC [A]	-1.719581	-2.099857	-0.380276	2.675301
U_fund_SYM+_rc@AC [V]	477.8856	402.9185	-74.96704	442.2931
U_fund_SYM-_rc@AC [V]	0.520824	3.763055	3.242231	9.090765
U+ [V]	275.9426	270.5686	-5.373991	273.2688
U- [V]	0.471746	2.633182	2.161435	1.891585

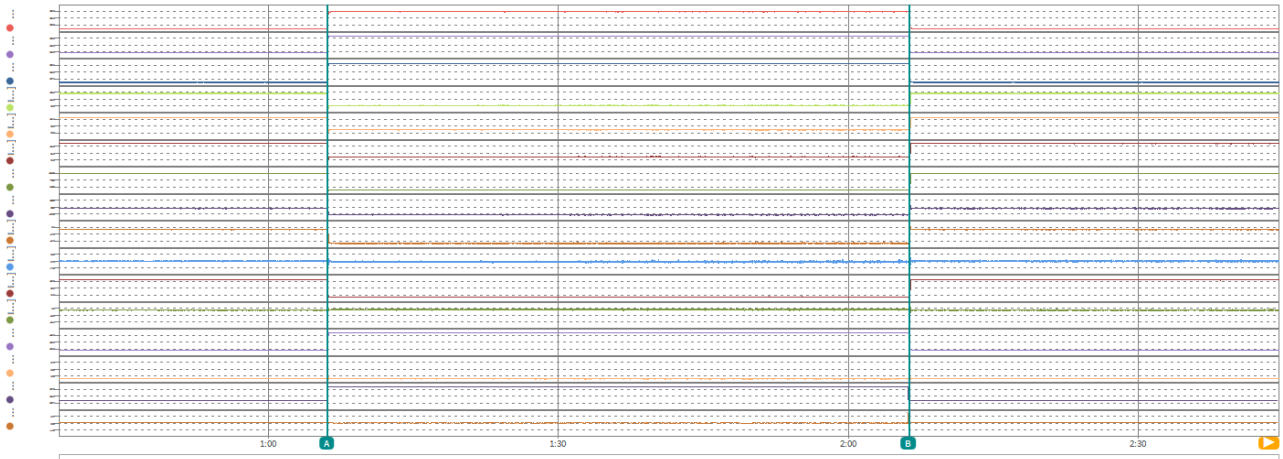
Test – VS2.2.1

Before fault



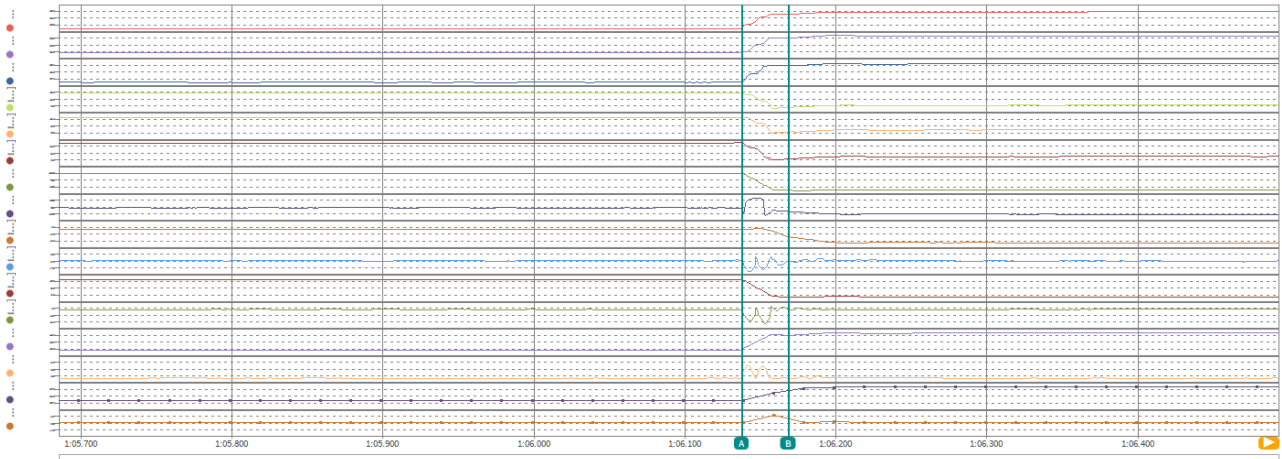
时间 [s]	A 0:56.05916	B 1:06.13785	间隔 0:10.07868	有效值
U1_tRMS_rc@AC [V]	230.6010	230.5725	-0.028564	230.5804
U2_tRMS_rc@AC [V]	229.9297	229.9334	3.723e-3	229.9277
U3_tRMS_rc@AC [V]	229.8812	229.8778	-3.418e-3	229.8783
I1_tRMS_rc@AC [A]	180.3827	179.7350	-0.647736	179.7941
I2_tRMS_rc@AC [A]	181.5690	180.8362	-0.732834	180.8928
I3_tRMS_rc@AC [A]	183.3591	185.4478	2.088654	183.4656
P_t_rc@AC [W]	125478.5	125632.4	153.9141	125201.7
Q_t_rc@AC [var]	-2056.141	-2247.893	-191.7520	2343.299
I_fund_Q_SYM+_rc@AC [A]	-0.354689	-0.054740	0.299949	0.333206
I_fund_Q_SYM-_rc@AC [A]	0.082866	1.269921	1.187055	0.553840
I_fund_P_SYM+_rc@AC [A]	181.7464	181.9790	0.232544	181.3522
I_fund_P_SYM-_rc@AC [A]	-0.756558	-1.275739	-0.519181	0.843719
U_fund_SYM+_rc@AC [V]	398.6028	398.5847	-0.018188	398.5888
U_fund_SYM-_rc@AC [V]	0.997493	0.689719	-0.307773	1.044790
U+ [V]	230.1023	230.1378	0.035441	230.1320
U- [V]	0.603068	0.620570	0.017502	0.603077

Duration fault time



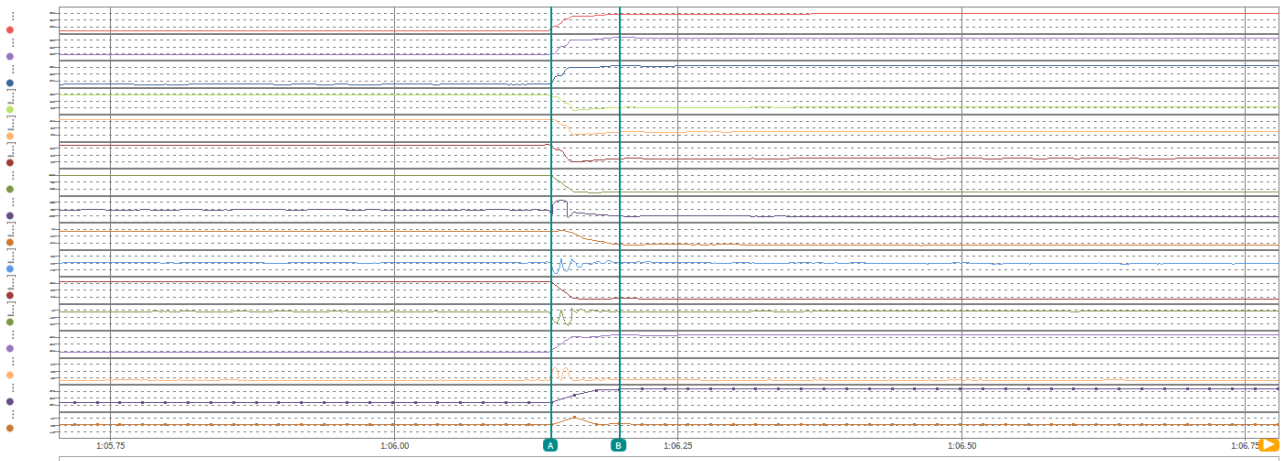
时间 [s]	A 1:06.13835	B 2:06.25867	间隔 1:00.12032	有效值
U1_tRMS_rc@AC [V]	230.7359	264.6396	33.90366	-
U2_tRMS_rc@AC [V]	229.9892	264.1450	34.15573	-
U3_tRMS_rc@AC [V]	229.8920	264.1851	34.29308	-
I1_tRMS_rc@AC [A]	179.6445	54.28491	-125.3596	-
I2_tRMS_rc@AC [A]	180.7632	54.27154	-126.4917	-
I3_tRMS_rc@AC [A]	185.3281	55.73514	-129.5930	-
P_t_rc@AC [W]	125606.0	4075.673	-121530.4	-
Q_t_rc@AC [var]	-2427.594	-43234.20	-40806.60	-
I_fund_Q_SYM+_rc@AC [A]	-5.135e-3	-54.21326	-54.20813	-
I_fund_Q_SYM-_rc@AC [A]	0.599754	0.283573	-0.316180	-
I_fund_P_SYM+_rc@AC [A]	181.8835	5.135449	-176.7481	-
I_fund_P_SYM-_rc@AC [A]	-1.694958	0.041614	1.736573	-
U_fund_SYM+_rc@AC [V]	398.7161	457.8157	59.09961	-
U_fund_SYM-_rc@AC [V]	0.813336	0.825965	0.012630	-
U+ [V]	230.1378	264.3510	34.21324	-
U- [V]	0.620570	0.532181	-0.088389	-

Injected reactive current at 30ms



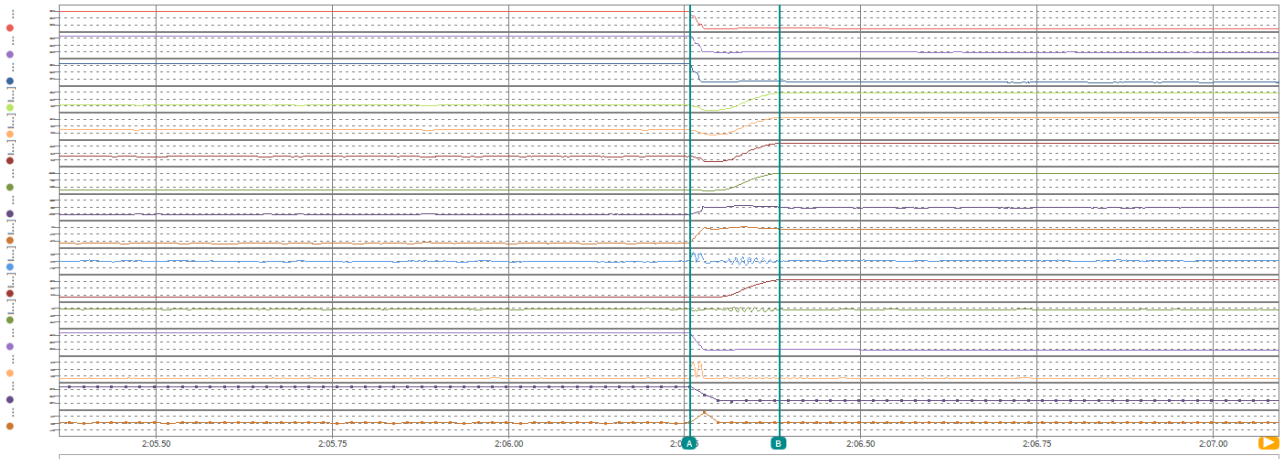
	A	B	间隔	有效值
时间 [s]	1:06.13785	1:06.16868	0.03083	
U1_tRMS_rc@AC [V]	230.5725	260.0565	29.48405	250.2489
U2_tRMS_rc@AC [V]	229.9334	259.7424	29.80898	248.4054
U3_tRMS_rc@AC [V]	229.8778	259.6078	29.73009	250.6184
I1_tRMS_rc@AC [A]	179.7350	30.89694	-148.8380	112.7401
I2_tRMS_rc@AC [A]	180.8362	29.70867	-151.1275	116.3936
I3_tRMS_rc@AC [A]	185.4478	30.77347	-154.6743	107.3830
P_t_rc@AC [W]	125632.4	2904.751	-122727.7	67790.81
Q_t_rc@AC [var]	-2247.893	-23562.21	-21314.32	43262.59
I_fund_Q_SYM+_rc@AC [A]	-0.054740	-26.92484	-26.87010	10.70435
I_fund_Q_SYM-_rc@AC [A]	1.269921	-0.849714	-2.119635	6.924482
I_fund_P_SYM+_rc@AC [A]	181.9790	3.715087	-178.2639	97.34935
I_fund_P_SYM-_rc@AC [A]	-1.275739	2.279427	3.555166	13.76961
U_fund_SYM+_rc@AC [V]	398.5847	449.9850	51.40039	432.2563
U_fund_SYM-_rc@AC [V]	0.689719	1.166894	0.477174	4.444023
U+ [V]	230.1378	248.7157	18.57794	236.5672
U- [V]	0.620570	2.703775	2.083205	1.664365

Injected reactive current at 60ms



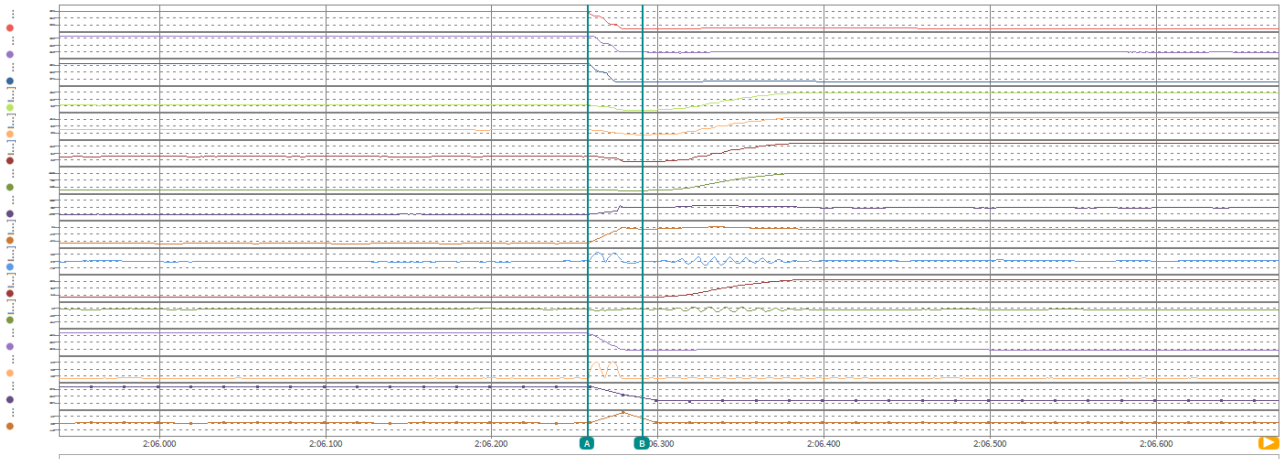
	A	B	间隔	有效值
时间 [s]	1:06.13835	1:06.19842	0.06007	
U1_tRMS_rc@AC [V]	230.7359	264.0441	33.30814	256.4043
U2_tRMS_rc@AC [V]	229.9892	264.5554	34.56616	255.5864
U3_tRMS_rc@AC [V]	229.8920	263.0106	33.11864	256.2295
I1_tRMS_rc@AC [A]	179.6445	51.57914	-128.0653	83.52001
I2_tRMS_rc@AC [A]	180.7632	52.25046	-128.5127	86.35917
I3_tRMS_rc@AC [A]	185.3281	53.55906	-131.7691	80.29403
P_t_rc@AC [W]	125606.0	7080.191	-118525.8	46457.06
Q_t_rc@AC [var]	-2427.594	-40920.91	-38493.32	39101.71
I_fund_Q_SYM+_rc@AC [A]	-5.135e-3	-51.38549	-51.38036	30.06050
I_fund_Q_SYM-_rc@AC [A]	0.599754	1.122994	0.523240	5.141422
I_fund_P_SYM+_rc@AC [A]	181.8835	8.941186	-172.9424	66.62203
I_fund_P_SYM-_rc@AC [A]	-1.694958	-0.384140	1.310819	10.00202
U_fund_SYM+_rc@AC [V]	398.7161	457.0298	58.31369	443.3529
U_fund_SYM-_rc@AC [V]	0.813336	1.338412	0.525077	3.361863
U+ [V]	230.1378	260.1373	29.99958	242.6745
U- [V]	0.620570	0.619628	-9.417e-4	1.474303

Recover time – Active power



时间 [s]	A 2:06.25774	B 2:06.38480	间隔 0.12706	有效值
U1_tRMS_rc@AC [V]	264.6322	232.2147	-32.41751	234.7417
U2_tRMS_rc@AC [V]	264.1408	231.0367	-33.10410	234.0258
U3_tRMS_rc@AC [V]	264.1773	231.6825	-32.49477	234.1038
I1_tRMS_rc@AC [A]	54.34602	177.4971	123.1510	92.40717
I2_tRMS_rc@AC [A]	54.43768	181.1397	126.7020	93.53666
I3_tRMS_rc@AC [A]	55.45591	182.1983	126.7424	95.09203
P_t_rc@AC [W]	4028.246	125106.7	121078.5	63205.76
Q_t_rc@AC [var]	-43223.81	6577.418	49801.23	16658.98
I_fund_Q_SYM+_rc@AC [A]	-54.21285	2.906239	57.11909	15.61194
I_fund_Q_SYM-_rc@AC [A]	0.293662	0.328820	0.035158	3.699870
I_fund_P_SYM+_rc@AC [A]	5.077182	180.0139	174.9367	90.83570
I_fund_P_SYM-_rc@AC [A]	0.014125	-1.417398	-1.431523	2.209916
U_fund_SYM+_rc@AC [V]	457.8045	401.2093	-56.59525	405.6817
U_fund_SYM-_rc@AC [V]	0.866109	0.957808	0.091699	2.994079
U+ [V]	264.3510	231.8616	-32.48940	241.3686
U- [V]	0.532181	0.602494	0.070313	1.412561

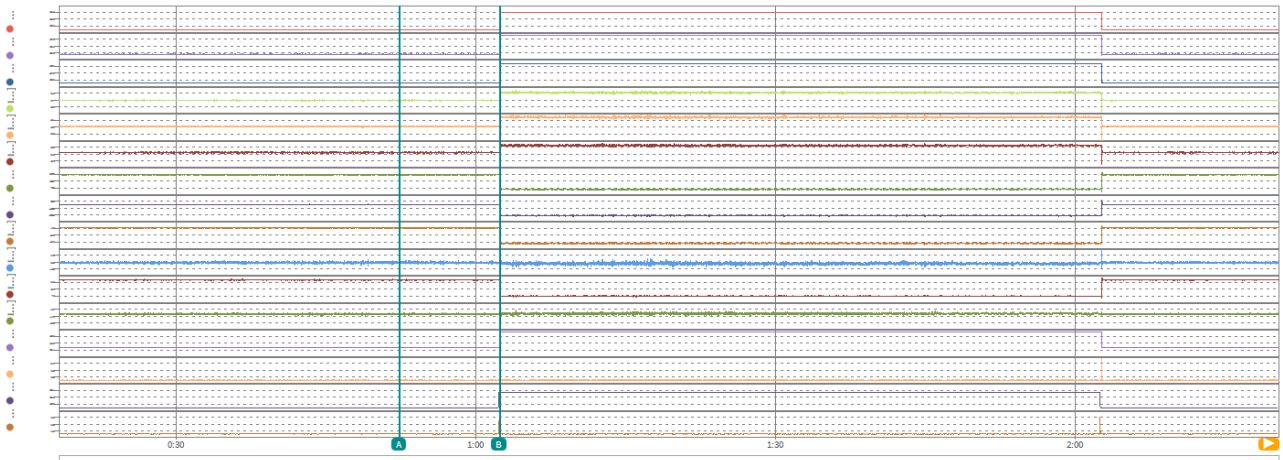
Recover time – Reactive power



时间 [s]	A 2:06.25774	B 2:06.29077	间隔 0.03303	有效值
U1_tRMS_rc@AC [V]	264.6322	230.8240	-33.80824	243.3289
U2_tRMS_rc@AC [V]	264.1408	230.2306	-33.91014	244.1755
U3_tRMS_rc@AC [V]	264.1773	230.1275	-34.04982	241.0766
I1_tRMS_rc@AC [A]	54.34602	3.832148	-50.51387	32.72942
I2_tRMS_rc@AC [A]	54.43768	4.846860	-49.59082	33.48705
I3_tRMS_rc@AC [A]	55.45591	5.629262	-49.82665	39.97432
P_t_rc@AC [W]	4028.246	376.5612	-3651.684	2687.352
Q_t_rc@AC [var]	-43223.81	3274.313	46498.12	26649.60
I_fund_Q_SYM+_rc@AC [A]	-54.21285	2.219487	56.43234	28.07761
I_fund_Q_SYM-_rc@AC [A]	0.293662	-0.949639	-1.243301	5.867891
I_fund_P_SYM+_rc@AC [A]	5.077182	0.537428	-4.539754	3.444392
I_fund_P_SYM-_rc@AC [A]	0.014125	0.798788	0.784663	1.331310
U_fund_SYM+_rc@AC [V]	457.8045	399.0497	-58.75479	420.2357
U_fund_SYM-_rc@AC [V]	0.866109	1.017840	0.151731	5.527469
U+ [V]	264.3510	244.0556	-20.29539	257.6929
U- [V]	0.532181	3.655486	3.123305	2.167530

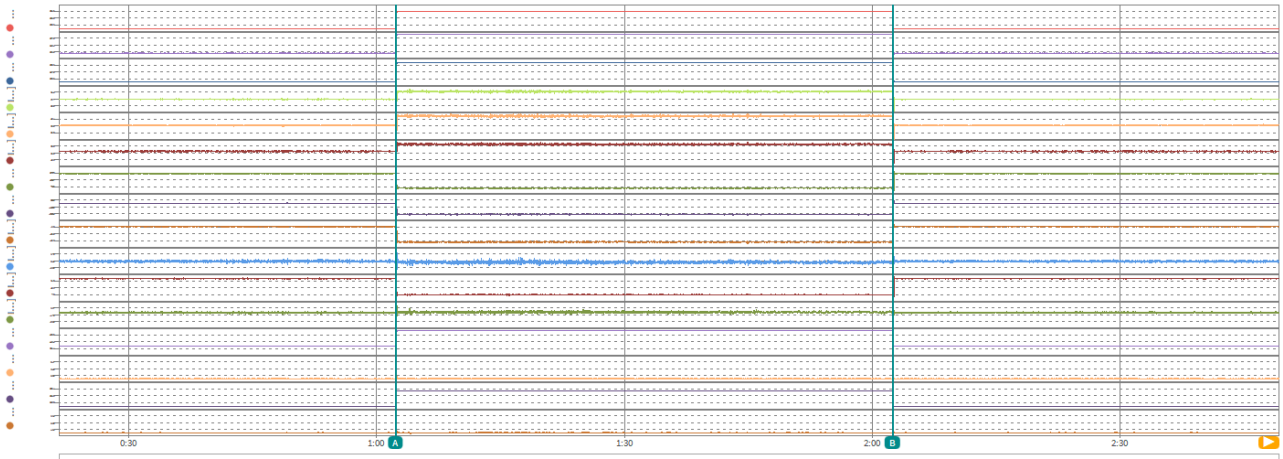
Test – VS2.2.2

Before fault



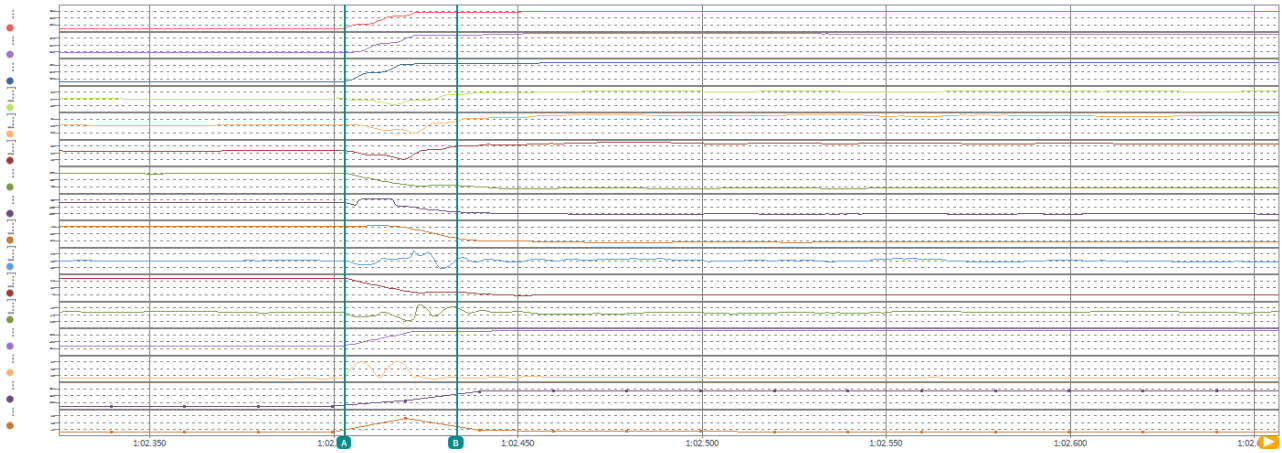
时间 [s]	A	B	间隔	有效值
	0:52.3859	1:02.4037	0:10.0178	
U1_tRMS_rc@AC [V]	230.2468	230.3878	0.141006	230.2591
U2_tRMS_rc@AC [V]	229.8384	229.8412	2.808e-3	229.7562
U3_tRMS_rc@AC [V]	229.5879	229.6806	0.092743	229.6197
I1_tRMS_rc@AC [A]	35.69305	36.55000	0.856945	36.31920
I2_tRMS_rc@AC [A]	37.29430	37.22897	-0.065331	36.68197
I3_tRMS_rc@AC [A]	37.05103	37.62576	0.574730	37.22780
P_t_rc@AC [W]	25231.88	25553.61	321.7305	25267.66
Q_t_rc@AC [var]	-1804.879	-1834.056	-29.17737	1876.838
I_fund_Q_SYM+_rc@AC [A]	-0.715961	-0.986707	-0.270747	1.112243
I_fund_Q_SYM-_rc@AC [A]	-0.163976	0.117363	0.281339	0.279731
I_fund_P_SYM+_rc@AC [A]	36.58536	37.04195	0.456593	36.63954
I_fund_P_SYM-_rc@AC [A]	-0.272275	-0.311779	-0.039505	0.366256
U_fund_SYM+_rc@AC [V]	398.1799	398.3138	0.133942	398.1579
U_fund_SYM-_rc@AC [V]	0.982906	1.078475	0.095570	0.976003
U+ [V]	229.9346	229.9063	-0.028231	229.8834
U- [V]	0.547276	0.541717	-5.559e-3	0.563360

Duration fault time



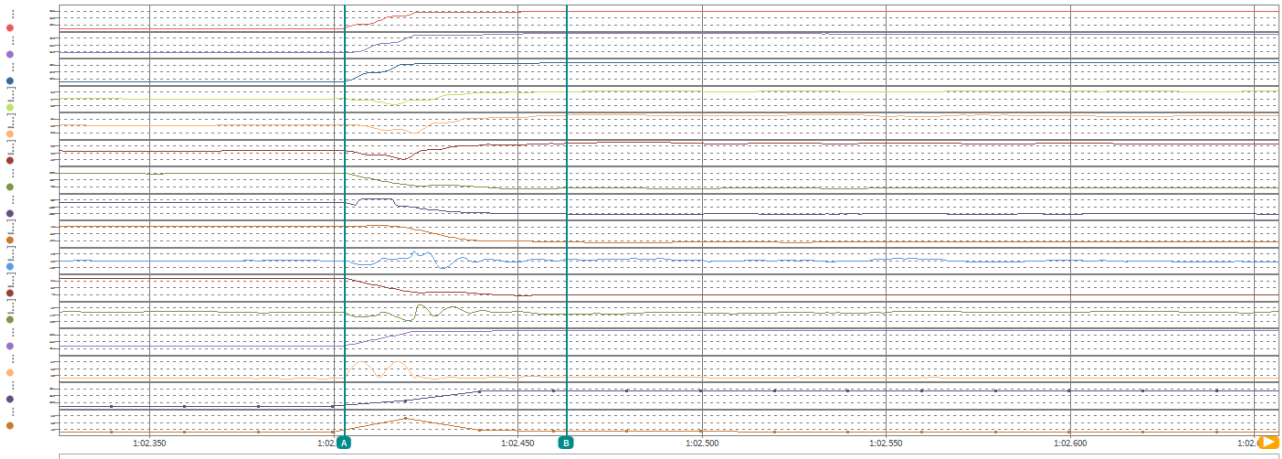
时间 [s]	A	B	间隔	有效值
	1:02.4029	2:02.5244	1:00.1214	
U1_tRMS_rc@AC [V]	230.2178	262.9724	32.75456	264.6647
U2_tRMS_rc@AC [V]	229.7861	264.0158	34.22968	264.1727
U3_tRMS_rc@AC [V]	229.6633	263.4437	33.78044	264.1232
I1_tRMS_rc@AC [A]	36.63371	56.41936	19.78565	56.51418
I2_tRMS_rc@AC [A]	37.36588	55.96292	18.59705	55.82068
I3_tRMS_rc@AC [A]	37.70518	56.86594	19.16075	56.10339
P_t_rc@AC [W]	25613.68	4667.906	-20945.78	4388.349
Q_t_rc@AC [var]	-1835.869	-44347.82	-42511.95	44303.67
I_fund_Q_SYM+_rc@AC [A]	-0.970828	-55.85244	-54.88162	55.66399
I_fund_Q_SYM-_rc@AC [A]	0.121473	0.069939	-0.051534	0.613009
I_fund_P_SYM+_rc@AC [A]	37.13973	5.936466	-31.20327	5.534940
I_fund_P_SYM-_rc@AC [A]	-0.207613	-0.134002	0.073612	0.468321
U_fund_SYM+_rc@AC [V]	398.1766	456.2592	58.08255	457.8109
U_fund_SYM-_rc@AC [V]	0.942895	1.246501	0.303606	0.983424
U+ [V]	229.9063	264.3186	34.41228	264.3132
U- [V]	0.541717	0.567955	0.026238	0.566487

Injected reactive current at 30ms



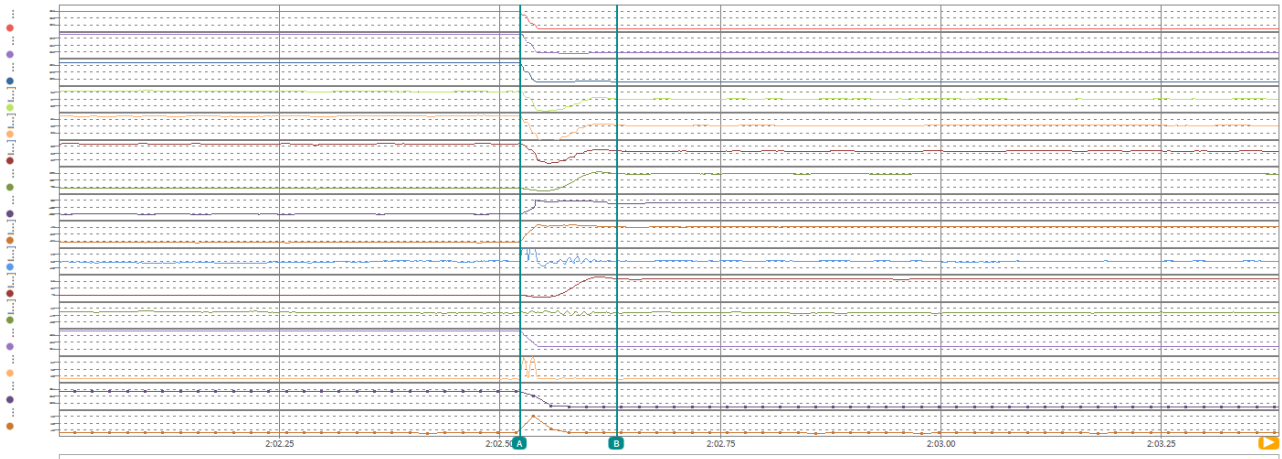
时间 [s]	A 1:02.4029	B 1:02.4334	间隔 0.0304	有效值
U1_tRMS_rc@AC [V]	230.2178	262.9649	32.74706	251.7999
U2_tRMS_rc@AC [V]	229.7861	262.3317	32.54556	250.0194
U3_tRMS_rc@AC [V]	229.6633	262.2176	32.55431	252.2824
I1_tRMS_rc@AC [A]	36.63371	47.42655	10.79284	33.83306
I2_tRMS_rc@AC [A]	37.36588	43.93105	6.565178	33.31559
I3_tRMS_rc@AC [A]	37.70518	48.93116	11.22597	33.03054
P_t_rc@AC [W]	25613.68	8119.376	-17494.31	14647.42
Q_t_rc@AC [var]	-1835.869	-35920.42	-34084.55	20457.65
I_fund_Q_SYM+_rc@AC [A]	-0.970828	-42.48767	-41.51685	18.01822
I_fund_Q_SYM-_rc@AC [A]	0.121473	0.205663	0.084191	2.290160
I_fund_P_SYM+_rc@AC [A]	37.13973	10.26700	-26.87274	20.74462
I_fund_P_SYM-_rc@AC [A]	-0.207613	3.944556	4.152169	3.761554
U_fund_SYM+_rc@AC [V]	398.1766	454.6641	56.48749	434.9962
U_fund_SYM-_rc@AC [V]	0.942895	1.361686	0.418791	4.661658
U+ [V]	229.9063	241.0398	11.13341	235.5388
U- [V]	0.541717	2.825954	2.284237	2.034634

Injected reactive current at 60ms



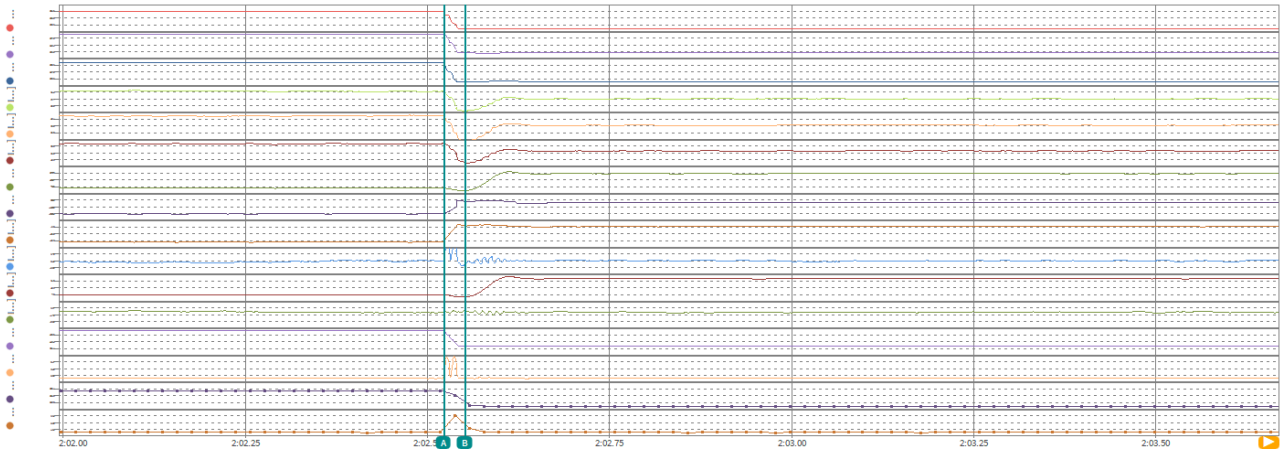
时间 [s]	A 1:02.4029	B 1:02.4632	间隔 0.0603	有效值
U1_tRMS_rc@AC [V]	230.2178	265.0184	34.80052	257.6950
U2_tRMS_rc@AC [V]	229.7861	265.3636	35.57742	256.8175
U3_tRMS_rc@AC [V]	229.6633	263.6752	34.01189	257.4481
I1_tRMS_rc@AC [A]	36.63371	54.33693	17.70322	43.77269
I2_tRMS_rc@AC [A]	37.36588	57.14719	19.78132	44.16438
I3_tRMS_rc@AC [A]	37.70518	57.41034	19.70515	44.45115
P_t_rc@AC [W]	25613.68	4221.940	-21391.74	11032.08
Q_t_rc@AC [var]	-1835.869	-44502.93	-42667.06	32595.93
I_fund_Q_SYM+_rc@AC [A]	-0.970828	-55.66559	-54.69476	38.54004
I_fund_Q_SYM-_rc@AC [A]	0.121473	0.658628	0.537156	1.729339
I_fund_P_SYM+_rc@AC [A]	37.13973	5.313112	-31.82662	15.48053
I_fund_P_SYM-_rc@AC [A]	-0.207613	-1.475857	-1.268244	2.806169
U_fund_SYM+_rc@AC [V]	398.1766	458.4429	60.26630	445.4915
U_fund_SYM-_rc@AC [V]	0.942895	1.445338	0.502444	3.482343
U+ [V]	229.9063	263.6141	33.70779	249.5714
U- [V]	0.541717	0.830542	0.288824	1.554442

Recover time – Active power



时间 [s]	A 2:02.5231	B 2:02.6329	间隔 0.1097	有效值
U1_tRMS_rc@AC [V]	264.6842	230.2789	-34.40530	234.3681
U2_tRMS_rc@AC [V]	264.1929	229.1658	-35.02708	233.7203
U3_tRMS_rc@AC [V]	264.1004	230.2465	-33.85394	233.6924
I1_tRMS_rc@AC [A]	56.31786	37.12443	-19.19344	30.75653
I2_tRMS_rc@AC [A]	56.28181	37.92942	-18.35239	30.64857
I3_tRMS_rc@AC [A]	56.80557	37.94322	-18.86235	32.90108
P_t_rc@AC [W]	4512.585	25780.64	21268.05	16695.47
Q_t_rc@AC [var]	-44550.12	-3191.189	41358.93	15123.13
I_fund_Q_SYM+_rc@AC [A]	-55.96104	-0.656341	55.30470	15.62461
I_fund_Q_SYM-_rc@AC [A]	0.098629	0.162627	0.063997	3.239768
I_fund_P_SYM+_rc@AC [A]	5.688589	37.37708	31.68849	24.16771
I_fund_P_SYM-_rc@AC [A]	-0.232029	-0.371551	-0.139523	0.798002
U_fund_SYM+_rc@AC [V]	457.8197	398.1906	-59.62903	405.0372
U_fund_SYM-_rc@AC [V]	0.812237	0.966565	0.154328	3.311519
U+ [V]	264.3186	230.1832	-34.13538	240.1036
U- [V]	0.567955	0.618377	0.050422	1.519775

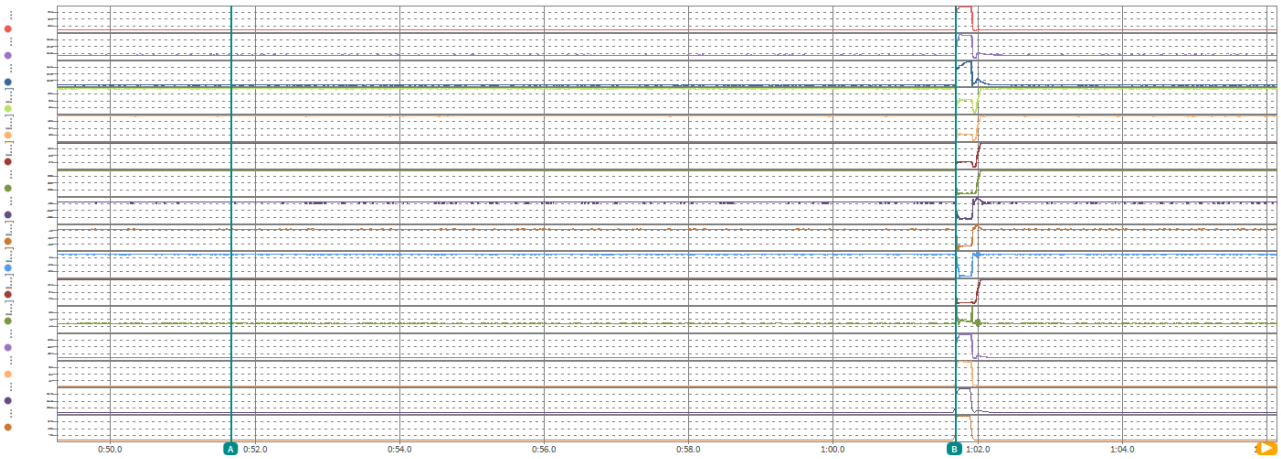
Recover time – Reactive power



时间 [s]	A 2:02.5231	B 2:02.5524	间隔 0.0293	有效值
U1_tRMS_rc@AC [V]	264.6842	230.8461	-33.83810	244.6102
U2_tRMS_rc@AC [V]	264.1929	230.3868	-33.80606	245.5746
U3_tRMS_rc@AC [V]	264.1004	230.0334	-34.06706	241.9863
I1_tRMS_rc@AC [A]	56.31786	4.199803	-52.11806	35.63036
I2_tRMS_rc@AC [A]	56.28181	6.105563	-50.17625	34.10577
I3_tRMS_rc@AC [A]	56.80557	8.188496	-48.61708	39.79923
P_t_rc@AC [W]	4512.585	676.4938	-3836.091	2768.613
Q_t_rc@AC [var]	-44550.12	4205.717	48755.84	27601.47
I_fund_Q_SYM+_rc@AC [A]	-55.96104	2.842147	58.80319	29.07222
I_fund_Q_SYM-_rc@AC [A]	0.098629	-2.244482	-2.343111	5.955293
I_fund_P_SYM+_rc@AC [A]	5.688589	0.966358	-4.722231	3.523206
I_fund_P_SYM-_rc@AC [A]	-0.232029	1.180902	1.412930	0.593233
U_fund_SYM+_rc@AC [V]	457.8197	399.0983	-58.72134	422.2732
U_fund_SYM-_rc@AC [V]	0.812237	1.074557	0.262320	6.014105
U+ [V]	264.3186	253.4130	-10.90565	258.9232
U- [V]	0.567955	3.279075	2.711120	2.353179

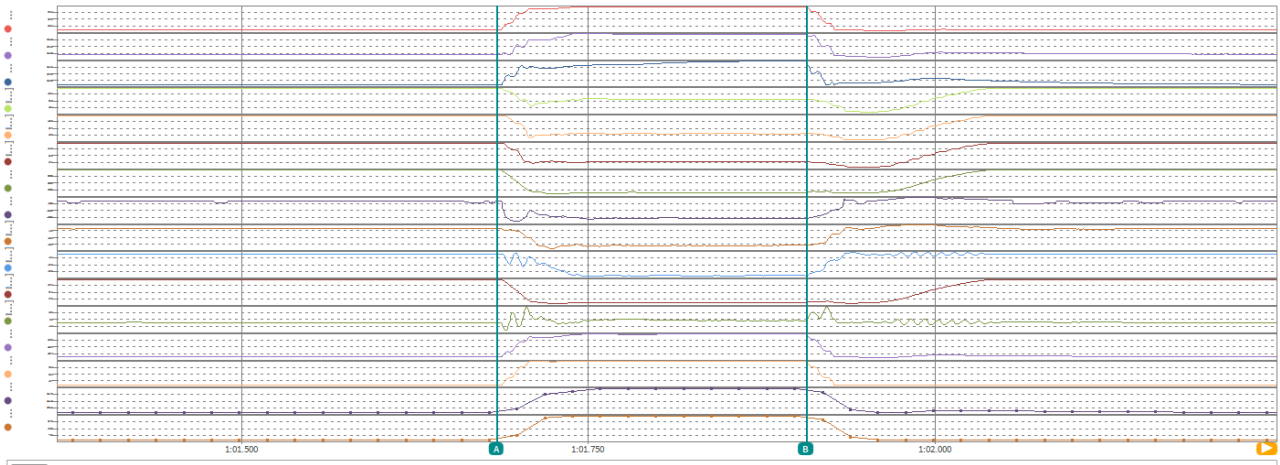
Test – VS3.1

Before fault



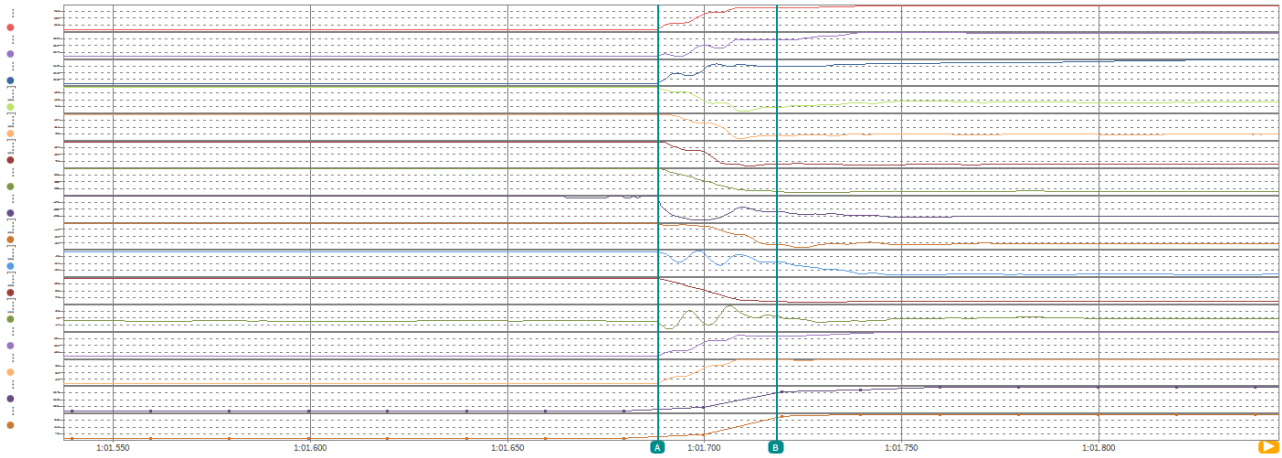
	A	B	间隔	有效值
时间 [s]	0:51.678300	1:01.687300	0:10.009000	
U1_tRMS_rc@AC [V]	230.5649	230.4986	-0.066254	230.5674
U2_tRMS_rc@AC [V]	229.9092	229.8491	-0.060043	229.8939
U3_tRMS_rc@AC [V]	229.8251	229.8144	-0.010666	229.8210
I1_tRMS_rc@AC [A]	178.9489	178.4507	-0.498199	179.1283
I2_tRMS_rc@AC [A]	180.3933	180.7113	0.318008	180.9114
I3_tRMS_rc@AC [A]	183.0417	183.2038	0.162079	183.2117
P_t_rc@AC [W]	124772.5	124751.3	-21.25000	124975.9
Q_t_rc@AC [var]	2664.708	2265.620	-399.0886	2311.172
I_fund_Q_SYM+_rc@AC [A]	1.012768	0.127748	-0.885020	0.492507
I_fund_Q_SYM-_rc@AC [A]	0.784941	0.402581	-0.382361	0.413272
I_fund_P_SYM+_rc@AC [A]	180.7562	180.7614	5.188e-3	181.0537
I_fund_P_SYM-_rc@AC [A]	-0.816533	-1.610028	-0.793495	0.975485
U_fund_SYM+_rc@AC [V]	398.5388	398.4593	-0.079437	398.5290
U_fund_SYM-_rc@AC [V]	1.080986	0.862394	-0.218592	1.044807
U+ [V]	230.1123	230.0748	-0.037540	230.0976
U- [V]	0.594473	0.624116	0.029644	0.603115

Duration fault time



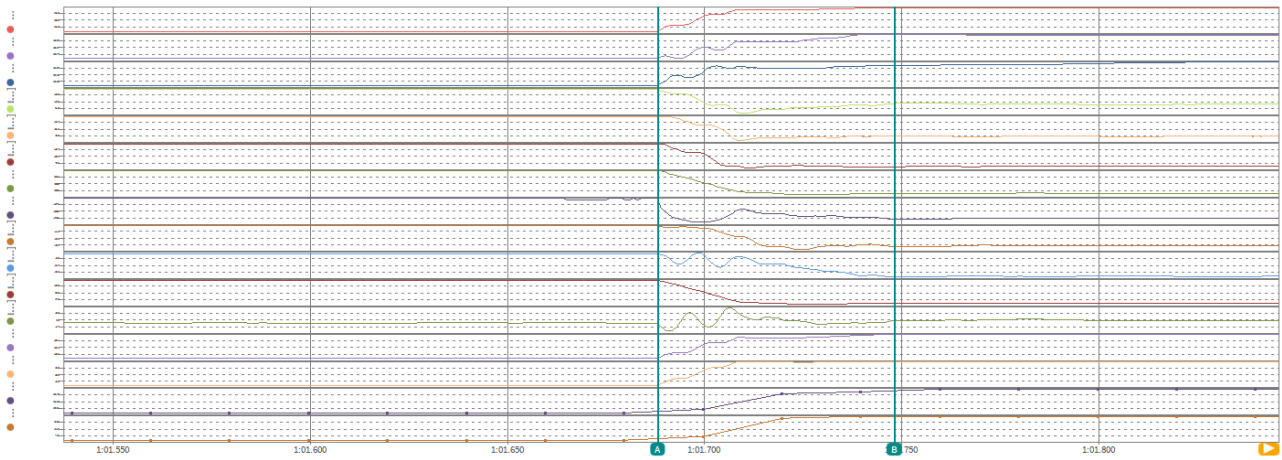
	A	B	间隔	有效值
时间 [s]	1:01.684300	1:01.907300	0.223000	
U1_tRMS_rc@AC [V]	230.5094	287.6248	57.11545	283.3107
U2_tRMS_rc@AC [V]	229.8857	246.1518	16.26608	244.5000
U3_tRMS_rc@AC [V]	229.8013	245.2317	15.43031	242.6336
I1_tRMS_rc@AC [A]	178.6258	101.3712	-77.25458	102.8977
I2_tRMS_rc@AC [A]	180.8779	50.30222	-130.5757	66.88362
I3_tRMS_rc@AC [A]	183.0667	44.93879	-138.1279	62.30630
P_t_rc@AC [W]	124804.5	2225.913	-122578.6	29366.06
Q_t_rc@AC [var]	2267.776	-52512.12	-54779.89	50462.18
I_fund_Q_SYM+_rc@AC [A]	-4.936e-4	-42.69670	-42.69621	40.84493
I_fund_Q_SYM-_rc@AC [A]	0.398485	-51.08442	-51.48291	46.04280
I_fund_P_SYM+_rc@AC [A]	180.8290	2.495448	-178.3335	42.10882
I_fund_P_SYM-_rc@AC [A]	-1.294484	1.899618	3.194102	5.088722
U_fund_SYM+_rc@AC [V]	398.4799	448.1003	49.62036	443.2073
U_fund_SYM-_rc@AC [V]	1.167058	50.66164	49.49459	49.04998
U+ [V]	230.0748	258.6763	28.60151	253.3287
U- [V]	0.624116	29.42092	28.79680	26.76250

Injected reactive current at 30ms



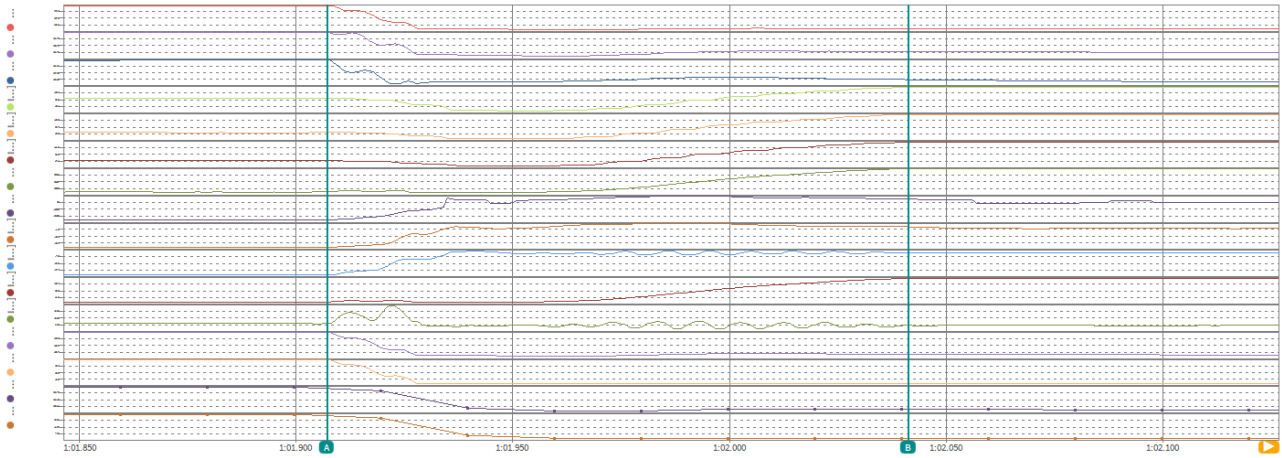
	A	B	间隔	有效值
时间 [s]	1:01.688300	1:01.718300	0.030000	
U1_tRMS_rc@AC [V]	230.7640	282.5640	51.80000	266.7590
U2_tRMS_rc@AC [V]	229.9612	241.8180	11.85675	236.9828
U3_tRMS_rc@AC [V]	229.8605	240.4794	10.61896	238.5017
I1_tRMS_rc@AC [A]	178.1861	71.62113	-106.5650	113.3023
I2_tRMS_rc@AC [A]	180.6471	38.53958	-142.1075	114.1356
I3_tRMS_rc@AC [A]	183.1091	45.33447	-137.7746	105.4790
P_t_rc@AC [W]	124718.9	2533.076	-122185.8	64733.54
Q_t_rc@AC [var]	2800.022	-40379.75	-43179.77	46489.28
I_fund_Q_SYM+_rc@AC [A]	0.152148	-44.66128	-44.81343	22.74309
I_fund_Q_SYM-_rc@AC [A]	0.109066	-22.25654	-22.36561	16.91497
I_fund_P_SYM+_rc@AC [A]	180.6163	2.379535	-178.2368	92.47342
I_fund_P_SYM-_rc@AC [A]	-1.783309	7.774610	9.557918	11.56562
U_fund_SYM+_rc@AC [V]	398.6947	439.9886	41.29395	426.9367
U_fund_SYM-_rc@AC [V]	1.090791	50.53577	49.44498	38.20158
U+ [V]	230.0748	234.3291	4.254301	232.2117
U- [V]	0.624116	5.735907	5.111790	4.079837

Injected reactive current at 60ms



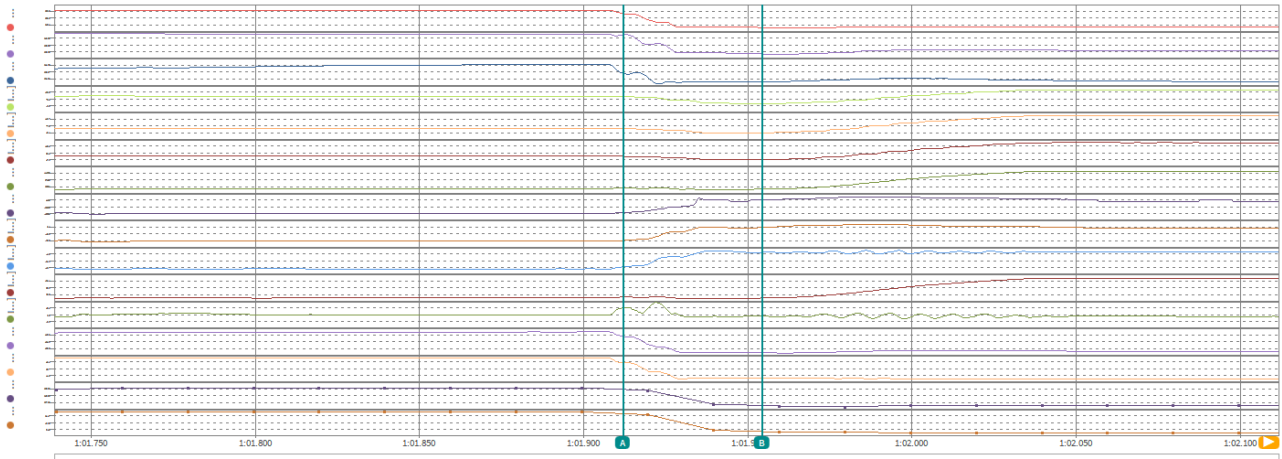
	A	B	间隔	有效值
时间 [s]	1:01.688300	1:01.748300	0.060000	
U1_tRMS_rc@AC [V]	230.7640	287.2375	56.47346	275.6753
U2_tRMS_rc@AC [V]	229.9612	247.1058	17.14455	240.8108
U3_tRMS_rc@AC [V]	229.8605	242.2375	12.37700	239.8816
I1_tRMS_rc@AC [A]	178.1861	103.7568	-74.42938	102.2101
I2_tRMS_rc@AC [A]	180.6471	53.27408	-127.3730	87.83751
I3_tRMS_rc@AC [A]	183.1091	43.74683	-139.3622	81.53363
P_t_rc@AC [W]	124718.9	3051.939	-121666.9	46206.76
Q_t_rc@AC [var]	2800.022	-53477.27	-56277.29	47060.24
I_fund_Q_SYM+_rc@AC [A]	0.152148	-44.71595	-44.86809	35.52693
I_fund_Q_SYM-_rc@AC [A]	0.109066	-52.17114	-52.28021	31.59929
I_fund_P_SYM+_rc@AC [A]	180.6163	3.464864	-177.1514	65.99172
I_fund_P_SYM-_rc@AC [A]	-1.783309	3.565891	5.349199	8.412594
U_fund_SYM+_rc@AC [V]	398.6947	446.7391	48.04440	435.0645
U_fund_SYM-_rc@AC [V]	1.090791	51.52227	50.43148	44.75473
U+ [V]	230.0748	255.2471	25.17234	243.2262
U- [V]	0.624116	29.04256	28.41844	20.00282

Recover time – Active power



	A	B	间隔	有效值
时间 [s]	1:01.907300	1:02.041300	0.134000	
U1_tRMS_rc@AC [V]	287.6248	231.7572	-55.86761	236.2887
U2_tRMS_rc@AC [V]	246.1518	231.0821	-15.06976	231.4285
U3_tRMS_rc@AC [V]	245.2317	232.2932	-12.93846	232.9144
I1_tRMS_rc@AC [A]	101.3712	178.8318	77.46065	95.85413
I2_tRMS_rc@AC [A]	50.30222	180.5008	130.1986	91.46348
I3_tRMS_rc@AC [A]	44.93879	181.5194	136.5806	91.83197
P_t_rc@AC [W]	2225.913	125114.3	122888.4	61630.92
Q_t_rc@AC [var]	-52512.12	7208.447	59720.56	20046.60
I_fund_Q_SYM+_rc@AC [A]	-42.69670	3.319476	46.01618	15.46664
I_fund_Q_SYM-_rc@AC [A]	-51.08442	0.532288	51.61671	15.36839
I_fund_P_SYM+_rc@AC [A]	2.495448	179.9742	177.4788	88.50595
I_fund_P_SYM-_rc@AC [A]	1.899618	0.079710	-1.819908	6.285426
U_fund_SYM+_rc@AC [V]	448.1003	401.3245	-46.77582	404.1566
U_fund_SYM-_rc@AC [V]	50.66164	0.675061	-49.98658	12.92380
U+ [V]	258.6763	231.9331	-26.74320	237.8229
U- [V]	29.42092	0.412466	-29.00845	13.71225

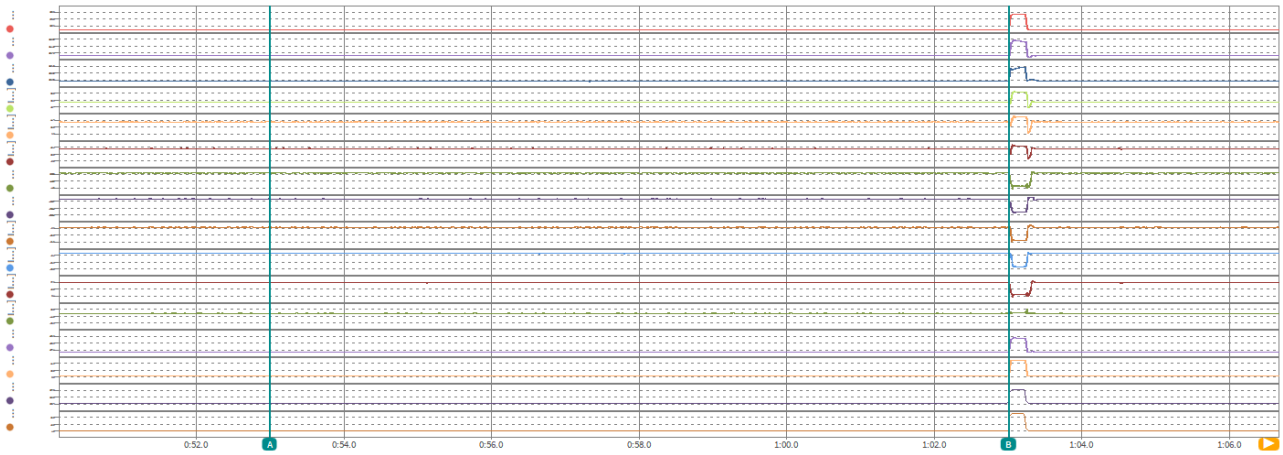
Recover time – Reactive power



	A	B	间隔	有效值
时间 [s]	1:01.912058	1:01.954436	0.042379	
U1_tRMS_rc@AC [V]	276.7010	229.4684	-47.23267	242.0972
U2_tRMS_rc@AC [V]	244.8280	227.6248	-17.20316	232.6416
U3_tRMS_rc@AC [V]	238.7685	231.0141	-7.754333	232.2394
I1_tRMS_rc@AC [A]	99.10072	4.769185	-94.33153	57.02432
I2_tRMS_rc@AC [A]	51.00759	6.303228	-44.70436	28.27189
I3_tRMS_rc@AC [A]	43.56102	6.739210	-36.82181	24.70605
P_t_rc@AC [W]	7833.483	861.4347	-6972.048	4619.462
Q_t_rc@AC [var]	-49696.76	3994.162	53690.92	26863.33
I_fund_Q_SYM+_rc@AC [A]	-41.59543	1.094194	42.68963	21.46104
I_fund_Q_SYM-_rc@AC [A]	-46.15918	-0.948613	45.21056	22.02579
I_fund_P_SYM+_rc@AC [A]	9.583365	1.250250	-8.333116	5.785389
I_fund_P_SYM-_rc@AC [A]	14.68012	0.520825	-14.15930	10.13920
U_fund_SYM+_rc@AC [V]	437.0834	397.2707	-39.81268	407.4489
U_fund_SYM-_rc@AC [V]	40.94459	1.587531	-39.35706	17.38965
U+ [V]	258.6763	232.8621	-25.81426	248.7684
U- [V]	29.42092	3.935526	-25.48539	22.37061

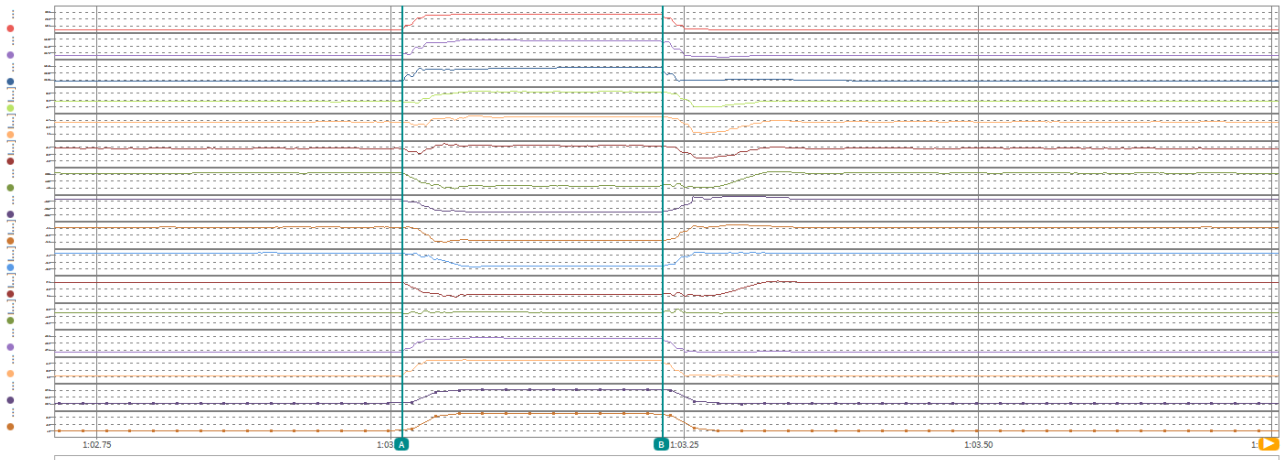
Test – VS3.2

Before fault



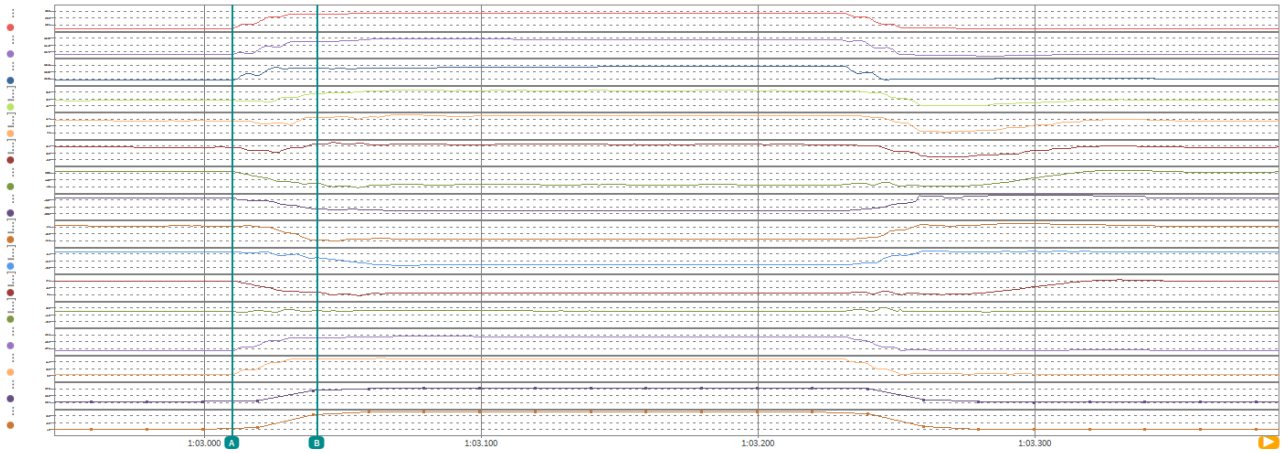
时间 [s]	A 0:53.004502	B 1:03.011338	间隔 0:10.006836	有效值
U1_tRMS_rc@AC [V]	230.3160	230.2793	-0.036697	230.2830
U2_tRMS_rc@AC [V]	229.8606	229.8053	-0.055313	229.8017
U3_tRMS_rc@AC [V]	229.6749	229.5950	-0.079895	229.5957
I1_tRMS_rc@AC [A]	37.10318	37.53974	0.436558	36.99146
I2_tRMS_rc@AC [A]	38.03133	37.55459	-0.476734	37.20314
I3_tRMS_rc@AC [A]	38.17894	37.45303	-0.725910	37.77385
P_t_rc@AC [W]	25983.80	25796.83	-186.9688	25667.52
Q_t_rc@AC [var]	-1939.781	-1995.510	-55.72827	1916.060
I_fund_Q_SYM+_rc@AC [A]	-0.231153	-1.024357	-0.793204	0.718154
I_fund_Q_SYM-_rc@AC [A]	-0.035197	-0.177152	-0.141954	0.328061
I_fund_P_SYM+_rc@AC [A]	37.66683	37.40656	-0.260273	37.21665
I_fund_P_SYM-_rc@AC [A]	-0.320338	0.010027	0.330364	0.348679
U_fund_SYM+_rc@AC [V]	398.2831	398.1837	-0.099457	398.1842
U_fund_SYM-_rc@AC [V]	0.942078	1.075599	0.133521	0.980506
U+ [V]	229.9628	229.9146	-0.048209	229.8987
U- [V]	0.556367	0.623059	0.066692	0.565911

Duration fault time



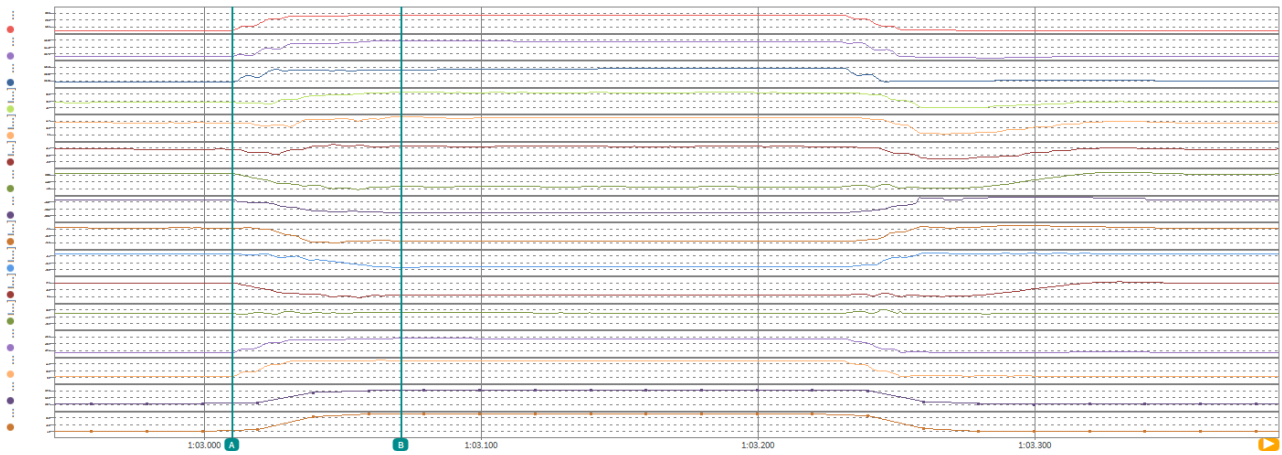
时间 [s]	A 1:03.010355	B 1:03.231365	间隔 0.221010	有效值
U1_tRMS_rc@AC [V]	230.2787	287.7644	57.48575	284.7848
U2_tRMS_rc@AC [V]	229.8217	246.2424	16.42064	245.4779
U3_tRMS_rc@AC [V]	229.5940	245.4354	15.84145	243.5743
I1_tRMS_rc@AC [A]	37.68995	97.58693	59.89698	91.80161
I2_tRMS_rc@AC [A]	37.59818	51.60812	14.00993	49.57467
I3_tRMS_rc@AC [A]	37.44671	46.57515	9.128445	45.42430
P_t_rc@AC [W]	25842.04	2262.961	-23579.08	6013.493
Q_t_rc@AC [var]	-1977.667	-52172.29	-50194.62	49222.10
I_fund_Q_SYM+_rc@AC [A]	-1.020168	-47.78708	-46.76691	45.79011
I_fund_Q_SYM-_rc@AC [A]	-0.215430	-49.75619	-49.54076	45.32576
I_fund_P_SYM+_rc@AC [A]	37.47097	2.650495	-34.82048	8.338399
I_fund_P_SYM-_rc@AC [A]	0.080958	2.009171	1.928213	3.249671
U_fund_SYM+_rc@AC [V]	398.1920	448.3850	50.19299	445.1582
U_fund_SYM-_rc@AC [V]	1.043259	50.82865	49.78539	49.46587
U+ [V]	229.9146	258.8686	28.95399	253.8053
U- [V]	0.623059	29.49993	28.87687	26.67345

Injected reactive current at 30ms



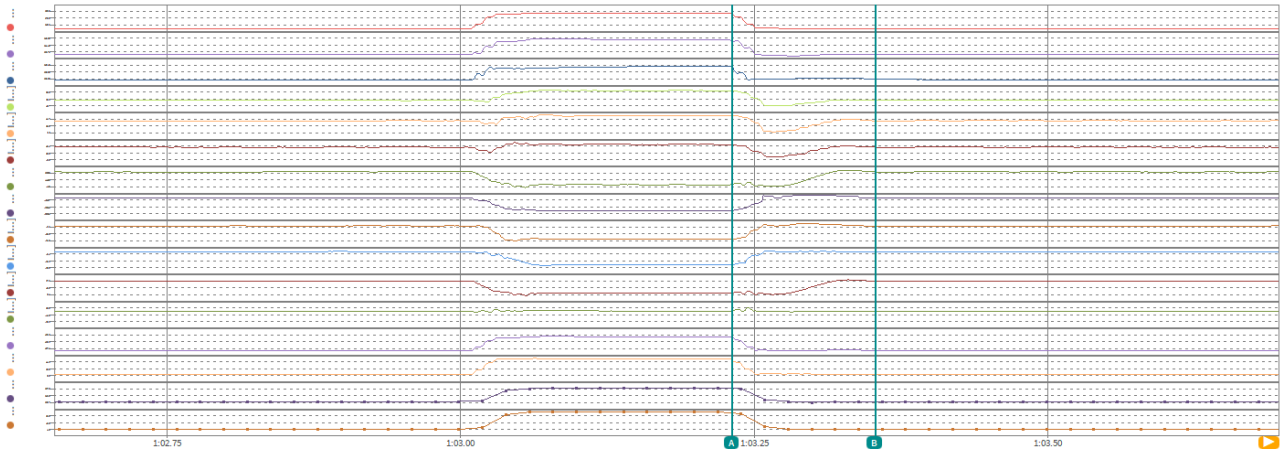
时间 [s]	A 1:03.010355	B 1:03.040897	间隔 0.030542	有效值
U1_tRMS_rc@AC [V]	230.2787	285.2591	54.98041	265.9332
U2_tRMS_rc@AC [V]	229.8217	244.4125	14.59079	238.0234
U3_tRMS_rc@AC [V]	229.5940	242.9814	13.38744	239.1997
I1_tRMS_rc@AC [A]	37.68995	78.40918	40.71923	49.64746
I2_tRMS_rc@AC [A]	37.59818	46.66792	9.069733	35.00928
I3_tRMS_rc@AC [A]	37.44671	47.87960	10.43289	33.51605
P_t_rc@AC [W]	25842.04	4516.409	-21325.64	14770.19
Q_t_rc@AC [var]	-1977.667	-45181.84	-43204.17	25793.24
I_fund_Q_SYM+_rc@AC [A]	-1.020168	-52.61930	-51.59913	25.45814
I_fund_Q_SYM-_rc@AC [A]	-0.215430	-23.61418	-23.39875	11.80922
I_fund_P_SYM+_rc@AC [A]	37.47097	5.300289	-32.17068	20.93892
I_fund_P_SYM-_rc@AC [A]	0.080958	4.593367	4.512409	4.291858
U_fund_SYM+_rc@AC [V]	398.1920	444.4623	46.27029	427.4886
U_fund_SYM-_rc@AC [V]	1.043259	50.96024	49.91698	36.74550
U+ [V]	229.9146	252.6259	22.71128	238.5999
U- [V]	0.623059	24.98272	24.35966	14.57793

Injected reactive current at 60ms



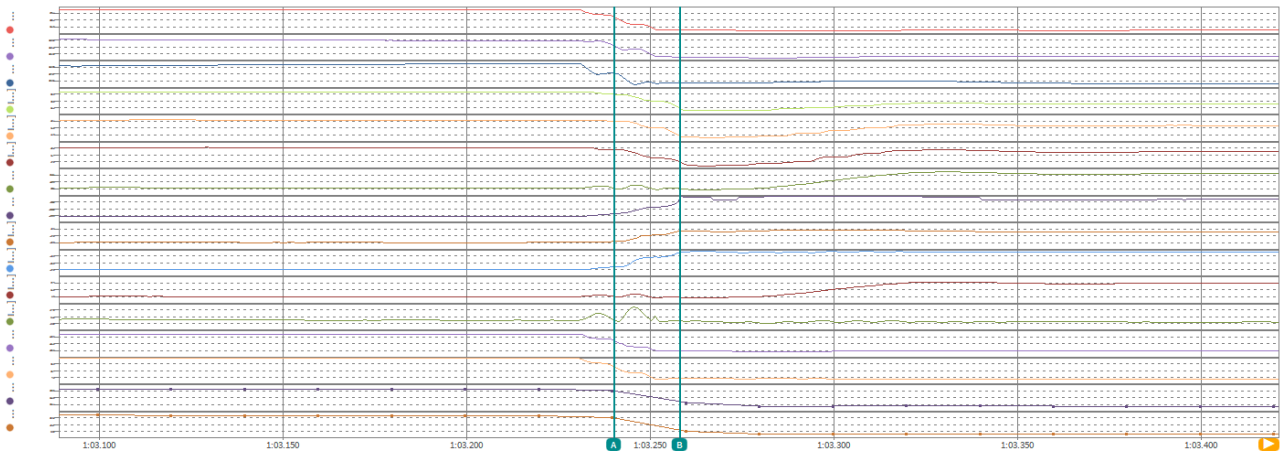
时间 [s]	A 1:03.010355	B 1:03.071214	间隔 0.060859	有效值
U1_tRMS_rc@AC [V]	230.2787	288.6265	58.34784	276.1649
U2_tRMS_rc@AC [V]	229.8217	248.0232	18.20143	241.9957
U3_tRMS_rc@AC [V]	229.5940	243.1272	13.53322	240.9502
I1_tRMS_rc@AC [A]	37.68995	100.4797	62.78975	72.48098
I2_tRMS_rc@AC [A]	37.59818	55.12324	17.52506	42.09124
I3_tRMS_rc@AC [A]	37.44671	48.18900	10.74229	41.42620
P_t_rc@AC [W]	25842.04	3324.832	-22517.21	10704.43
Q_t_rc@AC [var]	-1977.667	-54287.28	-52309.61	39183.41
I_fund_Q_SYM+_rc@AC [A]	-1.020168	-48.27423	-47.25407	39.14943
I_fund_Q_SYM-_rc@AC [A]	-0.215430	-52.39481	-52.17938	29.82029
I_fund_P_SYM+_rc@AC [A]	37.47097	3.720957	-33.75002	15.14253
I_fund_P_SYM-_rc@AC [A]	0.080958	4.753253	4.672296	3.985502
U_fund_SYM+_rc@AC [V]	398.1920	448.6013	50.40930	436.6450
U_fund_SYM-_rc@AC [V]	1.043259	51.80074	50.75748	44.35028
U+ [V]	229.9146	256.9540	27.03948	243.3183
U- [V]	0.623059	29.39236	28.76930	19.37433

Recover time – Active power



时间 [s]	A 1:03.230973	B 1:03.352599	间隔 0.121626	有效值
U1_tRMS_rc@AC [V]	287.7644	229.9497	-57.81473	236.0211
U2_tRMS_rc@AC [V]	246.2424	229.4812	-16.76120	230.9629
U3_tRMS_rc@AC [V]	245.4354	231.0876	-14.34776	232.3973
I1_tRMS_rc@AC [A]	97.58693	37.80641	-59.78052	44.48476
I2_tRMS_rc@AC [A]	51.60812	37.28917	-14.31895	32.40544
I3_tRMS_rc@AC [A]	46.57515	38.00800	-8.567154	30.95521
P_t_rc@AC [W]	2262.961	25743.37	23480.41	16890.55
Q_t_rc@AC [var]	-52172.29	-3878.583	48293.70	19260.83
I_fund_Q_SYM+_rc@AC [A]	-47.78708	-1.200495	46.58658	17.35274
I_fund_Q_SYM-_rc@AC [A]	-49.75619	-0.185288	49.57090	16.38071
I_fund_P_SYM+_rc@AC [A]	2.650495	37.27828	34.62778	24.38370
I_fund_P_SYM-_rc@AC [A]	2.009171	0.408161	-1.601010	4.683009
U_fund_SYM+_rc@AC [V]	448.3850	398.6682	-49.71689	403.4016
U_fund_SYM-_rc@AC [V]	50.82865	0.658009	-50.17064	13.29639
U+ [V]	258.8686	230.6854	-28.18318	238.9166
U- [V]	29.49993	0.485005	-29.01492	15.23708

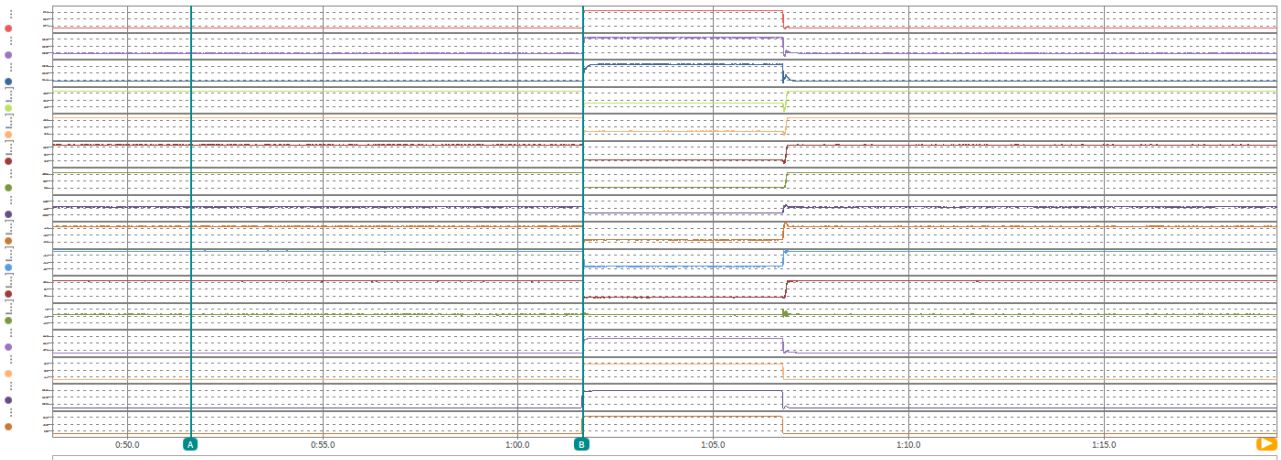
Recover time – Reactive power



时间 [s]	A 1:03.24024	B 1:03.25815	间隔 0.01791	有效值
U1_tRMS_rc@AC [V]	270.1250	231.6214	-38.50365	244.0770
U2_tRMS_rc@AC [V]	241.9758	228.8117	-13.16412	233.9908
U3_tRMS_rc@AC [V]	238.5627	231.0627	-7.499954	232.1622
I1_tRMS_rc@AC [A]	87.87038	24.51664	-63.35373	65.84837
I2_tRMS_rc@AC [A]	48.83808	11.79354	-37.04455	37.77173
I3_tRMS_rc@AC [A]	41.59534	17.02464	-24.57070	31.12947
P_t_rc@AC [W]	2709.141	1286.798	-1422.343	3240.116
Q_t_rc@AC [var]	-45395.95	-12243.40	33152.55	32456.94
I_fund_Q_SYM+_rc@AC [A]	-44.25619	-1.165226	43.09096	28.16956
I_fund_Q_SYM-_rc@AC [A]	-42.19158	-3.510602	38.68098	25.84387
I_fund_P_SYM+_rc@AC [A]	3.021505	1.799894	-1.221611	3.876930
I_fund_P_SYM-_rc@AC [A]	4.659170	2.049635	-2.609535	10.06373
U_fund_SYM+_rc@AC [V]	431.3870	399.2258	-32.16122	409.1006
U_fund_SYM-_rc@AC [V]	34.19617	1.892416	-32.30376	15.85776
U+ [V]	256.0700	256.0700	0.000000	256.0700
U- [V]	26.81464	26.81464	0.000000	26.81464

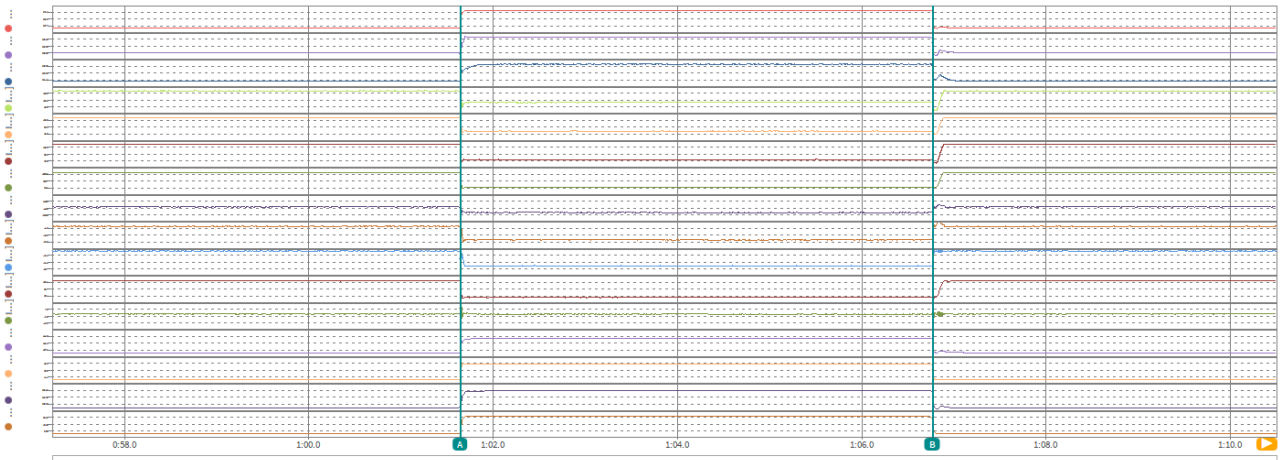
Test – VS4.1.1

Before fault



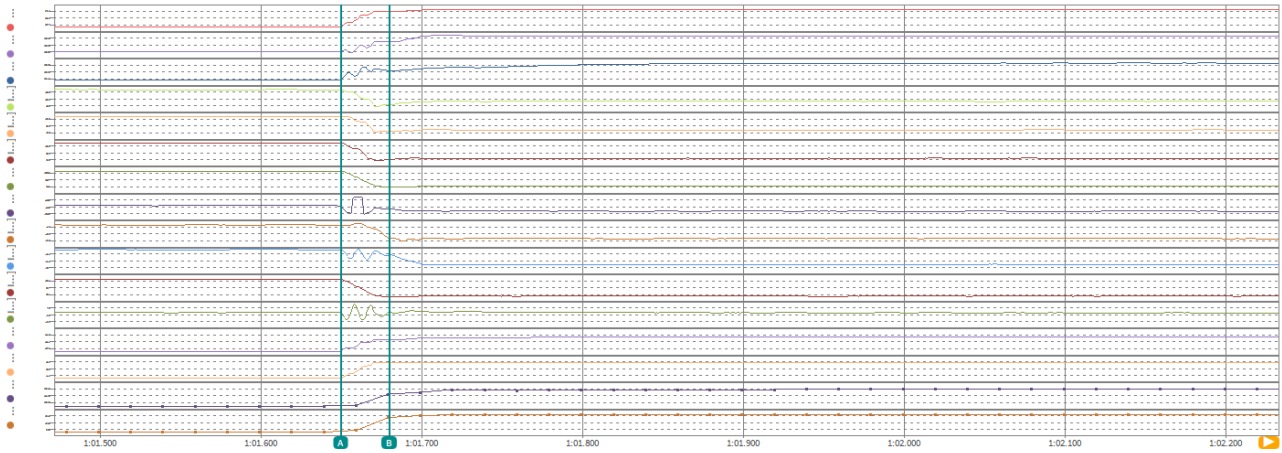
时间 [s]	A 0:51.642989	B 1:01.651509	间隔 0:10.008520	有效值
U1_tRMS_rc@AC [V]	230.5240	230.5820	0.058044	230.5786
U2_tRMS_rc@AC [V]	229.8793	229.9100	0.030685	229.9054
U3_tRMS_rc@AC [V]	229.8757	229.8678	-7.950e-3	229.8351
I1_tRMS_rc@AC [A]	179.6934	180.4797	0.786285	179.5852
I2_tRMS_rc@AC [A]	180.8679	182.3181	1.450195	181.2291
I3_tRMS_rc@AC [A]	183.3443	183.3605	0.016190	183.6981
P_t_rc@AC [W]	125130.3	125659.3	529.0078	125269.5
Q_t_rc@AC [var]	-2091.910	-2321.107	-229.1970	2466.367
I_fund_Q_SYM+_rc@AC [A]	-0.307852	-0.210150	0.097702	0.603455
I_fund_Q_SYM-_rc@AC [A]	0.208670	-0.020530	-0.229201	0.557079
I_fund_P_SYM+_rc@AC [A]	181.2748	182.0195	0.744705	181.4688
I_fund_P_SYM-_rc@AC [A]	-0.652432	-0.431786	0.220647	1.009683
U_fund_SYM+_rc@AC [V]	398.5266	398.5703	0.043701	398.5499
U_fund_SYM-_rc@AC [V]	1.062072	0.694706	-0.367365	1.056908
U+ [V]	230.1147	230.1317	0.016990	230.1096
U- [V]	0.595490	0.621563	0.026073	0.610038

Duration fault time



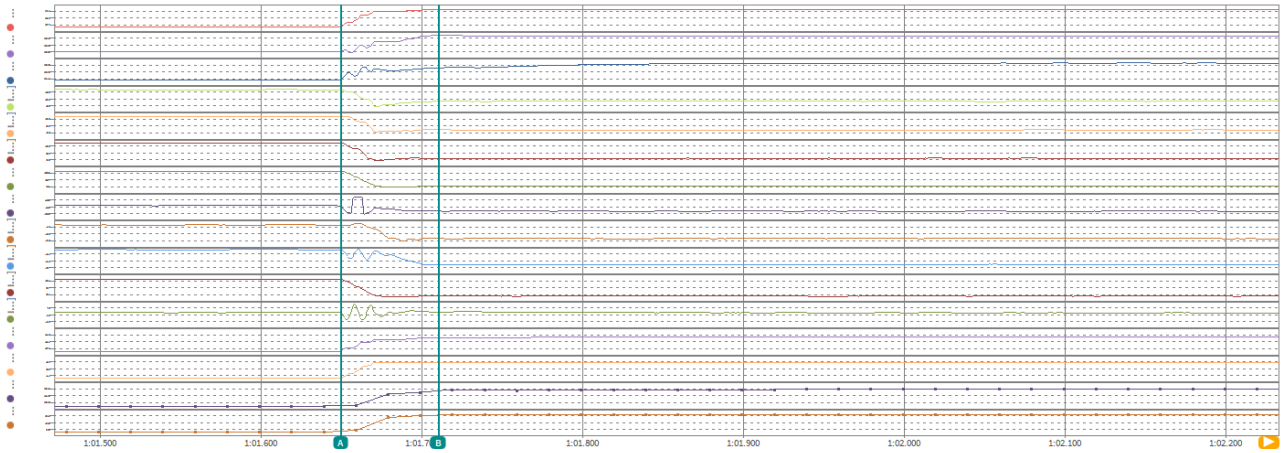
时间 [s]	A 1:01.649948	B 1:06.770696	间隔 5.120748	有效值
U1_tRMS_rc@AC [V]	230.5919	276.1813	45.58936	276.0013
U2_tRMS_rc@AC [V]	229.9134	241.4492	11.53586	241.4132
U3_tRMS_rc@AC [V]	229.8662	241.0443	11.17812	240.9228
I1_tRMS_rc@AC [A]	180.2677	75.72375	-104.5439	76.85245
I2_tRMS_rc@AC [A]	182.3480	41.91385	-140.4341	42.84988
I3_tRMS_rc@AC [A]	183.2929	36.73784	-146.5550	38.75367
P_t_rc@AC [W]	125605.2	1711.648	-123893.5	5505.721
Q_t_rc@AC [var]	-2251.635	-39852.26	-37600.62	40402.28
I_fund_Q_SYM+_rc@AC [A]	-0.105560	-30.30211	-30.19655	30.50524
I_fund_Q_SYM-_rc@AC [A]	0.147861	-43.96152	-44.10939	44.64201
I_fund_P_SYM+_rc@AC [A]	181.9391	2.402297	-179.5368	7.923283
I_fund_P_SYM-_rc@AC [A]	-0.498743	-1.625070	-1.126327	1.518385
U_fund_SYM+_rc@AC [V]	398.5771	436.3914	37.81433	436.2277
U_fund_SYM-_rc@AC [V]	0.753032	46.33869	45.58566	46.60228
U+ [V]	230.1317	251.9801	21.84842	251.7459
U- [V]	0.621563	26.90840	26.28683	26.82833

Injected reactive current at 30ms



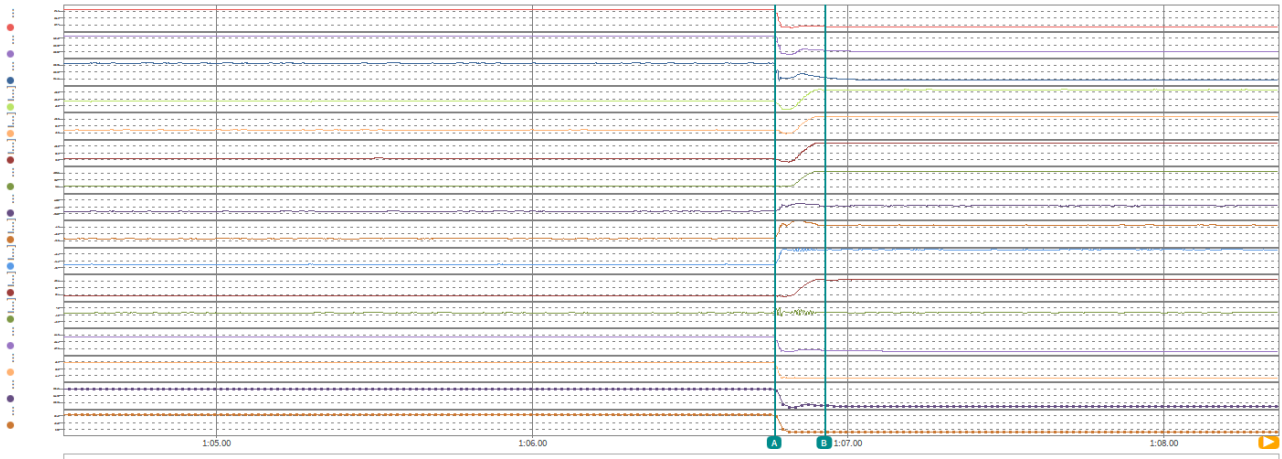
时间 [s]	A 1:01.649948	B 1:01.680036	间隔 0.030088	有效值
U1_tRMS_rc@AC [V]	230.5919	270.8485	40.25653	256.6289
U2_tRMS_rc@AC [V]	229.9134	237.1304	7.217056	233.7805
U3_tRMS_rc@AC [V]	229.8662	236.2298	6.363632	235.0148
I1_tRMS_rc@AC [A]	180.2677	48.36373	-131.9039	116.0057
I2_tRMS_rc@AC [A]	182.3480	26.45485	-155.8931	120.0270
I3_tRMS_rc@AC [A]	183.2929	26.83969	-156.4532	107.7140
P_t_rc@AC [W]	125605.2	-594.5706	-126199.7	68378.58
Q_t_rc@AC [var]	-2251.635	-25705.95	-23454.32	43275.53
I_fund_Q_SYM+_rc@AC [A]	-0.105560	-28.76427	-28.65871	10.94224
I_fund_Q_SYM-_rc@AC [A]	0.147861	-17.04492	-17.19278	15.79677
I_fund_P_SYM+_rc@AC [A]	181.9391	-0.645546	-182.5846	98.54708
I_fund_P_SYM-_rc@AC [A]	-0.498743	-1.236341	-0.737598	8.630647
U_fund_SYM+_rc@AC [V]	398.5771	428.0719	29.49487	417.5201
U_fund_SYM-_rc@AC [V]	0.753032	46.26363	45.51059	32.95650
U+ [V]	230.1317	244.9977	14.86605	235.8346
U- [V]	0.621563	22.75115	22.12959	13.29176

Injected reactive current at 60ms



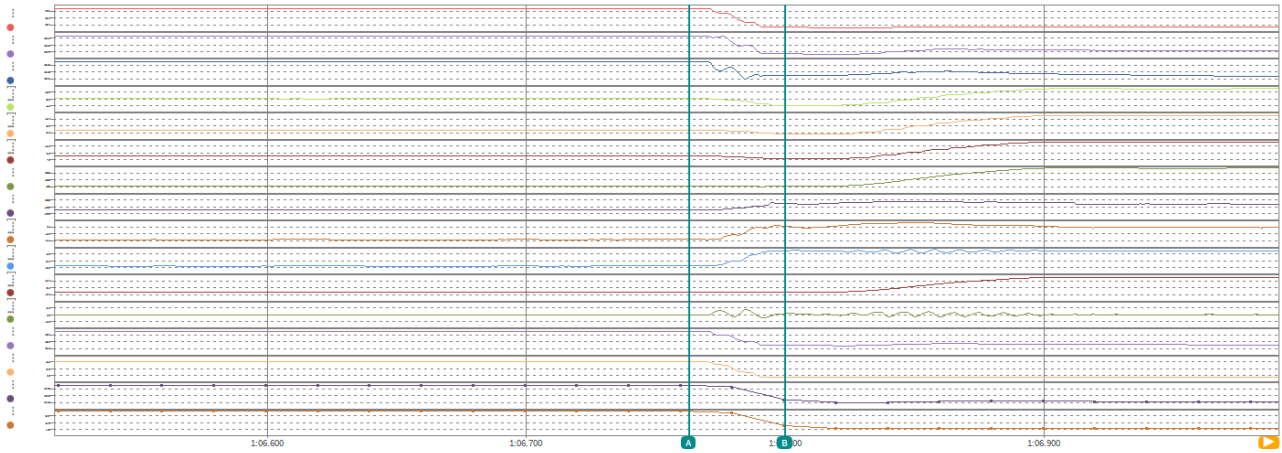
时间 [s]	A 1:01.649948	B 1:01.710430	间隔 0.060482	有效值
U1_tRMS_rc@AC [V]	230.5919	275.5600	44.96802	264.9352
U2_tRMS_rc@AC [V]	229.9134	241.9802	12.06685	236.7192
U3_tRMS_rc@AC [V]	229.8662	237.8866	8.020386	235.9705
I1_tRMS_rc@AC [A]	180.2677	75.35398	-104.9137	95.19876
I2_tRMS_rc@AC [A]	182.3480	45.90066	-136.4473	89.30778
I3_tRMS_rc@AC [A]	183.2929	35.50569	-147.7872	81.09358
P_t_rc@AC [W]	125605.2	3496.017	-122109.2	48785.92
Q_t_rc@AC [var]	-2251.635	-40166.06	-37914.43	39770.86
I_fund_Q_SYM+_rc@AC [A]	-0.105560	-30.23378	-30.12822	23.66563
I_fund_Q_SYM-_rc@AC [A]	0.147861	-45.09225	-45.24012	27.33839
I_fund_P_SYM+_rc@AC [A]	181.9391	4.644422	-177.2947	70.30266
I_fund_P_SYM-_rc@AC [A]	-0.498743	-0.167574	0.331168	6.216733
U_fund_SYM+_rc@AC [V]	398.5771	434.5599	35.98282	424.3857
U_fund_SYM-_rc@AC [V]	0.753032	46.85494	46.10191	40.19670
U+ [V]	230.1317	248.2489	18.11723	238.9986
U- [V]	0.621563	26.72987	26.10830	17.63872

Recover time – Active power



时间 [s]	A 1:06.768772	B 1:06.927580	间隔 0.158808	有效值
U1_tRMS_rc@AC [V]	276.1692	231.8111	-44.35809	235.3040
U2_tRMS_rc@AC [V]	241.4623	230.9497	-10.51260	231.2532
U3_tRMS_rc@AC [V]	241.0488	231.6258	-9.423019	232.6632
I1_tRMS_rc@AC [A]	75.64043	179.8669	104.2264	110.7751
I2_tRMS_rc@AC [A]	42.04060	182.4609	140.4203	110.3608
I3_tRMS_rc@AC [A]	36.70850	181.8938	145.1853	110.8998
P_t_rc@AC [W]	1670.908	125885.7	124214.8	75576.30
Q_t_rc@AC [var]	-39854.30	-4488.404	35365.90	14971.56
I_fund_Q_SYM+_rc@AC [A]	-30.18201	-0.265492	29.91652	10.05582
I_fund_Q_SYM-_rc@AC [A]	-43.97549	-0.466742	43.50874	12.36899
I_fund_P_SYM+_rc@AC [A]	2.340626	181.2760	178.9354	108.5806
I_fund_P_SYM-_rc@AC [A]	-2.013929	-0.318491	1.695438	2.918189
U_fund_SYM+_rc@AC [V]	436.4257	400.8951	-35.53052	403.4273
U_fund_SYM-_rc@AC [V]	46.61005	0.800993	-45.80905	11.66040
U+ [V]	251.9801	231.7081	-20.27196	236.0394
U- [V]	26.90840	0.445584	-26.46281	12.22258

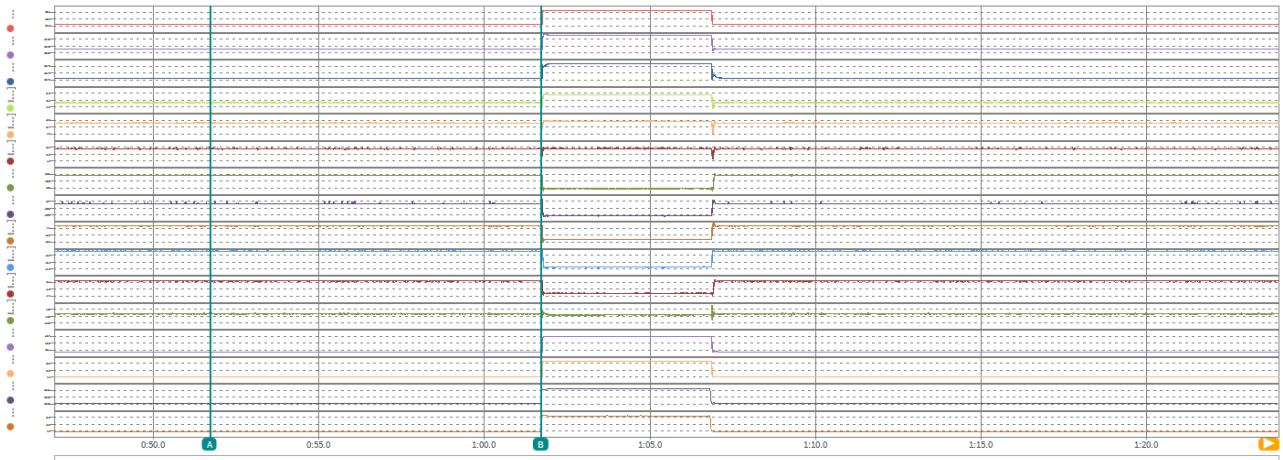
Recover time – Reactive power



时间 [s]	A 1:06.76279	B 1:06.79995	间隔 0.03717	有效值
U1_tRMS_rc@AC [V]	276.1710	231.2135	-44.95746	254.6496
U2_tRMS_rc@AC [V]	241.4423	228.4616	-12.98062	235.9241
U3_tRMS_rc@AC [V]	241.0028	231.1054	-9.897430	234.7009
I1_tRMS_rc@AC [A]	75.76252	6.532585	-69.22993	56.75732
I2_tRMS_rc@AC [A]	41.66457	5.907035	-35.75753	32.50559
I3_tRMS_rc@AC [A]	37.25380	7.664400	-29.58940	27.40022
P_t_rc@AC [W]	1442.416	529.0810	-913.3353	2618.375
Q_t_rc@AC [var]	-39935.23	4600.917	44536.15	29250.20
I_fund_Q_SYM+_rc@AC [A]	-30.12602	3.033746	33.15977	20.81140
I_fund_Q_SYM-_rc@AC [A]	-44.18751	0.746887	44.93440	30.50835
I_fund_P_SYM+_rc@AC [A]	2.069787	0.748662	-1.321125	3.303885
I_fund_P_SYM-_rc@AC [A]	-1.252111	1.096500	2.348611	4.374354
U_fund_SYM+_rc@AC [V]	436.3809	398.8176	-37.56326	417.5369
U_fund_SYM-_rc@AC [V]	46.49974	1.786236	-44.71350	30.16274
U+ [V]	251.9801	249.5939	-2.386237	250.7898
U- [V]	26.90840	24.36084	-2.547556	25.66624

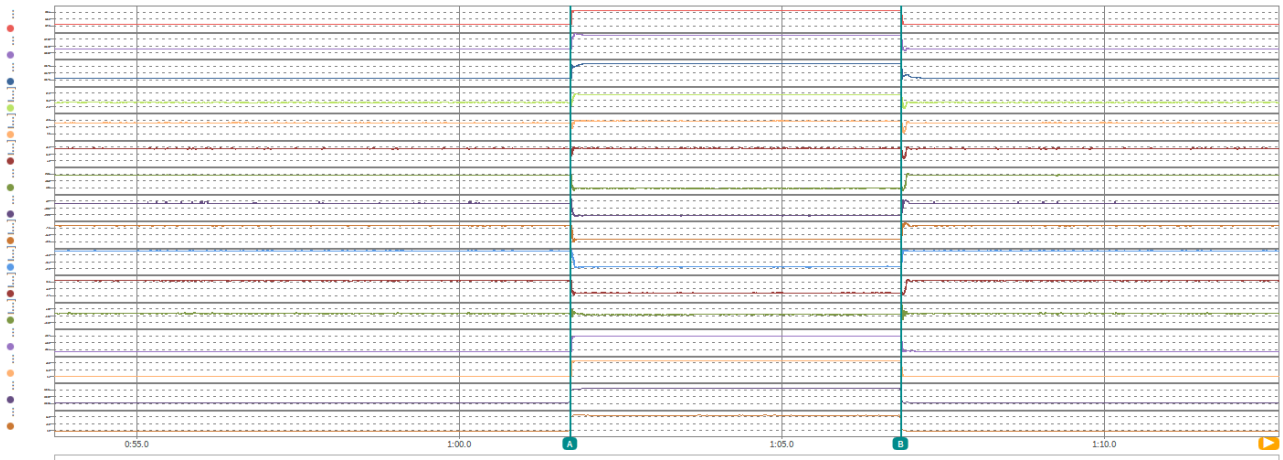
Test – VS4.1.2

Before fault



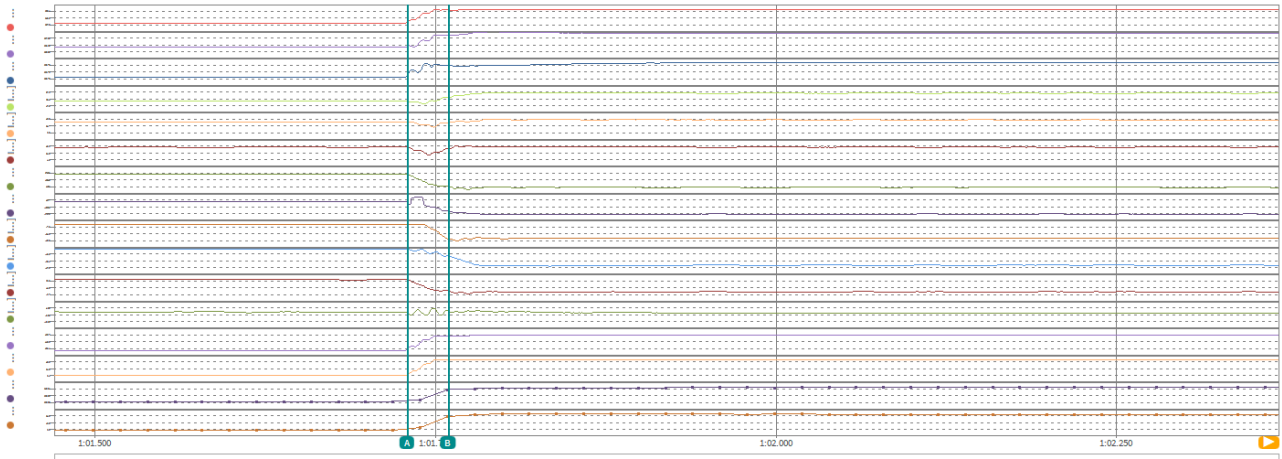
时间 [s]	A 0:51.72075	B 1:01.72941	间隔 0:10.00867	有效值
U1_tRMS_rc@AC [V]	230.2236	230.2722	0.048584	230.2840
U2_tRMS_rc@AC [V]	229.7884	229.8412	0.052734	229.8053
U3_tRMS_rc@AC [V]	229.5801	229.6659	0.085876	229.6050
I1_tRMS_rc@AC [A]	36.78404	37.39180	0.607761	37.37889
I2_tRMS_rc@AC [A]	37.69897	37.68977	-9.209e-3	37.48354
I3_tRMS_rc@AC [A]	37.53817	39.26210	1.723923	38.10437
P_t_rc@AC [W]	25674.09	26227.41	553.3203	25902.44
Q_t_rc@AC [var]	-1967.309	-1814.662	152.6475	1852.435
I_fund_Q_SYM+_rc@AC [A]	-0.254397	-0.707278	-0.452881	0.725475
I_fund_Q_SYM-_rc@AC [A]	-0.347172	0.484162	0.831334	0.322961
I_fund_P_SYM+_rc@AC [A]	37.23172	38.02452	0.792797	37.55668
I_fund_P_SYM-_rc@AC [A]	-0.439069	-0.477547	-0.038478	0.363218
U_fund_SYM+_rc@AC [V]	398.1332	398.2416	0.108337	398.1922
U_fund_SYM-_rc@AC [V]	0.962213	0.968988	6.776e-3	0.965942
U+ [V]	229.8616	229.9093	0.047651	229.9030
U- [V]	0.566570	0.570968	4.398e-3	0.557621

Duration fault time



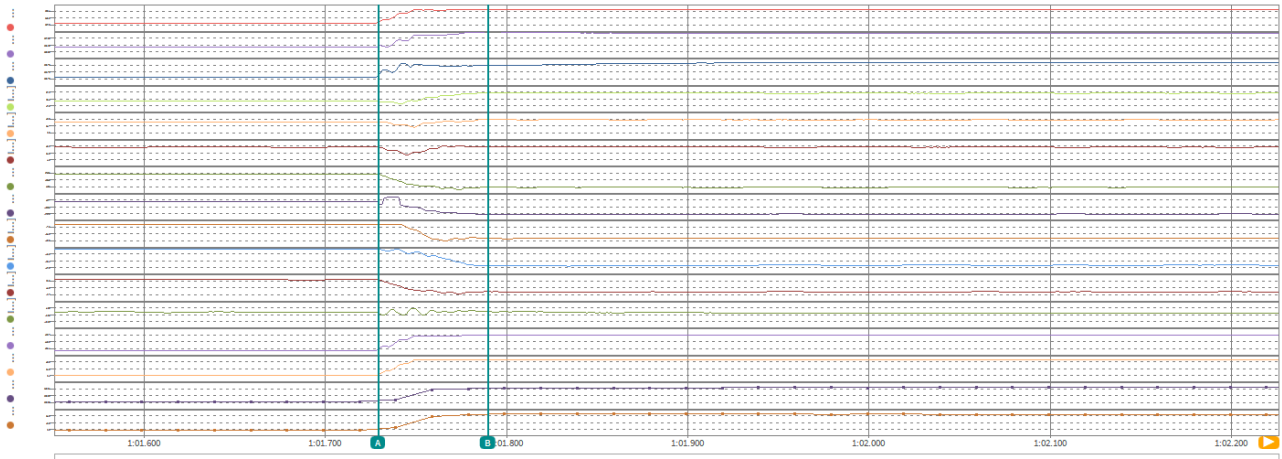
时间 [s]	A 1:01.72951	B 1:06.84970	间隔 5.12019	有效值
U1_tRMS_rc@AC [V]	230.2722	276.1826	45.91042	276.0564
U2_tRMS_rc@AC [V]	229.8412	241.4792	11.63802	241.4496
U3_tRMS_rc@AC [V]	229.6659	241.0260	11.36002	240.9637
I1_tRMS_rc@AC [A]	37.39180	79.52421	42.13241	80.08759
I2_tRMS_rc@AC [A]	37.68977	42.99269	5.302921	43.45438
I3_tRMS_rc@AC [A]	39.26210	37.11287	-2.149223	38.60205
P_t_rc@AC [W]	26227.41	2146.132	-24081.28	2066.247
Q_t_rc@AC [var]	-1814.662	-41234.39	-39419.73	41854.71
I_fund_Q_SYM+_rc@AC [A]	-0.707278	-35.80999	-35.10271	35.90388
I_fund_Q_SYM-_rc@AC [A]	0.484162	-43.28434	-43.76851	44.03355
I_fund_P_SYM+_rc@AC [A]	38.02452	2.981381	-35.04314	2.914422
I_fund_P_SYM-_rc@AC [A]	-0.477547	-1.509169	-1.031621	1.423310
U_fund_SYM+_rc@AC [V]	398.2416	436.4077	38.16608	436.3103
U_fund_SYM-_rc@AC [V]	0.968988	46.39751	45.42852	46.57364
U+ [V]	229.9093	251.9541	22.04479	251.7923
U- [V]	0.570968	26.94942	26.37845	26.81184

Injected reactive current at 30ms



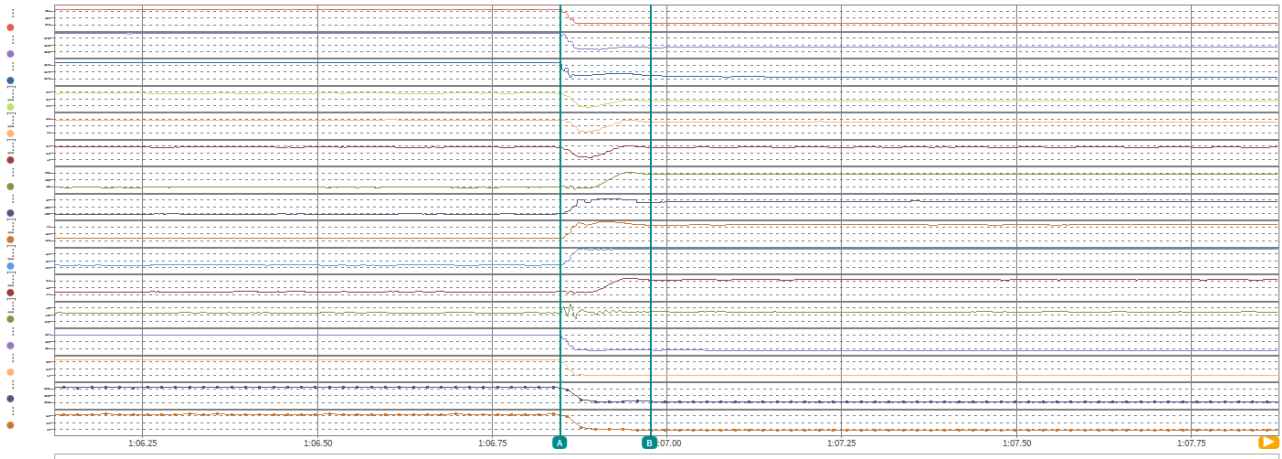
	A	B	间隔	有效值
时间 [s]	1:01.72951	1:01.75970	0.03019	
U1_tRMS_rc@AC [V]	230.2722	273.9229	43.65074	259.6873
U2_tRMS_rc@AC [V]	229.8412	239.9671	10.12590	235.7805
U3_tRMS_rc@AC [V]	229.6659	238.7476	9.081696	236.8101
I1_tRMS_rc@AC [A]	37.39180	57.69746	20.30566	38.82589
I2_tRMS_rc@AC [A]	37.68977	34.56210	-3.127663	30.29544
I3_tRMS_rc@AC [A]	39.26210	33.38173	-5.880363	26.99487
P_t_rc@AC [W]	26227.41	4678.110	-21549.30	13861.67
Q_t_rc@AC [var]	-1814.662	-31725.18	-29910.51	18829.66
I_fund_Q_SYM+_rc@AC [A]	-0.707278	-37.53419	-36.82691	16.53513
I_fund_Q_SYM-_rc@AC [A]	0.484162	-17.69737	-18.18153	9.179219
I_fund_P_SYM+_rc@AC [A]	38.02452	6.008698	-32.01582	19.89414
I_fund_P_SYM-_rc@AC [A]	-0.477547	2.045105	2.522653	2.656622
U_fund_SYM+_rc@AC [V]	398.2416	432.9272	34.68561	421.3768
U_fund_SYM-_rc@AC [V]	0.968988	46.66477	45.69578	34.22342
U+ [V]	229.9093	232.6280	2.718692	231.2726
U- [V]	0.570968	3.958917	3.387949	2.828341

Injected reactive current at 60ms



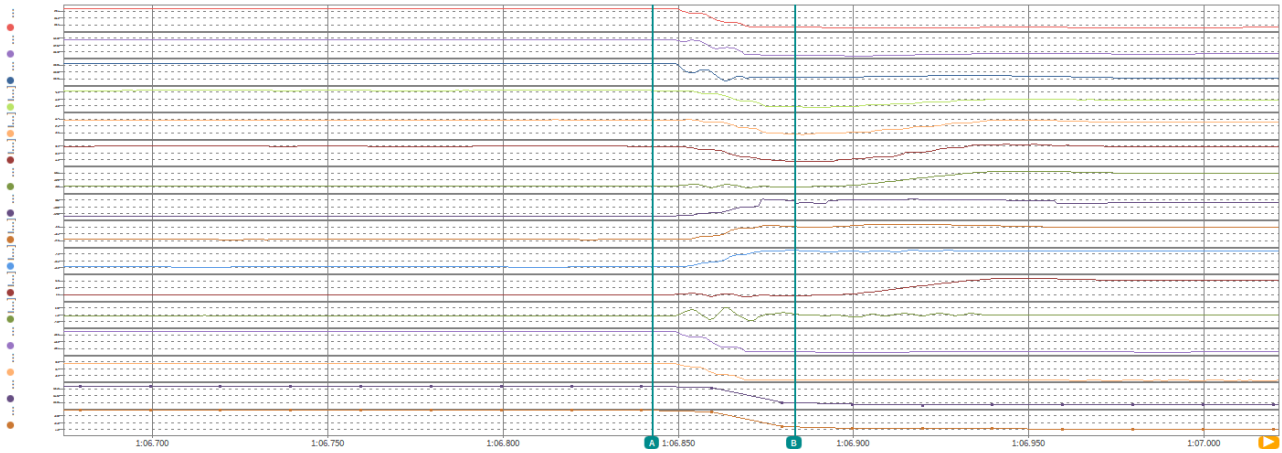
	A	B	间隔	有效值
时间 [s]	1:01.72951	1:01.79005	0.06054	
U1_tRMS_rc@AC [V]	230.2722	276.7195	46.44737	267.3939
U2_tRMS_rc@AC [V]	229.8412	242.8712	13.03008	238.5892
U3_tRMS_rc@AC [V]	229.6659	238.5496	8.883698	237.5905
I1_tRMS_rc@AC [A]	37.39180	81.98027	44.58847	58.46285
I2_tRMS_rc@AC [A]	37.68977	45.56681	7.877041	35.08955
I3_tRMS_rc@AC [A]	39.26210	39.44726	0.185162	33.80889
P_t_rc@AC [W]	26227.41	2360.844	-23866.57	9951.159
Q_t_rc@AC [var]	-1814.662	-43097.93	-41283.26	30542.75
I_fund_Q_SYM+_rc@AC [A]	-0.707278	-35.55373	-34.84645	29.07610
I_fund_Q_SYM-_rc@AC [A]	0.484162	-46.16784	-46.65200	25.98425
I_fund_P_SYM+_rc@AC [A]	38.02452	3.028530	-34.99599	14.26724
I_fund_P_SYM-_rc@AC [A]	-0.477547	0.807164	1.284711	2.006218
U_fund_SYM+_rc@AC [V]	398.2416	436.1250	37.88345	427.7747
U_fund_SYM-_rc@AC [V]	0.968988	47.17979	46.21080	40.86642
U+ [V]	229.9093	250.2887	20.37948	240.3231
U- [V]	0.570968	26.85718	26.28621	18.00108

Recover time – Active power



时间 [s]	A 1:06.84789	B 1:06.97651	间隔 0.12863	有效值
U1_tRMS_rc@AC [V]	276.1872	230.0427	-46.14453	235.2347
U2_tRMS_rc@AC [V]	241.4817	229.6010	-11.88072	230.6683
U3_tRMS_rc@AC [V]	241.0366	230.7593	-10.27733	232.1251
I1_tRMS_rc@AC [A]	79.58905	37.35142	-42.23763	38.57962
I2_tRMS_rc@AC [A]	43.06892	37.23244	-5.836483	30.75198
I3_tRMS_rc@AC [A]	37.07447	37.31394	0.239471	29.75863
P_t_rc@AC [W]	2215.971	25542.68	23326.70	17708.61
Q_t_rc@AC [var]	-41258.67	-3273.309	37985.36	14948.06
I_fund_Q_SYM+_rc@AC [A]	-35.78284	-1.235031	34.54781	12.09552
I_fund_Q_SYM-_rc@AC [A]	-43.31091	-0.279381	43.03152	13.88467
I_fund_P_SYM+_rc@AC [A]	3.053137	36.99449	33.94135	25.57423
I_fund_P_SYM-_rc@AC [A]	-1.670965	0.207006	1.877971	2.480598
U_fund_SYM+_rc@AC [V]	436.4435	398.6013	-37.84216	402.6797
U_fund_SYM-_rc@AC [V]	46.65191	0.549439	-46.10247	12.89748
U+ [V]	251.9541	230.8584	-21.09569	236.6209
U- [V]	26.94942	0.440404	-26.50902	13.68239

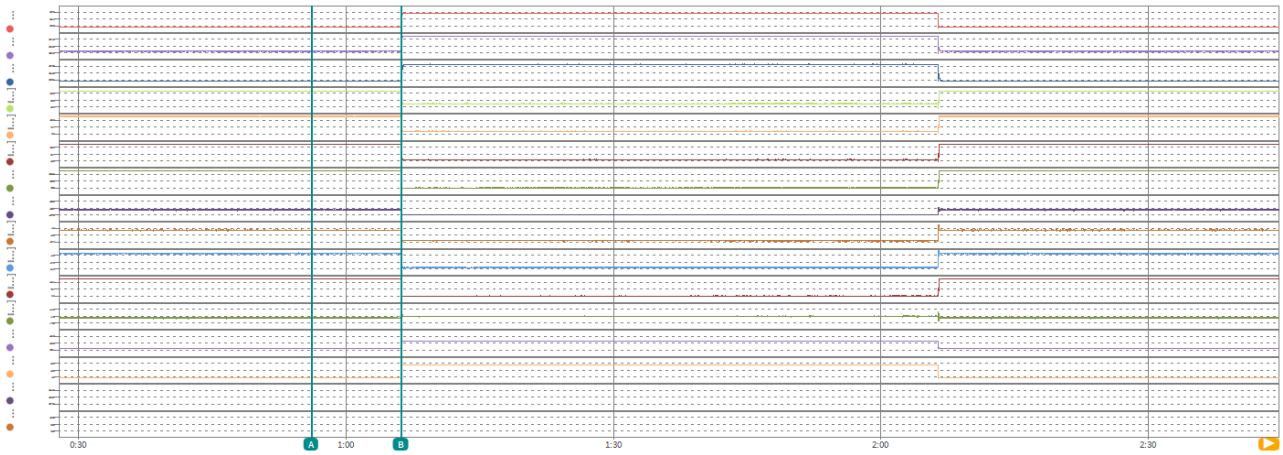
Recover time – Reactive power



时间 [s]	A 1:06.84266	B 1:06.88321	间隔 0.04056	有效值
U1_tRMS_rc@AC [V]	276.1625	231.2234	-44.93915	251.8885
U2_tRMS_rc@AC [V]	241.4934	228.5356	-12.95781	235.2244
U3_tRMS_rc@AC [V]	240.9852	231.2055	-9.779633	234.1815
I1_tRMS_rc@AC [A]	80.38081	7.355904	-73.02490	57.65510
I2_tRMS_rc@AC [A]	42.83802	5.989606	-36.84842	32.40882
I3_tRMS_rc@AC [A]	38.12299	5.971791	-32.15120	26.68887
P_t_rc@AC [W]	1904.158	479.0000	-1425.158	2233.510
Q_t_rc@AC [var]	-41686.87	4424.553	46111.42	29218.49
I_fund_Q_SYM+_rc@AC [A]	-36.07076	1.581993	37.65276	24.12513
I_fund_Q_SYM-_rc@AC [A]	-43.80236	1.938758	45.74111	28.98220
I_fund_P_SYM+_rc@AC [A]	2.666693	0.669499	-1.997194	2.838141
I_fund_P_SYM-_rc@AC [A]	-0.850833	2.430173	3.281006	4.199091
U_fund_SYM+_rc@AC [V]	436.4085	398.9239	-37.48468	415.3279
U_fund_SYM-_rc@AC [V]	46.64536	1.747664	-44.89769	28.13237
U+ [V]	251.9541	232.8311	-19.12292	244.7658
U- [V]	26.94942	4.245575	-22.70385	20.88252

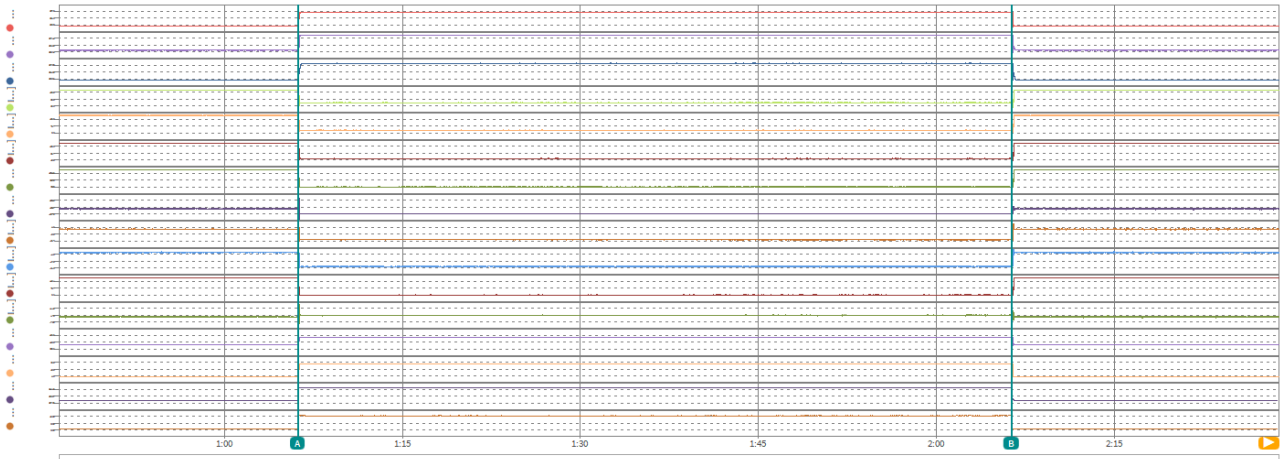
Test – VS4.2.1

Before fault



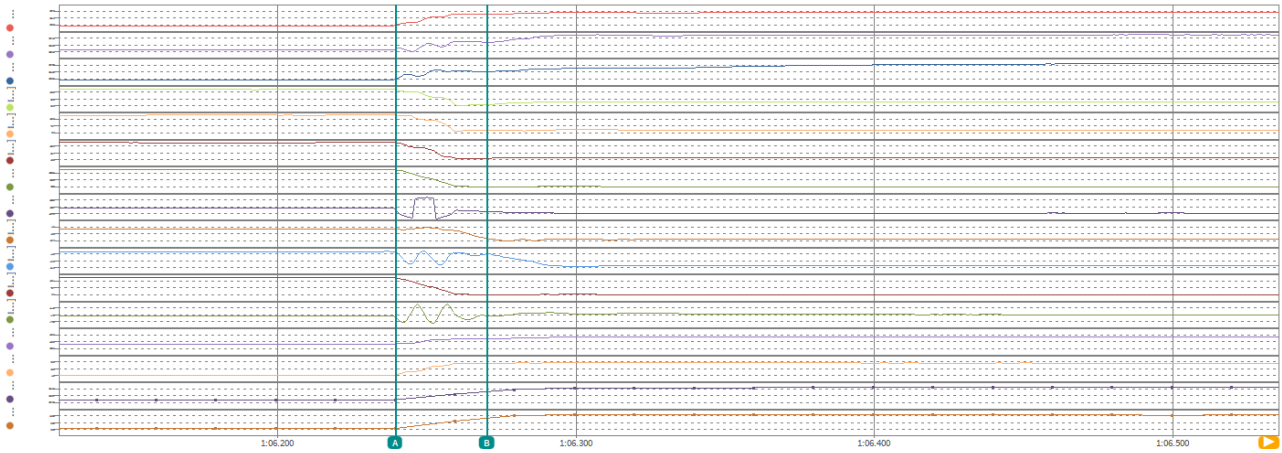
时间 [s]	A 0:56.1795	B 1:06.2404	间隔 0:10.0610	有效值
U1_tRMS_rc@AC [V]	230.5683	230.7129	0.144623	230.5833
U2_tRMS_rc@AC [V]	229.9157	229.9810	0.065247	229.9166
U3_tRMS_rc@AC [V]	229.7926	229.8577	0.065002	229.8413
I1_tRMS_rc@AC [A]	179.8143	179.4341	-0.380219	179.6398
I2_tRMS_rc@AC [A]	181.4567	181.8924	0.435699	181.3523
I3_tRMS_rc@AC [A]	183.1573	184.3370	1.179688	183.7302
P_t_rc@AC [W]	125243.6	125579.7	336.0781	125324.7
Q_t_rc@AC [var]	2443.426	2304.548	-138.8779	2331.162
I_fund_Q_SYM+_rc@AC [A]	0.191588	0.139537	-0.052051	0.491321
I_fund_Q_SYM-_rc@AC [A]	0.073623	6.487e-4	-0.072975	0.432433
I_fund_P_SYM+_rc@AC [A]	181.4418	181.8605	0.418701	181.5432
I_fund_P_SYM-_rc@AC [A]	-0.895798	-1.414346	-0.518548	0.983923
U_fund_SYM+_rc@AC [V]	398.5260	398.6782	0.152161	398.5629
U_fund_SYM-_rc@AC [V]	1.019912	0.835092	-0.184819	1.043280
U+ [V]	230.1225	230.0990	-0.023471	230.1171
U- [V]	0.598429	0.597718	-7.115e-4	0.602196

Duration fault time



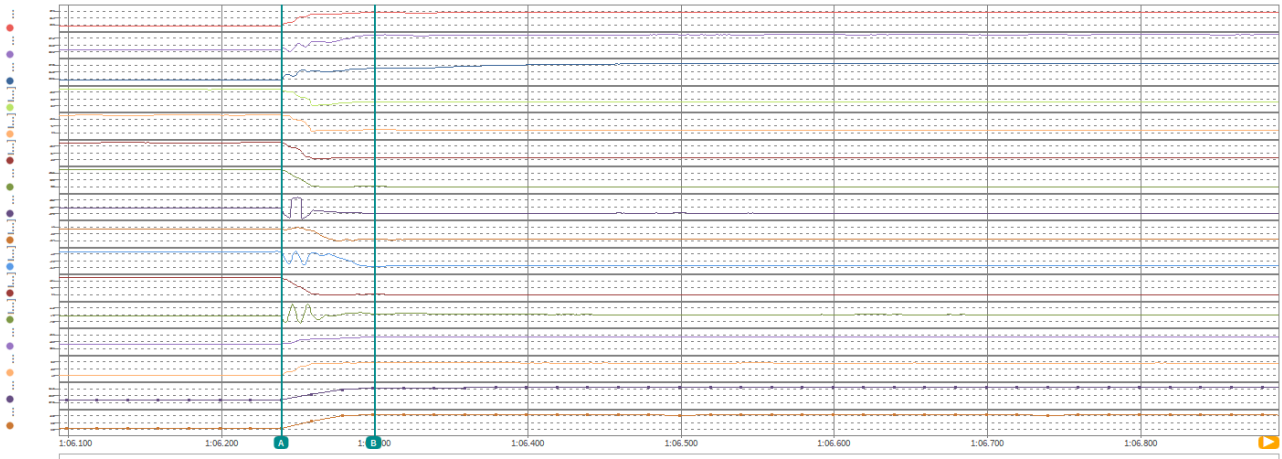
时间 [s]	A 1:06.2396	B 2:06.3588	间隔 1:00.1192	有效值
U1_tRMS_rc@AC [V]	230.7129	264.6825	33.96960	264.6703
U2_tRMS_rc@AC [V]	229.9810	239.1254	9.144470	239.1105
U3_tRMS_rc@AC [V]	229.8577	238.7294	8.871719	238.7316
I1_tRMS_rc@AC [A]	179.4341	52.40195	-127.0321	52.26762
I2_tRMS_rc@AC [A]	181.8924	29.41218	-152.4803	29.71923
I3_tRMS_rc@AC [A]	184.3370	24.46018	-159.8768	24.70472
P_t_rc@AC [W]	125579.7	2262.931	-123316.7	2547.602
Q_t_rc@AC [var]	2304.548	-26646.53	-28951.08	26702.00
I_fund_Q_SYM+_rc@AC [A]	0.139537	-22.69460	-22.83414	22.24713
I_fund_Q_SYM-_rc@AC [A]	6.487e-4	-29.27658	-29.27722	29.61221
I_fund_P_SYM+_rc@AC [A]	181.8605	2.926419	-178.9341	3.439827
I_fund_P_SYM-_rc@AC [A]	-1.414346	1.446093	2.860439	1.193215
U_fund_SYM+_rc@AC [V]	398.6782	427.9863	29.30807	427.9807
U_fund_SYM-_rc@AC [V]	0.835092	32.26530	31.43021	32.25786
U+ [V]	230.1037	247.1137	17.01007	247.0914
U- [V]	0.604998	18.67512	18.07012	18.61837

Injected reactive current at 30ms



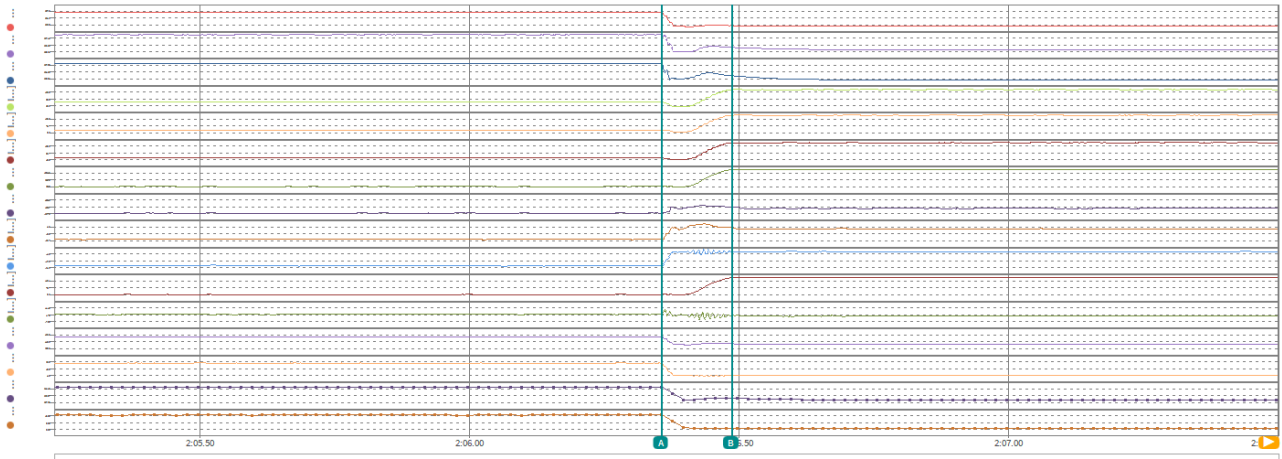
时间 [s]	A 1:06.2396	B 1:06.2704	间隔 0.0307	有效值
U1_tRMS_rc@AC [V]	230.7129	259.9242	29.21130	250.6246
U2_tRMS_rc@AC [V]	229.9810	234.6053	4.624329	232.7151
U3_tRMS_rc@AC [V]	229.8577	234.3582	4.500565	233.5612
I1_tRMS_rc@AC [A]	179.4341	26.34239	-153.0917	109.1072
I2_tRMS_rc@AC [A]	181.8924	21.23329	-160.6592	113.8500
I3_tRMS_rc@AC [A]	184.3370	20.39643	-163.9406	102.1655
P_t_rc@AC [W]	125579.7	650.3935	-124929.3	64211.92
Q_t_rc@AC [var]	2304.548	-16595.80	-18900.34	40872.42
I_fund_Q_SYM+_rc@AC [A]	0.139537	-20.04438	-20.18392	7.569809
I_fund_Q_SYM-_rc@AC [A]	6.487e-4	-5.059467	-5.060116	13.89651
I_fund_P_SYM+_rc@AC [A]	181.8605	0.883433	-180.9771	92.44009
I_fund_P_SYM-_rc@AC [A]	-1.414346	0.098627	1.512972	8.242972
U_fund_SYM+_rc@AC [V]	398.6782	420.1218	21.44357	413.2575
U_fund_SYM-_rc@AC [V]	0.835092	32.24472	31.40963	23.95190
U+ [V]	230.1037	236.9321	6.828405	232.4006
U- [V]	0.604998	10.28778	9.682785	5.959915

Injected reactive current at 60ms



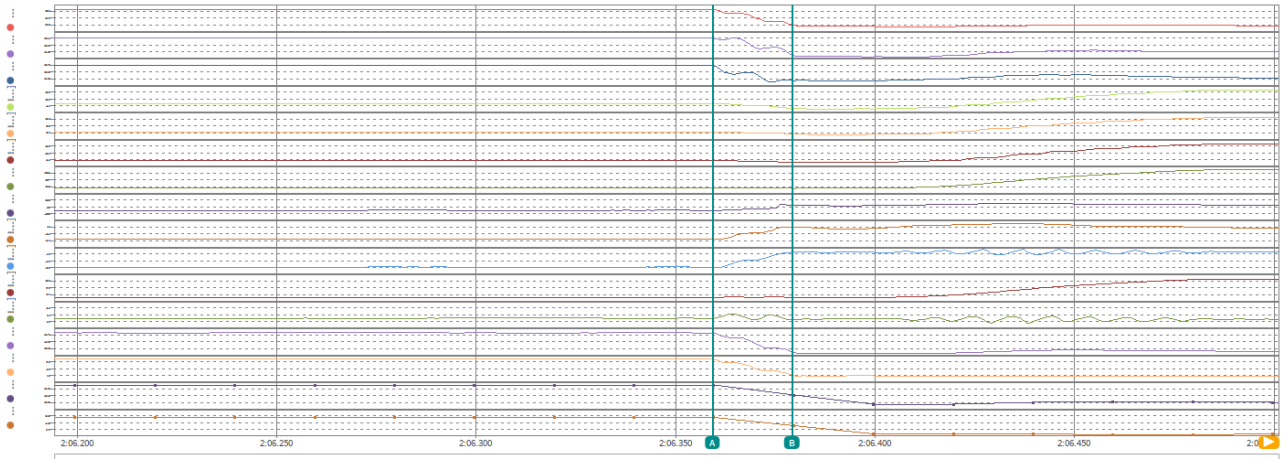
时间 [s]	A 1:06.2396	B 1:06.3000	间隔 0.0603	有效值
U1_tRMS_rc@AC [V]	230.7129	263.7878	33.07483	256.3257
U2_tRMS_rc@AC [V]	229.9810	239.0846	9.103607	234.8496
U3_tRMS_rc@AC [V]	229.8577	235.9955	6.137848	234.3983
I1_tRMS_rc@AC [A]	179.4341	52.24041	-127.1936	83.99574
I2_tRMS_rc@AC [A]	181.8924	34.34813	-147.5443	83.27795
I3_tRMS_rc@AC [A]	184.3370	24.88420	-159.4528	74.92726
P_t_rc@AC [W]	125579.7	3681.772	-121897.9	45800.58
Q_t_rc@AC [var]	2304.548	-27620.74	-29925.29	33618.32
I_fund_Q_SYM+_rc@AC [A]	0.139537	-21.60005	-21.73958	17.26415
I_fund_Q_SYM-_rc@AC [A]	6.487e-4	-31.31948	-31.32013	18.26959
I_fund_P_SYM+_rc@AC [A]	181.8605	4.808938	-177.0516	65.92856
I_fund_P_SYM-_rc@AC [A]	-1.414346	2.328008	3.742354	6.164626
U_fund_SYM+_rc@AC [V]	398.6782	425.8761	27.19791	418.2141
U_fund_SYM-_rc@AC [V]	0.835092	32.54233	31.70724	28.41864
U+ [V]	230.1037	242.7871	12.68338	235.0402
U- [V]	0.604998	18.36111	17.75611	10.53200

Recover time – Active power



时间 [s]	A 2:06.3562	B 2:06.4866	间隔 0.1304	有效值
U1_tRMS_rc@AC [V]	264.6743	232.2745	-32.39978	235.4031
U2_tRMS_rc@AC [V]	239.1162	231.3845	-7.731659	231.5486
U3_tRMS_rc@AC [V]	238.7350	232.1718	-6.563171	232.4942
I1_tRMS_rc@AC [A]	52.16410	178.8687	126.7046	90.92273
I2_tRMS_rc@AC [A]	29.46334	179.8066	150.3432	90.96250
I3_tRMS_rc@AC [A]	24.44707	182.6832	158.2362	91.73128
P_t_rc@AC [W]	2260.622	125360.9	123100.2	62157.22
Q_t_rc@AC [var]	-26592.11	7156.877	33748.99	13223.27
I_fund_Q_SYM+_rc@AC [A]	-22.63835	3.276736	25.91509	9.069938
I_fund_Q_SYM-_rc@AC [A]	-29.16463	0.983031	30.14766	8.938806
I_fund_P_SYM+_rc@AC [A]	2.928712	180.1466	177.2179	89.17049
I_fund_P_SYM-_rc@AC [A]	1.411817	-0.719836	-2.131653	2.781891
U_fund_SYM+_rc@AC [V]	427.9926	401.7267	-26.26593	403.6488
U_fund_SYM-_rc@AC [V]	32.43300	0.859484	-31.57352	9.749908
U+ [V]	247.1137	232.2857	-14.82808	236.2406
U- [V]	18.67512	0.452884	-18.22224	9.973677

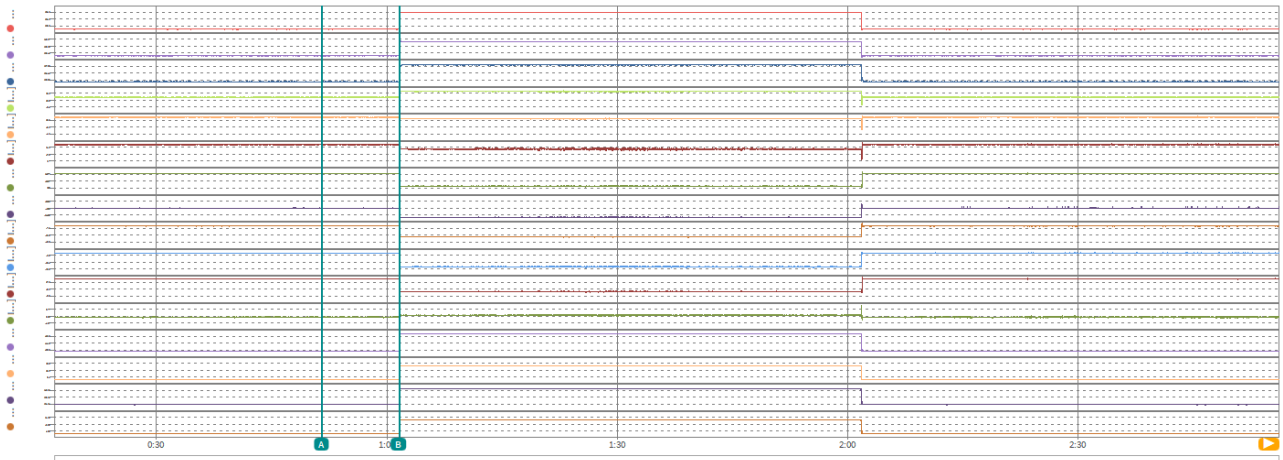
Recover time – Reactive power



时间 [s]	A 2:06.3594	B 2:06.3793	间隔 0.0199	有效值
U1_tRMS_rc@AC [V]	264.6825	235.8398	-28.84270	250.7298
U2_tRMS_rc@AC [V]	239.1254	230.9193	-8.206100	235.9650
U3_tRMS_rc@AC [V]	238.7294	230.8881	-7.841232	233.6352
I1_tRMS_rc@AC [A]	52.40195	11.15504	-41.24691	40.52364
I2_tRMS_rc@AC [A]	29.41218	11.30633	-18.10585	24.31396
I3_tRMS_rc@AC [A]	24.46018	8.079948	-16.38023	19.60491
P_t_rc@AC [W]	2262.931	1472.391	-790.5405	3241.235
Q_t_rc@AC [var]	-26646.53	6953.029	33599.56	20424.96
I_fund_Q_SYM+_rc@AC [A]	-22.69460	3.260283	25.95488	14.38566
I_fund_Q_SYM-_rc@AC [A]	-29.27658	-0.784197	28.49238	18.76730
I_fund_P_SYM+_rc@AC [A]	2.926419	1.942003	-0.984416	4.182263
I_fund_P_SYM-_rc@AC [A]	1.446093	-0.026139	-1.472232	4.431854
U_fund_SYM+_rc@AC [V]	427.9863	402.4891	-25.49716	415.1845
U_fund_SYM-_rc@AC [V]	32.26530	5.258577	-27.00673	21.03918
U+ [V]	247.1137	247.1139	1.797e-4	247.1138
U- [V]	18.67512	18.66527	-9.854e-3	18.67019

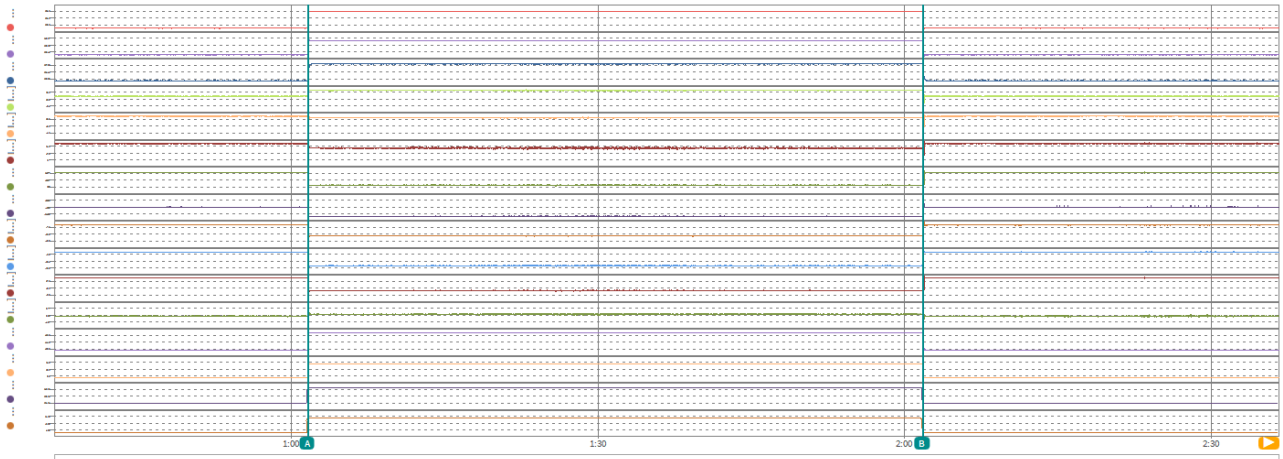
Test – VS4.2.2

Before fault



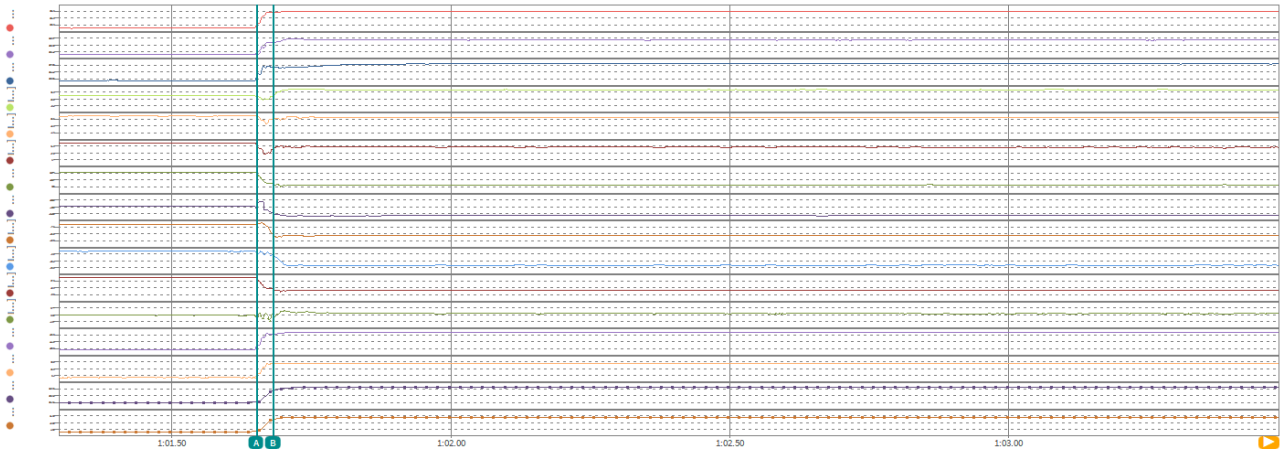
时间 [s]	A 0:51.6354	B 1:01.6525	间隔 0:10.0171	有效值
U1_tRMS_rc@AC [V]	230.3094	230.2536	-0.055817	230.2953
U2_tRMS_rc@AC [V]	229.7484	229.7983	0.049896	229.8060
U3_tRMS_rc@AC [V]	229.6520	229.5984	-0.053680	229.6134
I1_tRMS_rc@AC [A]	37.09741	36.78289	-0.314526	37.08848
I2_tRMS_rc@AC [A]	37.03716	37.36496	0.327805	37.24471
I3_tRMS_rc@AC [A]	37.01883	37.92750	0.908672	37.82526
P_t_rc@AC [W]	25484.92	25684.67	199.7520	25720.97
Q_t_rc@AC [var]	-1885.314	-2018.807	-133.4926	1815.670
I_fund_Q_SYM+_rc@AC [A]	-0.647259	-0.653862	-6.604e-3	0.660333
I_fund_Q_SYM-_rc@AC [A]	-0.109215	-9.767e-4	0.108239	0.185784
I_fund_P_SYM+_rc@AC [A]	36.94994	37.24266	0.292721	37.29248
I_fund_P_SYM-_rc@AC [A]	0.082947	-0.172336	-0.255284	0.188441
U_fund_SYM+_rc@AC [V]	398.2014	398.1664	-0.034912	398.2041
U_fund_SYM-_rc@AC [V]	1.000754	0.940383	-0.060371	0.992849
U+ [V]	229.8847	229.9059	0.021219	229.9100
U- [V]	0.581721	0.560756	-0.020965	0.573176

Duration fault time



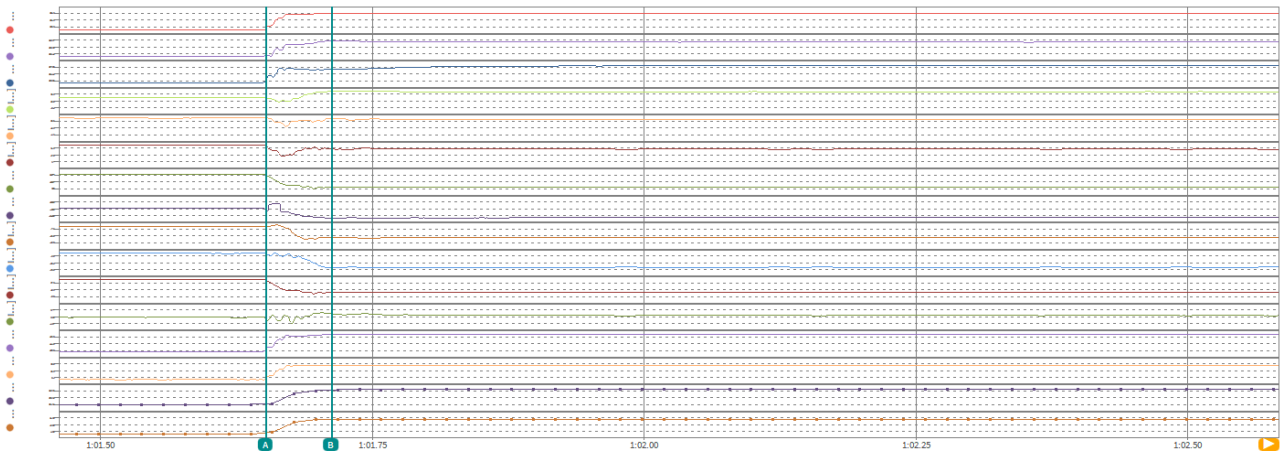
时间 [s]	A 1:01.6524	B 2:01.7730	间隔 1:00.1206	有效值
U1_tRMS_rc@AC [V]	230.2536	264.5999	34.34633	264.6689
U2_tRMS_rc@AC [V]	229.7983	238.9696	9.171265	239.1132
U3_tRMS_rc@AC [V]	229.5984	238.6242	9.025848	238.7371
I1_tRMS_rc@AC [A]	36.78289	60.98426	24.20137	61.30262
I2_tRMS_rc@AC [A]	37.36496	33.75220	-3.612762	33.33934
I3_tRMS_rc@AC [A]	37.92750	27.81284	-10.11466	28.21085
P_t_rc@AC [W]	25684.67	2777.568	-22907.11	2402.974
Q_t_rc@AC [var]	-2018.807	-30713.66	-28694.85	30835.81
I_fund_Q_SYM+_rc@AC [A]	-0.653862	-29.24020	-28.58633	29.03285
I_fund_Q_SYM-_rc@AC [A]	-9.767e-4	-31.42261	-31.42163	31.79011
I_fund_P_SYM+_rc@AC [A]	37.24266	3.617209	-33.62545	3.122834
I_fund_P_SYM-_rc@AC [A]	-0.172336	1.753879	1.926216	1.608559
U_fund_SYM+_rc@AC [V]	398.1664	427.7925	29.62610	427.9845
U_fund_SYM-_rc@AC [V]	0.940383	31.81087	30.87048	32.25146
U+ [V]	229.9059	247.1249	17.21901	247.0957
U- [V]	0.560756	18.62313	18.06238	18.61599

Injected reactive current at 30ms



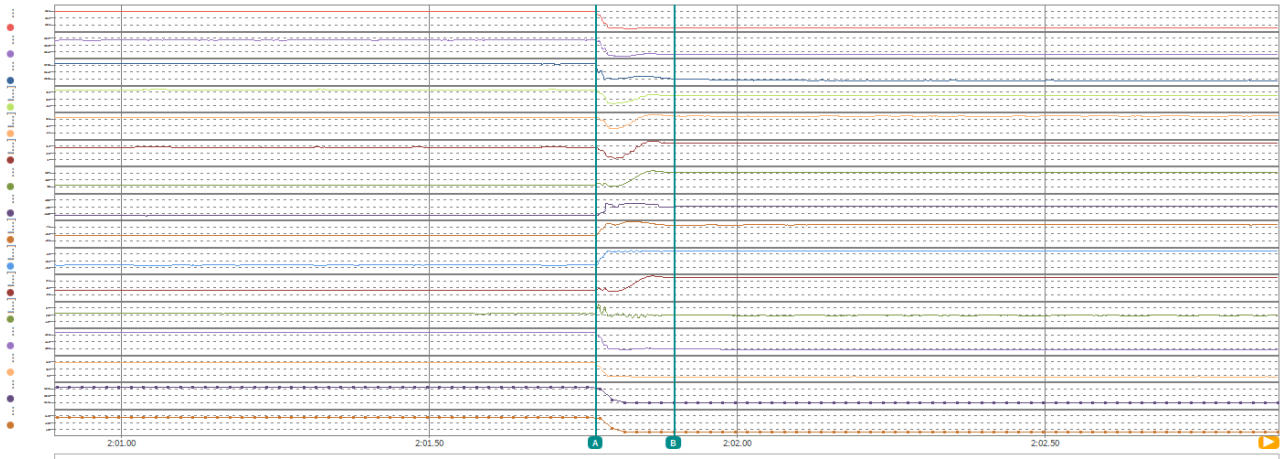
时间 [s]	A 1:01.6524	B 1:01.6829	间隔 0.0305	有效值
U1_tRMS_rc@AC [V]	230.2536	262.8338	32.58015	252.2979
U2_tRMS_rc@AC [V]	229.7983	237.4921	7.693817	234.5210
U3_tRMS_rc@AC [V]	229.5984	236.9631	7.364716	235.1707
I1_tRMS_rc@AC [A]	36.78289	35.33579	-1.447098	28.89753
I2_tRMS_rc@AC [A]	37.36496	28.97825	-8.386709	28.27732
I3_tRMS_rc@AC [A]	37.92750	25.54203	-12.38548	24.02829
P_t_rc@AC [W]	25684.67	5623.341	-20061.33	13721.23
Q_t_rc@AC [var]	-2018.807	-21498.79	-19479.99	13614.04
I_fund_Q_SYM+_rc@AC [A]	-0.653862	-26.30013	-25.64627	10.19607
I_fund_Q_SYM-_rc@AC [A]	-9.767e-4	-6.704076	-6.703100	4.898441
I_fund_P_SYM+_rc@AC [A]	37.24266	7.561274	-29.68138	19.74742
I_fund_P_SYM-_rc@AC [A]	-0.172336	0.969586	1.141923	2.455075
U_fund_SYM+_rc@AC [V]	398.1664	424.9778	26.81134	416.1742
U_fund_SYM-_rc@AC [V]	0.940383	32.46520	31.52482	24.08924
U+ [V]	229.9059	242.7195	12.81367	234.7025
U- [V]	0.560756	15.33146	14.77071	8.950863

Injected reactive current at 60ms



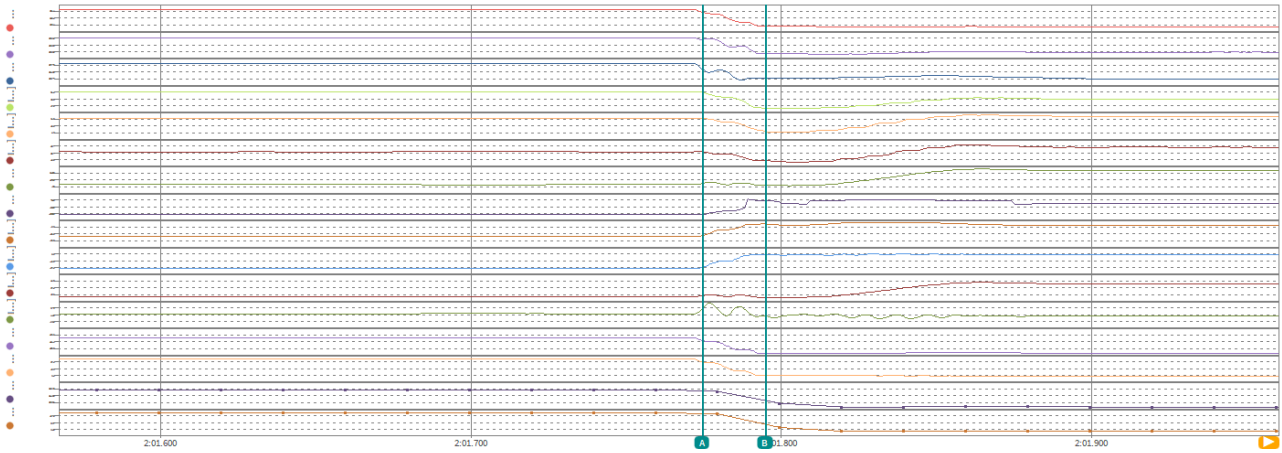
时间 [s]	A 1:01.6524	B 1:01.7128	间隔 0.0603	有效值
U1_tRMS_rc@AC [V]	230.2536	264.8483	34.59468	257.8948
U2_tRMS_rc@AC [V]	229.7983	240.0751	10.27678	236.5858
U3_tRMS_rc@AC [V]	229.5984	236.7929	7.194519	235.8992
I1_tRMS_rc@AC [A]	36.78289	61.96907	25.18618	43.34832
I2_tRMS_rc@AC [A]	37.36496	35.88398	-1.480980	29.61424
I3_tRMS_rc@AC [A]	37.92750	30.05507	-7.872427	27.05084
P_t_rc@AC [W]	25684.67	2568.827	-23115.85	9987.713
Q_t_rc@AC [var]	-2018.807	-32041.27	-30022.46	22263.14
I_fund_Q_SYM+_rc@AC [A]	-0.653862	-28.11015	-27.45629	22.57366
I_fund_Q_SYM-_rc@AC [A]	-9.767e-4	-34.10419	-34.10321	16.96360
I_fund_P_SYM+_rc@AC [A]	37.24266	3.208777	-34.03388	14.34457
I_fund_P_SYM-_rc@AC [A]	-0.172336	3.304241	3.476577	2.677799
U_fund_SYM+_rc@AC [V]	398.1664	427.5234	29.35696	420.9793
U_fund_SYM-_rc@AC [V]	0.940383	32.63774	31.69736	28.46883
U+ [V]	229.9059	245.5169	15.61107	237.4523
U- [V]	0.560756	18.67416	18.11341	12.13547

Recover time – Active power



时间 [s]	A 2:01.7711	B 2:01.8981	间隔 0.1269	有效值
U1_tRMS_rc@AC [V]	264.6950	230.2509	-34.44406	234.0359
U2_tRMS_rc@AC [V]	239.1122	229.6503	-9.461914	230.5762
U3_tRMS_rc@AC [V]	238.8012	230.5367	-8.264587	231.6811
I1_tRMS_rc@AC [A]	60.99506	36.99371	-24.00135	32.75461
I2_tRMS_rc@AC [A]	33.69591	37.78737	4.091461	29.33975
I3_tRMS_rc@AC [A]	27.58061	37.44576	9.865150	28.96110
P_t_rc@AC [W]	2715.866	25649.58	22933.71	18201.44
Q_t_rc@AC [var]	-30668.46	-3033.479	27634.98	10611.78
I_fund_Q_SYM+_rc@AC [A]	-29.12835	-1.540182	27.58817	8.453734
I_fund_Q_SYM-_rc@AC [A]	-31.48743	0.127115	31.61455	8.260703
I_fund_P_SYM+_rc@AC [A]	3.526963	37.14540	33.61843	26.27853
I_fund_P_SYM-_rc@AC [A]	1.350143	-0.172770	-1.522913	2.430090
U_fund_SYM+_rc@AC [V]	428.0323	398.6215	-29.41086	401.8487
U_fund_SYM-_rc@AC [V]	32.17922	0.631690	-31.54753	8.755546
U+ [V]	247.1249	230.7787	-16.34622	235.5468
U- [V]	18.62313	0.363240	-18.25989	9.757883

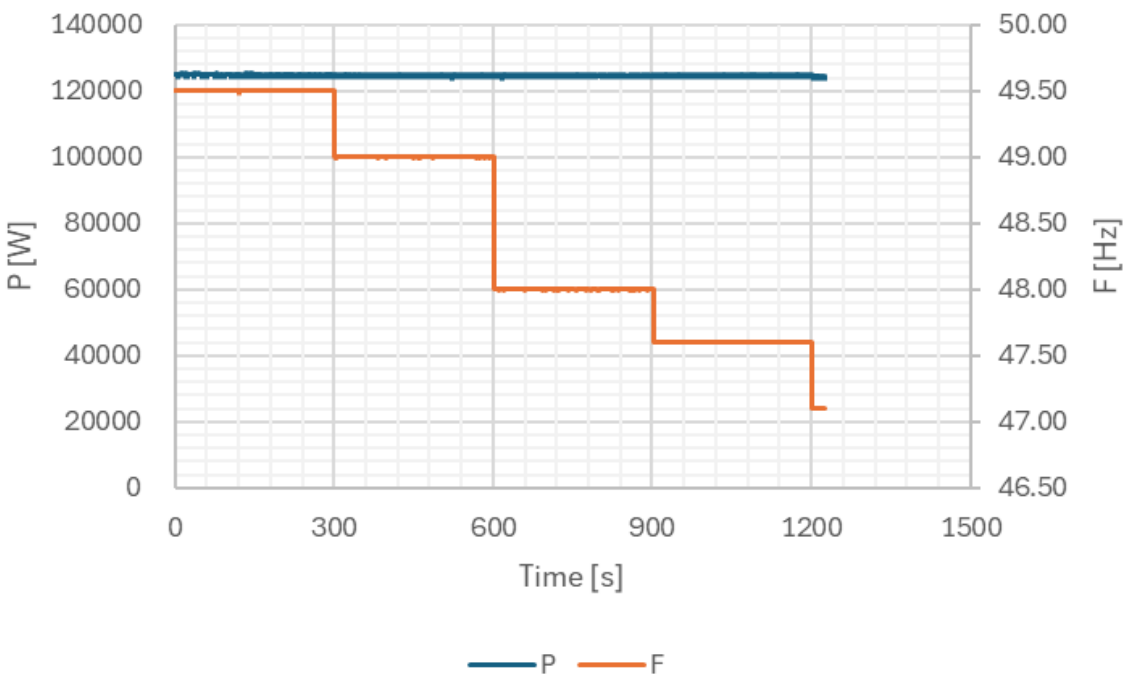
Recover time – Reactive power



时间 [s]	A 2:01.7746	B 2:01.7950	间隔 0.0204	有效值
U1_tRMS_rc@AC [V]	258.9072	231.0302	-27.87701	245.2848
U2_tRMS_rc@AC [V]	238.1404	228.9593	-9.181076	234.3338
U3_tRMS_rc@AC [V]	235.7532	230.7543	-4.998886	232.4047
I1_tRMS_rc@AC [A]	60.76983	6.115880	-54.65395	39.61509
I2_tRMS_rc@AC [A]	34.18592	5.888357	-28.29756	23.60386
I3_tRMS_rc@AC [A]	27.79495	7.865648	-19.92930	19.67150
P_t_rc@AC [W]	3477.161	1091.345	-2385.816	3861.752
Q_t_rc@AC [var]	-30228.21	4444.140	34672.35	19731.69
I_fund_Q_SYM+_rc@AC [A]	-29.37582	3.343028	32.71885	14.08773
I_fund_Q_SYM-_rc@AC [A]	-30.36551	0.317552	30.68306	14.96757
I_fund_P_SYM+_rc@AC [A]	4.537919	1.566193	-2.971726	5.025335
I_fund_P_SYM-_rc@AC [A]	5.023582	0.289037	-4.734545	5.627330
U_fund_SYM+_rc@AC [V]	422.2570	398.7948	-23.46219	410.5009
U_fund_SYM-_rc@AC [V]	26.77650	1.306587	-25.46991	16.63297
U+ [V]	247.1249	245.7547	-1.370162	246.4408
U- [V]	18.62313	17.30103	-1.322104	17.97424

4.4.3	Minimal requirement for active power delivery at under-frequency	P

Graph of frequency a) to b) to c) to d) to e):



	Switch to:				
5-min mean value (each)	a) 49.50 [Hz]	b) 49.00 [Hz]	c) 48.00 [Hz]	d) 47.60 [Hz]	e) 47.10 [Hz]
Frequency [Hz]:	49.50	49.00	48.00	47.60	47.10
Active power [W]:	124928	124740	124667	124718	124573
$\Delta P/P_M$ [%] per 1 Hz:	--	0.21	0.27	0.23	0.34

Test:

Operating points a) to d) must be kept for at least 5 minutes.

Operating points e) must be kept for at least 20s.

The test must be carried out at 100% P_n.

With a programmable AC source, the PGU is operated at 100% P_n and 49.50 ± 0.01 Hz, Since then the frequency has changed to 49.00Hz, 48.00Hz, 47.60Hz, 47.10Hz, A 5-min mean value is recorded both before and after the frequency change.

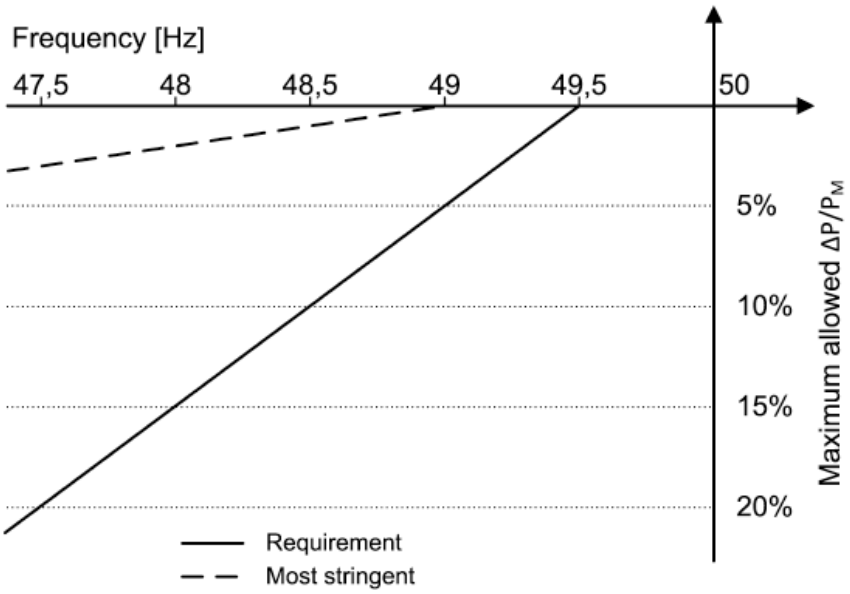
Assessment criterion:

The test is passed when the micro-generator

- The frequency should then be set to 49.5 Hz for 5 minutes. The output should remain at 100% of

registered Capacity.

- The frequency should then be set to 49.0 Hz and once the output has stabilised, held at this frequency for 5 minutes. The Active Power output must not be below 99% of registered Capacity.
- The frequency should then be set to 48.0 Hz and once the output has stabilised, held at this frequency for 5 minutes. The Active Power output must not be below 97% of registered Capacity.
- The frequency should then be set to 47.6 Hz and once the output has stabilised, held at this frequency for 5 minutes. The Active Power output must not be below 96.2% of registered Capacity.
- The frequency should then be set to 47.1 Hz and held at this frequency for 20s. The Active Power output must not be below 95.0% of registered Capacity and the Synchronous Power Generating Module must not trip in less than the 20s



Maximum allowable power reduction in case of under-frequency

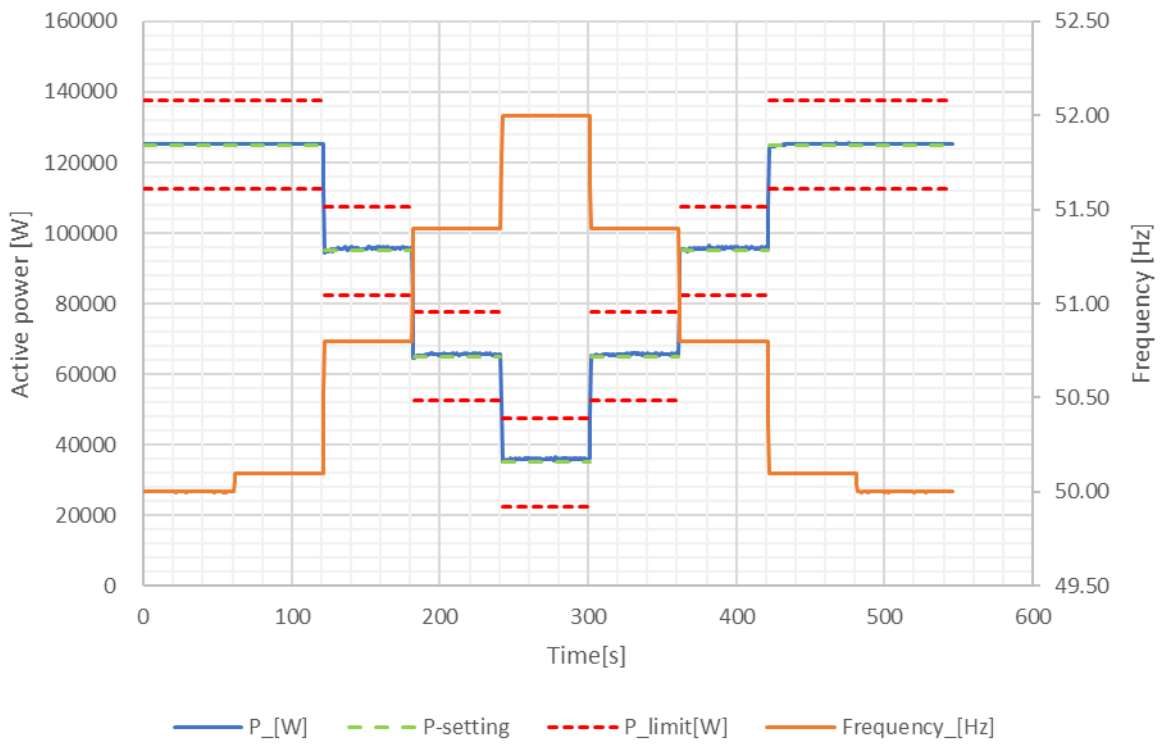
EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.4	**Active response to frequency deviation**	
5.4.3.2	Power response to over-frequencies	P
5.4.3.3	Power response to under-frequencies	P

5.4.3.2 Power response to over-frequency (For system with energy storage)									P
Test:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 50.10 ±0.01	c) 50.80 ±0.01	e) 51.40 ±0.01	d) 52.00 ±0.01	f) 51.40 ±0.01	g) 50.80 ±0.01	h) 50.10 ±0.01	i) 50.00 ±0.01
1. Measurement a) to i): Active power output =100% P_{Emax} s=5% (40% P_{ref} / Hz), threshold frequency for start/return: 50.2Hz, $P_{ref}=P_M$									
Frequency [Hz]:	50.00	50.10	50.80	51.40	52.00	51.40	50.80	50.10	50.00
P_M [W]:	125000	125000	95000	65000	35000	65000	95000	125000	125000
P_{E60} [W]:	125182	125224	95638	65631	35974	65674	95698	125218	125262
$\Delta P_{E60}/P_M$ [%]:	0.15	0.18	0.51	0.51	0.78	0.54	0.56	0.17	0.21
Dead time(≤2s)	-	-	0.2	0.2	0.2	0.2	0.2	-	-
Step response time (≤30s)	-	-	0.4	0.4	0.6	0.2	0.2	-	-
Setting time(s)	-	-	0.4	0.4	0.6	0.2	0.2	-	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}								
Test:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 50.10 ±0.01	c) 50.80 ±0.01	e) 51.40 ±0.01	d) 52.00 ±0.01	f) 51.40 ±0.01	g) 50.80 ±0.01	h) 50.10 ±0.01	i) 50.00 ±0.01
2. Measurement a) to i): Active power output 50% after freezing = 100% P_{Emax} s=5% (40% P_{ref} / Hz), threshold frequency for start/return: 50.2Hz, $P_{ref}=P_M$									
Frequency [Hz]:	50.00	50.10	50.80	51.40	52.00	51.40	50.80	50.10	50.00
P_M [W]:	62500	62500	32500	2500	-27500	2500	32500	125000	125000
P_{E60} [W]:	62575	62595	33088	2937	-26676	2897	33145	125708	125630
$\Delta P_{E60}/P_M$ [%]:	0.06	0.08	0.47	0.35	0.66	0.32	0.52	0.57	0.50
Dead time(≤2s)	-	-	0.2	0.2	0.4	0.2	0.2	-	-
Step response time (≤30s)	-	-	0.4	0.6	0.8	0.4	0.2	-	-
Setting time(s)	-	-	0.4	0.6	0.8	0.4	0.2	-	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}, ≤ 10% P_{Emax} /min								

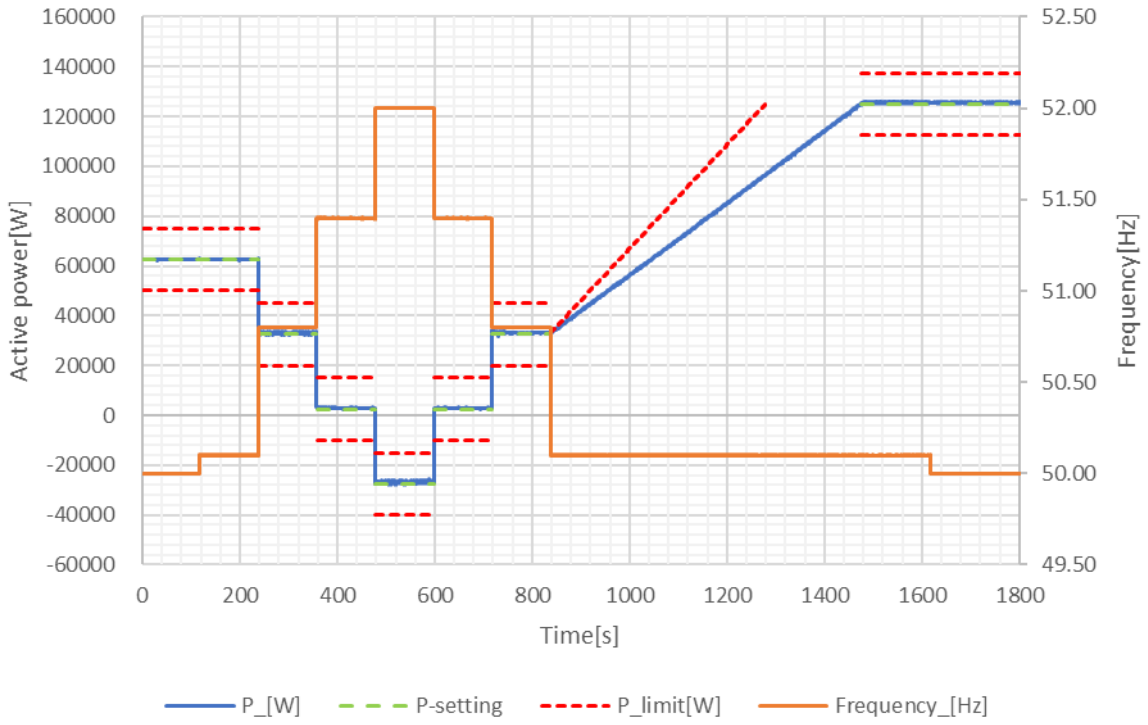
Test:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 50.25 ±0.01	c) 51.00 ±0.01	e) 51.50 ±0.01	d) 52.00 ±0.01	f) 51.50 ±0.01	g) 51.00 ±0.01	h) 50.50 ±0.01	i) 50.00 ±0.01
3. Measurement a) to i): Active power output -50% s=5%(40% Pref / Hz), threshold frequency for start/return: 50.2Hz, Pref=P_{Max}									
Frequency [Hz]:	50.00	50.10	50.80	51.40	52.00	51.40	50.80	50.10	50.00
P_M [W]:	-62500	-62500	-92500	-122500	-125000	-122500	-92500	-62500	-62500
P_{E60} [W]:	-62784	-62830	-92372	-122856	-125289	-122847	-92391	-62773	-62790
$\Delta P_{E60}/P_M$ [%]:	0.23	0.26	0.10	0.28	0.23	0.28	0.09	0.22	0.23
Dead time(≤2s)	-	-	0.2	0.2	0.2	0.2	0.2	0.2	-
Step response time (≤30s)	-	-	0.4	0.2	0.6	0.2	0.6	0.4	-
Setting time(s)	-	-	0.4	0.2	0.6	0.2	0.6	0.4	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}								
Test:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 50.25 ±0.01	c) 51.00 ±0.01	e) 51.50 ±0.01	d) 52.00 ±0.01	f) 51.50 ±0.01	g) 51.00 ±0.01	h) 50.40 ±0.01	i) 50.00 ±0.01
4. Measurement a) to i): Active power output 60% s=2%(100% Pref / Hz), threshold frequency for start/return: 50.5Hz, Pref=P_{Max}									
Frequency [Hz]:	50.00	50.25	51.00	51.50	52.00	51.50	51.00	50.40	50.00
P_M [W]:	75000	75000	12500	-50000	-112500	-112500	-112500	75000	75000
P_{E60} [W]:	74706	74704	13511	-48891	-113172	-113264	-113276	74792	74806
$\Delta P_{E60}/P_M$ [%]:	0.23	0.24	0.81	0.89	0.54	0.61	0.62	0.17	0.16
Dead time(≤2s)	-	-	0.2	0.2	0.2	-	-	-	-
Step response time (≤30s)	-	-	1.2	0.8	0.6	-	-	-	-
Setting time(s)	-	-	1.2	0.8	0.6	-	-	-	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}, ≤ 10% P_{Emax} /min, hold 1s								

Test:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 50.10 ±0.01	c) 50.80 ±0.01	e) 51.40 ±0.01	d) 52.00 ±0.01	f) 51.40 ±0.01	g) 50.80 ±0.01	h) 50.10 ±0.01	i) 50.00 ±0.01
5. Measurement a) to i): Active power output 40% s=12% (16.67% P_{ref} / Hz), threshold frequency for start: 50.2Hz, for return: 50.05Hz, $P_{ref}=P_M$, hold 600s									
Frequency [Hz]:	50.00	50.10	50.80	51.40	52.00	51.40	50.80	50.10	50.00
P_M [W]:	50000	50000	37500	25000	12500	12500	12500	12500	50000
P_{E60} [W]:	49968	49975	37653	25200	12453	12440	12472	12477	49941
$\Delta P_{E60}/P_M$ [%]:	0.03	0.02	0.12	0.16	0.04	0.05	0.02	0.02	0.05
Dead time(≤2s)	-	-	0.2	0.2	0.2	-	-	-	-
Step response time (≤30s)	-	-	0.6	1.0	1.0	-	-	-	-
Setting time(s)	-	-	0.6	1.0	1.0	-	-	-	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}, ≤ 10% P_{Emax} /min, hold 600s								

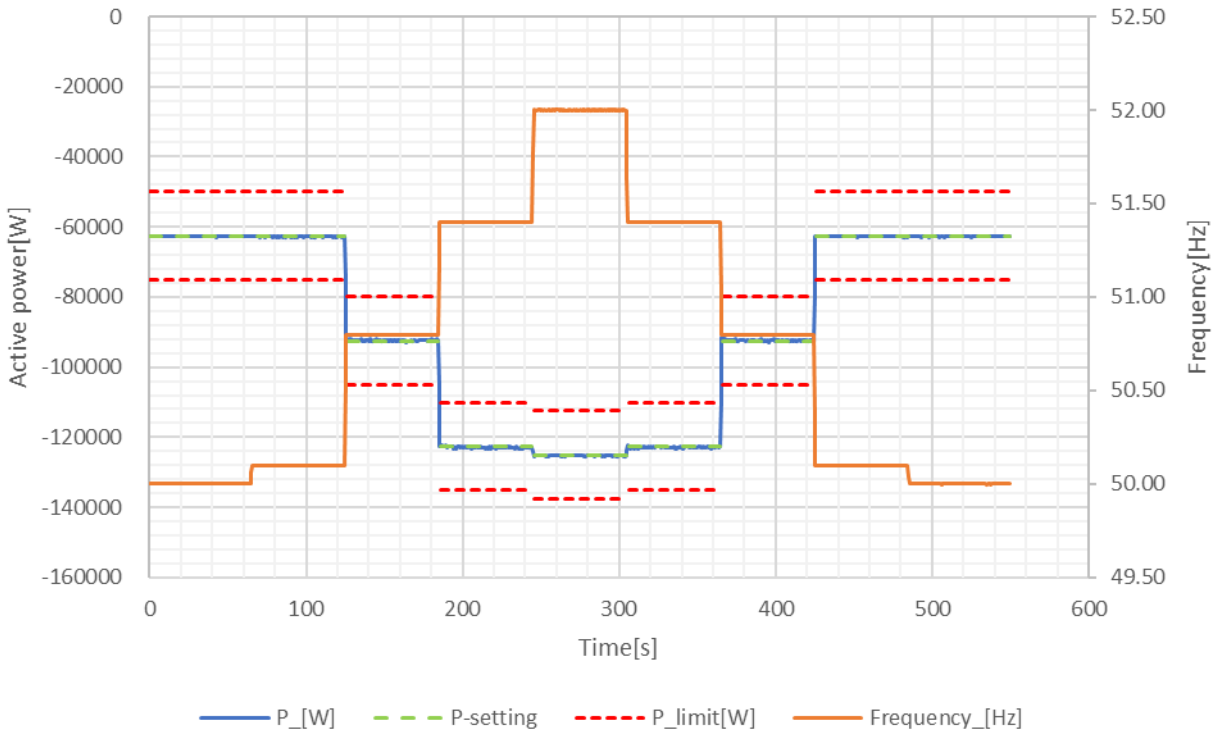
Graph of Measurement 1.: Active power output 100% P_{Emax}



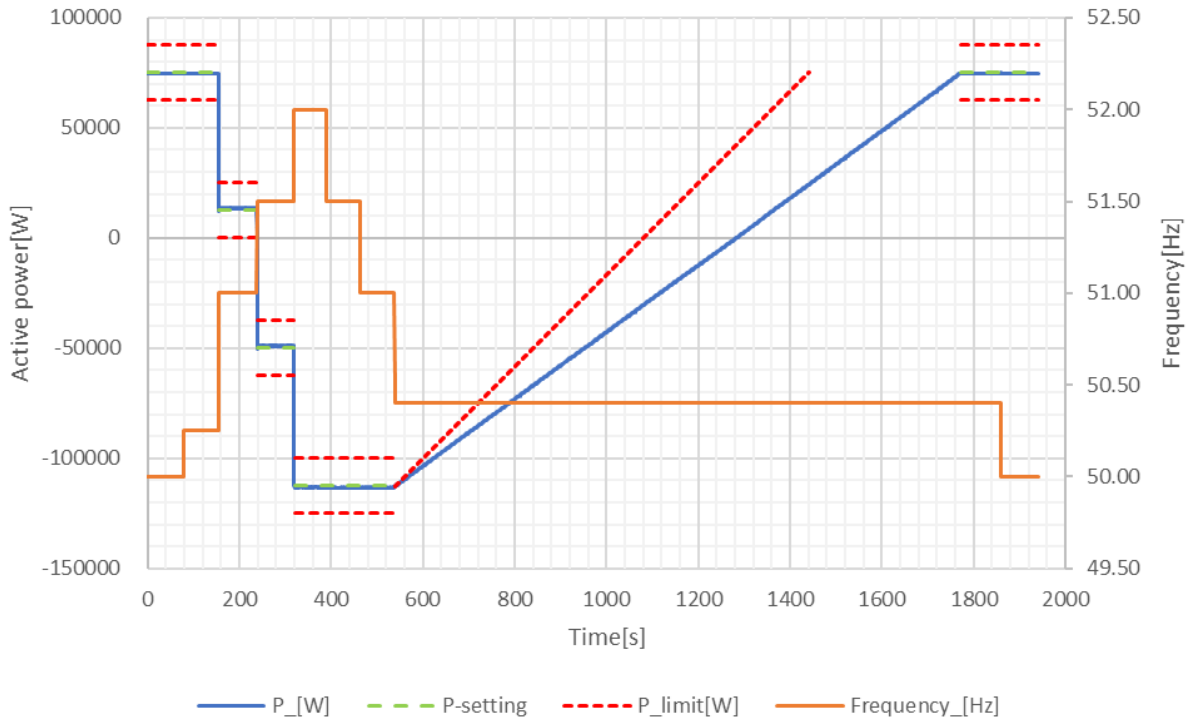
Graph of Measurement 2.: Active power output 50% P_{Emax}



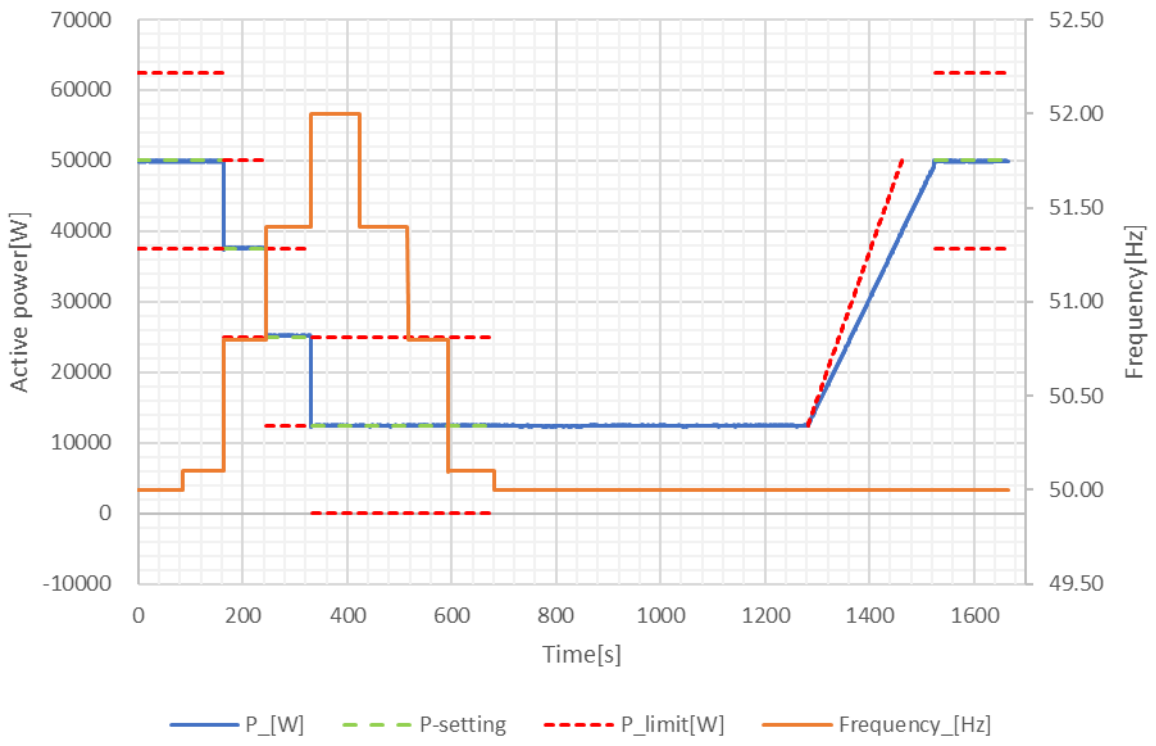
Graph of Measurement 3.: Active power output -50% P_{Emax}



Graph of Measurement 4.: Active power output 60% P_{Emax}



Graph of Measurement 5.: Active power output 40% P_{Emax}



Notes:

Setting (a) for other non-synchronous generating technology

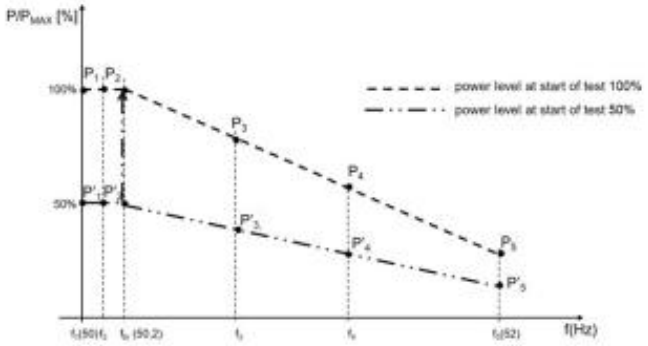


Figure 19 — Other non-synchronous generating technology ($P_{ref} = P_M$) without configured deactivation threshold, setting (a), example

Setting (b) other non-synchronous generating technology

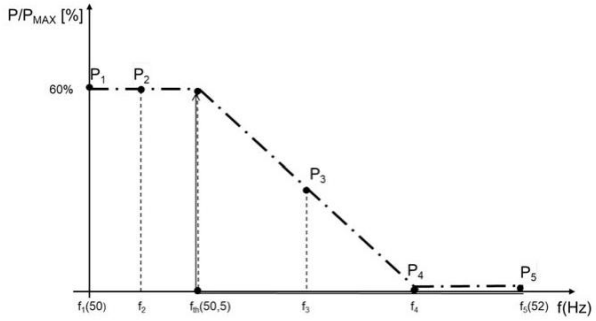


Figure 20 — Other non-synchronous generating technology ($P_{ref} = P_M$) with configured deactivation threshold, setting (b), example

Setting (c) other non-synchronous generating technology

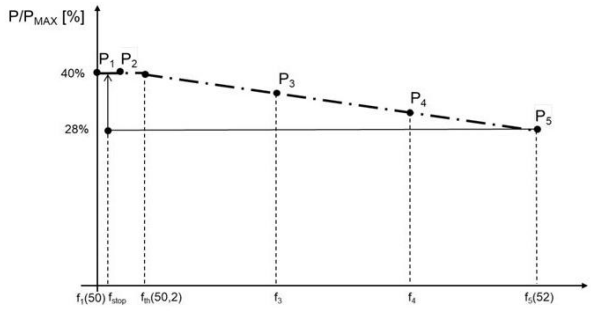
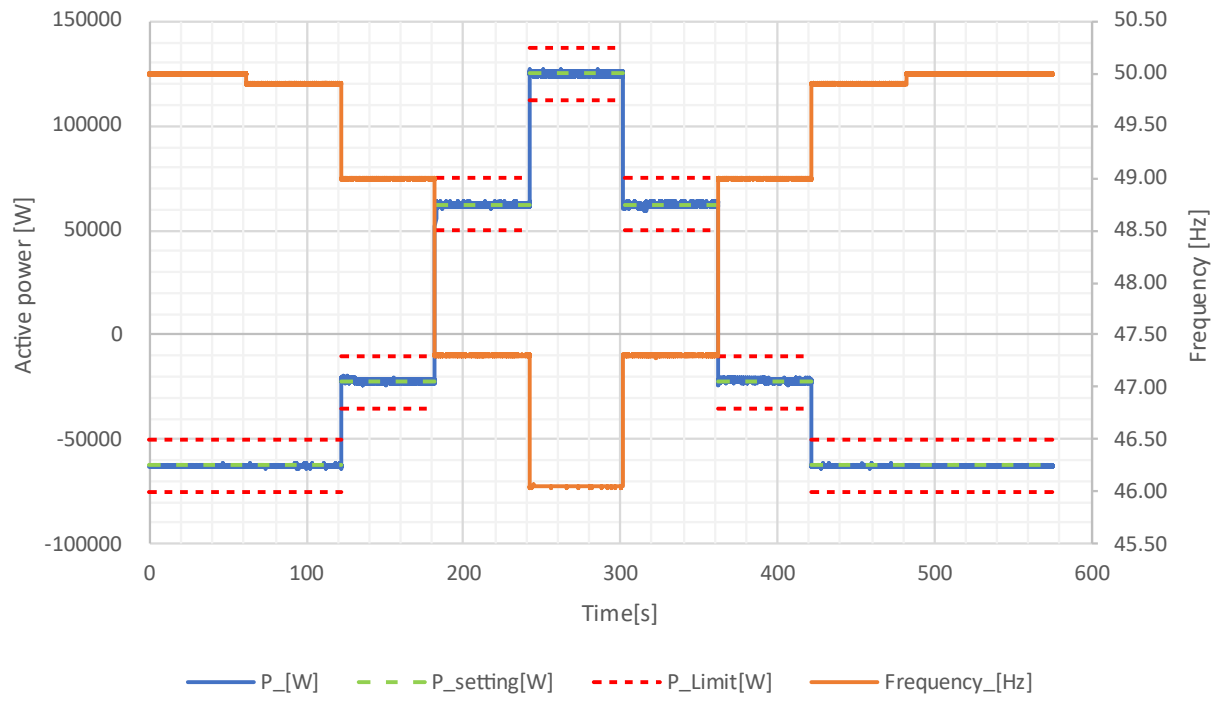


Figure 21 — Other non-synchronous generating technology ($P_{ref} = P_M$) with configured deactivation threshold, setting (c), example

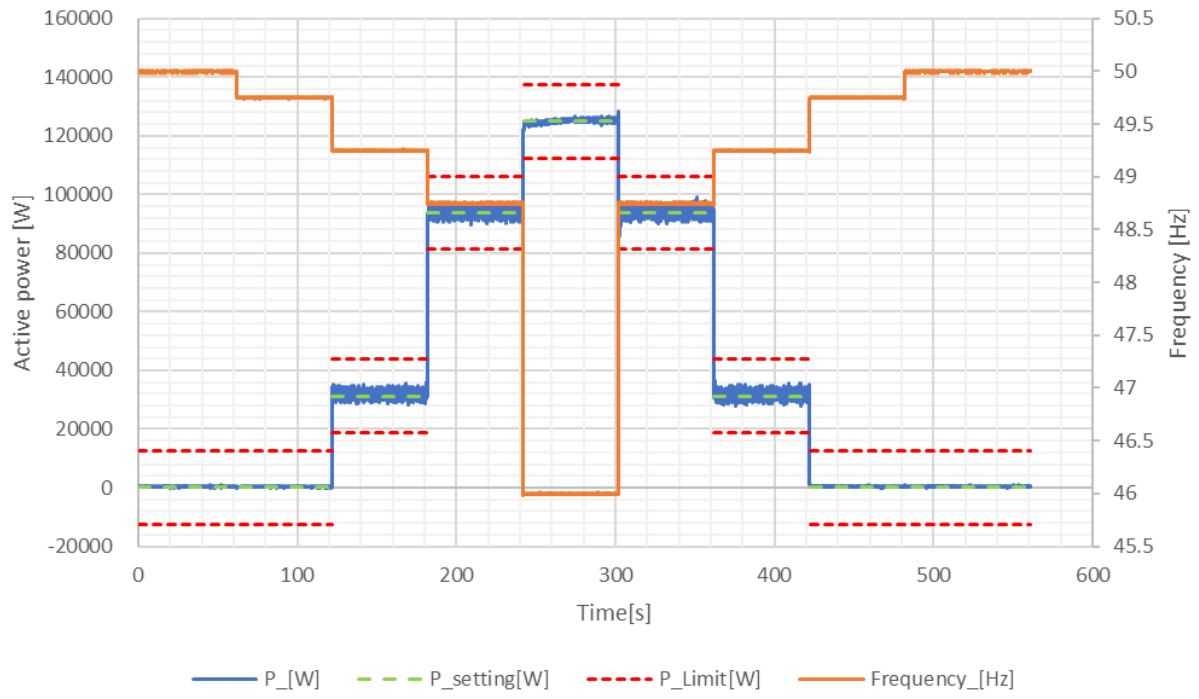
5.4.3.3 Power response to under-frequency (For system with energy storage)									P
Test a:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 49.90 ±0.01	c) 49.00 ±0.01	e) 47.30 ±0.01	d) 46.05 ±0.01	f) 47.30 ±0.01	g) 49.00 ±0.01	h) 49.90 ±0.01	i) 50.00 ±0.01
1. Measurement a) to i): Active power output =-50% P_{Emax} s=5% (40% P_{ref} / Hz), threshold frequency for start/return: 49.8Hz, $P_{ref}=P_{Emax}$									
Frequency [Hz]:	50.00	49.90	49.00	47.30	46.05	47.30	49.00	49.90	50.00
P_M [W]:	-62500	-62500	-22500	62500	125000	62500	-22500	-62500	-62500
P_{E60} [W]:	-62716	-62699	-22163	62285	124965	62411	-21907	-62677	-62696
$\Delta P_{E60}/P_M$ [%]:	0.17	0.16	0.27	0.17	0.03	0.07	0.47	0.14	0.16
Dead time(≤2s)	-	-	0.4	0.4	0.2	0.4	0.2	0.2	-
Step response time(≤30s)	-	-	2.2	2.4	2.2	1.6	1.2	1.2	-
Setting time(s)	-	-	2.2	2.4	2.2	1.6	1.2	1.2	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}								
Test b:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 49.75 ±0.01	c) 49.25 ±0.01	e) 48.75 ±0.01	d) 46.00 ±0.01	f) 48.75 ±0.01	g) 49.25 ±0.01	h) 49.75 ±0.01	i) 50.00 ±0.01
2. Measurement a) to i): Active power output =0% P_{Emax} s=2% (100% P_{ref} / Hz), threshold frequency for start/return: 49.5Hz, $P_{ref}=P_{Emax}$									
Frequency [Hz]:	50.00	49.75	49.25	48.75	46.00	48.75	49.25	49.75	50.00
P_M [W]:	0	0	31250	93750	125000	93750	31250	0	0
P_{E60} [W]:	383	296	31847	93870	125098	93969	31854	426	430
$\Delta P_{E60}/P_M$ [%]:	0.31	0.24	0.48	0.10	0.08	0.18	0.48	0.34	0.34
Dead time(≤2s)	-	-	0.4	0.2	0.4	0.4	0.6	0.4	-
Step response time(≤30s)	-	-	2.6	1.8	1.2	1.2	1.2	0.8	-
Setting time(s)	-	-	2.6	1.8	1.2	1.2	1.2	0.8	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}								

Test c:									
1-min mean value [Hz]:	a) 50.00 ±0.01	b) 49.90 ±0.01	c) 49.20 ±0.01	e) 47.40 ±0.01	d) 46.00 ±0.01	f) 47.40 ±0.01	g) 49.20 ±0.01	h) 49.90 ±0.01	i) 50.00 ±0.01
3. Measurement a) to i): Active power output =50% P_{Emax} s=12% (16.67% P_{ref} / Hz), threshold frequency for start/return: 49.8Hz, P_{ref}=P_{Emax}									
Frequency [Hz]:	50.00	49.90	49.20	47.40	46.00	47.40	49.20	49.90	50.00
P_M [W]:	62500	62500	75000	112500	125000	112500	75000	62500	62500
P_{E60} [W]:	62598	62572	75299	112824	125620	112759	75266	62531	62569
$\Delta P_{E60}/P_M$ [%]:	0.08	0.06	0.24	0.26	0.50	0.21	0.21	0.02	0.06
Dead time(≤2s)	-	-	0.2	0.4	0.4	0.4	0.2	0.2	-
Step response time(≤30s)	-	-	1.2	2.4	0.6	0.8	0.4	0.6	-
Setting time(s)	-	-	1.2	2.4	0.6	0.8	0.4	0.6	-
Limit $\Delta P/P_{1min}$:	± 10 % of P_{Emax}								

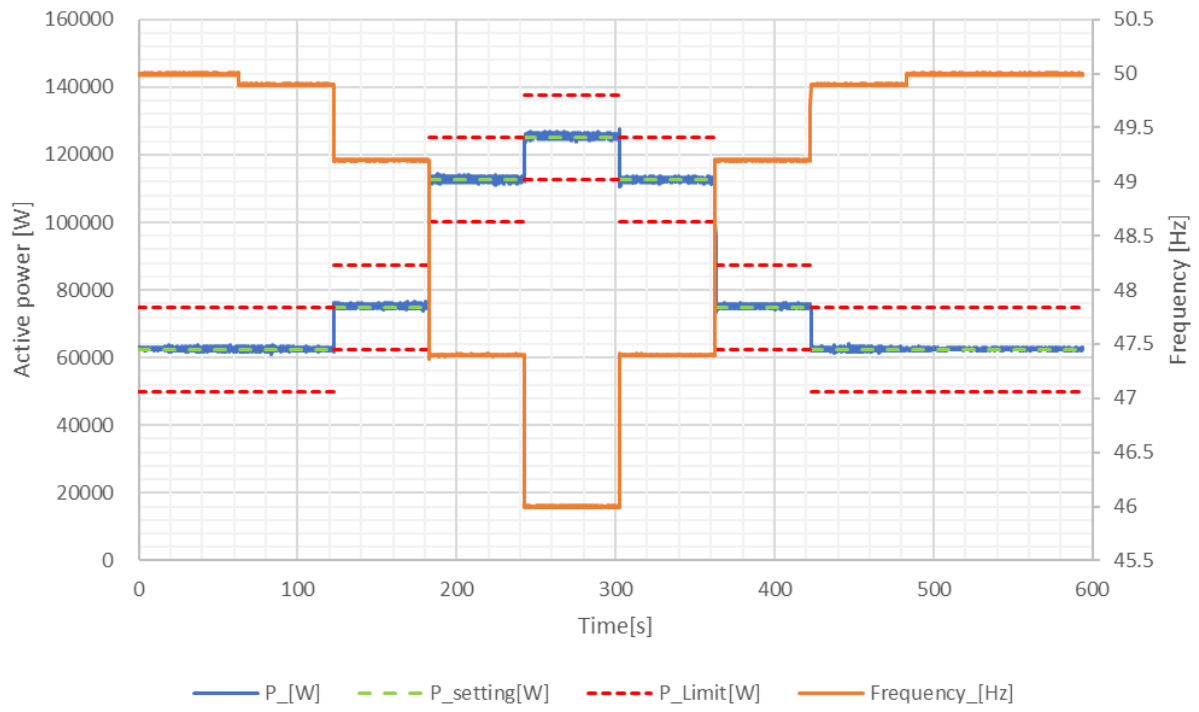
Graph of Measurement 1.: Active power output 0% P_{Emax}



Graph of Measurement 2.: Active power output 0% P_{Emax}



Graph of Measurement 3.: Active power output 50% P_{Emax}



Notes:

Setting (a) for other generators

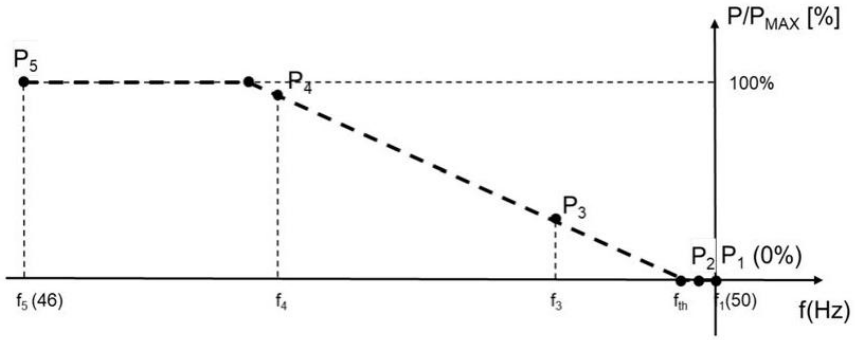


Figure 25 — Other generators: default values, example for interval frequency 46 – 50 Hz, setting (a)

Setting (b) other generators

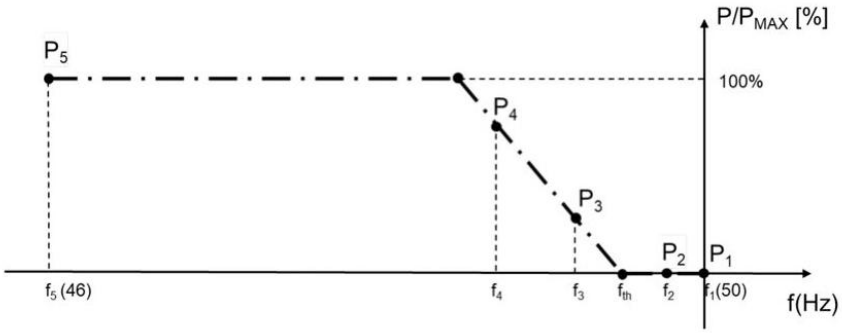


Figure 23 — Pref = Pmax, s = 2 %, fth = 49,5Hz, example for interval frequency 46 – 50 Hz, setting (b)

Setting (c) other generators

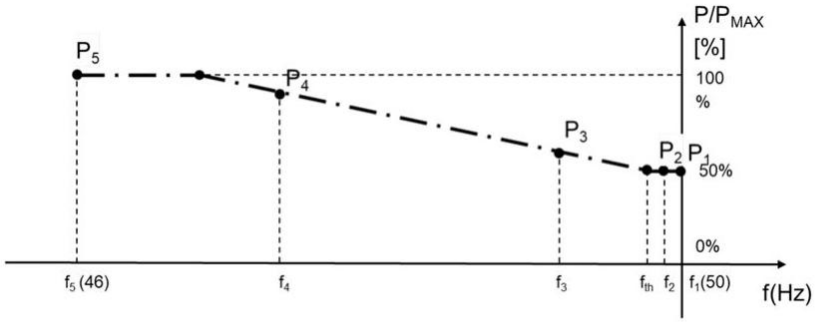


Figure 24 — Pref = Pmax, s = 12 %, fth = 49,8Hz, example for interval frequency 46 – 50 Hz, setting (c)

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.5	**Power specification and response to voltage variations**	
5.5.1	Power capabilities assessment - voltage support by reactive power	P
5.5.2	Voltage support by reactive power - test to determine the reactive power control modes	
5.5.2.3	Verification procedure for Set point control	P
5.5.2.4	Verification procedure for voltage related control mode for reactive power Q(U)	P
5.5.2.5	Verification procedure for power related control modes for reactive power	P

5.5.1 Power capabilities assessment - voltage support by reactive power 5.5.1.3 Verification procedure to determine the power capability (active, reactive, apparent) at nominal voltage					P
Q = 0 reactive power					
Rating power [%]	Active power [W]	Reactive power [Var]	Power factor [cos φ]	Voltage [V]	ΔQ ≤ 2%Smax
10%	12942	1665	0.9914	229.93	1.33
20%	25590	1851	0.9972	229.96	1.48
30%	37773	1723	0.9989	229.99	1.38
40%	50646	41	0.9992	230.01	0.03
50%	63020	-685	0.9995	230.03	0.55
60%	75597	-1537	0.9997	230.05	1.23
70%	87963	-2081	0.9997	230.05	1.66
80%	100220	-2235	0.9997	230.04	1.79
90%	112996	-2262	0.9998	230.04	1.81
100%	125200	-2429	0.9998	230.02	1.94
Q_{max}* under-excited					
Rating power [%]	Active power [W]	Reactive power [Var]	Power factor [cos φ]	Voltage [V]	ΔQ ≤ 2%Smax
10%	12489	-75637	0.1629	229.85	0.51
20%	25298	-75580	0.3174	229.89	0.46
30%	37960	-75626	0.4486	229.93	0.50
40%	50563	-75605	0.5559	229.98	0.48
50%	63171	-75653	0.6409	230.02	0.52
60%	75848	-75662	0.7080	230.06	0.53
70%	88460	-75632	0.7601	230.10	0.51
80%	101170	-75671	0.8008	230.15	0.54
90%	113880	-75724	0.8327	230.19	0.58
100%**	114965	-75719	0.8351	230.20	0.58

Q_{max}* over-excited					
Rating power [%]	Active power [W]	Reactive power [Var]	Power factor [cos φ]	Voltage [V]	ΔQ ≤ 2%Smax
10%	12246	75180	0.1608	230.10	0.14
20%	24863	75288	0.3136	230.15	0.23
30%	37447	75345	0.4451	230.19	0.28
40%	50065	75424	0.5530	230.23	0.34
50%	62780	75609	0.6388	230.28	0.49
60%	75443	75730	0.7058	230.32	0.58
70%	88188	75803	0.7584	230.37	0.64
80%	100844	75835	0.7992	230.41	0.67
90%	113722	76127	0.8310	230.46	0.90
100%**	114709	76047	0.8335	230.46	0.84

* Q_{max} is equal to 60%Pn.
**Due to the limit of max. apparent power, it can't reach target output power.

Assessment criterion:

The following shall be considered: Measurements shall be sampled during continuous operation only. Measurements shall be recorded and evaluated as 1 min average values. For the determination of the dynamic behaviour, 1 period RMS values shall be evaluated. During the test, the generated active power shall be kept stable within ± 5 %*Sn compared to the value set for the entire duration of each test sequence. The active and reactive power shall be calculated based on the positive sequence component of the fundamental of the voltages and currents at the generating unit terminals. The active factor shall be calculated based on the positive sequence component of the fundamental of the voltages and currents at the generating unit terminals. The active power, reactive power and the active factor, frequency, RMS voltage, RMS current at the generating unit terminals shall be recorded during tests.

Verification procedure to determine the power capability (active, reactive, apparent) at 5.5.1.3The verification shall be conducted operating the EUT at nominal voltage and frequency and different active power levels as follows: The generating unit manufacturer shall provide the capability curve (Figure 26 gives a graphical representation of the minimum and optional capabilities at nominal voltage). The maximum underexcited and overexcited reactive power shall be measured over a period of 1 min for each 10 % of Pn, from 0 % to maximum active power as declared by manufacturer. The values P_{max}, S_{max} and $Q_{max\ over}$ and $Q_{max\ under}$ shall be measured over a period of 10 min.

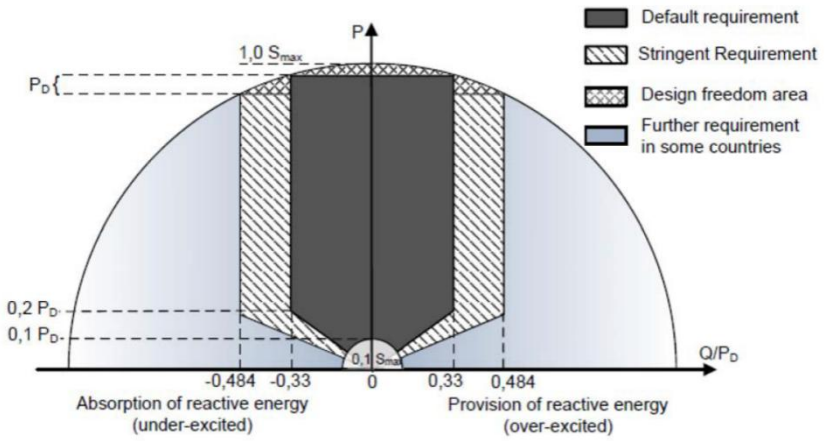


Figure 26 — reactive power capability at nominal voltage

5.5.1 Power capabilities assessment - voltage support by reactive power 5.5.1.6 Verification procedure for reactive power capability considering voltage range				P
Test: 85%U_n				
Inductive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	195.1	6278	-4683	0.8016
10%	195.3	12714	-9620	0.7974
20%	195.3	25239	-18947	0.7997
30%	195.4	37658	-28294	0.7995
40%	195.4	50365	-37707	0.8005
50%	195.4	62673	-46811	0.8012
60%	195.3	75153	-56114	0.8013
70%	195.3	87576	-65312	0.8016
80%*	195.3	93050	-69305	0.8020
90%*	195.3	93122	-69377	0.8019
100%*	195.3	93174	-69442	0.8018
Capacitive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	195.1	6212	4594	0.8040
10%	195.3	12648	9285	0.8061
20%	195.2	25177	18587	0.8045
30%	195.2	37685	28017	0.8025
40%	195.2	50303	37484	0.8019
50%	195.1	62733	46705	0.8021
60%	195.1	75155	56047	0.8016
70%	195.0	87596	65206	0.8022
80%*	195.0	93028	69193	0.8024
90%*	195.0	93060	69215	0.8024
100%*	195.0	93065	69213	0.8024

Test: 90%U_n				
Inductive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	206.6	6347	-4669	0.8055
10%	206.8	12686	-9534	0.7994
20%	206.9	25119	-18867	0.7996
30%	206.9	37675	-28231	0.8002
40%	206.9	50468	-37728	0.8009
50%	206.9	62916	-47031	0.8010
60%	206.9	75458	-56356	0.8012
70%	206.8	87925	-65617	0.8014
80%	206.8	98612	-73523	0.8017
90%*	206.8	98617	-73521	0.8017
100%*	206.8	98697	-73582	0.8017
Capacitive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	206.6	6257	4661	0.8019
10%	206.8	12672	9294	0.8064
20%	206.8	25228	18626	0.8045
30%	206.7	37817	28149	0.8022
40%	206.7	50397	37537	0.8020
50%	206.7	62937	46934	0.8016
60%	206.6	75413	56155	0.8021
70%	206.5	87735	65390	0.8018
80%	206.5	98574	73318	0.8024
90%*	206.5	98617	73355	0.8024
100%*	206.5	98658	73398	0.8023

Test: 95%U_n				
Inductive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	218.1	6184	-4614	0.8014
10%	218.4	12629	-9358	0.8034
20%	218.4	25271	-18658	0.8045
30%	218.4	37769	-27731	0.8061
40%	218.4	50344	-36941	0.8062
50%	218.4	62971	-46042	0.8072
60%	218.4	75463	-55233	0.8069
70%	218.4	87892	-64234	0.8074
80%	218.3	100222	-73145	0.8077
90%*	218.3	104501	-76213	0.8080
100%*	218.3	104889	-76495	0.8080
Capacitive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	218.2	6580	4772	0.8095
10%	218.3	12835	9567	0.8017
20%	218.3	25316	18912	0.8011
30%	218.3	37832	28285	0.8009
40%	218.2	50226	37584	0.8006
50%	218.2	62830	47033	0.8005
60%	218.1	75394	56423	0.8006
70%	218.1	87727	65611	0.8008
80%	218.0	100342	74979	0.8011
90%*	218.0	104011	77717	0.8011
100%*	218.0	104062	77761	0.8011

Test: 100%U_n				
Inductive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	229.7	6114	-4519	0.8042
10%	229.9	12646	-9409	0.8023
20%	229.9	25244	-18704	0.8035
30%	229.9	37587	-27934	0.8026
40%	229.9	50140	-37332	0.8021
50%	229.9	62670	-46759	0.8015
60%	229.9	75162	-56052	0.8016
70%	229.9	87731	-65349	0.8020
80%	229.9	100137	-74512	0.8023
90%*	229.9	109827	-81755	0.8022
100%*	229.9	109897	-81793	0.8022
Capacitive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	229.7	6115	4561	0.8015
10%	229.8	12839	9622	0.8002
20%	229.8	25272	18890	0.8010
30%	229.8	37627	28152	0.8007
40%	229.8	50231	37547	0.8010
50%	229.7	62858	47087	0.8003
60%	229.7	75400	56349	0.8010
70%	229.6	87977	65816	0.8007
80%	229.6	100438	75065	0.8010
90%*	229.5	109386	81748	0.8010
100%*	229.5	109434	81774	0.8011

Test: 105%U_n				
Inductive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	241.2	6102	-4545	0.8019
10%	241.4	12828	-9444	0.8053
20%	241.4	25344	-18719	0.8044
30%	241.5	37918	-27832	0.8061
40%	241.5	50503	-37027	0.8065
50%	241.5	63033	-46476	0.8049
60%	241.5	75271	-55455	0.8051
70%	241.5	87916	-64634	0.8057
80%	241.4	100214	-73683	0.8057
90%	241.4	110736	-81932	0.8039
100%*	241.4	110750	-81936	0.8039
Capacitive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	241.3	6081	4514	0.8028
10%	241.4	12726	9360	0.8056
20%	241.4	25214	18707	0.8031
30%	241.4	37973	28244	0.8024
40%	241.3	50454	37625	0.8016
50%	241.3	62890	46986	0.8011
60%	241.3	75641	56518	0.8011
70%	241.2	87964	65737	0.8010
80%	241.2	100480	74981	0.8014
90%	241.1	111055	81868	0.8049
100%*	241.1	111059	81867	0.8049

Test: 110%U_n				
Inductive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	252.8	6097	-4475	0.8061
10%	253.0	12844	-9467	0.8049
20%	253.0	25382	-18511	0.8080
30%	253.0	37994	-27748	0.8076
40%	253.0	50728	-37084	0.8073
50%	253.0	63117	-46304	0.8063
60%	253.0	75375	-55268	0.8064
70%	253.0	89246	-65385	0.8067
80%	253.0	100469	-73651	0.8065
90%	252.9	111203	-81458	0.8067
100%*	252.9	111269	-81487	0.8068
Capacitive supply reactive power				
Rating power [%]	Voltage [V]	Active power [W]	Reactive power [Var]	Power factor [cos φ]
0%	252.8	6077	4472	0.8053
10%	252.9	12669	9442	0.8018
20%	252.9	25148	18568	0.8045
30%	252.9	37902	27800	0.8063
40%	252.8	50441	37081	0.8057
50%	252.8	62882	46290	0.8053
60%	252.8	75580	55536	0.8058
70%	252.7	87940	64635	0.8058
80%	252.7	100480	73780	0.8060
90%	252.6	111015	81543	0.8059
100%*	252.6	111103	81618	0.8059
Note: * Due to the limit of max apparent power or max output current, it can't reach target output power.				

Assessment criterion:

The power factor resulting in each of the measurement points between 10 % and 90 % of the nominal power is equal to or lower than 0.90 both in over excited and under excited operation.

Test method:

The voltage dependency of PQ-characteristic shall be evaluated according to the following procedures:
Non-synchronous generating units:

The manufacturer shall provide a characteristic or model of the voltage dependency of the reactive power capability represented in a P-Q diagram at different voltage values (e.g. 110 % Un, 100 %Un and 90 % Un); the voltage dependency can be also represented in the form of a U-Q/P diagram.

For the verification the following applies:two tests shall be conducted at the maximum power as verified according to 5.5.1.3. and for each Q and $Q_{max\ under}$. In case of generating units operating in a Q-priority mode, the test shall be conducted with an active factor not below $0{,}9._{max\ over}$. The tests shall be conducted for under voltage and over voltage. The voltage level shall be chosen to show the declared characteristic. If the declared characteristic does not show a voltage dependency, the voltage deviation shall be at least 5 % of nominal voltage.

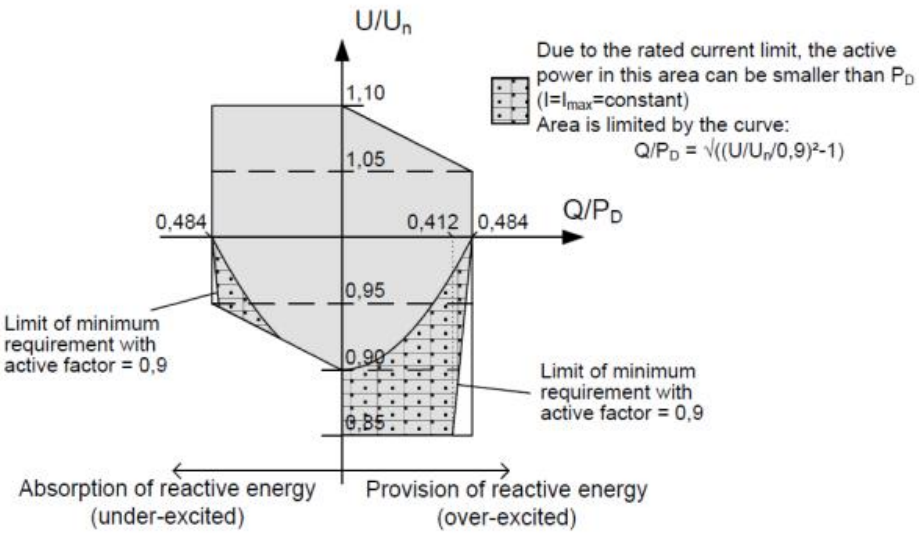


Figure 30 — Example: U-Q normalized diagram taken from the EN 50549-1

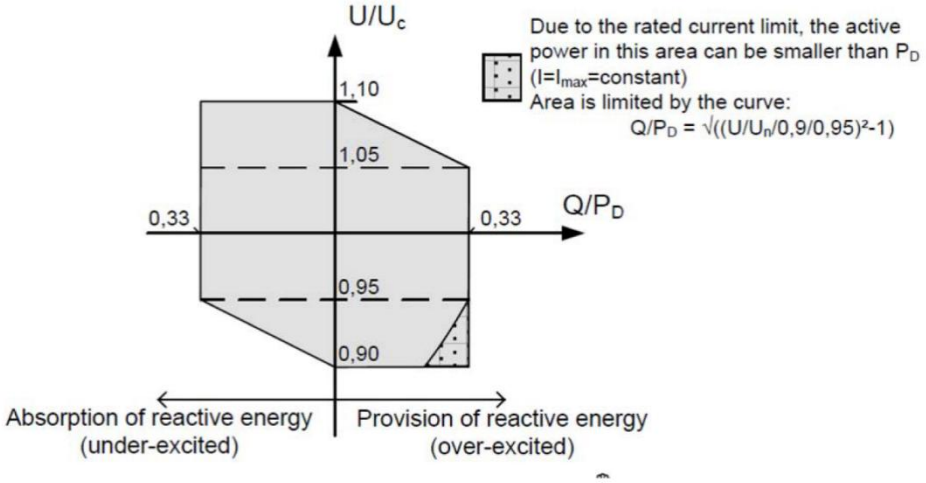


Figure 31 — Example of U-Q normalized diagram taken from the EN 50549-2

5.5.2.3.2 Reactive power set point control accuracy							P
Q_{max} [Var]	75000			**Q_{min} [Var]**		-75000	
Test no.1: Test for reactive power set point control accuracy							
Test: 50%P_{Emax}±10%Pn							
Reactive power step Q/Pn(p.u.)	Voltage	Set point value		Measure value		Deviation	
	(%)	Var	Q/P_n (%)	Var	Q/P_n (%)	Var	Q/S_n (%)
Q=0	100.1	0	0	-798	-0.64	798	0.64
Q_{max} (over-excited)	100.1	75000	60.0	75322	60.26	322	0.26
Q_{min} (under-excited)	100.0	-75000	-60.0	-75575	-60.46	575	0.46
Q=0	100.1	0	0	-801	-0.64	801	0.64
ΔLimit Q≤2%S_{max}							

Test no.2: Test for reactive power set point control accuracy			
50±10%Pn (Tau=3s) shortest time constant (not longer than 3s)			
Reactive power set point step p.u.	Generating unit response time setting	Measured response behaviour	
		dead time	response time/ settling time
Q=0→Q=$Q_{max\ over}$	9s	0.2	9.8
Q=$Q_{max\ over}$ →Q=$Q_{min\ under}$	9s	0.2	9.4
Q=$Q_{min\ under}$ →Q=0	9s	0.2	9.6
50±10%Pn (Tau=60s) (if longest time>60s, then test 60s)			
Reactive power set point step p.u.	Generating unit response time setting	Measured response behaviour	
		dead time	response time/ settling time
Q=0→Q=$Q_{max\ over}$	180s	0.4	171.8
Q=$Q_{max\ over}$ →Q=$Q_{min\ under}$	180s	0.6	176.0
Q=$Q_{min\ under}$ →Q=0	180s	0.6	181.6
-Note:			

Diagram for 50%P_n (Tau=3s) 0 → $Q_{max\ over}$

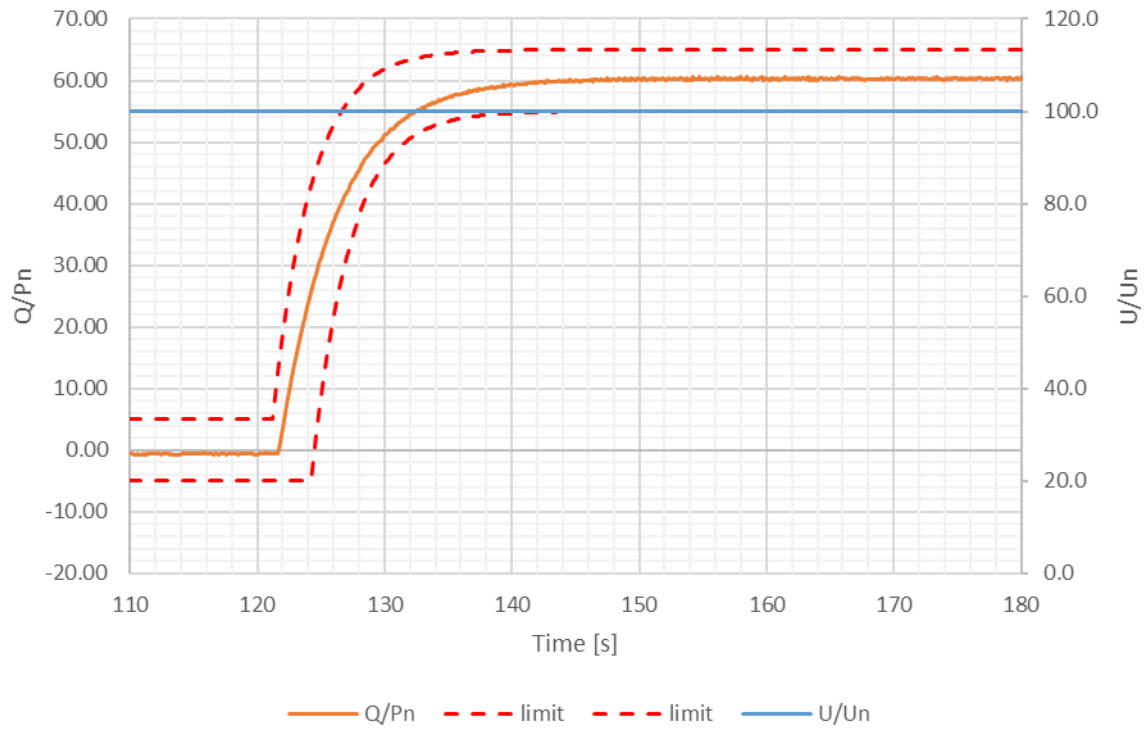


Diagram for 50%P_n (Tau=3s) $Q_{max\ over}$→ $Q_{min\ under}$

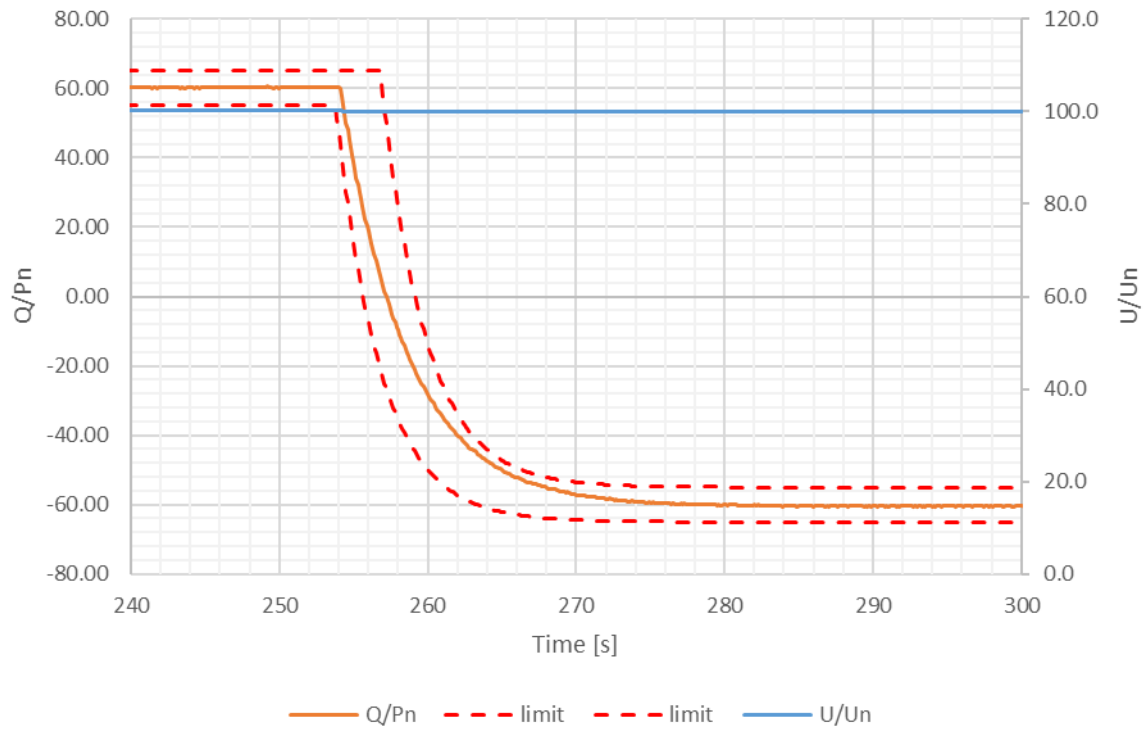


Diagram for 50%P_n (Tau=3s)) $Q_{min\ under} \rightarrow 0$

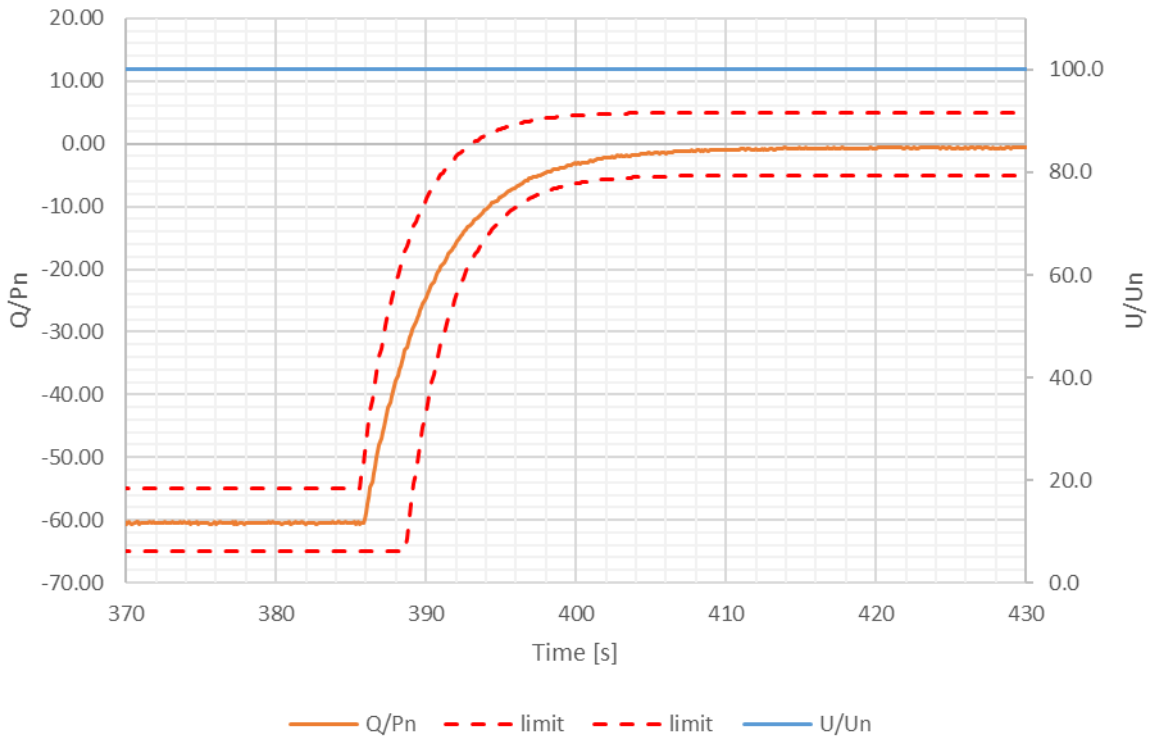


Diagram for 50%P_n (Tau=60s) $0 \rightarrow Q_{max\ over}$

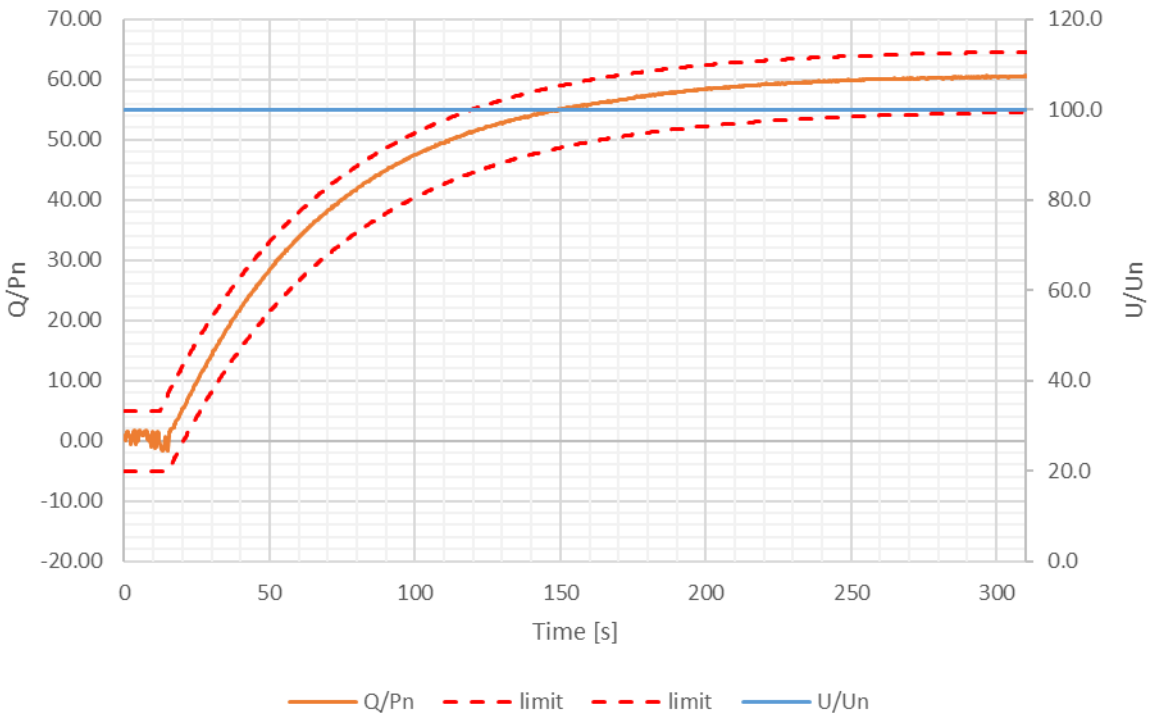


Diagram for 50%P_n (Tau=60s) $Q_{max\ over} \rightarrow Q_{min\ under}$

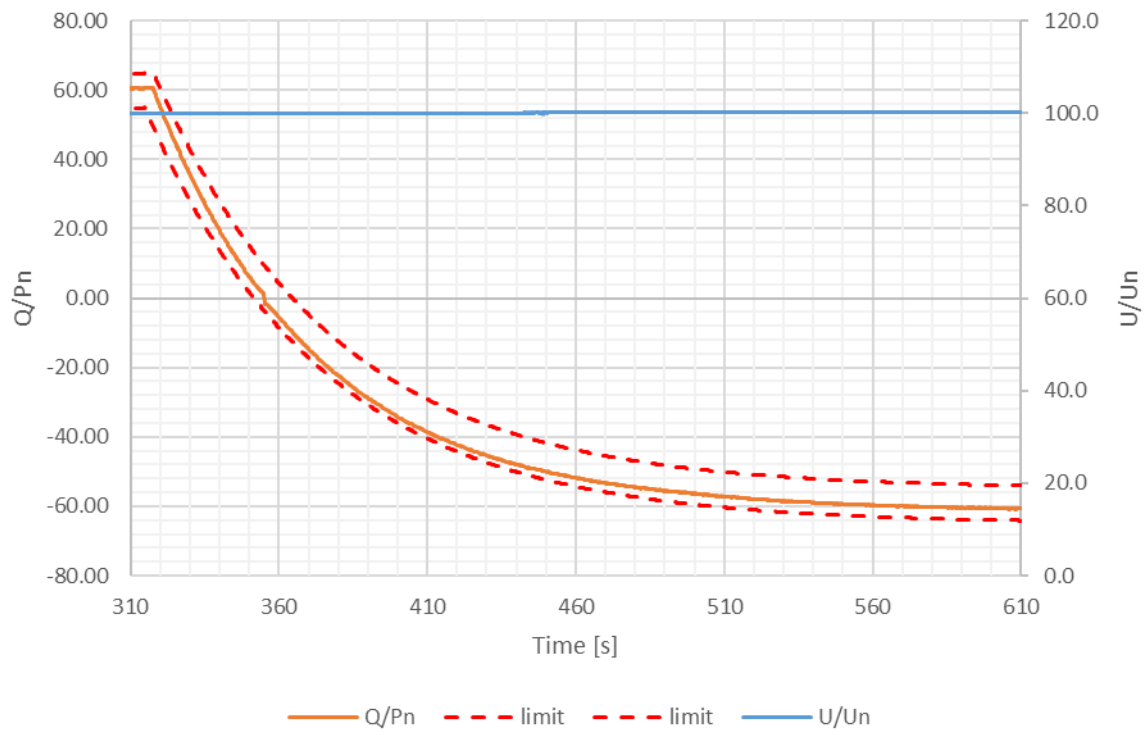
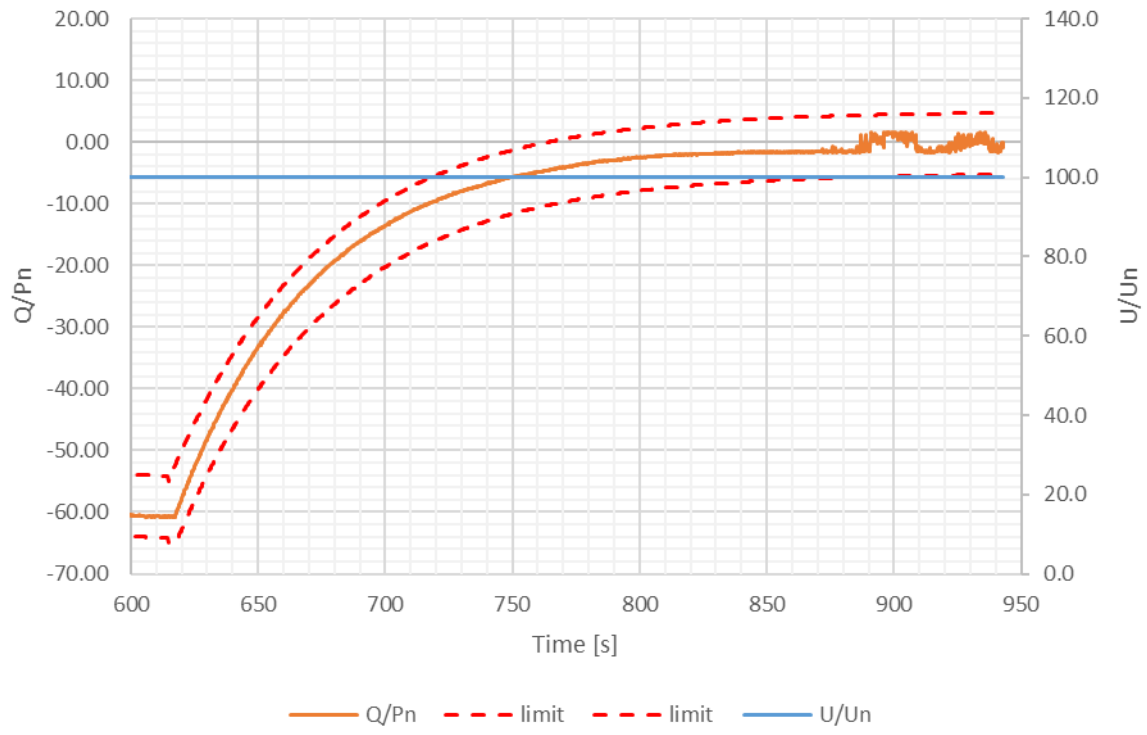


Diagram for 50%P_n (Tau=60s) $Q_{min\ under} \rightarrow 0$



5.5.2.4 Verification procedure for voltage related control mode for reactive power Q(U) 5.5.2.4.2 Test procedure for steady-state behaviour							P
Q_{max} [Var]		75000		**Q_{min} [Var]**		-75000	
Setting (a)							
Setting value		Measurement value					Limit
Un	Pn	Grid voltage(%)	Active power (%)	Reactive power (%)	Reactive power Target (%)	PF	ΔU≤±1%Un ΔQ≤±2%Sn or PF≥0.4
100%	100%	100.1	99.8	-0.7	0	0.9999	
103%	100%	103.1	100.1	-0.9	0	0.9999	
105%	100%	105.1	100.0	-1.5	0	0.9999	
106%	100%	106.1	100.0	-1.8	0	0.9999	
107%	100%	107.1	100.0	-49.5	-50%Qmax	0.9586	
108%	100%**	108.2	91.6	-99.3	-100%Qmax	0.8384	
110%	100%**	110.2	92.5	-99.2	-100%Qmax	0.8411	
112%	100%**	112.2	92.5	-99.3	-100%Qmax	0.8407	
115%	100%**	115.2	92.5	-99.0	-100%Qmax	0.8413	
112%	100%**	112.2	92.5	-99.3	-100%Qmax	0.8406	
110%	100%**	110.2	92.5	-99.2	-100%Qmax	0.8409	
108%	100%**	108.2	92.6	-99.3	-100%Qmax	0.841	
107%	100%	107.1	99.9	-49.5	-50%Qmax	0.9586	
106%	100%	106.1	100.0	-1.3	0	0.9999	
105%	100%	105.1	100.0	-0.7	0	0.9999	
103%	100%	103.1	100.1	-1.3	0	0.9999	
100%	100%	100.1	100.1	-1.8	0	0.9999	
97%	100%	97.1	100.1	-0.5	0	0.9999	
94%	100%	94.1	100.2	0.8	0	0.9999	
93%	100%	92.9	83.3	-99.4	100%Qmax	0.8131	
90%	100%	90.0	79.4	-99.2	100%Qmax	0.8004	
87%	100%	87.0	75.2	-99.2	100%Qmax	0.7841	
85%	100%	85.0	72.3	-99.3	100%Qmax	0.7718	
87%	100%	87.0	75.1	-99.3	100%Qmax	0.7834	
90%	100%	90.0	79.3	-99.3	100%Qmax	0.7996	
93%	100%	92.9	83.2	-99.3	100%Qmax	0.8133	
94%	100%	94.1	100.0	1.0	0	0.9999	
97%	100%	97.1	100.0	0.8	0	0.9999	

100%	100%	100.1	99.9	0.0	0	0.9999	
100%	20%	100.0	20.3	-1.5	0	0.9991	
103%	20%	103.0	20.3	-1.6	0	0.9989	
105%	20%	105.0	20.4	-1.6	0	0.9989	
106%	20%	106.0	20.4	-1.6	0	0.9989	
107%	20%	107.0	20.2	-49.2	-50%Qmax	0.5656	
108%	20%	108.1	20.2	-71.9	-100%Qmax*	0.4242	
110%	20%	110.1	20.3	-71.8	-100%Qmax*	0.4260	
112%	20%	112.1	20.2	-71.6	-100%Qmax*	0.4248	
115%	20%	115.1	20.2	-71.8	-100%Qmax*	0.4242	
112%	20%	112.1	20.2	-71.7	-100%Qmax*	0.4251	
110%	20%	110.1	20.3	-71.8	-100%Qmax*	0.4270	
108%	20%	108.1	20.2	-71.9	-100%Qmax*	0.4247	
107%	20%	107.0	20.3	-49.2	-50%Qmax	0.5661	
106%	20%	106.0	20.4	-1.8	0	0.9986	
105%	20%	105.0	20.3	-1.7	0	0.9988	
103%	20%	103.0	20.3	-1.6	0	0.9988	
100%	20%	100.0	20.4	-1.5	0	0.9990	
97%	20%	97.0	20.4	-1.4	0	0.9991	
94%	20%	94.0	20.2	-1.3	0	0.9992	
93%	20%	93.0	20.5	73.0	100%Qmax*	0.4241	
90%	20%	90.0	20.7	73.0	100%Qmax*	0.4267	
87%	20%	87.0	20.5	73.1	100%Qmax*	0.4240	
85%	20%	85.0	20.6	73.1	100%Qmax*	0.4256	
87%	20%	87.0	20.5	73.0	100%Qmax*	0.4240	
90%	20%	90.0	20.6	73.1	100%Qmax*	0.4252	
93%	20%	93.0	20.5	73.1	100%Qmax*	0.4234	
94%	20%	94.0	20.3	-1.4	0	0.9992	
97%	20%	97.0	20.4	-1.4	0	0.9991	
100%	20%	100.0	20.4	-1.4	0	0.9991	
Setting (c)							
Setting value		Measurement value					Limit
Un	Pn	Grid voltage(%)	Active power (%)	Reactive power (%)	Reactive power Target (%)	PF	ΔQ≤±2%Sn ΔU≤±1%Un
100%	100%	100.1	100.3	1.6	0	0.9999	
103%	100%	103.1	100.2	-3.2	-3%Qmax	0.9998	

105%	100%	105.1	100.2	-5.0	-5%Qmax	0.9995	
106%	100%	106.1	100.2	-6.0	-6%Qmax	0.9994	
107%	100%	107.0	100.2	-7.0	-7%Qmax	0.9991	
108%	100%	108.1	100.2	-8.1	-8%Qmax	0.9988	
110%	100%	110.1	100.2	-9.8	-10%Qmax	0.9983	
112%	100%	112.1	100.1	-9.9	-10%Qmax	0.9982	
115%	100%	115.1	100.2	-10.1	-10%Qmax	0.9982	
112%	100%	112.1	100.2	-9.8	-10%Qmax	0.9983	
110%	100%	110.1	100.2	-9.8	-10%Qmax	0.9983	
108%	100%	108.1	100.2	-8.1	-8%Qmax	0.9988	
107%	100%	107.0	100.2	-7.0	-7%Qmax	0.9991	
106%	100%	106.1	100.3	-6.0	-6%Qmax	0.9994	
105%	100%	105.1	100.2	-5.1	-5%Qmax	0.9995	
103%	100%	103.1	100.3	-3.4	-3%Qmax	0.9998	
100%	100%	100.1	100.3	1.6	0	0.9999	
97%	100%	97.1	100.3	-2.8	3%Qmax	0.9999	
94%	100%	94.1	100.3	-5.1	6%Qmax	0.9995	
93%	100%	93.1	100.4	-6.1	7%Qmax	0.9993	
90%	100%	90.1	98.2	-9.3	10%Qmax	0.9984	
87%	100%	87.1	94.9	-9.9	10%Qmax	0.9980	
85%	100%	85.1	92.8	-9.7	10%Qmax	0.9980	
87%	100%	87.1	94.9	-10.1	10%Qmax	0.9980	
90%	100%	90.1	98.1	-9.2	10%Qmax	0.9984	
93%	100%	93.1	100.3	-6.0	7%Qmax	0.9994	
94%	100%	94.1	100.2	-5.0	6%Qmax	0.9995	
97%	100%	97.1	100.1	-2.7	3%Qmax	0.9999	
100%	100%	100.1	100.1	1.7	0	0.9999	
100%	20%	100.0	20.5	1.7	0	0.9987	
103%	20%	103.0	20.5	-2.4	-3%Qmax	0.9976	
105%	20%	105.0	20.5	-3.8	-5%Qmax	0.9939	
106%	20%	106.0	20.5	-4.9	-6%Qmax	0.9898	
107%	20%	107.0	20.5	-6.0	-7%Qmax	0.9850	
108%	20%	108.0	20.5	-7.3	-8%Qmax	0.9782	
110%	20%	110.0	20.5	-9.1	-10%Qmax	0.9667	
112%	20%	112.0	20.5	-10.1	-10%Qmax	0.9590	
115%	20%	115.0	20.4	-10.3	-10%Qmax	0.9569	
112%	20%	112.0	20.5	-10.2	-10%Qmax	0.9582	

110%	20%	110.0	20.5	-9.1	-10%Qmax	0.9659
108%	20%	108.0	20.5	-7.3	-8%Qmax	0.9782
107%	20%	107.0	20.5	-6.0	-7%Qmax	0.9849
106%	20%	106.0	20.5	-5.2	-6%Qmax	0.9886
105%	20%	105.0	20.5	-4.2	-5%Qmax	0.9924
103%	20%	103.0	20.5	-2.4	-3%Qmax	0.9975
100%	20%	100.0	20.6	1.7	0	0.9988
97%	20%	97.0	20.6	1.8	3%Qmax	0.9987
94%	20%	94.0	20.5	4.1	6%Qmax	0.9928
93%	20%	93.0	20.6	5.1	7%Qmax	0.9892
90%	20%	90.0	20.5	8.5	10%Qmax	0.9707
87%	20%	87.0	20.5	9.6	10%Qmax	0.9629
85%	20%	85.0	20.5	9.3	10%Qmax	0.9648
87%	20%	87.0	20.5	9.6	10%Qmax	0.9629
90%	20%	90.0	20.5	8.6	10%Qmax	0.9701
93%	20%	93.0	20.5	5.1	7%Qmax	0.9892
94%	20%	94.0	20.5	4.1	6%Qmax	0.9929
97%	20%	97.0	20.5	1.7	3%Qmax	0.9988
100%	20%	100.0	20.6	1.3	0	0.9992

Test method:

Standard	Parameter	X1	X2	X3	X4
EN 50549-10: 2022 (Setting a)	U (U/Un)	93%	94%	106%	108%
	Q (Q/Qmax)	100%	0%	0%	-100%

Standard	Parameter	X1	X2	X3
EN 50549-10: 2022 (Setting b)	U (U/Un)	90%	100%	110%
	Q (Q/Qmax)	10%	0%	-10%

Assessment criterion:

The actual tested configuration shall be chosen according the principle of 4.4. If the conformity assessment is conducted for a specific grid code, the EUT control shall be configured as defined in this grid code. If thel conformity assessment is conducted in general, the configuration shall be chosen in a way that each parameter shall be tested once configured to its minimum and once to its maximum according to the principle given in Table 17 and Table 18.

Table 17 — Q(U) characteristic configuration

parameter of characteristic	Setting (a)	Setting (b)
dead band (horizontal section of the characteristic curve around U_n) db_{char}	as wide as possible but extending not more than from −6 %U_n to +6 %U_n.	0
minimum and maximum reactive power of the characteristic $Q_{max\ char}$ [a]	≥ 95 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively [b]	10 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively
Slope of the steepest section of the characteristic curve [a]	as steep as configurable, [c]	as flat as configurable [d]

[a] If an unsymmetrical configuration is possible, this shall be apparent in the chosen configuration by using different steepness and different values for maximum reactive power $Q_{max\ char}$ for over voltage and under voltage.

[b] if Q_{max}, based on the capability curve of the EUT, is above 60 %P_n, $Q_{max\ char}$ shall not exceed 60 % P_n.

[c] if the maximum configurable steepness exceeds 100 %Q_{max} / 1 %U_n the configured value during the test shall not exceed 100 %Q_{max} / 1 %U_n.

[d] if the minimum configurable steepness is below 1 %Q_{max} / 1 %U_n the configured value during the test shall not be below 1 %Q_{max} / 1 %U_n.

Note:

* Due to the limit of output current, it can't reach target output power.

5.5.2.4 Verification procedure for voltage related control mode for reactive power Q(U) 5.5.2.4.3 Test procedure for dynamic behaviour							P
Q_{max} [Var]		75000		**Q_{min} [Var]**		-75000	
Setting value		Measurement value					Limit
Un	Pn	Grid voltage(%)	Active power (%)	Reactive power (%)	Reactive power Target (%)	PF	ΔU≤±1%Un ΔQ≤±2%Sn or PF≥0.4
1: 100%	＞90%	100.1	100.87	-1.06	0	0.9998	
2: 107%	＞90%	107.1	100.86	-47.84	-50%Qmax	0.9616	
3: 109%	＞90%	108.8	93.61	-98.89	-100%Qmax	0.8444	
4: 109%	18%	108.6	18.07	-66.06*	-100%Qmax	0.4146	
5: 109%	3%	108.6	2.53	-1.81	0	0.8674	
6: 109%	22%	108.6	22.14	-80.41*	-100%Qmax	0.4169	
7: 109%	＞90%	108.8	94.60	-96.59	-100%Qmax	0.8525	
8: 100%	＞90%	100.1	100.89	-1.02	0%Qmax	0.9998	
9: 92%	＞90%	92.2	81.80**	99.71	100%Qmax	0.8070	
10: 92%	18%	92.0	17.82	63.57*	100% Qmax	0.4231	
11: 92%	3%	92.0	2.58	-1.03	0%Qmax	0.9397	
12: 92%	22%	92.0	21.86	77.62*	100%Qmax	0.4248	
13: 92%	＞90%	92.2	81.77**	99.94	100%Qmax	0.8063	
14: 93%	＞90%	93.2	83.22**	99.90	100%Qmax	0.8113	
15: 100%	＞90%	100.1	100.87	-0.92	0%	0.9998	

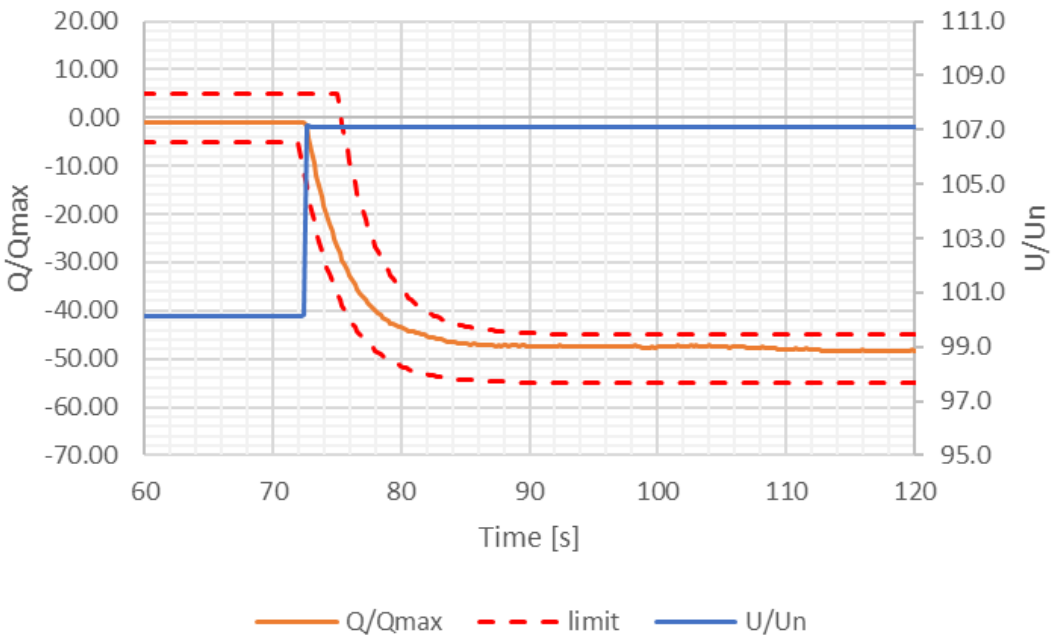
Note:

*cos φ⩾0.4 Priority

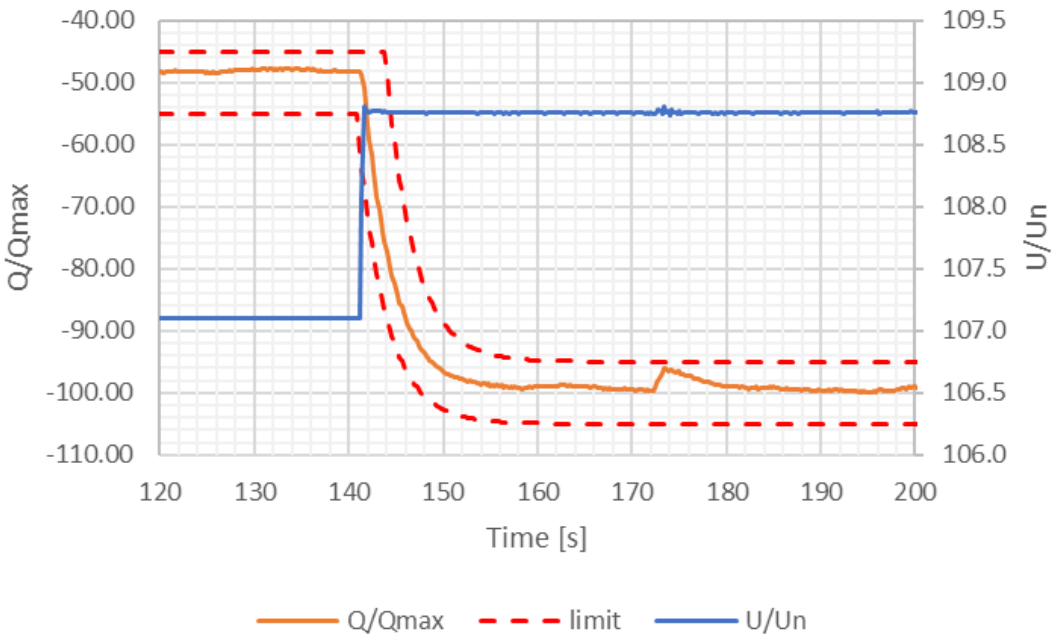
** Due to the limit of max output current, it can't reach target output power.

P lock-in: 20%Pn; P lock-out: 5%Pn.

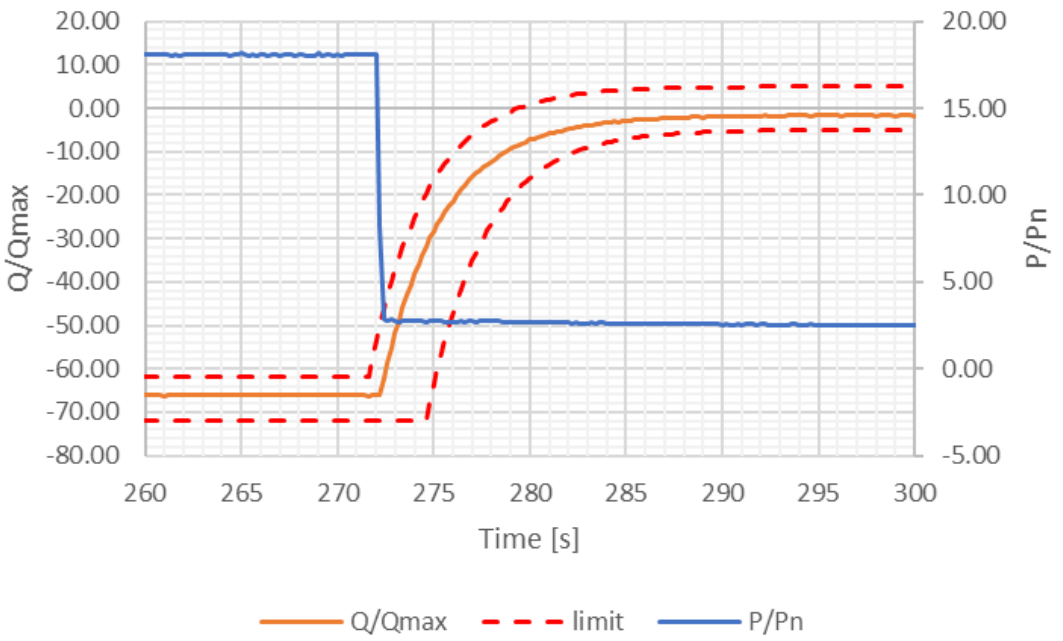
U/Un: 100%-107%



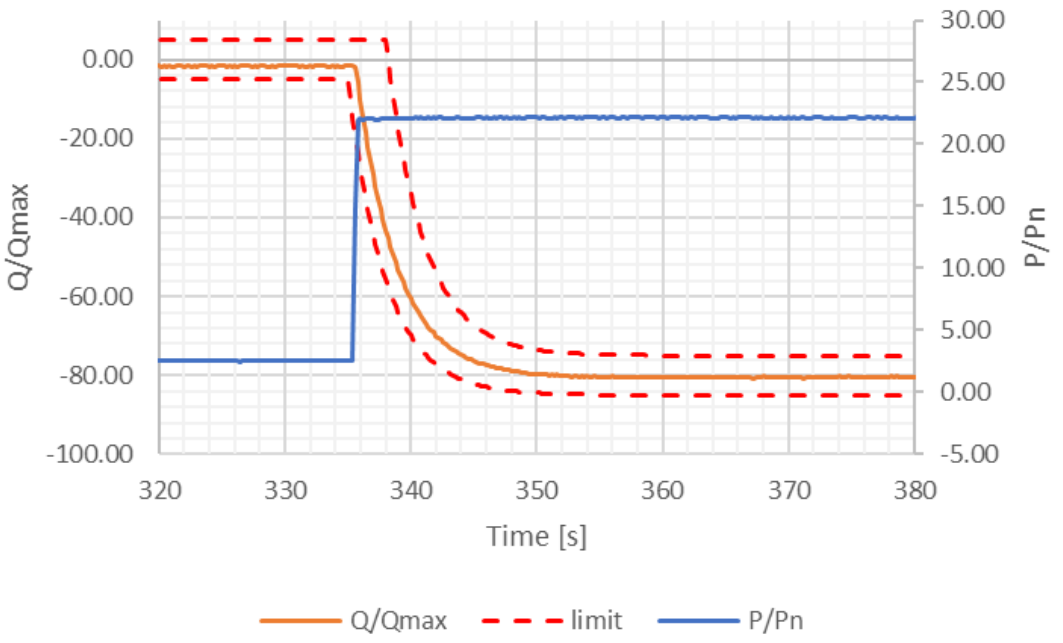
U/Un: 107%-109%



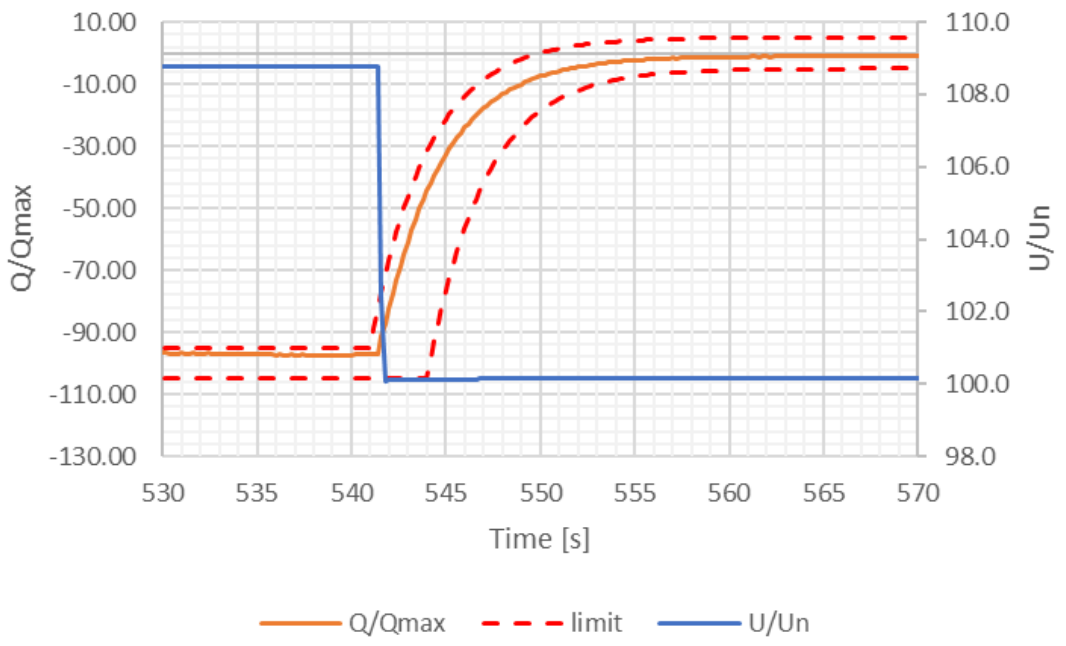
P/Pn:18%-3%



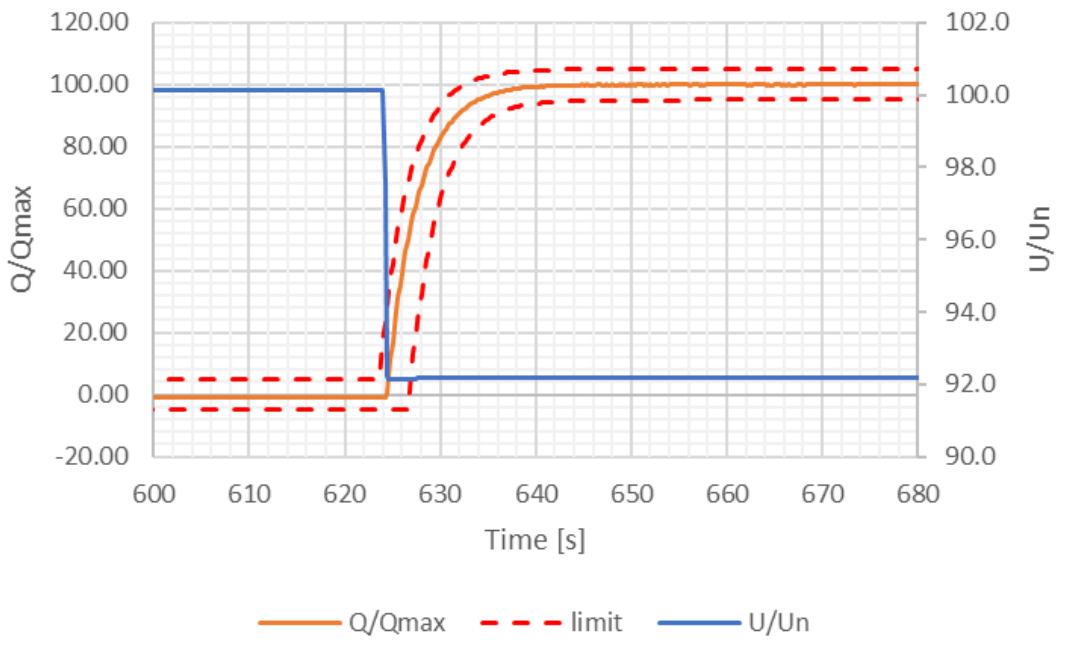
P/Pn:3%-22%



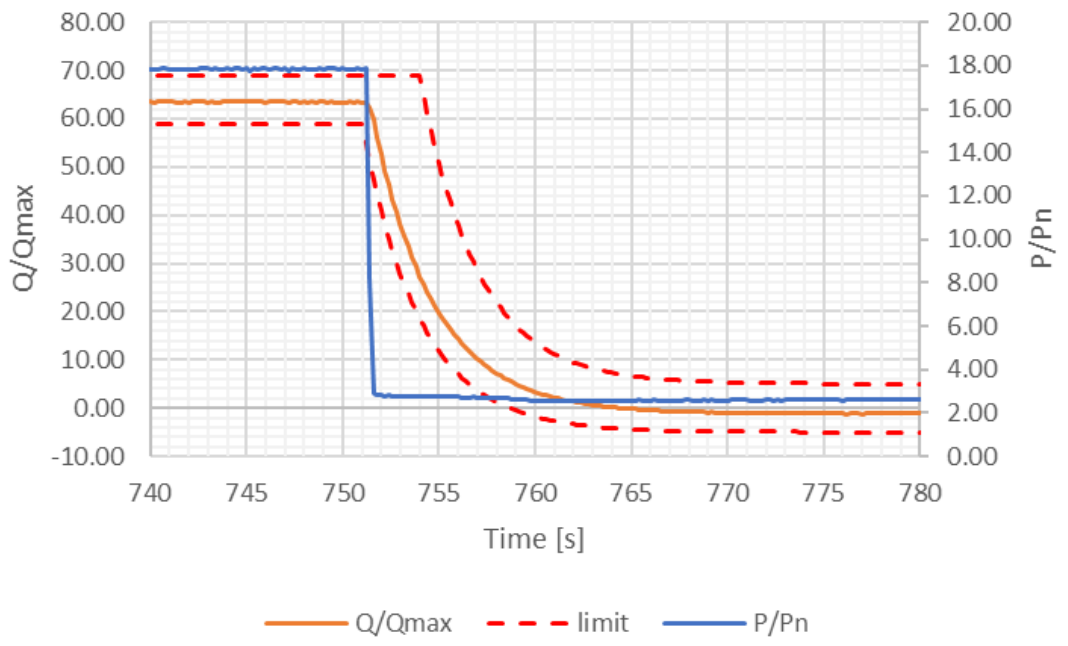
U/Un: 109%-100%



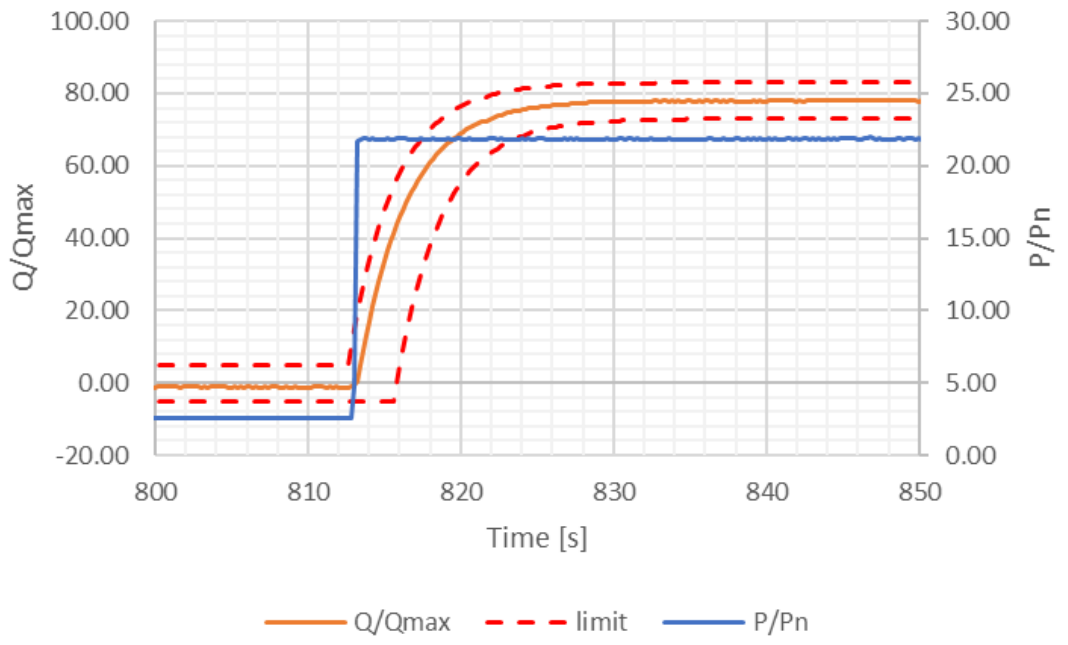
U/Un: 100%-92%



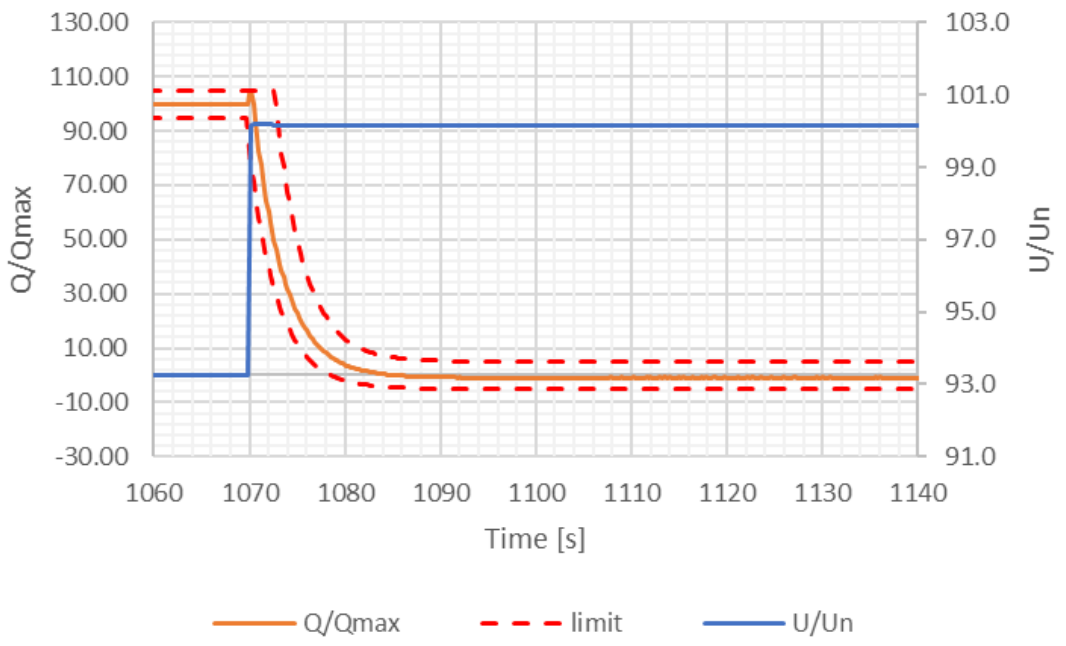
P/Pn:18%-3%



P/Pn:3%-22%



U/Un: 93%-100%


130.00
110.00
90.00
70.00
50.00
30.00
10.00
-10.00
-30.00
Q/Qmax
103.0
101.0
99.0
97.0
95.0
93.0
91.0
U/Un
1060
1070
1080
1090
1100
1110
1120
1130
1140
Time [s]
Q/Qmax
limit
U/Un

Test method:

Standard	Parameter	X1	X2	X3	X4
EN 50549-10: 2022 (Setting a)	U (U/Un)	93%	94%	106%	108%
	Q (Q/Qmax)	100%	0%	0%	-100%

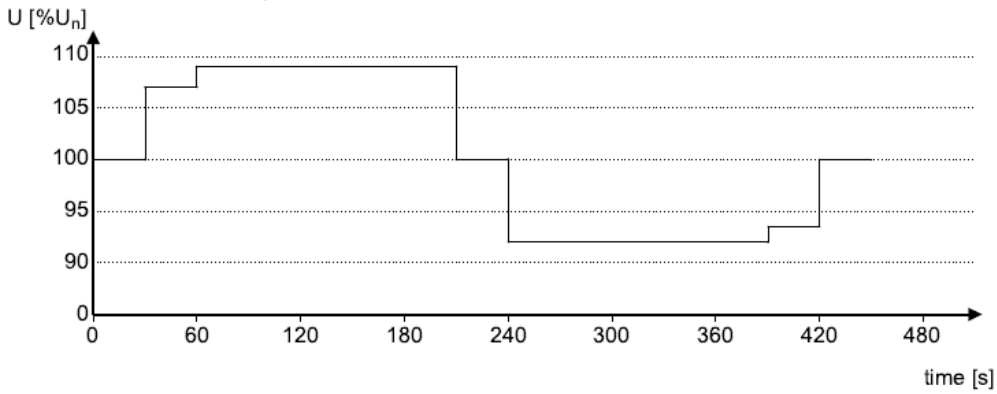


Figure 34 — Example voltage profile for setting (a) applied for the test of the dynamic behaviour of the Q(U), assuming < 30 s for stabilization of P and Q

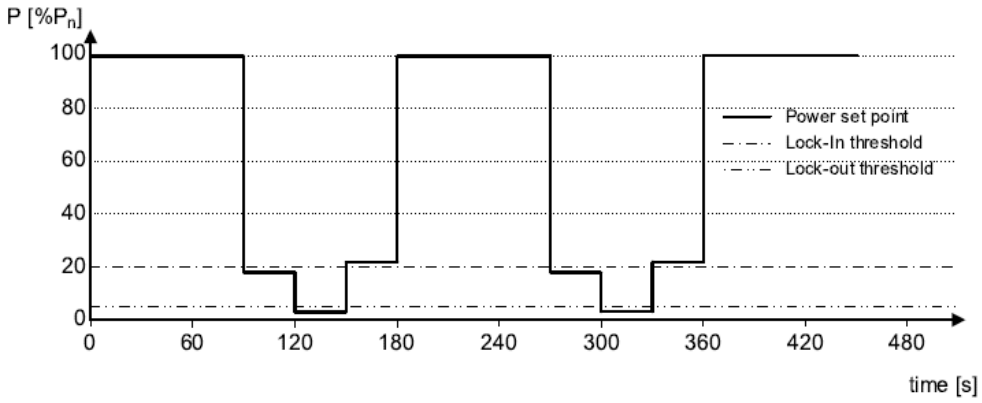


Figure 35 — Example active power set point profile for setting (a) applied for the test of the dynamic behaviour of the Q(U) control, assuming < 30 s for stabilization of P and Q

5.5.2.5 Verification procedure for power related control modes for reactive power 5.5.2.5.2 Test procedure for quasi-stationary behaviour										P
Test a):										
P_n/P [%]	10	20	30	40	50	60	70	80	90	100
30 s mean value	10% to 100% P_n									
U [V]:	230.0	229.9	229.9	230.0	230.0	230.0	230.1	230.1	230.0	230.0
P_{E30} [W]:	12711	25118	37891	50352	63004	75651	87956	100324	112892	115141
P_{E30} of P_n [%]:	10.17	20.09	30.31	40.28	50.40	60.52	70.36	80.26	90.31	92.11*
Q_{E30} [Var]:	75345	-1791	-1760	-1762	-1134	-773	252	724	-75179	-75121
Q_{E30} of P_n [%]:	60.28	-1.43	-1.41	-1.41	-0.91	-0.62	0.20	0.58	-60.14	-60.10
cos φ_{E30}:	0.1664	0.9974	0.9988	0.9993	0.9995	0.9997	0.9997	0.9997	0.8323	0.8375
Q_{E30} target [%]:	60	0	0	0	0	0	0	0	-60	-60
P_n/P [%]	100	90	80	70	60	50	40	30	20	10
30 s mean value	100% to 10% P_n									
U [V]:	230.0	230.0	230.1	230.1	230.1	230.0	230.0	229.9	229.9	230.0
P_{E30} [W]:	115053	112487	100276	87669	75239	62717	50139	37854	25268	12879
P_{E30} of P_n [%]:	92.04*	89.99	80.22	70.13	60.19	50.17	40.11	30.28	20.21	10.30
Q_{E30} [Var]:	-75095	-75081	1124	123	-864	-1414	-1669	-1825	-1801	75436
Q_{E30} of P_n [%]:	-60.08	-60.06	0.90	0.10	-0.69	-1.13	-1.34	-1.46	-1.44	60.35
cos φ_{E30}:	0.8374	0.8317	0.9998	0.9997	0.9996	0.9995	0.9992	0.9986	0.9975	0.1683
Q_{E30} target [%]:	-60	-60	0	0	0	0	0	0	0	60
Limit ΔQ:	±2%Smax									

Test c):										
P_n/P [%]	10	20	30	40	50	60	60	70	80	90
30 s mean value	10% to 100% to 10%									
U [V]:	239.1	239.1	239.1	239.2	239.2	239.3	243.8	243.8	243.8	243.8
P_{E30} [W]:	12639	25136	37827	50461	62858	75534	75554	88097	100620	113148
P_{E30} of P_n [%]:	10.11	20.11	30.26	40.37	50.29	60.43	60.44	70.48	80.50	90.52
Q_{E30} [Var]:	634	600	628	747	951	1559	-14092	-30730	-46912	-60601
Q_{E30} of P_n [%]:	0.51	0.48	0.50	0.60	0.76	1.25	-11.27	-24.58	-37.53	-48.48
cos φ_{E30}:	0.9987	0.9997	0.9999	0.9999	0.9999	0.9998	0.9830	0.9442	0.9063	0.8815
Q_{E30} target [%]:	0	0	0	0	0	0	-12	-24	-36	-48
P_n/P [%]	100	90	80	70	60	60	50	40	30	20
30 s mean value	10% to 100% to 10%									
U [V]:	243.8	243.8	243.8	243.8	243.8	227.7	227.7	227.7	227.6	227.6
P_{E30} [W]:	119017	112976	100148	87371	74970	75345	62766	50186	37743	25261
P_{E30} of P_n [%]:	95.21*	90.38	80.12	69.90	59.98	60.28	50.21	40.15	30.19	20.21
Q_{E30} [Var]:	-69047	-60542	-46136	-30943	-14370	2030	1370	773	726	676
Q_{E30} of P_n [%]:	-55.24*	-48.43	-36.91	-24.75	-11.50	1.62	1.10	0.62	0.58	0.54
cos φ_{E30}:	0.8650	0.8814	0.9083	0.9426	0.9821	0.9996	0.9998	0.9999	0.9998	0.9996
Q_{E30} target [%]:	-60	-48	-36	-24	-12	0	0	0	0	0
P_n/P [%]	10	--	--	--	--	--	--	--	--	--
30 s mean value	10% to 100% to 10%									
U [V]:	227.6	--	--	--	--	--	--	--	--	--
P_{E30} [W]:	12794	--	--	--	--	--	--	--	--	--
P_{E30} of P_n [%]:	10.24	--	--	--	--	--	--	--	--	--
Q_{E30} [Var]:	768	--	--	--	--	--	--	--	--	--
$\Delta Q_{E30}/P_n$ [%]:	0.61	--	--	--	--	--	--	--	--	--
cos φ_{E30}:	0.9982	--	--	--	--	--	--	--	--	--
Q_{E30} target [%]:	0	--	--	--	--	--	--	--	--	--
Limit ΔQ:	±2%Smax									
* Due to the limit of output current, it can't reach target output power.										

Test method:

Table 19 — Q (P) or cos φ (P) characteristic configuration

parameter of characteristic	Setting (a)	Setting (b)	Setting (c)
minimum and maximum reactive power (Cos Φ [b]) of the characteristic $Q_{max\ char}$ [a]	≥ 95 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively but not more than 60 % P_n	10 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively	$Q_{max\ char\ over}$ = 0 %P_n $Q_{max\ char\ over}$ = 33 %P_n
Slope of the steepest section of the characteristic curve [a]	as steep as configurable, but not more than 200 %Q_{max} / 10 %P_n	as flat as configurable, but not less than 2 %Q_{max} / 10 %P_n	0 below 50 %P_n; 20 %Q_{max}/10 %P_n above 50 %P_n
Time constant	as fast as possible but not slower than 3 s	as slow as possible but not slower than 20 s [c]	3,33 s

[a] If multiple sections with different steepness are configurable, this shall be apparent in the chosen configuration by using different steepness and different values for maximum reactive power $Q_{max\ char\ over}$ and $Q_{max\ char\ under}$.

[b] The cos φ(P) characteristic shall be configured accordingly with the cos φ value representing the given reactive power value at P_n.

[c] The test is considered significant also for slower values of the time constant, as slow time constants are technically less demanding. 20 s is chosen to reduce test duration compared to 60 s as defined in EN 50549-2:2019.

Setting (c) represents a commonly applied characteristic.

Table 20 — cos φ (P) optional additional parameter configuration if applicable

parameter	Setting (a)	Setting (b)	
Lock-in voltage	deactivated	105 %U_n	
Lock-out voltage	deactivated	100 %U_n	

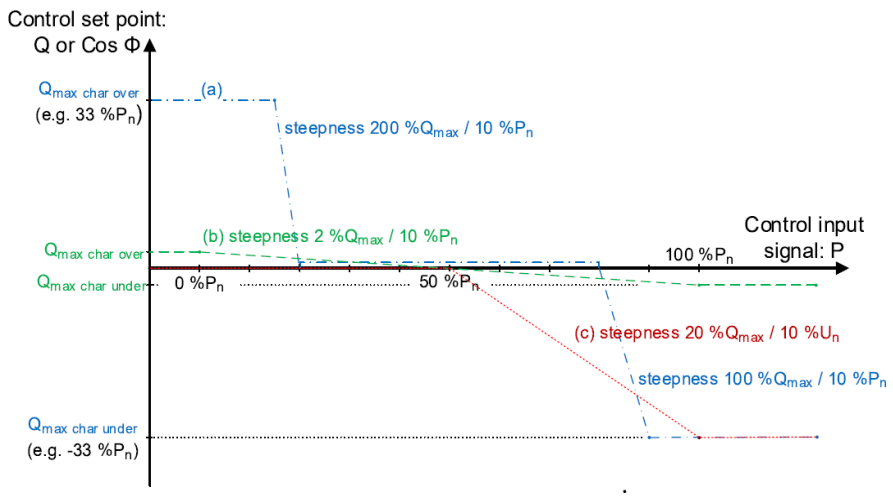


Figure 36 — Q (P) and cos φ (P) and example characteristics for setting (a), (b) and (c) for the test

Assessment criterion:

Test of the accuracy of the Q(P) cos φ (P) control shall be considered passed if:

The measured 30-s averages of the reactive power during steady-state conditions are within a tolerance band of ± 2% S_{max} around the reactive power set point resulting from the measured active power and the given cos φ (P) or Q (P) characteristic.

5.5.2.5 Verification procedure for power related control modes for reactive power 5.5.2.5.3 Test procedure for dynamic behaviour					P
Test a):					
P_{Emax}/P_n [%]	20	50	90	50	20
30 s mean value	20% to 50% to 90% to 50% to 20%				
U_{target} [V]:	230.0	230.0	230.0	230.0	230.0
U [V]:	230.0	230.1	230.1	230.1	230.0
P_{E30} [W]:	25859	64255	111698	64195	25792
P_{E30} of P_n [%]:	20.69	51.40	89.36	51.36	20.63
Q_{E30} [Var]:	-1506	-2004	-74683	-1944	-1453
Q_{E30} of P_n [%]:	-1.20	-1.60	-59.75	-1.56	-1.16
Q_{E30} target [%]:	0.00	0.00	-60.00	0.00	0.00
cos φ_{E30}:	0.9981	0.9994	0.8142	0.9995	0.9982

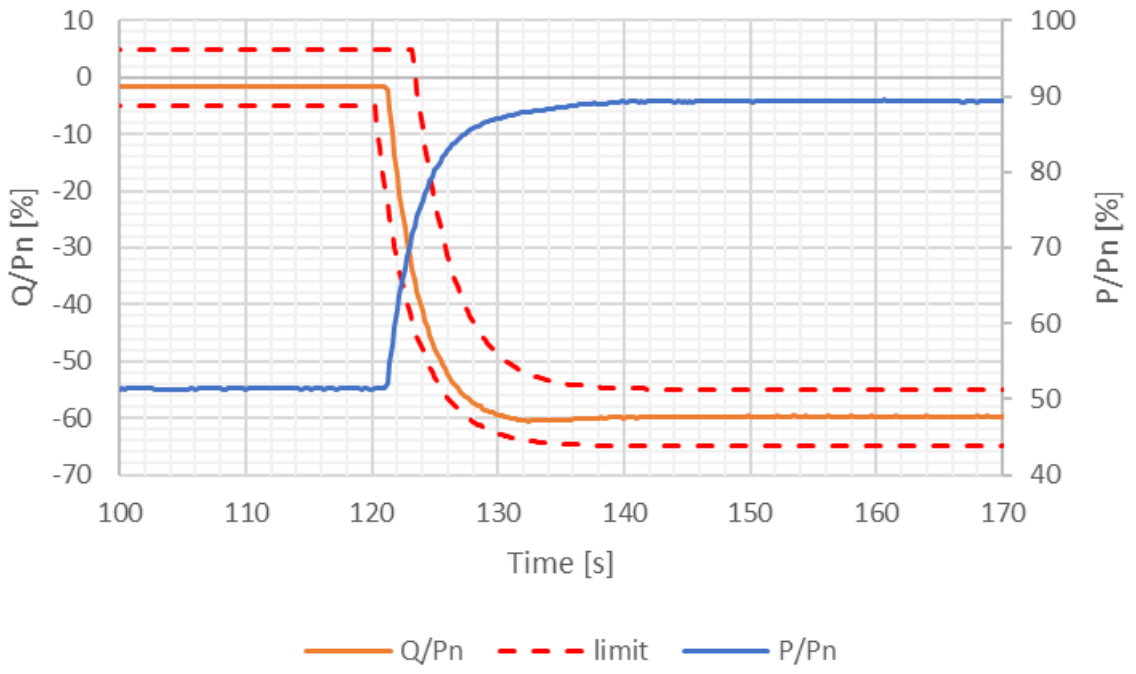
Test condition	$T_{dead\ time}$[s]	$T_{set\ time}$[s]	$T_{seting\ response\ time}$[s]
50% P_n-90% P_n	0.2	9.6	9.6
90% P_n-50% P_n	0.2	9.6	9.6
Limit:	PT1:3s ΔQ=± 5 % P_n, delay time <3s		

Test c):			
P_{Emax}/P_n [%]	20	50	90
30 s mean value	20% to 50% to 90% to 50% to 20%		
U_{target} [V]:	246.1	246.1	246.1
U [V]:	246.0	246.1	246.1
P_{E30} [W]:	25310	62715	112943
P_{E30} of P_n [%]:	20.25	50.17	90.35
Q_{E30} [Var]:	-628	-426	-60099
Q_{E30} of P_n [%]:	-0.50	-0.34	-48.08
Q_{E30} target [%]:	0.00	0.00	-48.00
cos φ_{E30}:	0.9977	0.9996	0.8607
P_{Emax}/P_n [%]	90	90	90
U_{target} [V]:	236.9	225.4	246.1
U [V]:	237.0	225.6	246.1

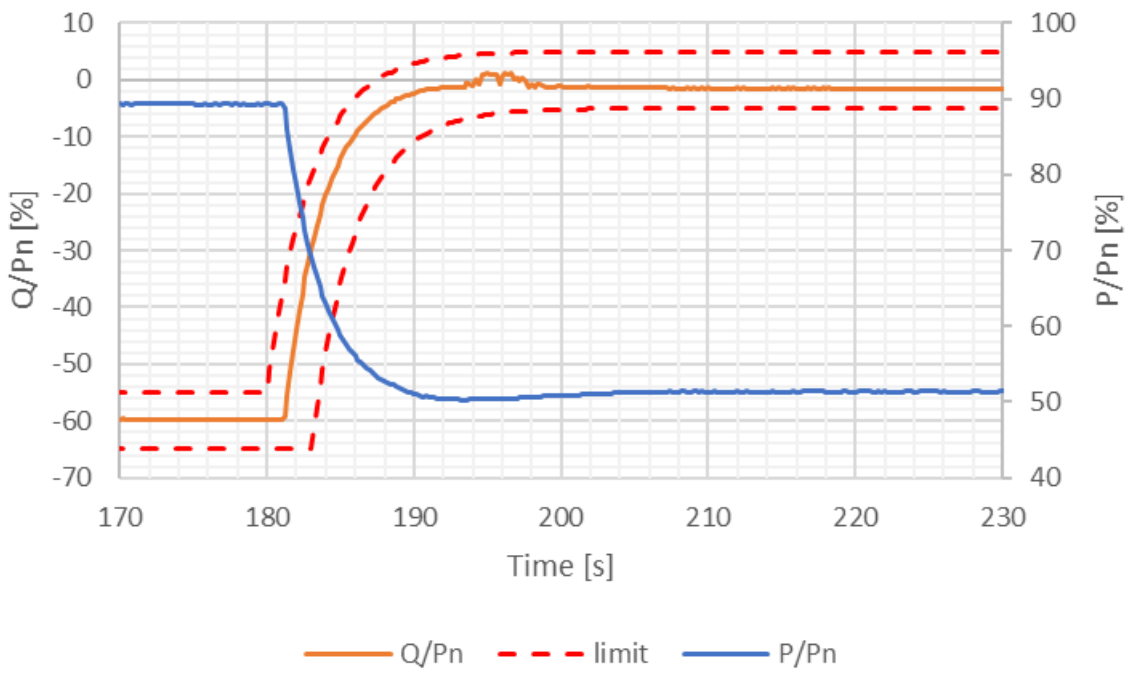
P_{E30} [W]:	112865	112476	112592
P_{E30} of P_n [%]:	90.29	89.98	90.07
Q_{E30} [Var]:	-60104	-242	-60087
Q_{E30} of P_n[%]:	-48.08	-0.19	-48.07
Q_{E30} target [%]:	-48.00	0.00	-48.00
cos φ_{E30}:	0.8605	0.9998	0.8600
P_{Emax}/P_n [%]	90	50	20
U_{target} [V]:	230.0	230.0	230.0
U [V]:	230.0	229.9	229.8
P_{E30} [W]:	112391	62696	25409
P_{E30} of P_n [%]:	89.91	50.16	20.33
Q_{E30} [Var]:	-210	-352	-495
Q_{E30} of Smax. [%]:	-0.17	-0.28	-0.40
Q_{E30} target [%]:	0.00	0.00	0.00
cos φ_{E30}:	0.9998	0.9997	0.9982
Test condition	$T_{dead\ time}$[s]	$T_{set\ time}$[s]	$T_{seting\ response\ time}$[s]
50% P_n-90% P_n (107%Un-107%Un)	0.2	9.8	9.8
90% P_n (103%Un-98%Un)	0.2	9.6	9.6
90% P_n (98%Un-107%Un)	0.4	9.6	9.6
90% P_n (107%Un-100%Un)	0.2	9.2	9.2
Limit:	Q PT1:3.33s, ΔQ=± 5 % Pn, delay time <3s		
Note:			

Test a:

50%Pn -> 90%Pn:

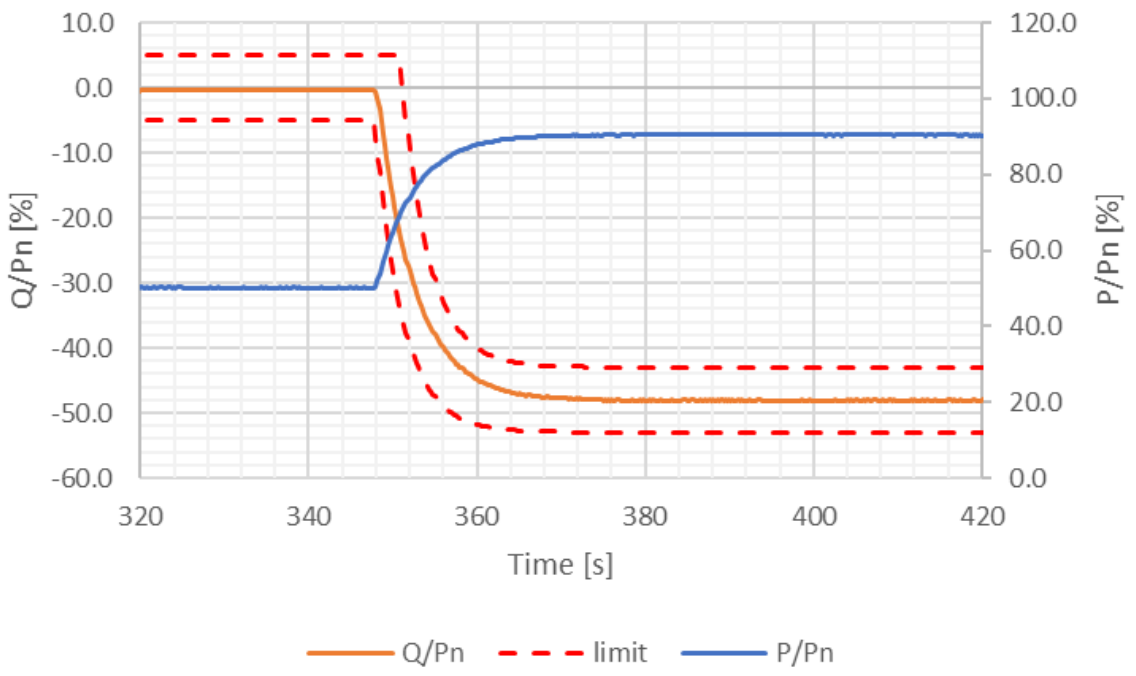


90%Pn -> 50%Pn:

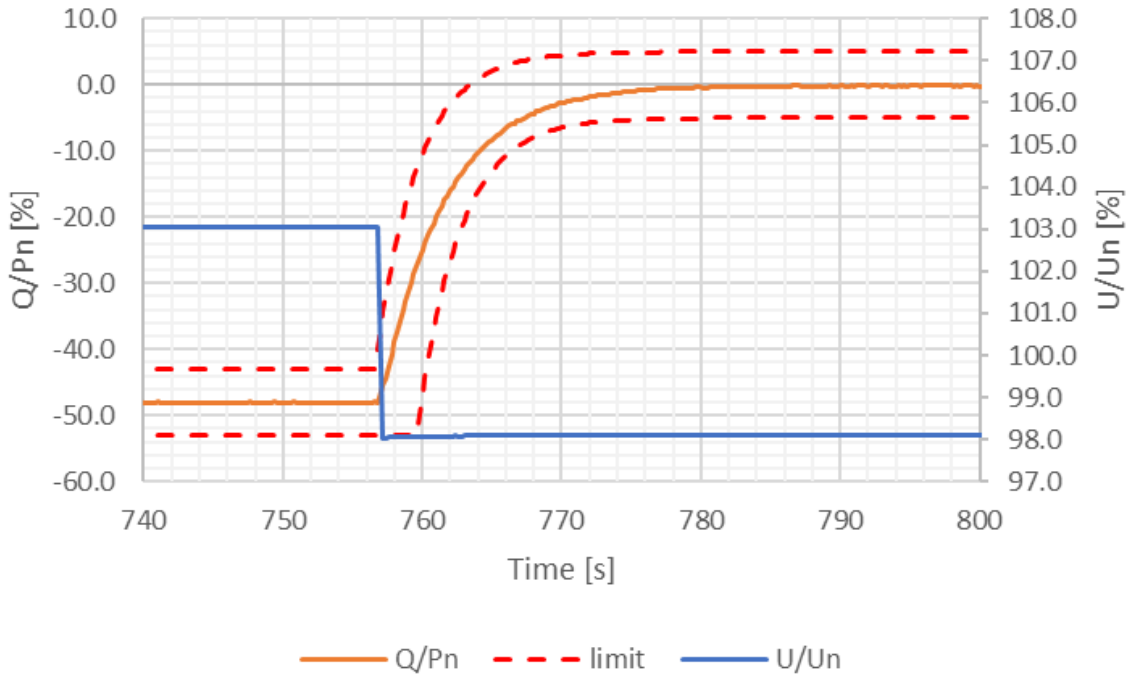


Test c:

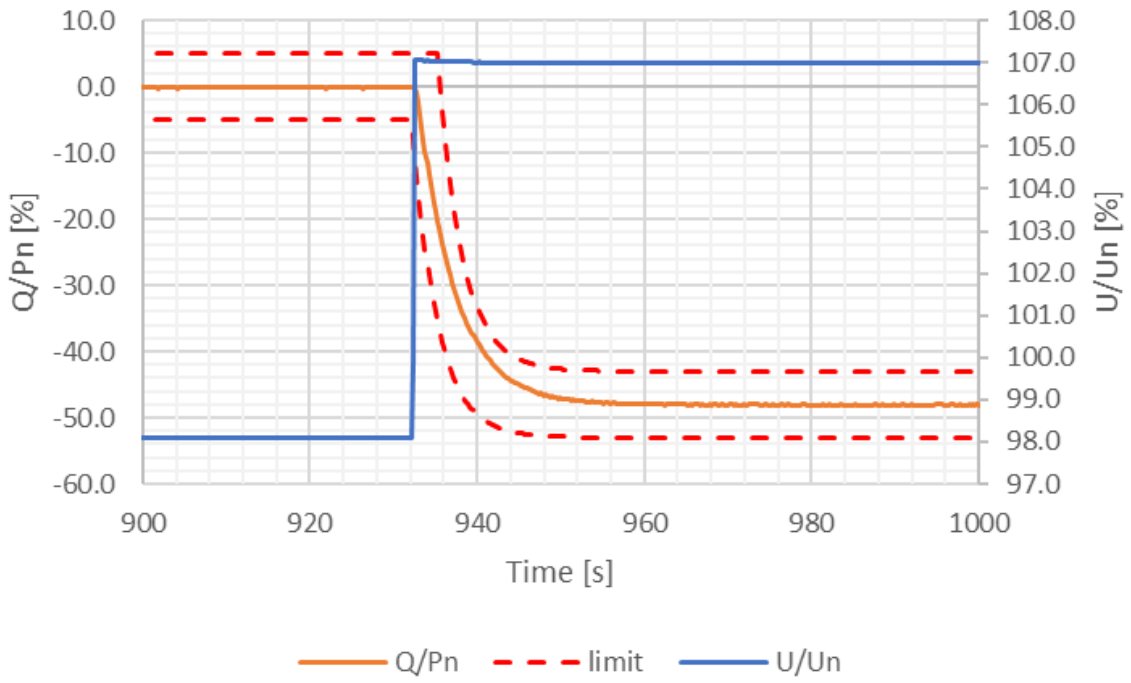
50%Pn -> 90%Pn



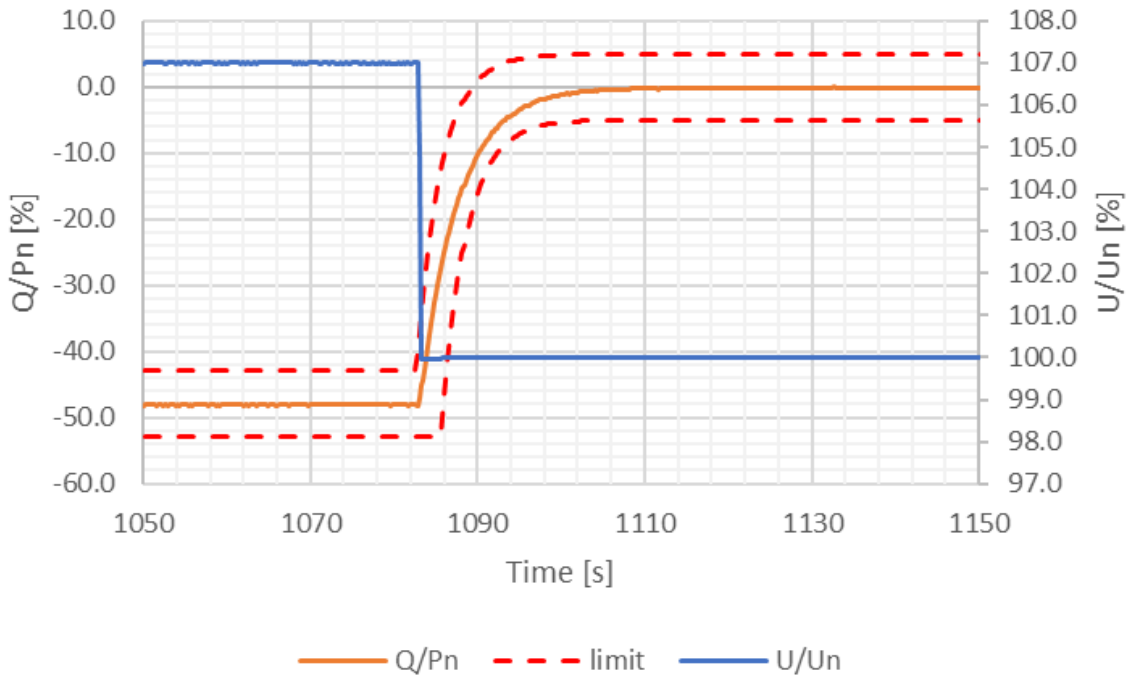
103%Un -> 98%Un



98%Un-> 107%Un



107%Un-> 100%Un



EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.6	**Voltage related active power reduction - P(U)**	
5.6.3	Test procedure for steady-state behaviour	P
5.6.4	Test procedure for dynamic behaviour	P

5.6 Voltage related active power reduction (P(U) function) 5.6.3 Test procedure for steady-state behaviour				P
Test condition	100% Pn			
V_{Target} [%]	100	103	106	109
$V_{measured}$ [%]	100.12	103.03	106.02	109.07
$P_{measured}$ [%]	100.11	100.03	99.99	92.64*
$Q_{measured}$ [%]	1.59	1.59	1.60	-60.59
P_{Target} [%]	100.0	100.0	100.0	100.0
Q_{Target} [%]	0.0	0.0	0.0	-60.0
V_{Target} [%]	112	115	112	109
$V_{measured}$ [%]	112.04	114.97	112.04	109.07
$P_{measured}$ [%]	59.82	0.04	60.04	92.79*
$Q_{measured}$ [%]	-60.87	-60.98	-60.88	-60.66
P_{Target} [%]	60.0	0.0	60.0	100.0
Q_{Target} [%]	-60.0	-60.0	-60.0	-60.0
V_{Target} [%]	106		103	
$V_{measured}$ [%]	106.02		103.02	
$P_{measured}$ [%]	100.05		100.10	
$Q_{measured}$ [%]	1.64		1.58	
P_{Target} [%]	100.0		100.0	
Q_{Target} [%]	0.0		0.0	
Limits	ΔP=±2%Pn, ΔQ=±2%Smax, ΔU=±1%Un			

Assessment criterion:

P(U) setting

U/Un(%)	110	115
P/Pn(%)	100	0

Unless further requirements apply for a specific grid code, the test shall be considered passed if:

The measured 30-s averages of the active power (positive sequence components) during steady-stateconditions are within a tolerance band of ± 2% Smax and ± 1 %Un, of the set P(U) characteristic.

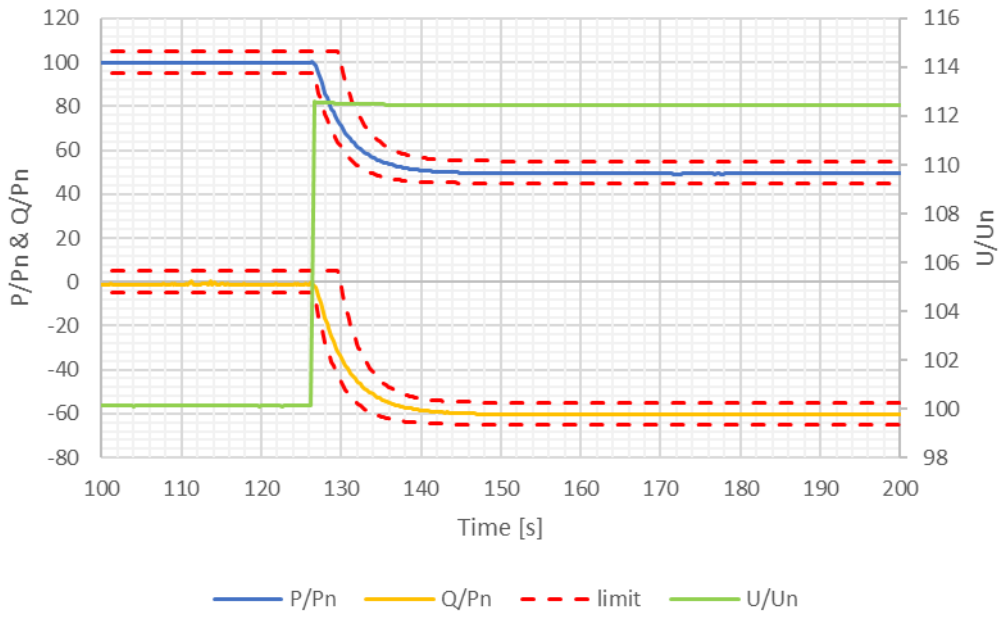
the time response of the active power during the measurement represents the applied configuration withinthe

tolerance band resulting from the behaviour of an equivalent first order filter element and the configuredtime constant tau. Accepted tolerances are -5 % Pn, for the active power values and 3 s for the time in case of a power decrease. +5 % Pn, for the active power values and 3 s for the time in case of a power increase. No discontinuities in the characteristic curve are detected and no oscillations of the active power after theend of the transient period of 5 τ as configured and no disconnection of the EUT occurs. The settings of the function, as well as the enabling and disabling of the function, are field adjustable andmeans are provided to protect these from unpermitted interference (e.g. password or seal).
Note: *the active power can’t reach because of the limit of output current.

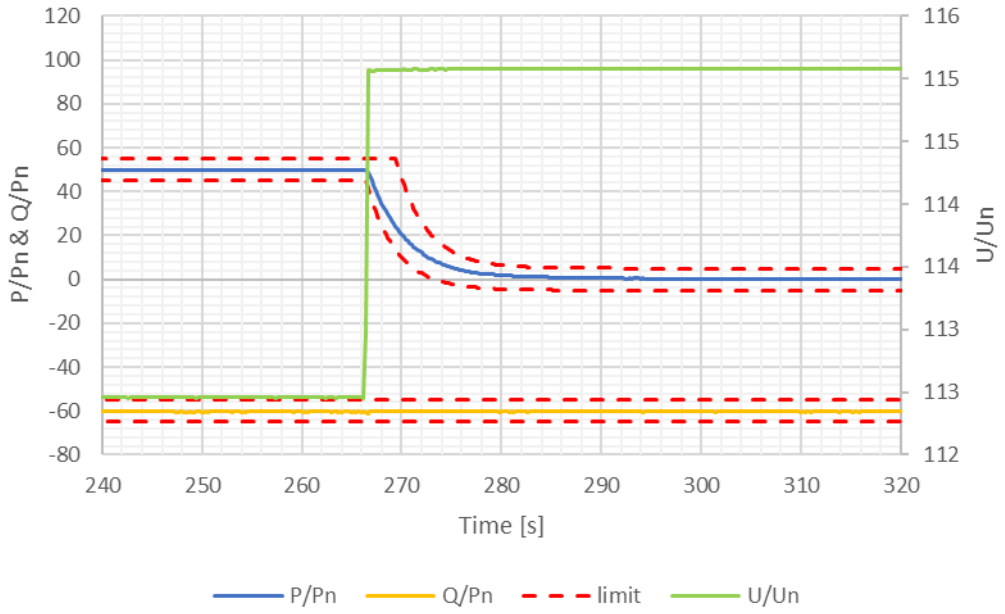
5.6 Voltage related active power reduction (P(U) function) 5.6.4 Test procedure for dynamic behaviour					P
Test condition	100% Pn				
	Step 1	Step 2	Step 3	Step 4	Step 5
V_{Target} [%]	100.0	112.5	115.0	112.5	100.0
$V_{measured}$ [%]	100.11	112.46	115.08	112.46	100.11
$P_{measured}$ [%]	99.83	49.47	0.12	49.79	99.89
$Q_{measured}$ [%]	-1.28	-60.34	-60.35	-60.36	-1.20
P_{Target} [%]	100.0	50.0	0.0	50.0	100.0
Q_{Target} [%]	0.0	-60.0	-60.0	-60.0	0.0
Limit	P: Tau=3s, Q: Tau=3s, ΔP=±2%Pn, ΔQ=±2%Smax, ΔU=±1%Un				

Test condition	100% Pn					
	Dead time[s]		response time[s]		settling time[s]	
	P	Q	P	Q	P	Q
Step 1- Step 2	0.8	0.8	9.8	9.8	9.8	9.8
Step 2- Step 3	0.4	-	9.2	-	9.2	-
Step 3- Step 4	0.4	-	9.2	-	9.2	-
Step 4- Step 5	0.4	0.4	9.8	9.8	9.8	9.8

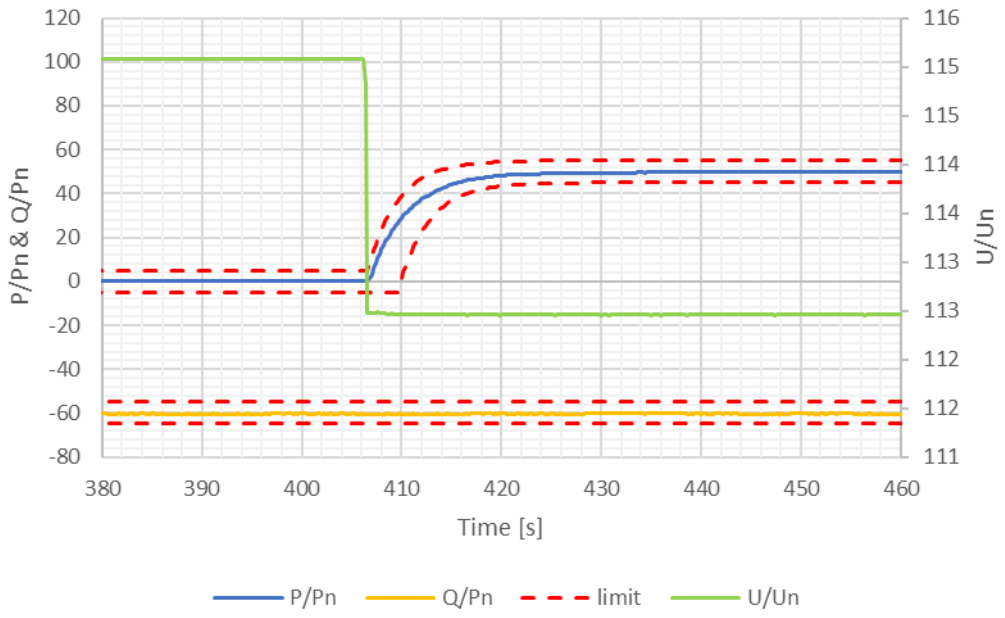
Step 1- Step 2



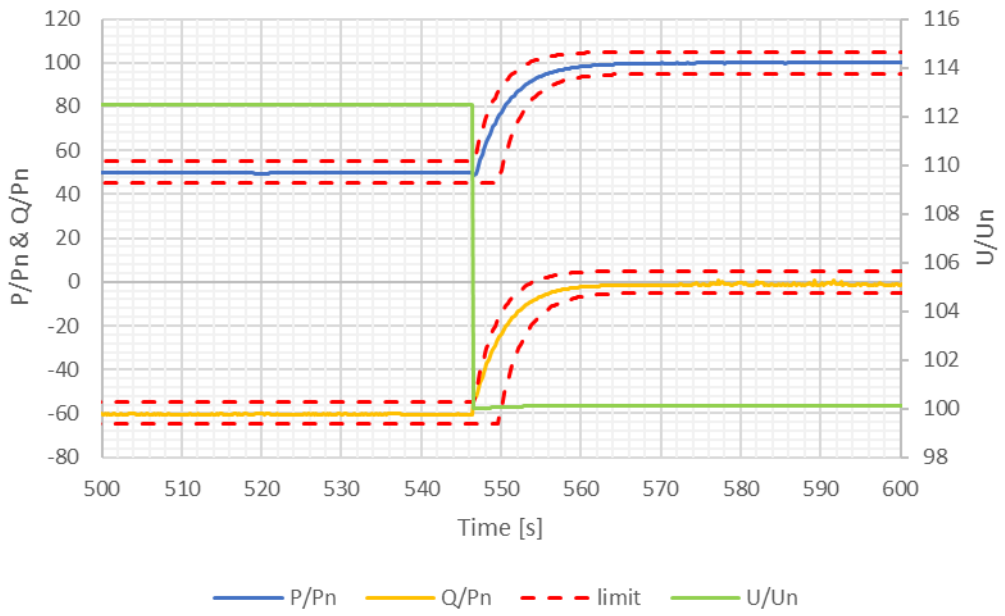
Step 2- Step 3



Step 3- Step 4



Step 4- Step 5



Assessment criterion:

P(U) setting

U/Un(%)	110	115
P/Pn(%)	100	0

Unless further requirements apply for a specific grid code, the test shall be considered passed if:

The measured 30-s averages of the active power (positive sequence components) during steady-stateconditions are within a tolerance band of ± 2% Smax and ± 1 %Un, of the set P(U) characteristic.

the time response of the active power during the measurement represents the applied configuration withinthe tolerance band resulting from the behaviour of an equivalent first order filter element and the configuredtime constant tau. Accepted tolerances are

-5 % Pn, for the active power values and 3 s for the time in case of a power decrease.

+5 % Pn, for the active power values and 3 s for the time in case of a power increase.

No discontinuities in the characteristic curve are detected and no oscillations of the active power after theend of the transient period of 5 τ as configured and no disconnection of the EUT occur.

The settings of the function, as well as the enabling and disabling of the function, are field adjustable andmeans are provided to protect these from unpermitted interference (e.g. password or seal).

Note:

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.7	**EMC and power quality**	
5.7.1	EMC	P
5.7.2	Power Quality	
5.7.2.2	Verification procedure for harmonics, interharmonics and higher frequencies up to 9 kHz	P
5.7.2.3	Verification procedure for flicker and rapid voltage changes	P
5.7.2.3.2	Flicker - Generation units with a rated currents 75 A	N/A
5.7.2.3.3	Flicker - Generation units with a rated currents >75 A	P
5.7.2.3.4	Rapid voltage changes - Generation units with a rated current 75A	N/A
5.7.2.3.5	Rapid voltage changes - Generation units with a rated current> 75 A	P
5.7.2.4	Verification procedure for DC injection	P

5.7 EMC and power quality 5.7.2.2 Verification procedure for harmonics, interharmonics and higher frequencies up to 9 kHz							P
Model: TAA-125KW-11							
Power Level	**33%**		**66%**		**100%**		
Harmonic	**Current Magnitude (A)**	**% of Funda-mental**	**Current Magnitude (A)**	**% of Funda-mental**	**Current Magnitude (A)**	**% of Funda-mental**	**Harmonic Current Limits (%)**
2nd	0.206	0.346	0.365	0.304	0.406	0.224	8.000
3rd	0.266	0.447	0.165	0.138	0.319	0.176	N/A
4th	0.052	0.087	0.230	0.192	0.338	0.186	4.000
5th	0.209	0.351	0.177	0.148	0.187	0.103	10.700
6th	0.030	0.051	0.173	0.144	0.223	0.123	2.670
7th	0.277	0.465	0.203	0.170	0.274	0.151	7.200
8th	0.029	0.048	0.049	0.041	0.071	0.039	2.000
9th	0.284	0.476	0.131	0.109	0.150	0.083	N/A
10th	0.031	0.052	0.048	0.040	0.082	0.045	1.600
11th	0.850	1.428	0.909	0.758	1.219	0.672	3.100
12th	0.023	0.038	0.039	0.032	0.050	0.027	1.330
13th	0.565	0.949	0.523	0.437	0.671	0.370	2.000
14th	0.015	0.025	0.030	0.025	0.041	0.023	N/A
15th	0.353	0.592	0.384	0.321	0.442	0.244	N/A
16th	0.010	0.018	0.031	0.026	0.031	0.017	N/A
17th	0.337	0.566	0.378	0.315	0.372	0.205	N/A
18th	0.017	0.028	0.032	0.026	0.036	0.020	N/A
19th	0.307	0.515	0.323	0.270	0.303	0.167	N/A
20th	0.015	0.025	0.029	0.024	0.035	0.019	N/A
21st	0.220	0.369	0.268	0.224	0.253	0.140	N/A
22nd	0.009	0.016	0.028	0.024	0.028	0.015	N/A
23rd	0.172	0.289	0.254	0.212	0.251	0.138	N/A
24th	0.008	0.014	0.023	0.020	0.030	0.016	N/A
25th	0.139	0.233	0.215	0.180	0.222	0.122	N/A

26th	0.008	0.013	0.022	0.018	0.025	0.014	N/A
27th	0.109	0.183	0.176	0.147	0.189	0.104	N/A
28th	0.010	0.016	0.021	0.018	0.027	0.015	N/A
29th	0.095	0.160	0.164	0.137	0.182	0.101	N/A
30th	0.008	0.014	0.017	0.014	0.026	0.014	N/A
31st	0.094	0.159	0.145	0.121	0.163	0.090	N/A
32nd	0.008	0.013	0.017	0.014	0.021	0.012	N/A
33rd	0.081	0.136	0.127	0.106	0.140	0.077	N/A
34th	0.006	0.010	0.015	0.012	0.021	0.011	N/A
35th	0.061	0.102	0.126	0.105	0.137	0.075	N/A
36th	0.007	0.011	0.015	0.013	0.019	0.011	N/A
37th	0.060	0.101	0.122	0.102	0.126	0.070	N/A
38th	0.008	0.013	0.015	0.012	0.021	0.011	N/A
39th	0.055	0.092	0.114	0.095	0.114	0.063	N/A
40th	0.006	0.010	0.014	0.012	0.019	0.010	N/A
41st	0.040	0.066	0.111	0.092	0.121	0.067	N/A
42nd	0.007	0.012	0.013	0.011	0.019	0.011	N/A
43rd	0.044	0.074	0.104	0.087	0.124	0.069	N/A
44th	0.008	0.014	0.013	0.011	0.023	0.012	N/A
45th	0.054	0.091	0.100	0.084	0.123	0.068	N/A
46th	0.007	0.012	0.012	0.010	0.019	0.010	N/A
47th	0.035	0.058	0.091	0.076	0.129	0.071	N/A
48th	0.005	0.008	0.011	0.009	0.022	0.012	N/A
49th	0.028	0.047	0.078	0.065	0.131	0.072	N/A
50th	0.010	0.016	0.017	0.015	0.028	0.015	N/A
THD [%]	--	2.283	--	1.241	--	1.012	13
PWHD [%]	--	5.212	--	3.493	--	2.474	22

Note:

Samplerate：20 kHz

Choose the maximum value of three phases.

5.7 EMC and power quality 5.7.2.2 Verification procedure for harmonics, interharmonics and higher frequencies up to 9 kHz	P

The currents of the interharmonics to 2 kHz must be measured in accordance with DIN EN 61000-4-7 (VDE 0817-4-7), Annex A. The measurements of higher-frequency harmonic currents between 2 kHz and 9 kHz must be conducted in line with DIN EN 61000-4-7 (VDE 0847-4-7), Annex B.

Model: TAA-125KW-11

Harmonics

P/P_n [%]	0/5	10	20	30	40	50	60	70	80	90	100
Order	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.071	0.139	0.101	0.138	0.128	0.180	0.107	0.228	0.210	0.231	0.236
3	0.299	0.253	0.147	0.145	0.192	0.131	0.202	0.096	0.130	0.143	0.171
4	0.069	0.061	0.043	0.028	0.023	0.132	0.021	0.131	0.156	0.175	0.182
5	0.156	0.198	0.100	0.120	0.108	0.067	0.088	0.079	0.072	0.098	0.093
6	0.093	0.020	0.021	0.017	0.017	0.095	0.012	0.096	0.099	0.117	0.121
7	0.029	0.049	0.110	0.147	0.042	0.091	0.165	0.118	0.125	0.143	0.154
8	0.057	0.079	0.019	0.016	0.013	0.041	0.021	0.029	0.039	0.038	0.042
9	0.046	0.036	0.053	0.150	0.196	0.077	0.134	0.080	0.069	0.076	0.086
10	0.016	0.022	0.017	0.016	0.012	0.025	0.010	0.027	0.028	0.046	0.046
11	0.041	0.084	0.280	0.437	0.445	0.433	0.453	0.521	0.573	0.625	0.674
12	0.018	0.015	0.011	0.011	0.009	0.029	0.007	0.021	0.022	0.024	0.029
13	0.089	0.048	0.224	0.275	0.341	0.291	0.290	0.296	0.310	0.336	0.370
14	0.021	0.010	0.004	0.009	0.007	0.027	0.005	0.016	0.020	0.020	0.024
15	0.066	0.116	0.094	0.197	0.232	0.227	0.204	0.212	0.218	0.226	0.245
16	0.019	0.032	0.008	0.007	0.007	0.030	0.004	0.015	0.014	0.019	0.017
17	0.036	0.148	0.083	0.202	0.204	0.218	0.212	0.206	0.204	0.204	0.206
18	0.013	0.013	0.006	0.008	0.006	0.025	0.005	0.017	0.017	0.019	0.020
19	0.038	0.045	0.076	0.165	0.164	0.176	0.192	0.175	0.171	0.168	0.166
20	0.011	0.007	0.006	0.006	0.005	0.022	0.004	0.015	0.015	0.018	0.020
21	0.039	0.019	0.041	0.101	0.115	0.137	0.144	0.148	0.145	0.142	0.140
22	0.009	0.006	0.006	0.003	0.005	0.020	0.005	0.015	0.015	0.016	0.016
23	0.038	0.077	0.043	0.077	0.103	0.120	0.137	0.142	0.143	0.142	0.138
24	0.008	0.017	0.004	0.004	0.005	0.015	0.004	0.013	0.013	0.016	0.017
25	0.027	0.077	0.053	0.073	0.095	0.097	0.122	0.122	0.126	0.124	0.122

26	0.007	0.007	0.003	0.005	0.004	0.014	0.003	0.012	0.013	0.015	0.014
27	0.023	0.032	0.045	0.061	0.073	0.080	0.091	0.100	0.105	0.104	0.104
28	0.007	0.007	0.004	0.005	0.005	0.013	0.004	0.012	0.013	0.015	0.016
29	0.023	0.026	0.043	0.048	0.060	0.073	0.083	0.094	0.098	0.102	0.100
30	0.007	0.005	0.003	0.003	0.004	0.013	0.003	0.008	0.010	0.012	0.014
31	0.020	0.044	0.049	0.045	0.059	0.066	0.080	0.083	0.087	0.090	0.090
32	0.006	0.010	0.003	0.004	0.003	0.013	0.003	0.008	0.010	0.013	0.012
33	0.017	0.043	0.045	0.040	0.050	0.060	0.067	0.073	0.076	0.077	0.077
34	0.006	0.007	0.003	0.003	0.003	0.012	0.004	0.008	0.010	0.012	0.018
35	0.015	0.027	0.039	0.029	0.040	0.056	0.062	0.072	0.075	0.074	0.075
36	0.005	0.005	0.003	0.003	0.003	0.012	0.002	0.009	0.009	0.010	0.011
37	0.014	0.028	0.040	0.029	0.040	0.051	0.065	0.069	0.072	0.071	0.069
38	0.005	0.005	0.003	0.004	0.003	0.011	0.002	0.008	0.009	0.011	0.012
39	0.013	0.032	0.039	0.029	0.036	0.047	0.058	0.066	0.068	0.068	0.063
40	0.006	0.008	0.003	0.003	0.003	0.012	0.003	0.008	0.009	0.012	0.011
41	0.012	0.027	0.033	0.022	0.025	0.045	0.051	0.066	0.071	0.071	0.067
42	0.006	0.006	0.003	0.003	0.003	0.012	0.002	0.008	0.010	0.011	0.011
43	0.012	0.022	0.032	0.022	0.028	0.044	0.052	0.062	0.071	0.072	0.068
44	0.006	0.004	0.002	0.003	0.004	0.013	0.003	0.007	0.009	0.012	0.013
45	0.012	0.027	0.029	0.019	0.036	0.045	0.049	0.060	0.068	0.070	0.067
46	0.004	0.005	0.003	0.004	0.004	0.013	0.003	0.006	0.009	0.012	0.011
47	0.013	0.029	0.025	0.017	0.029	0.043	0.039	0.055	0.067	0.071	0.071
48	0.006	0.010	0.003	0.003	0.004	0.010	0.004	0.006	0.009	0.012	0.013
49	0.019	0.028	0.020	0.020	0.026	0.039	0.045	0.046	0.065	0.074	0.071
50	0.006	0.008	0.005	0.004	0.004	0.011	0.004	0.006	0.012	0.015	0.016
Interharmonics at continuous operation											
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100
f [Hz]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]
75	0.082	0.193	0.107	0.268	0.307	0.288	0.303	0.294	0.178	0.194	0.182
125	0.070	0.138	0.123	0.184	0.146	0.259	0.147	0.318	0.181	0.116	0.118
175	0.060	0.100	0.091	0.105	0.095	0.177	0.092	0.182	0.207	0.133	0.120
225	0.047	0.071	0.071	0.079	0.081	0.088	0.074	0.096	0.141	0.089	0.076
275	0.041	0.059	0.039	0.048	0.051	0.085	0.080	0.145	0.143	0.148	0.129

325	0.027	0.048	0.029	0.034	0.032	0.050	0.032	0.054	0.066	0.108	0.069
375	0.027	0.041	0.026	0.030	0.028	0.047	0.028	0.052	0.055	0.082	0.081
425	0.026	0.034	0.025	0.028	0.026	0.037	0.025	0.038	0.041	0.050	0.079
475	0.020	0.034	0.018	0.025	0.022	0.038	0.020	0.041	0.042	0.044	0.066
525	0.016	0.027	0.016	0.021	0.021	0.022	0.019	0.026	0.026	0.026	0.035
575	0.015	0.022	0.014	0.020	0.019	0.019	0.015	0.021	0.022	0.023	0.025
625	0.013	0.019	0.013	0.017	0.018	0.018	0.014	0.019	0.018	0.020	0.019
675	0.013	0.018	0.013	0.016	0.018	0.017	0.013	0.017	0.016	0.018	0.018
725	0.013	0.018	0.013	0.016	0.017	0.017	0.014	0.017	0.017	0.018	0.018
775	0.014	0.017	0.013	0.015	0.016	0.016	0.013	0.016	0.016	0.017	0.018
825	0.015	0.021	0.019	0.015	0.015	0.016	0.012	0.015	0.015	0.015	0.017
875	0.013	0.017	0.011	0.014	0.014	0.014	0.012	0.014	0.014	0.014	0.017
925	0.013	0.015	0.010	0.013	0.012	0.013	0.010	0.013	0.012	0.012	0.014
975	0.013	0.014	0.011	0.014	0.013	0.014	0.010	0.013	0.012	0.011	0.013
1025	0.010	0.012	0.010	0.012	0.011	0.013	0.011	0.013	0.013	0.013	0.014
1075	0.008	0.012	0.009	0.011	0.010	0.011	0.009	0.011	0.011	0.011	0.011
1125	0.008	0.013	0.009	0.012	0.013	0.014	0.009	0.014	0.011	0.011	0.011
1175	0.008	0.011	0.009	0.010	0.010	0.011	0.009	0.011	0.011	0.010	0.011
1225	0.007	0.011	0.009	0.010	0.010	0.010	0.008	0.011	0.010	0.010	0.010
1275	0.008	0.011	0.008	0.010	0.010	0.009	0.008	0.010	0.010	0.010	0.014
1325	0.007	0.011	0.008	0.010	0.010	0.010	0.008	0.010	0.010	0.010	0.010
1375	0.008	0.010	0.010	0.011	0.010	0.009	0.008	0.010	0.010	0.009	0.010
1425	0.007	0.010	0.008	0.009	0.009	0.009	0.008	0.010	0.010	0.011	0.010
1475	0.008	0.011	0.008	0.009	0.010	0.009	0.007	0.009	0.009	0.010	0.009
1525	0.009	0.013	0.008	0.008	0.009	0.009	0.007	0.009	0.009	0.009	0.009
1575	0.008	0.013	0.008	0.009	0.010	0.009	0.008	0.009	0.009	0.009	0.009
1625	0.008	0.012	0.007	0.008	0.008	0.019	0.007	0.009	0.009	0.016	0.010
1675	0.009	0.010	0.008	0.009	0.009	0.010	0.009	0.009	0.021	0.022	0.011
1725	0.007	0.010	0.007	0.008	0.008	0.008	0.008	0.013	0.014	0.009	0.028
1775	0.007	0.009	0.008	0.008	0.008	0.008	0.007	0.020	0.009	0.009	0.009
1825	0.007	0.009	0.007	0.008	0.008	0.008	0.007	0.009	0.009	0.008	0.010
1875	0.007	0.009	0.008	0.008	0.008	0.008	0.007	0.008	0.008	0.008	0.008
1925	0.009	0.017	0.017	0.020	0.020	0.021	0.007	0.008	0.008	0.009	0.009
1975	0.008	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.009	0.010

Higher Frequencies components											
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100
f [kHz]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]	I_h [%]
2.1	0.025	0.041	0.049	0.036	0.042	0.067	0.075	0.093	0.103	0.105	0.099
2.3	0.025	0.047	0.043	0.032	0.050	0.067	0.064	0.084	0.099	0.104	0.101
2.5	0.042	0.048	0.039	0.034	0.038	0.060	0.078	0.066	0.092	0.112	0.114
2.7	0.050	0.061	0.048	0.038	0.041	0.069	0.072	0.099	0.058	0.072	0.110
2.9	0.032	0.043	0.031	0.027	0.030	0.061	0.051	0.092	0.090	0.061	0.046
3.1	0.022	0.023	0.023	0.023	0.023	0.038	0.036	0.055	0.085	0.086	0.061
3.3	0.017	0.017	0.019	0.019	0.019	0.019	0.035	0.023	0.048	0.068	0.068
3.5	0.025	0.028	0.024	0.023	0.022	0.021	0.041	0.030	0.028	0.055	0.070
3.7	0.039	0.040	0.034	0.041	0.031	0.039	0.034	0.055	0.048	0.037	0.058
3.9	0.043	0.042	0.039	0.046	0.040	0.048	0.042	0.056	0.071	0.064	0.059
4.1	0.052	0.056	0.048	0.060	0.049	0.052	0.093	0.086	0.131	0.124	0.104
4.3	0.053	0.066	0.052	0.050	0.050	0.047	0.065	0.065	0.085	0.102	0.094
4.5	0.118	0.100	0.069	0.065	0.071	0.068	0.072	0.086	0.081	0.097	0.090
4.7	0.083	0.074	0.049	0.066	0.073	0.078	0.053	0.081	0.087	0.093	0.095
4.9	0.106	0.114	0.098	0.106	0.115	0.167	0.147	0.237	0.266	0.258	0.226
5.1	0.081	0.088	0.078	0.081	0.085	0.108	0.103	0.149	0.173	0.171	0.154
5.3	0.018	0.020	0.014	0.016	0.017	0.018	0.016	0.021	0.029	0.036	0.043
5.5	0.011	0.017	0.014	0.015	0.016	0.016	0.011	0.016	0.021	0.027	0.031
5.7	0.011	0.012	0.011	0.011	0.011	0.010	0.009	0.013	0.016	0.021	0.022
5.9	0.009	0.010	0.011	0.011	0.011	0.009	0.010	0.010	0.011	0.014	0.015
6.1	0.015	0.013	0.015	0.014	0.014	0.014	0.012	0.013	0.014	0.016	0.020
6.3	0.066	0.063	0.062	0.066	0.071	0.085	0.085	0.105	0.119	0.136	0.158
6.5	0.058	0.056	0.057	0.059	0.063	0.073	0.074	0.089	0.099	0.111	0.126
6.7	0.011	0.010	0.012	0.011	0.011	0.010	0.010	0.010	0.010	0.010	0.011
6.9	0.006	0.006	0.007	0.007	0.007	0.006	0.007	0.007	0.008	0.009	0.009
7.1	0.006	0.006	0.006	0.007	0.007	0.006	0.007	0.007	0.008	0.009	0.009
7.3	0.005	0.006	0.007	0.007	0.007	0.007	0.007	0.007	0.008	0.009	0.010
7.5	0.005	0.005	0.006	0.006	0.007	0.006	0.007	0.007	0.007	0.007	0.007
7.7	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.007	0.007	0.008	0.008
7.9	0.005	0.005	0.006	0.006	0.007	0.006	0.007	0.008	0.009	0.009	0.009

8.1	0.005	0.005	0.006	0.006	0.006	0.005	0.006	0.006	0.007	0.007	0.007
8.3	0.005	0.005	0.006	0.006	0.006	0.005	0.006	0.006	0.006	0.006	0.006
8.5	0.005	0.005	0.006	0.007	0.007	0.005	0.007	0.006	0.006	0.007	0.007
8.7	0.006	0.006	0.007	0.007	0.007	0.006	0.007	0.007	0.007	0.007	0.006
8.9	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.007	0.006	0.006

Note:

The normalization current is 181.15A.

R_A=0.15 Ω j_{XA}=0.15 Ω

R_N=0.16 Ω j_{XN}=0.10 Ω

Samplerate：20 kHz

Choose the maxium value of three phases

5.7.2.3 Verification procedure for flicker and rapid voltage change 5.7.2.3.3 Flicker - Generation units with a rated current > 75 A	P

Model: TAA-125KW-11

Test:

Test conditions:	The objective of the test is to determine the system flicker coefficient c(Ψk) at the system impedance angles 30°, 50°, 70° and 85°. The flicker coefficient is determined according to the equation in 3.1.8.2. The system flicker coefficient c(Ψk) is determined for continuous operation without disturbances. It shall be normalized to the nominal apparent power. The apparent short-circuit power Sk shall be referenced to a symmetrical short-circuit of the test source for a three-phase EUT, and to the single-phase short-circuit power in the case of a single-phase EUT.

Test:

%Pn		Pst				Ficker coefficient, c(ψk)			
		30°	50°	70°	85°	30°	50°	70°	85°
0	L1	0.0010	0.0008	0.0009	0.0011	0.0330	0.0264	0.0297	0.0363
	L2	0.0010	0.0008	0.0010	0.0012	0.0330	0.0264	0.0330	0.0396
	L3	0.0010	0.0008	0.0009	0.0011	0.0330	0.0264	0.0297	0.0363
10	L1	0.0010	0.0010	0.0010	0.0010	0.0330	0.0330	0.0330	0.0330
	L2	0.0010	0.0010	0.0010	0.0009	0.0330	0.0330	0.0330	0.0297
	L3	0.0008	0.0008	0.0008	0.0008	0.0264	0.0264	0.0264	0.0264
20	L1	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297
	L2	0.0008	0.0008	0.0008	0.0008	0.0264	0.0264	0.0264	0.0264
	L3	0.0008	0.0009	0.0009	0.0009	0.0264	0.0297	0.0297	0.0297
30	L1	0.0011	0.0011	0.0011	0.0011	0.0363	0.0363	0.0363	0.0363
	L2	0.0011	0.0011	0.0011	0.0011	0.0363	0.0363	0.0363	0.0363
	L3	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297
40	L1	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297
	L2	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297
	L3	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297
50	L1	0.0010	0.0010	0.0010	0.0010	0.0330	0.0330	0.0330	0.0330
	L2	0.0010	0.0010	0.0010	0.0009	0.0330	0.0330	0.0330	0.0297
	L3	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297

60	**L1**	0.0011	0.0010	0.0010	0.0010	0.0363	0.0330	0.0330	0.0330
	L2	0.0010	0.0010	0.0010	0.0010	0.0330	0.0330	0.0330	0.0330
	L3	0.0010	0.0010	0.0009	0.0009	0.0330	0.0330	0.0297	0.0297
70	**L1**	0.0011	0.0010	0.0010	0.0010	0.0363	0.0330	0.0330	0.0330
	L2	0.0011	0.0010	0.0010	0.0010	0.0363	0.0330	0.0330	0.0330
	L3	0.0010	0.0010	0.0009	0.0009	0.0330	0.0330	0.0297	0.0297
80	**L1**	0.0010	0.0010	0.0010	0.0010	0.0330	0.0330	0.0330	0.0330
	L2	0.0010	0.0010	0.0010	0.0010	0.0330	0.0330	0.0330	0.0330
	L3	0.0009	0.0009	0.0009	0.0009	0.0297	0.0297	0.0297	0.0297
90	**L1**	0.0011	0.0010	0.0009	0.0009	0.0363	0.0330	0.0297	0.0297
	L2	0.0011	0.0010	0.0009	0.0009	0.0363	0.0330	0.0297	0.0297
	L3	0.0010	0.0010	0.0009	0.0009	0.0330	0.0330	0.0297	0.0297
100	**L1**	0.0012	0.0011	0.0010	0.0010	0.0396	0.0363	0.0330	0.0330
	L2	0.0011	0.0010	0.0010	0.0009	0.0363	0.0330	0.0330	0.0297
	L3	0.0011	0.0010	0.0009	0.0009	0.0363	0.0330	0.0297	0.0297

Test method:

Although EN IEC 61000-3-11 applies only to rated currents ≤ 75 A, flicker of the EUT with rated currents > 75 A is also determined according to DIN EN 61000-3-11.

For controllable generating units with rated currents > 75 A, at least 12 measurements of 10 min each shall be performed. One measurement shall be made for each of the 10 % active power bins from 0 % Pn or minimum regulating level, whichever is the higher to 90 % Pn and three measurements shall be made for the 10 % active power bin from 100 % Pn.

NOTE 2 This means the midpoints of the bins are near 0 % Pn, 10 % Pn, 20 % Pn to 100 % Pn of the EUT.

A measurement consists of determining the short-term flicker strength Pst as a 3-tuple (phases L1, L2 and L3).

The maximum over all Pst shall be selected as the value for the long-term flicker strength Plt.

Note:

Determination of the flicker coefficient: $c(\Psi_k) = P_{st,flc} \times \frac{S_{k,flc}}{S_n}$

Sk.fic/Sn set to 33.

5.7.2.3 Verification procedure for flicker and rapid voltage change 5.7.2.3.5 Rapid voltage changes - Generation units with a rated current > 75 A				P
Model: TAA-125KW-11				
Max, number of switching operations, N_{10}	10			
Max, number of switching operations, N_{120}	120			
Case of switching operation	Start up Cut-in at 10% of rated power			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.0012	0.0012	0.0011	0.0011
Voltage change factor, $k_u(\psi_k)$	0.0777			
Maximum inrush current factor k_{imax}	0.101			
Case of switching operation	Start-up Cut-in at 100% of rated power			
Grid impedance angle	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.0037	0.0030	0.0020	0.0016
Voltage change factor, $k_u(\psi_k)$	0.1597			
Maximum inrush current factor k_{imax}	0.671			
Case of switching operation	Service disconnection at rated power			
Grid impedance angle	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.0010	0.0009	0.0008	0.0008
Voltage change factor, $k_u(\psi_k)$	0.137			
Maximum inrush current factor k_{imax}	0.700			
Worst-case over-all switching operations, k_{imax}	0.700			

Note:
- The maximum number *N*10m of the switching operation within a 10-minute period.
- The maximum number *N*120m of the switching operation within a 2-hour period.
- The flicker step factor *k*f(ψ k) for the network impedance phase angles ψ k = 30°, 50°, 70° and 85°.
- The voltage change factor *k*u(ψ k) for the network impedance phase angles ψ k = 30°, 50°, 70° and 85°.

Flicker step factor *k*f(ψ k)

$$k_f(\psi_k) = \frac{1}{130} \times \frac{S_{k,fic}}{S_n} \times P_{st,fic} \times T_p^{0,31}$$

Voltage change factor *k*u(ψ k)

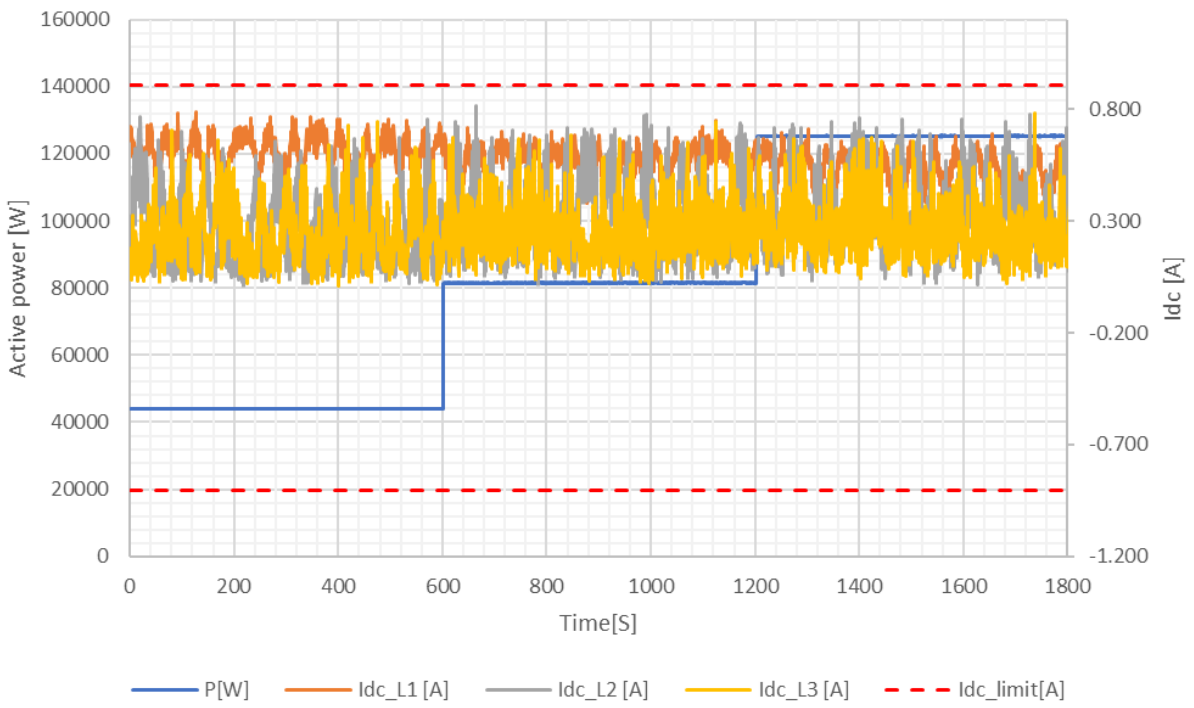
$$k_u(\psi_k) = \sqrt{3} \times \frac{U_{fic,max} - U_{fic,min}}{U_n} \times \frac{S_{k,fic}}{S_n}$$

*U*fic,min is the minimum one period RMS value of the voltage on the fictitious grid during the switching

operation;
*U*fic,max is the maximum one period RMS value of the voltage on the fictitious grid during the switching operation.
$S_{k,fic}/S_n$ in the fictitious grid was set to: 20.83
Choose the maxium value of three phases

5.7.2.4 verification procedure for DC injection			P
Model: TAA-125KW-11			
Protection limit	Tested at four power levels limit 0.5% of I_{AC};nom (0.9A)		
Output power limit	30%-40%	60%-70%	>95%
Output power(W)	43948	81534	125332
Max. test value [A] L1	0.786	0.751	0.710
Max. test value [A] L2	0.765	0.817	0.777
Max. test value [A] L3	0.744	0.745	0.784

Diagram of permanent dc-injection

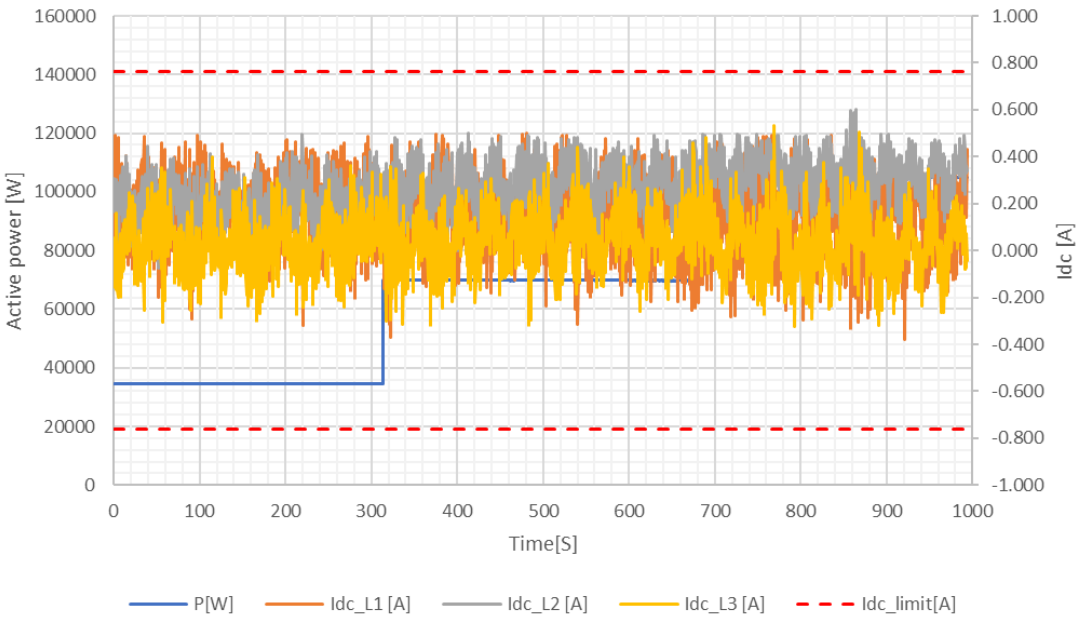


Note:

The average rms value of the mains currents and mains voltages for each phase during the measurement period and the averaged values of the individual DC current components for each phase as percentages of I_{rated} must be written down in the protocol.

5.7.2.4 verification procedure for DC injection			P
Model: TAA-105KW-11			
Protection limit	Tested at four power levels limit 0.5% of I_{AC};nom (0.761A)		
Output power limit	30%-40%	60%-70%	>95%
Output power(W)	34697	69789.27	104959
Max. test value [A] L1	0.492	0.498	0.492
Max. test value [A] L2	0.495	0.499	0.601
Max. test value [A] L3	0.397	0.457	0.534

Diagram of permanent dc-injection



Note:

The average rms value of the mains currents and mains voltages for each phase during the measurement period and the averaged values of the individual DC current components for each phase as percentages of I_{rated} must be written down in the protocol.

5.7.2	EMC and power quality Unbalance					P
Setting values	cos φ = 1			1.00		
	cos φ over-excited			+0.80		
	cos φ under-excited			-0.80		
Test:						
1-min mean value	L1	L2	L3	L1 – L2	L2 – L3	L3 – L1
a) cos φ = 1 at 100 % P_{rE} ± 5 % P_{Emax}						
S_{E60} [VA]	41646	41904	41935	258	31	289
	41640	41886	41925	246	39	285
	41601	41861	41906	260	45	305
	41613	41865	41917	252	52	304
	41575	41861	41911	286	50	336
cos φ_{E60}	0.9999					
max. asymmetry [VA]	336					
b) maximum under-excited (i) at 100 % P_{rE} ± 5 % P_{Emax}						
S_{E60} [VA]	45933	46175	46193	242	18	260
	45945	46198	46224	253	26	279
	45996	46207	46235	211	28	239
	45953	46189	46217	236	28	264
	45928	46192	46204	264	12	276
cos φ_{E60}	0.8025					
max. asymmetry [VA]	279					
c) maximum over-excited (c) at 100 % P_{rE} ± 5 % P_{Emax}						
S_{E60} [VA]	45740	46079	46177	339	98	437
	45732	46077	46159	345	82	427
	45738	46075	46168	337	93	430
	45731	46078	46170	347	92	439
	45719	46081	46158	362	77	439
cos φ_{E60}	0.8012					
max. asymmetry [VA]	439					
d) cos φ = 1 at 50 % P_{rE} ± 5 % P_{Emax}						
S_{E60} [VA]	20711	21020	21162	309	142	451
	20699	21020	21149	321	129	450

	20688	21030	21155	342	125	467
	20689	21034	21149	345	115	460
	20684	21025	21142	341	117	458
cos φ_{E60}	0.9996					
max. asymmetry [VA]	467					
e) maximum under-excited (i) at 50 % P_{rE} ± 5 % P_{Emax}						
S_{E60} [VA]	26097	26486	26594	389	108	497
	26089	26478	26602	389	124	513
	26078	26465	26598	387	133	520
	26084	26460	26599	376	139	515
	26096	26468	26601	372	133	505
cos φ_{E60}	0.7968					
max. asymmetry [VA]	520					
f) maximum over-excited (c) at 50 % P_{rE} ± 5 % P_{Emax}						
S_{E60} [VA]	25654	26021	26174	367	153	520
	25650	26023	26160	373	137	510
	25650	26031	26156	381	125	506
	25646	26031	26168	385	137	522
	25638	26025	26180	387	155	542
cos φ_{E60}:	0.8056					
max. asymmetry [VA]	542					
Limit:	≤5% S_{Emax} and ≤4600VA					

Test:

The maximum absolute difference between the apparent powers of the three phases is determined for each of the five measurements (1-min means) in the respective operating point. The maximum of these five values is again determined.

Assessment criterion:

The test is passed if the maximum value from the above measurements does not exceed 5 % S_{Emax} and ≤ 4600 VA.

4.9.3 Requirements on voltage and frequency protection Checklist			--
Several points to check			
Clause(s) / subclause(s) of this EN 50549-2:2019	**Parameter***	**Configurable value range**	**Value default**
5.2 Operating frequency range	47.0 – 47.5 Hz Duration	0 – 20 s	0s
	47.5 – 48.5 Hz Duration	30 – 90 min	30min
	48.5 – 49.0 Hz Duration	30 – 90 min	30min
	49.0 – 51.0 Hz Duration	not configurable	unlimited
	51.0 – 51.5 Hz Duration	30 – 90 min	30min
	51. 5 – 52 Hz Duration	0 – 15 min	0s
4.4.3 Minimal requirement for active power delivery at underfrequency	Reduction threshold	not configurable	49.5Hz
	Maximum reduction rate	not configurable	10% P_M/Hz
4.4.4 Continuous operating voltage range	Upper limit	not configurable	110% U_n
	Lower limit	not configurable	90% U_n
4.5.2 Rate of change of frequency (ROCOF) immunity	ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology: synchronous generating technology:	not configurable	2 Hz/s
4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology	Maximum power resumption time	not configurable	1 s
	Voltage-Time-Diagram	see Figure 6	Time [s] / U [p.u.] 0.0 / 0.2 0.15 / 0.2 1.5 / 0.85 180 / 0.85 180 / 0.9
4.5.3.3 Under-voltage ride through (UVRT)	Maximum power resumption time	not configurable	N/A

Generating plant with synchronous generating technology	Voltage-Time-Diagram	see Figure 7	N/A	
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time-Diagram	not configurable see Figure 8	Time [s]	Time [s]
			0.0	1.25
			0.1	1.25
			0.1	1.20
			5.0	1.20
			5.0	1.15
			60	1.15
			60	1.10
4.6.1 Power response to overfrequency	Threshold frequency f_1	50.2 Hz – 52 Hz	50.2 Hz	
	Droop	2 % – 12 %	5 %	
	Power reference	P_M | P_{max}	P_{Max} for synchronous generating technology and EESS P_M for other non-synchronous generating technology	
	Intentional delay	0 – 2 s	0s	
	Deactivation threshold f_{stop}	50.0 Hz – f_1	deactivated	
	Deactivation time t_{stop}	0 – 600 s	-	
	Acceptance of staged disconnection	yes | no	yes	
4.6.2 Power response to underfrequency	Threshold frequency f_1	49.8 Hz – 46 Hz	49.8 Hz	
	Droop	2 – 12 %	5 %	
	Power reference	P_M | P_{max}	P_{max}	
	Intentional delay	0 – 2 s	0 s	
4.7.2.2 voltage support by Capabilities	Active factor/ reactive power (%Pd) range overexcited	0.9 – 1 / 48%P_d-0 0.95 – 1 / 33%P_d-0	0.90 – 1 / 48%Pd-0	
	Active factor/ reactive power (%Pd) range underexcited	0.9 – 1 / 48%Pd-0 0.95 – 1 / 33%Pd-0	0.90 – 1 / 48%Pd-0	
4.7.2.3 voltage support by reactive	Enabled control mode	Q setp.	Q set point	

power - Control modes		Q(U) Q(P) cos φ setp. cos φ (P)	
4.7.2.3.2 voltage support by reactive power - Set point control modes	Q set point and excitation	0 – 48 % P_D 0 – 33 % P_D	0
	cos φ setpoint and excitation	1 – 0.9	1
4.7.2.3.3 voltage support by reactive power - Voltage related control modes	Characteristic curve	-	Indicate default characteristic
	Time constant	3 s – 60 s	10 s
	Min cos φ	0.0 – 1	0.9
	Lock in power	0 % – 20 %	deactivated
	Lock out power	0 % – 20 %	deactivated
4.7.2.3.4 voltage support by reactive power - Power related control mode	Characteristic curve	-	Indicate default characteristic
4.7.4.2.2 Zero current mode for converter connected generating technology / Generating Plant with non-synchronous generator	Enabling	enable | disable	disabled
	Static voltage range overvoltage	100 % U_n – 120 % U_n	120 % U_n
	Static voltage range undervoltage	20 % U_n – 100 % U_n	50 % U_n
4.9.3 Requirements on voltage and frequency protection**	Threshold for protection as dedicated device [in A or kW. kVA]	16 A – 250 kVA	Interface protection integrated
	Undervoltage threshold stage 1	0.2 U_n – 1 U_n	0.85 Un
	Undervoltage operate time stage 1	0.1 s – 100 s	99 s
	Undervoltage threshold stage 2	0.2 U_n – 1 U_n	0.5 Un
	Undervoltage operate time stage 2	0.1 s – 5 s	4 s
	Overvoltage threshold stage 1	1.0 U_n – 1.2 U_n	1.2 Un
	Overvoltage operate time stage 1	0.1 s – 100 s	99 s
	Overvoltage threshold stage 2	1.0 U_n – 1.3 U_n	1.3 Un
	Overvoltage operate time stage 2	0.1 s – 5 s	4 s
	Overvoltage threshold 10 min mean protection	1.0 U_n – 1.15 U_n	1.10 Un

	Underfrequency threshold stage 1	47.0 Hz– 50.0 Hz	47.5 Hz
	Underfrequency operate time stage 1	0.1 s – 100 s	99 s
	Underfrequency threshold stage 2	47.0 Hz – 50.0 Hz	47 Hz
	Underfrequency operate time stage 2	0.1 s – 5 s	4 s
	Overfrequency threshold stage 1	50.0 Hz – 52.0 Hz	51.5 Hz
	Overfrequency operate time stage 1	0.1 s – 100 s	99 s
	Overfrequency threshold stage 2	50.0 Hz – 52.0 Hz	52 Hz
	Overfrequency operate time stage 2	0.1 s – 5 s	4 s
4.10.2 Automatic reconnection after tripping	Lower frequency	47.0 Hz – 50.0 Hz	49.5 Hz
	Upper frequency	50.0 Hz – 52.0 Hz	50.2 Hz
	Lower voltage	50 % U_n – 100 % U_n	90 % U_n
	Upper voltage	100 % U_n – 120 % U_n	110 % U_n
	Observation time	10 s – 600 s	60 s
	Active power increase gradient	6 % – 3000 %/min	10 %Pn /min
4.10.2 Automatic reconnection after tripping	Lower frequency	47.0 Hz – 50.0 Hz	49.5 Hz
	Upper frequency	50.0 Hz – 52.0 Hz	50.2 Hz
	Lower voltage	50 % U_n – 100 % U_n	90 % U_n
	Upper voltage	100 % U_n – 120 % U_n	110 % U_n
	Observation time	10 s – 600 s	60 s
	Active power increase gradient	6 % – 3000 %/min	10 % /min
4.10.3 Starting to generate electrical power	Lower frequency	47.0 Hz – 50.0 Hz	49.5 Hz
	Upper frequency	50.0 Hz – 52.0 Hz	50.1 Hz
	Lower voltage	50 % – 100 % U_n	85 % U_n
	Upper voltage	100 % – 120 % U_n	110 % U_n
	Observation time	10 s – 600 s	60 s
	Active power increase gradient	6 % – 3000 %/min	disabled
4.11.1 Ceasing active power	Activation option	--	Can be achieved by PGU. (Logic interface shall be specified by DNO)
4.11.2 Reduction of active power on set	Activation option	--	Can be achieved by PGU. (Definition shall be specified

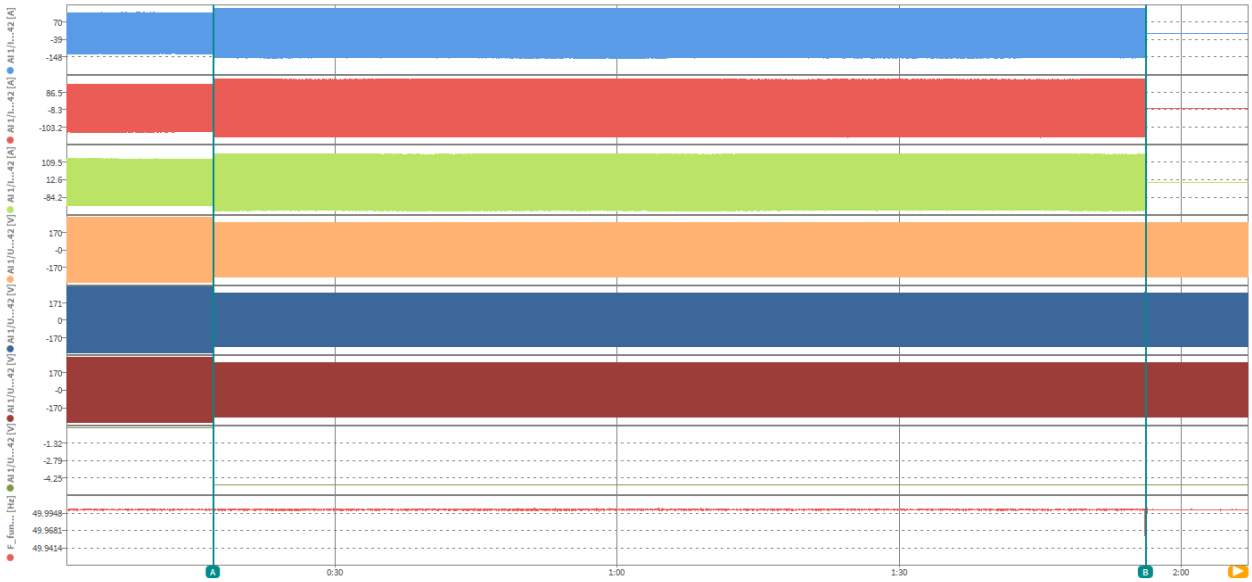
point			by DNO)
4.12 Remote information exchange	Activation option	--	Can be achieved by PGU. (Definition shall be specified by DNO)
*If additional parameters have been evaluated during test, these shall be added as additional lines in the table. **This can be used for manufacturer specific parameter descriptions.			

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.8	**Interface protection**	
5.8.3	Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as internal device	
5.8.4	Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as dedicated device	
5.8.5	Verification procedure for generating plants to be connected to a MV distribution network	
5.8.5.1	Voltage protections	P
5.8.5.2	Overvoltage 10 min mean protection	P
5.8.5.3	Frequency protections	P
5.8.6	Islanding detection	P

5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L1, L2, L3-N)					P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz				
Stage 1	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	
Trip value [V]	196.7		277.2		
	196.0		276.5		
	196.3		277.2		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.027	U_n To $U_{th\text{-}high}$ + 5%U_n	99.083	
		99.014		99.054	
		99.164		99.025	
Stage 2	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.5U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	
Trip value [V]	116.1		299.6		
	115.8		299.7		
	115.4		299.4		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.558	U_n To $U_{th\text{-}high}$ + 5%U_n	4.876	
		4.549		4.830	
		4.562		4.760	

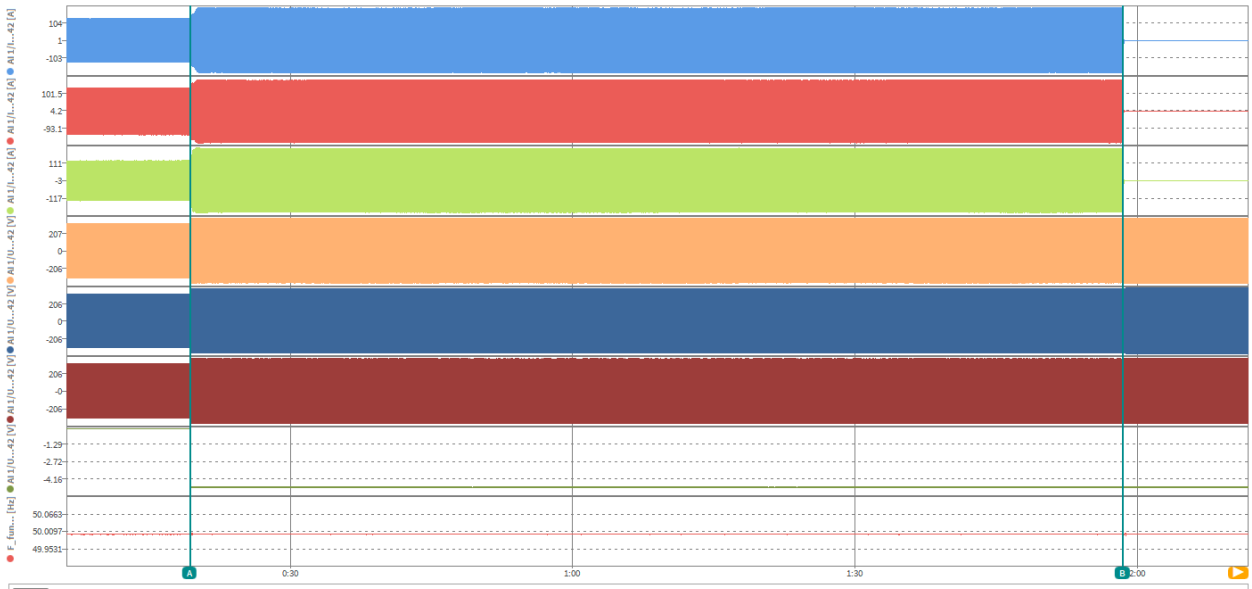
Scope pictures of the disconnection time

Under -voltage – Stage 1



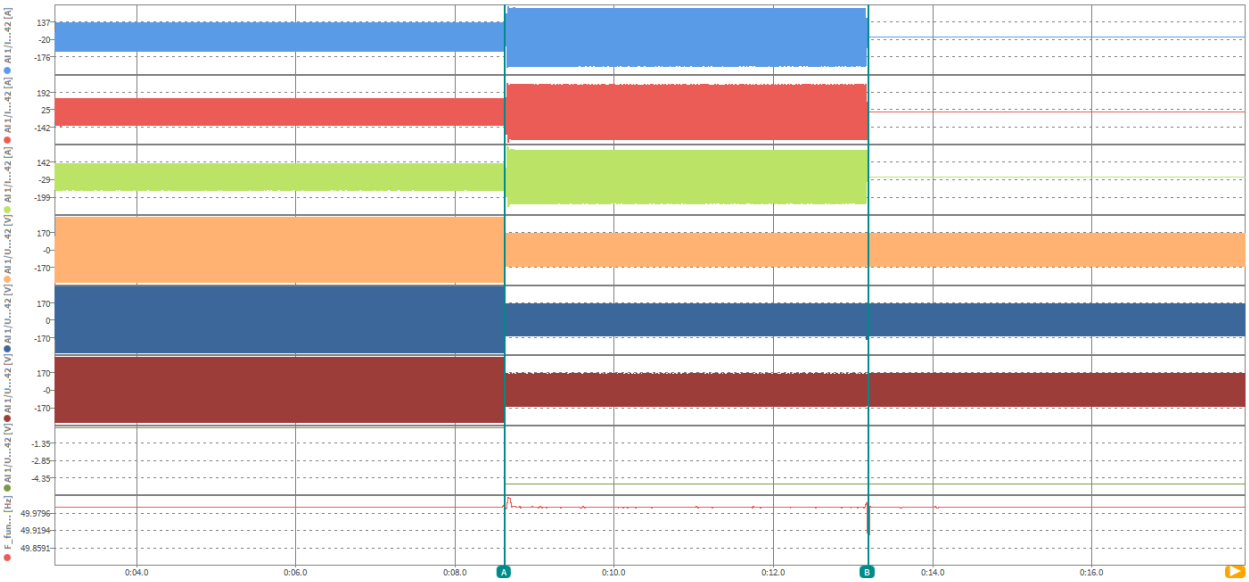
时间 [s]	A	B	间隔	有效值
	0:17.09480	1:56.25830	1:39.16350	
AI 1/I1@TRIONet3_1342 [A]	81.82097	-1.163244	-82.98421	110.3486
AI 1/I2@TRIONet3_1342 [A]	43.55073	-0.998855	-44.54959	111.9389
AI 1/I3@TRIONet3_1342 [A]	-136.2515	-1.913428	134.3380	111.0668
AI 1/U1@TRIONet3_1342 [V]	148.7060	-135.0153	-283.7212	190.0883
AI 1/U2@TRIONet3_1342 [V]	123.8403	268.1813	144.3410	190.0129
AI 1/U3@TRIONet3_1342 [V]	-267.4647	-135.7286	131.7360	190.0969
AI 1/U4@TRIONet3_1342 [V]	-4.916430	-4.915238	1.192e-3	4.916438
F_fund@AC [Hz]	50.00644	50.00019	-6.248e-3	50.00001

Over-voltage – Stage 1



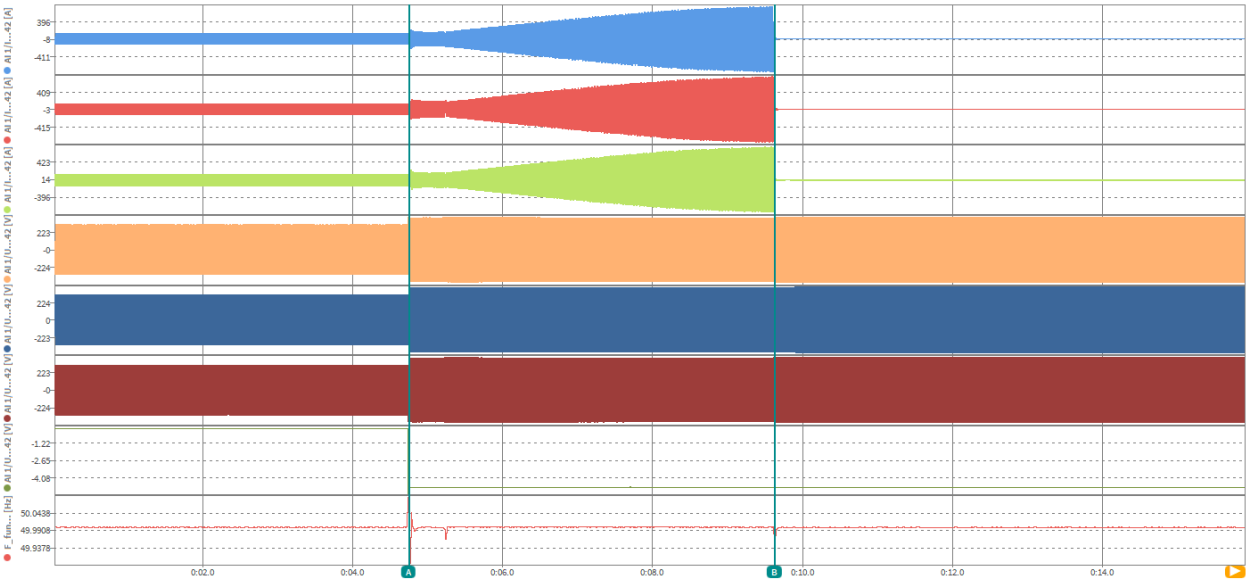
时间 [s]	A	B	间隔	有效值
	0:19.39690	1:58.48010	1:39.08320	
AI 1/I1@TRIONet3_1342 [A]	37.54008	-14.15837	-51.69845	102.9541
AI 1/I2@TRIONet3_1342 [A]	-3.739238	-5.503297	-1.764059	100.0780
AI 1/I3@TRIONet3_1342 [A]	28.23329	1.568794	-26.66450	98.75898
AI 1/U1@TRIONet3_1342 [V]	277.4365	379.7169	102.2804	276.9932
AI 1/U2@TRIONet3_1342 [V]	-373.5514	-114.4848	259.0666	276.9370
AI 1/U3@TRIONet3_1342 [V]	98.62114	-267.6931	-366.3142	277.0113
AI 1/U4@TRIONet3_1342 [V]	-4.907608	-4.915953	-8.345e-3	4.916990
F_fund@AC [Hz]	49.90194	50.00157	0.099632	50.00000

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	8.62330	0:13.18530	4.56200	
AI 1/I1@TRIONet3_1342 [A]	-234.6674	-0.487328	234.1801	185.1799
AI 1/I2@TRIONet3_1342 [A]	343.0795	-0.045896	-343.1254	188.0832
AI 1/I3@TRIONet3_1342 [A]	-133.6763	-3.979564	129.6967	185.0551
AI 1/U1@TRIONet3_1342 [V]	-83.89926	-145.4036	-61.50437	114.3070
AI 1/U2@TRIONet3_1342 [V]	193.1875	128.0291	-65.15837	114.1700
AI 1/U3@TRIONet3_1342 [V]	-73.74454	15.94925	89.69379	114.2259
AI 1/U4@TRIONet3_1342 [V]	-4.919052	-4.915476	3.576e-3	4.917120
F_fund@AC [Hz]	50.00586	50.01728	0.011421	50.00037

Over-voltage – Stage 2

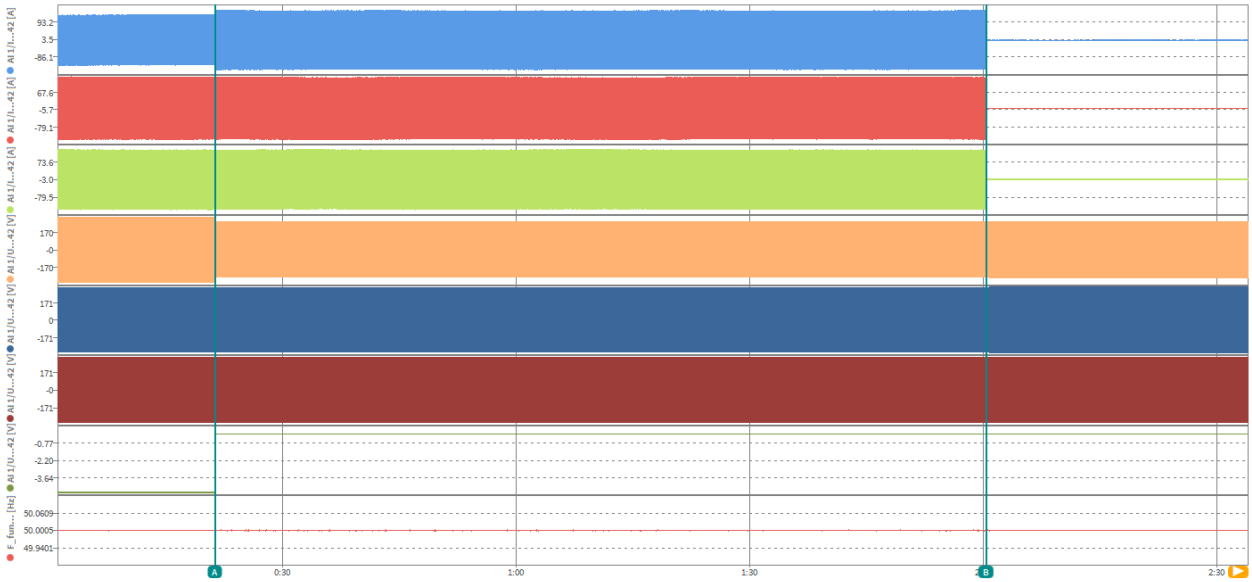


	A	B	间隔
时间 [s]	4.75560	9.63180	4.87620
AI 1/I1@TRIONet3_1342 [A]	127.4821	-7.177234	-134.6593
AI 1/I2@TRIONet3_1342 [A]	-82.11554	0.228643	82.34418
AI 1/I3@TRIONet3_1342 [A]	-43.72764	0.576615	44.30425
AI 1/U1@TRIONet3_1342 [V]	320.0507	95.34646	-224.7043
AI 1/U2@TRIONet3_1342 [V]	-202.7145	-407.4433	-204.7289
AI 1/U3@TRIONet3_1342 [V]	-122.4356	314.3642	436.7998
AI 1/U4@TRIONet3_1342 [V]	-0.462294	-4.903794	-4.441500
F_fund@AC [Hz]	50.09172	49.95726	-0.134460

5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L1-N)				P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz			
Stage 1	**Under-voltage**		**Over-voltage**	
Parameter	Voltage	Time	Voltage	Time
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s
Trip value [V]	196.5		277.7	
	197.1		277.3	
	196.8		277.4	
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.004	U_n To $U_{th\text{-}high}$ + 5%U_n	99.031
		99.020		99.284
		99.007		99.325
Stage 2	**Under-voltage**		**Over-voltage**	
Parameter	Voltage	Time	Voltage	Time
Limit	$0.5U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s
Trip value [V]	115.9		300.0	
	116.6		299.9	
	116.7		300.5	
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.582	U_n To $U_{th\text{-}high}$ + 5%U_n	4.551
		4.564		4.524
		4.539		4.646

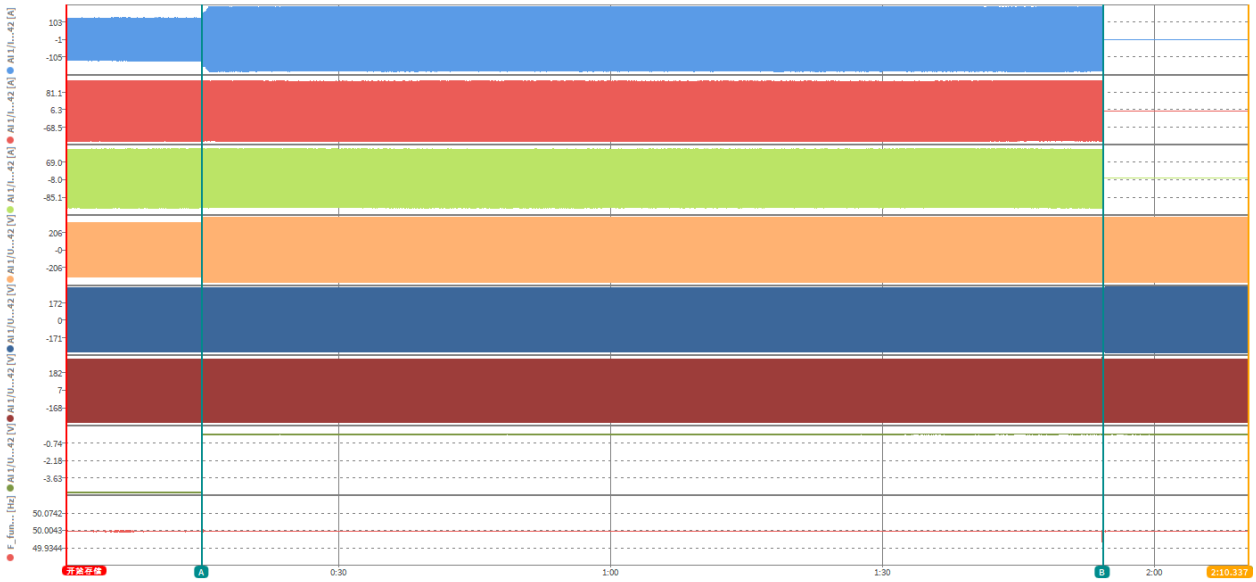
Scope pictures of the disconnection time

Under -voltage – Stage 1



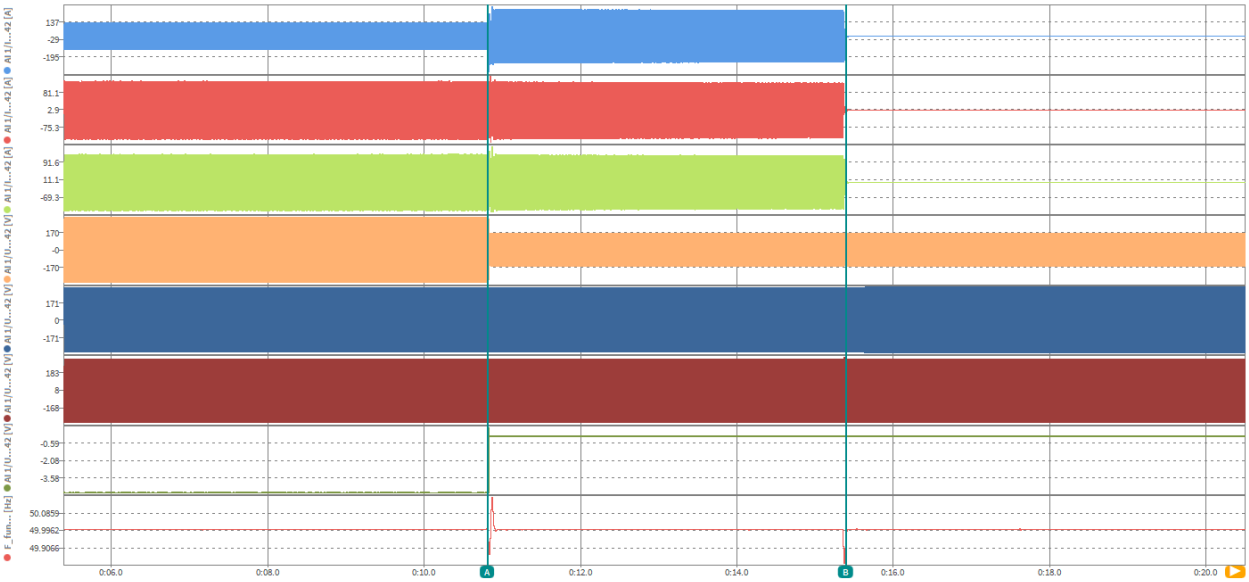
时间 [s]	A	B	间隔	有效值
AI 1/I1@TRIONet3_1342 [A]	158.3856	-1.725674	-160.1113	107.2650
AI 1/I2@TRIONet3_1342 [A]	-79.01299	-3.814340	75.19865	91.94714
AI 1/I3@TRIONet3_1342 [A]	-43.48564	1.899243	45.38489	91.44617
AI 1/U1@TRIONet3_1342 [V]	271.7929	271.0757	-0.717163	195.1124
AI 1/U2@TRIONet3_1342 [V]	-201.5917	-208.6806	-7.088900	229.9107
AI 1/U3@TRIONet3_1342 [V]	-123.6401	-114.0220	9.618044	230.0686
AI 1/U4@TRIONet3_1342 [V]	-0.015020	-2.384e-3	0.012636	0.014395
F_fund@AC [Hz]	50.00324	49.99948	-3.757e-3	49.99996

Over-voltage – Stage 1



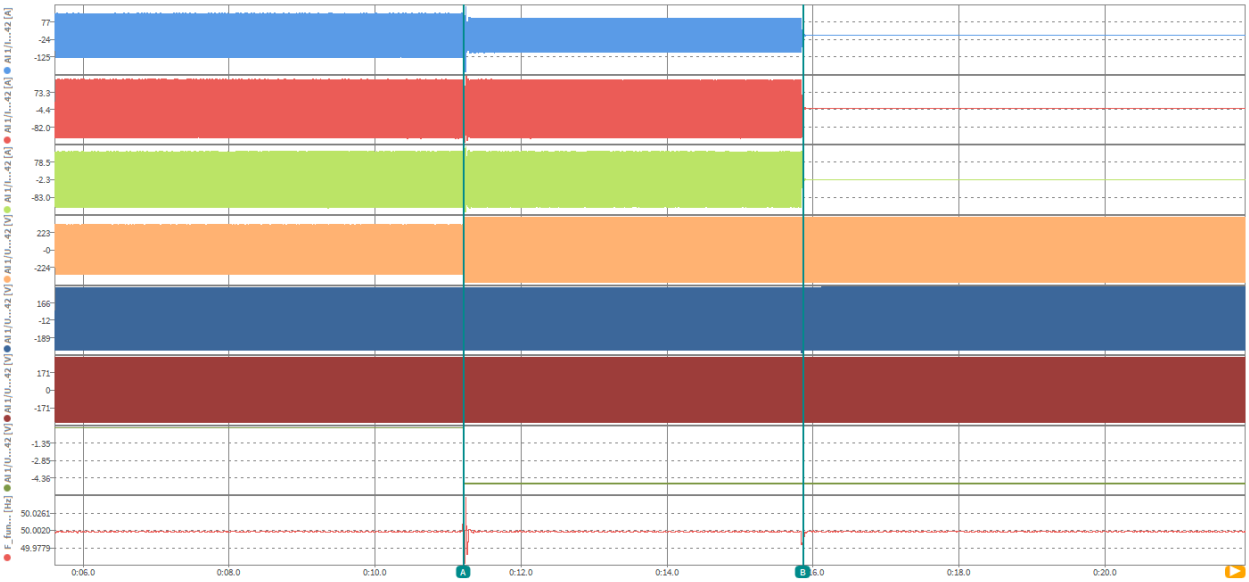
时间 [s]	A	B	间隔	有效值
AI 1/I1@TRIONet3_1342 [A]	-94.45394	-1.184106	93.26983	104.0377
AI 1/I2@TRIONet3_1342 [A]	131.6819	-0.951290	-132.6332	91.81326
AI 1/I3@TRIONet3_1342 [A]	-50.15552	-2.062798	48.09273	91.47639
AI 1/U1@TRIONet3_1342 [V]	-254.9727	-289.9978	-35.02512	276.9594
AI 1/U2@TRIONet3_1342 [V]	318.5480	-69.97538	-388.5234	230.0213
AI 1/U3@TRIONet3_1342 [V]	-112.0768	309.2320	421.3088	230.0339
AI 1/U4@TRIONet3_1342 [V]	-0.011206	-0.010967	2.384e-4	0.014108
F_fund@AC [Hz]	49.99438	49.99998	5.600e-3	49.99995

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	0:10.81570	0:15.39810	4.58240	
AI 1/I1@TRIONet3_1342 [A]	124.5873	0.201106	-124.3862	179.1079
AI 1/I2@TRIONet3_1342 [A]	-48.95222	-4.537821	44.41440	88.83379
AI 1/I3@TRIONet3_1342 [A]	-81.09665	-1.405239	79.69141	88.29601
AI 1/U1@TRIONet3_1342 [V]	319.9487	101.4376	-218.5111	114.7290
AI 1/U2@TRIONet3_1342 [V]	-118.7377	121.3739	240.1116	229.5741
AI 1/U3@TRIONet3_1342 [V]	-206.1188	-320.6895	-114.5706	230.1754
AI 1/U4@TRIONet3_1342 [V]	-4.901886	-0.010014	4.891873	0.207508
F_fund@AC [Hz]	50.00551	49.98256	-0.022949	49.99949

Over-voltage – Stage 2

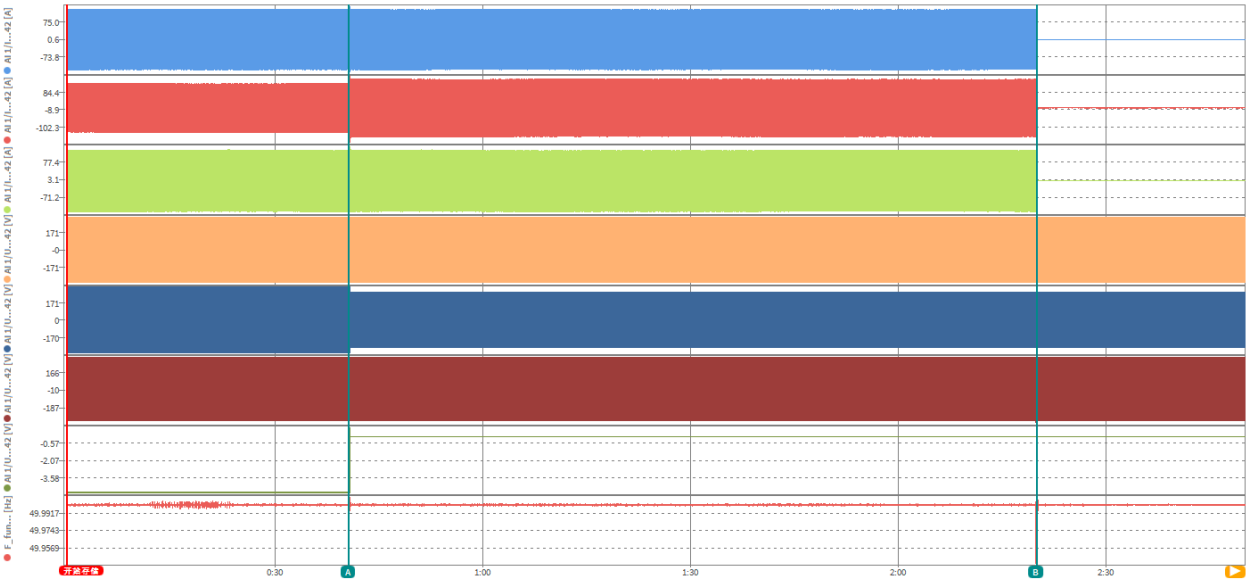


	A	B	间隔	有效值
时间 [s]	0:11.22030	0:15.86660	4.64630	
AI 1/I1@TRIONet3_1342 [A]	-9.535432	-0.398040	9.137393	69.36980
AI 1/I2@TRIONet3_1342 [A]	-115.4691	-5.217076	110.2520	91.81788
AI 1/I3@TRIONet3_1342 [A]	104.2422	0.754356	-103.4879	91.22135
AI 1/U1@TRIONet3_1342 [V]	-100.3795	416.1206	516.5000	299.8971
AI 1/U2@TRIONet3_1342 [V]	-237.7865	-113.7626	124.0239	230.0923
AI 1/U3@TRIONet3_1342 [V]	310.1118	-207.6278	-517.7396	229.9638
AI 1/U4@TRIONet3_1342 [V]	-4.902840	-4.914284	-0.011444	4.916257
F_fund@AC [Hz]	50.01023	49.98726	-0.022972	49.99978

5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L2-N)					P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz				
Stage 1	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	
Trip value [V]	195.4		276.2		
	196.0		276.8		
	195.3		276.5		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.339	U_n To $U_{th\text{-}high}$ + 5%U_n	99.215	
		99.236		99.032	
		99.023		99.027	
Stage 2	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.2U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	
Trip value [V]	115.3		299.3		
	115.5		299.7		
	115.5		298.9		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.551	U_n To $U_{th\text{-}high}$ + 5%U_n	4.602	
		4.559		4.532	
		4.570		4.582	

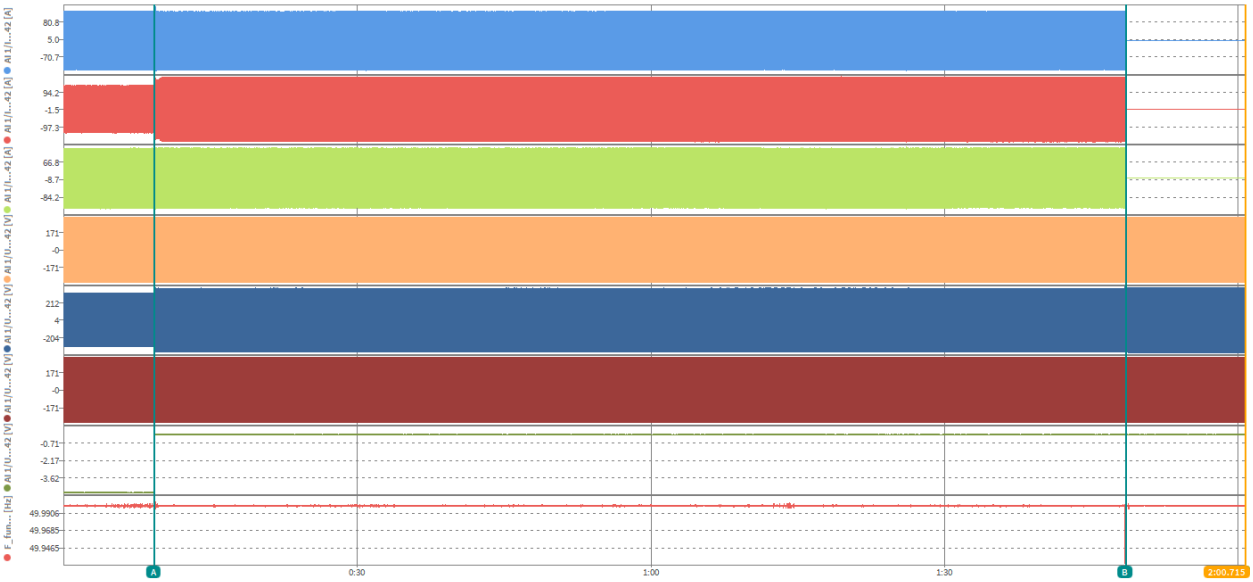
Scope pictures of the disconnection time

Under -voltage – Stage 1



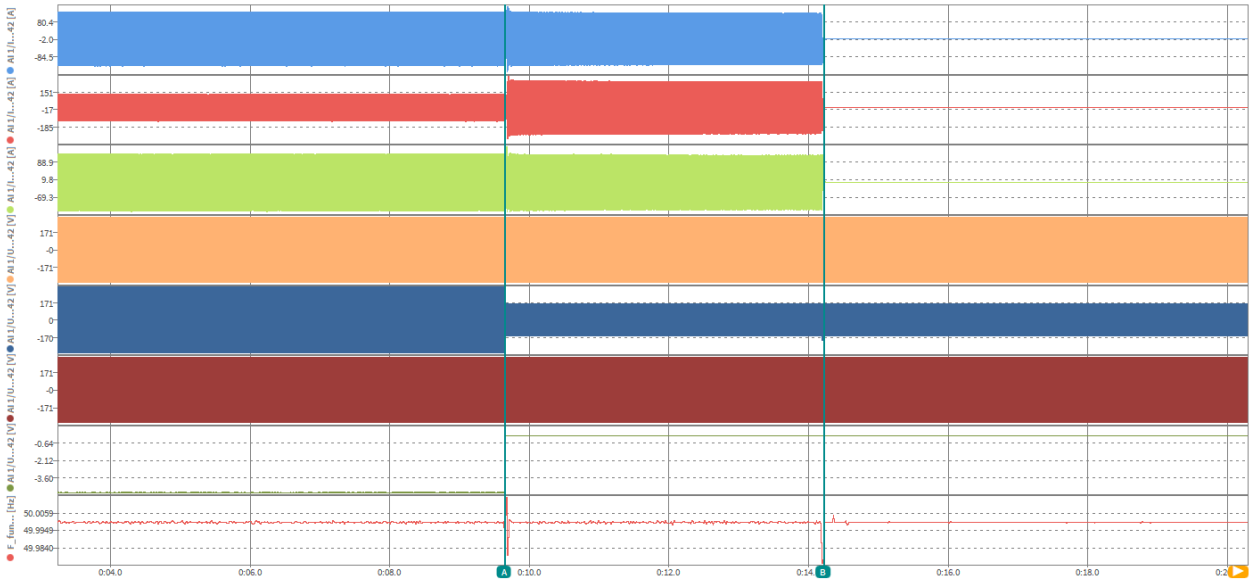
	A	B	间隔	有效值
时间 [s]	0:40.6270	2:19.9662	1:39.3392	
AI 1/I1@TRIONet3_1342 [A]	-129.6467	-1.170755	128.4759	90.46787
AI 1/I2@TRIONet3_1342 [A]	65.51218	-0.955463	-66.46765	108.8276
AI 1/I3@TRIONet3_1342 [A]	58.74801	-2.001882	-60.74989	91.65518
AI 1/U1@TRIONet3_1342 [V]	-323.9494	-311.6403	12.30908	230.0571
AI 1/U2@TRIONet3_1342 [V]	165.0629	198.2708	33.20790	195.1187
AI 1/U3@TRIONet3_1342 [V]	163.7149	78.98903	-84.72586	230.0005
AI 1/U4@TRIONet3_1342 [V]	-4.918099	-0.014782	4.903317	0.211647
F_fund@AC [Hz]	49.99996	50.00020	2.365e-4	49.99996

Over-voltage – Stage 1



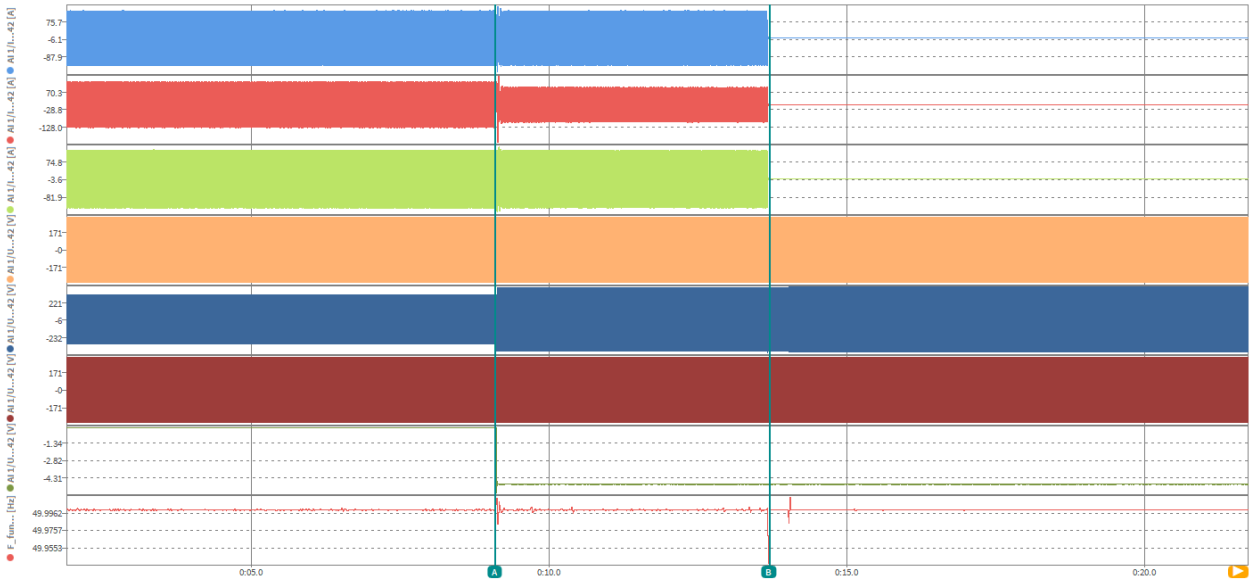
	A	B	间隔	有效值
时间 [s]	9.27320	1:48.48800	1:39.21480	
AI 1/I1@TRIONet3_1342 [A]	63.73644	-1.184106	-64.92055	90.50593
AI 1/I2@TRIONet3_1342 [A]	-131.3056	-0.955463	130.3501	101.2611
AI 1/I3@TRIONet3_1342 [A]	69.49175	-2.020240	-71.51199	91.10213
AI 1/U1@TRIONet3_1342 [V]	151.9110	-300.6597	-452.5707	230.0138
AI 1/U2@TRIONet3_1342 [V]	-323.5052	54.52848	378.0337	276.8684
AI 1/U3@TRIONet3_1342 [V]	177.4905	256.8314	79.34094	230.0998
AI 1/U4@TRIONet3_1342 [V]	-4.914761	-5.722e-3	4.909039	0.113620
F_fund@AC [Hz]	50.00095	50.00004	-9.117e-4	49.99995

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	9.64710	0:14.21660	4.56950	
AI 1/I1@TRIONet3_1342 [A]	61.85723	-3.899455	-65.75668	87.54418
AI 1/I2@TRIONet3_1342 [A]	65.23681	0.528216	-64.70859	182.3036
AI 1/I3@TRIONet3_1342 [A]	-132.4780	-2.628565	129.8494	88.77669
AI 1/U1@TRIONet3_1342 [V]	167.0458	-210.1655	-377.2114	230.1654
AI 1/U2@TRIONet3_1342 [V]	163.0077	-54.52752	-217.5353	114.7456
AI 1/U3@TRIONet3_1342 [V]	-324.0960	317.5793	641.6753	229.7358
AI 1/U4@TRIONet3_1342 [V]	-4.913092	-0.022888	4.890204	0.221358
F_fund@AC [Hz]	50.00079	49.97406	-0.026730	49.99982

Over-voltage – Stage 2

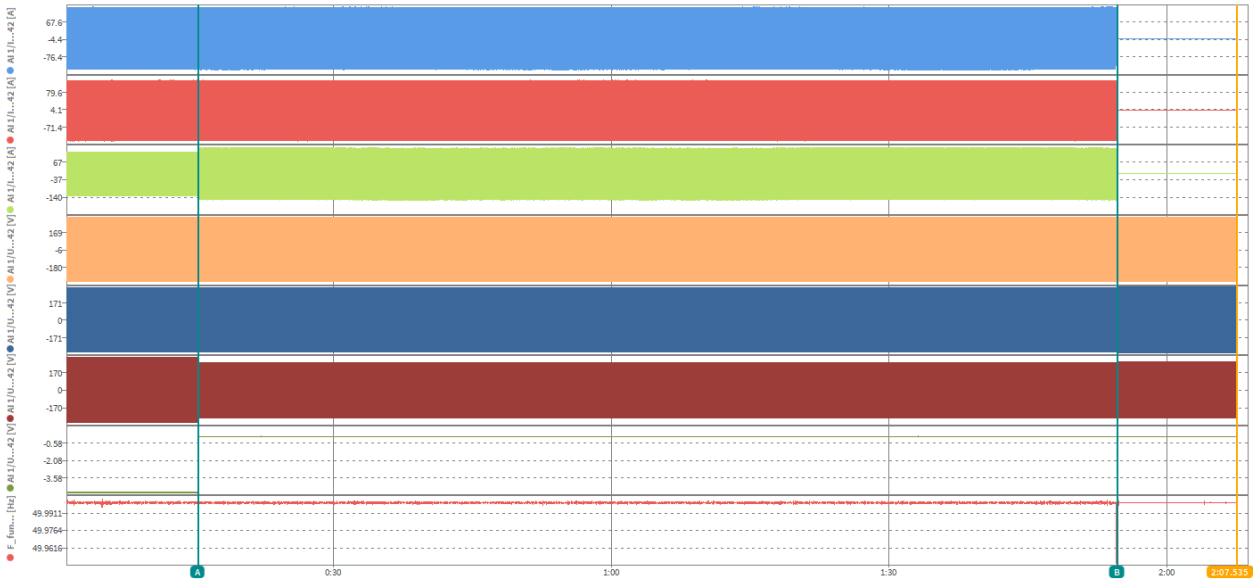


	A	B	间隔	有效值
时间 [s]	9.10470	0:13.70650	4.60180	
AI 1/I1@TRIONet3_1342 [A]	10.05781	-4.237414	-14.29522	90.44510
AI 1/I2@TRIONet3_1342 [A]	-119.9677	-1.669765	118.2979	70.43094
AI 1/I3@TRIONet3_1342 [A]	107.4524	1.554608	-105.8978	90.80129
AI 1/U1@TRIONet3_1342 [V]	27.67039	196.1911	168.5207	229.9561
AI 1/U2@TRIONet3_1342 [V]	-295.1093	-419.6229	-124.5136	299.6534
AI 1/U3@TRIONet3_1342 [V]	265.1518	127.9900	-137.1617	230.1035
AI 1/U4@TRIONet3_1342 [V]	-9.775e-3	-4.904032	-4.894257	4.906759
F_fund@AC [Hz]	50.00003	50.00051	4.807e-4	49.99972

5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L3-N)					P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz				
Stage 1	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	
Trip value [V]	196.3		276.2		
	195.6		275.9		
	195.4		275.8		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.184	U_n To $U_{th\text{-}high}$ + 5%U_n	99.212	
		99.087		99.041	
		99.160		99.124	
Stage 2	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.5U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	
Trip value [V]	115.2		299.3		
	115.1		298.9		
	115.6		298.9		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.539	U_n To $U_{th\text{-}high}$ + 5%U_n	4.565	
		4.547		4.582	
		4.569		4.570	

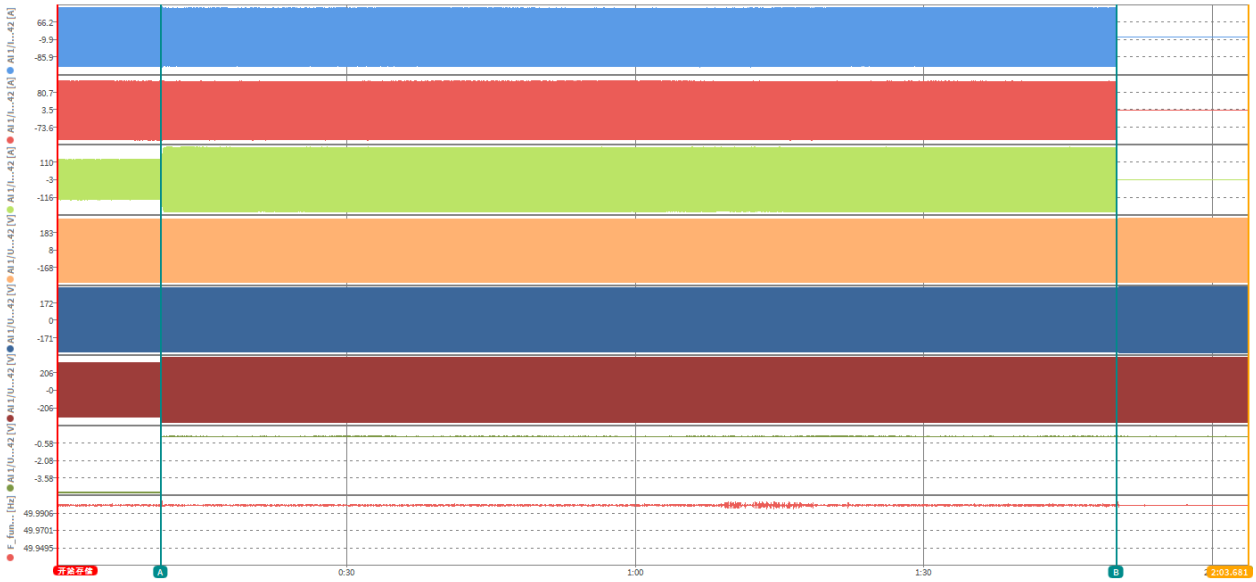
Scope pictures of the disconnection time

Under -voltage – Stage 1



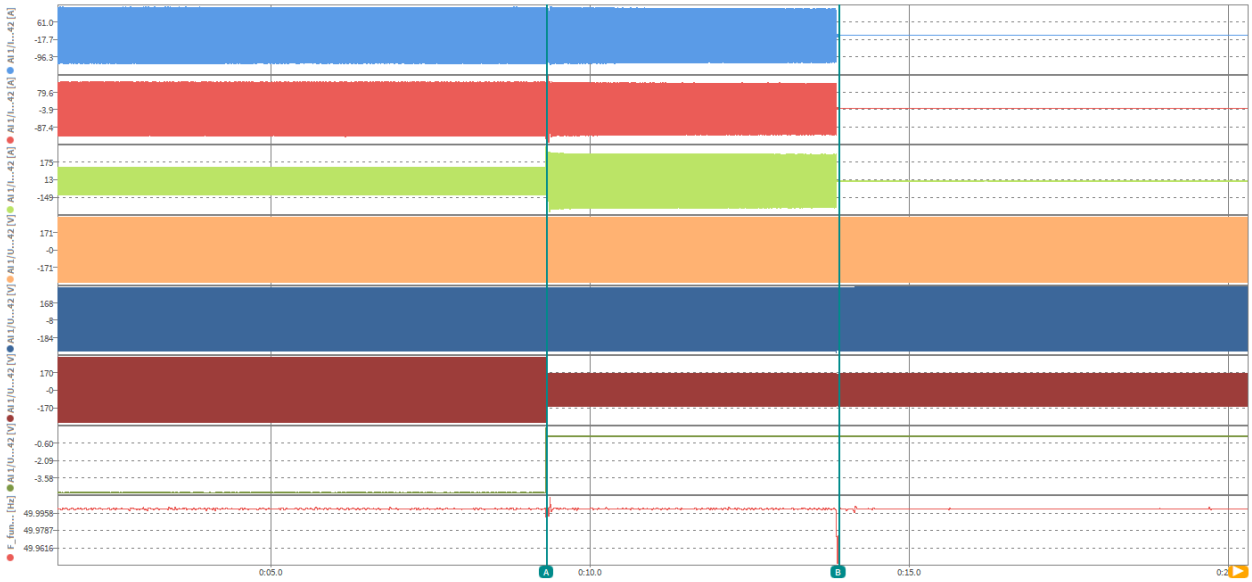
时间 [s]	A	B	间隔	有效值
	0:15.42870	1:54.61290	1:39.18420	
AI 1/I1@TRIONet3_1342 [A]	120.6102	-1.221657	-121.8319	90.63976
AI 1/I2@TRIONet3_1342 [A]	-103.9009	-0.945449	102.9555	91.75311
AI 1/I3@TRIONet3_1342 [A]	-11.39629	-2.028585	9.367705	107.9348
AI 1/U1@TRIONet3_1342 [V]	296.8083	208.5071	-88.30119	229.9845
AI 1/U2@TRIONet3_1342 [V]	-262.0227	114.0781	376.1008	229.9862
AI 1/U3@TRIONet3_1342 [V]	-28.92280	-270.9549	-242.0321	195.1270
AI 1/U4@TRIONet3_1342 [V]	-0.014067	-4.292e-3	9.775e-3	0.013727
F_fund@AC [Hz]	50.00442	49.99997	-4.452e-3	49.99996

Over-voltage – Stage 1



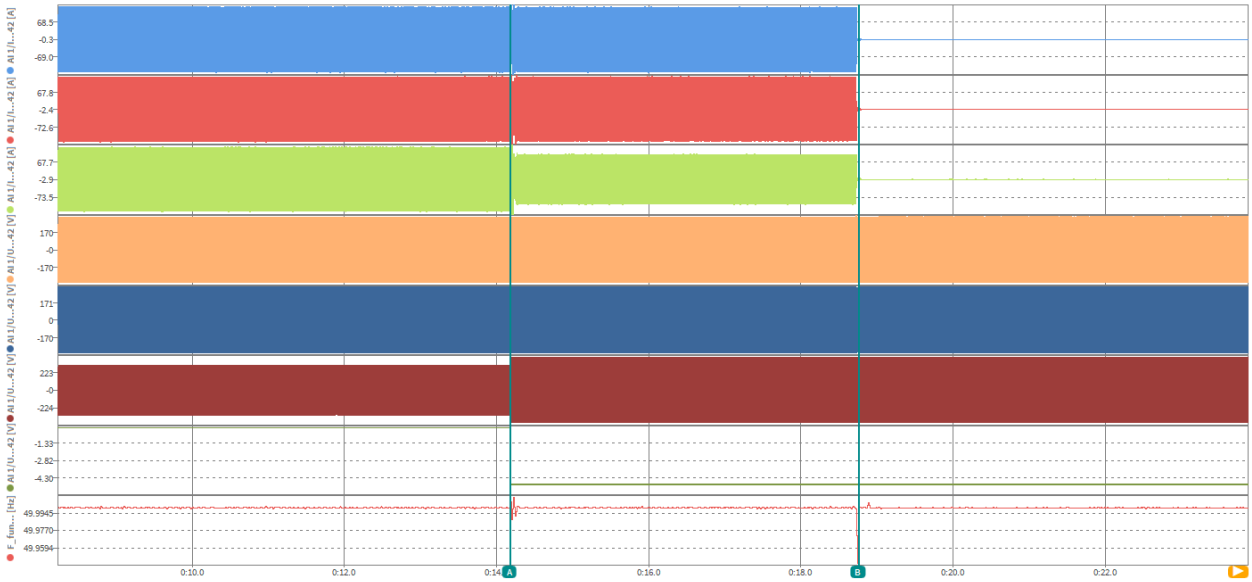
时间 [s]	A	B	间隔	有效值
	0:10.77300	1:49.98470	1:39.21170	
AI 1/I1@TRIONet3_1342 [A]	-123.5250	-1.191616	122.3334	90.36807
AI 1/I2@TRIONet3_1342 [A]	96.89892	-0.948787	-97.84771	91.80661
AI 1/I3@TRIONet3_1342 [A]	12.30586	-2.059460	-14.36532	100.1957
AI 1/U1@TRIONet3_1342 [V]	-307.1761	319.1414	626.3175	230.0838
AI 1/U2@TRIONet3_1342 [V]	244.1459	-110.5504	-354.6963	229.9554
AI 1/U3@TRIONet3_1342 [V]	77.18611	-254.0357	-331.2218	276.9803
AI 1/U4@TRIONet3_1342 [V]	-0.010490	-8.345e-3	2.146e-3	0.013724
F_fund@AC [Hz]	50.00063	50.00013	-4.997e-4	49.99995

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	9.32420	0:13.89360	4.56940	
AI 1/I1@TRIONet3_1342 [A]	115.0135	-0.019193	-115.0327	87.79135
AI 1/I2@TRIONet3_1342 [A]	-88.73702	1.744032	90.48105	88.48275
AI 1/I3@TRIONet3_1342 [A]	-24.32549	-3.637433	20.68806	179.3267
AI 1/U1@TRIONet3_1342 [V]	322.5498	-312.5355	-635.0854	229.7214
AI 1/U2@TRIONet3_1342 [V]	-184.2921	231.6160	415.9081	230.0595
AI 1/U3@TRIONet3_1342 [V]	-72.13378	39.27851	111.4123	114.4339
AI 1/U4@TRIONet3_1342 [V]	-5.484e-3	-0.014782	-9.298e-3	0.014261
F_fund@AC [Hz]	49.99154	49.94619	-0.045349	49.99973

Over-voltage – Stage 2

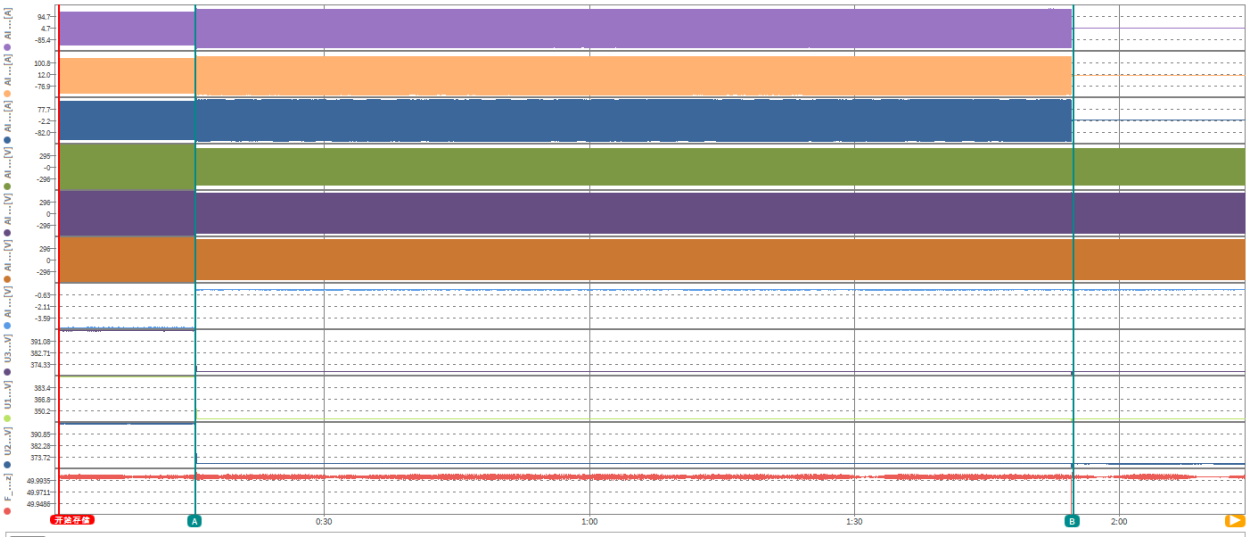


	A	B	间隔	有效值
时间 [s]	0:14.17910	0:18.76140	4.58230	
AI 1/I1@TRIONet3_1342 [A]	-69.11457	0.215292	69.32986	90.47857
AI 1/I2@TRIONet3_1342 [A]	129.9663	1.496196	-128.4701	91.77902
AI 1/I3@TRIONet3_1342 [A]	-72.47580	-7.391692	65.08410	70.23599
AI 1/U1@TRIONet3_1342 [V]	-159.1082	-303.9274	-144.8193	230.0977
AI 1/U2@TRIONet3_1342 [V]	324.1146	249.6512	-74.46337	229.9768
AI 1/U3@TRIONet3_1342 [V]	-170.9330	72.70408	243.6371	299.8651
AI 1/U4@TRIONet3_1342 [V]	-0.017405	-4.901171	-4.883766	4.915101
F_fund@AC [Hz]	49.99985	49.94359	-0.056263	49.99970

5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L1-L2)					P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz				
Stage 1	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	
Trip value [V]	340.5		480.6		
	340.9		480.6		
	340.6		480.4		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.054	U_n To $U_{th\text{-}high}$ + 5%U_n	99.259	
		99.146		99.112	
		99.300		99.169	
Stage 2	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.5U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	
Trip value [V]	201.3		520.6		
	200.6		521.0		
	200.3		520.7		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.586	U_n To $U_{th\text{-}high}$ + 5%U_n	4.581	
		4.574		4.575	
		4.574		4.560	

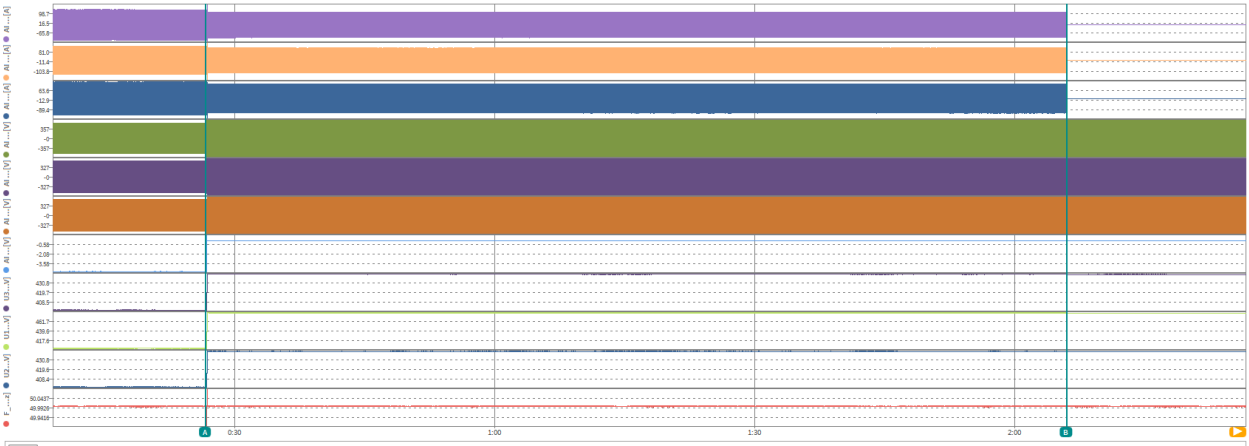
Scope pictures of the disconnection time

Under -voltage – Stage 1



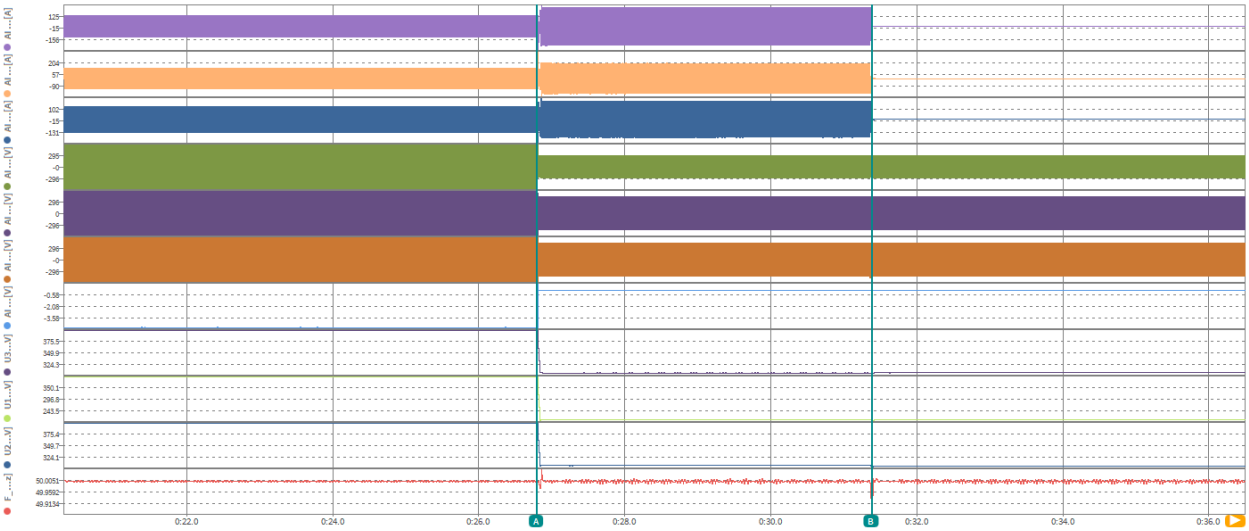
	A	B	间隔	有效值
时间 [s]	0:15.40660	1:54.70630	1:39.29970	
AI 1/I1@TRIONet3_1455 [A]	-109.8582	-1.194954	108.6632	103.7602
AI 1/I2@TRIONet3_1455 [A]	114.0330	-0.942111	-114.9751	102.9595
AI 1/I3@TRIONet3_1455 [A]	-8.204461	-2.002716	6.201744	100.1438
AI 1/U1@TRIONet3_1455 [V]	-561.6186	-470.1505	91.46810	337.7938
AI 1/U2@TRIONet3_1455 [V]	304.1718	315.0842	10.91242	368.5873
AI 1/U3@TRIONet3_1455 [V]	257.4234	155.0465	-102.3769	368.6962
AI 1/U4@TRIONet3_1455 [V]	-4.917860	-9.060e-3	4.908800	0.150439
U31_tRMS@AC [V]	398.4685	368.5360	-29.93253	368.6920
U12_tRMS@AC [V]	398.2182	337.2798	-60.93832	337.8225
U23_tRMS@AC [V]	398.4659	368.2801	-30.18585	368.6081
F_fund@AC [Hz]	50.00263	50.00143	-1.198e-3	49.99995

Over-voltage – Stage 1



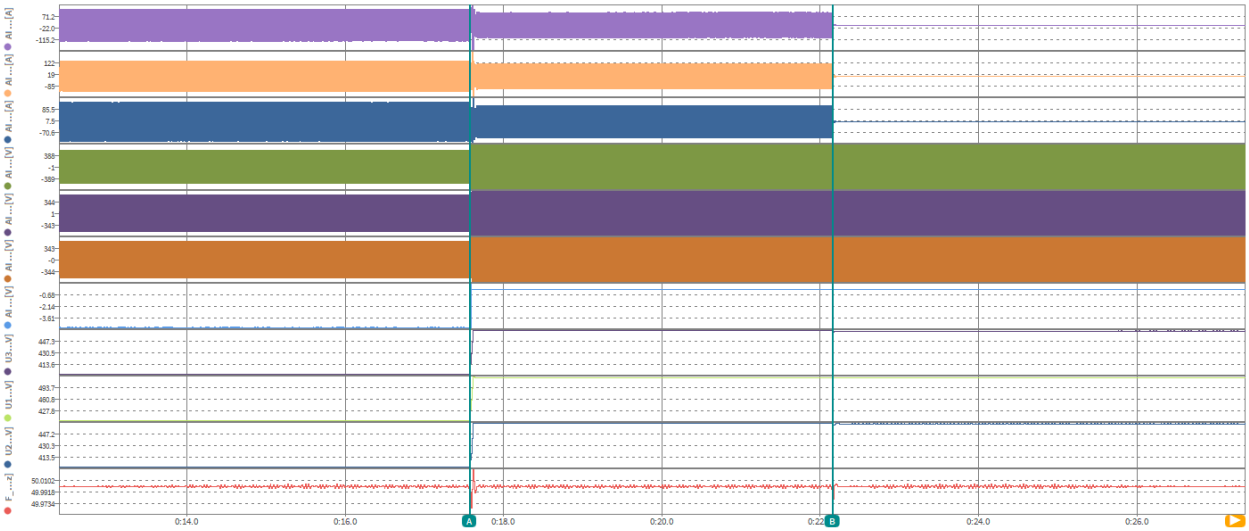
	A	B	间隔	有效值
时间 [s]	0:26.7106	2:05.9699	1:39.2593	
AI 1/I1@TRIONet3_1455 [A]	-15.50353	-1.166582	14.33694	77.06685
AI 1/I2@TRIONet3_1455 [A]	-103.0773	-0.971317	102.1060	83.45690
AI 1/I3@TRIONet3_1455 [A]	114.2483	-2.032757	-116.2810	80.76762
AI 1/U1@TRIONet3_1455 [V]	205.7638	70.62197	-135.1419	481.0857
AI 1/U2@TRIONet3_1455 [V]	-556.8533	-554.8179	2.035380	440.5939
AI 1/U3@TRIONet3_1455 [V]	351.1157	484.2253	133.1096	440.7671
AI 1/U4@TRIONet3_1455 [V]	-4.917145	-0.012636	4.904509	0.141453
U31_tRMS@AC [V]	398.5834	440.5817	41.99832	440.7412
U12_tRMS@AC [V]	398.1098	480.8571	82.74734	481.0769
U23_tRMS@AC [V]	398.4058	440.3356	41.92984	440.5951
F_fund@AC [Hz]	49.99934	50.00033	9.918e-4	49.99992

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	0:26.79740	0:31.38320	4.58580	
AI 1/I1@TRIONet3_1455 [A]	94.34629	0.400543	-93.94575	161.2470
AI 1/I2@TRIONet3_1455 [A]	-126.4123	-2.581835	123.8304	135.0130
AI 1/I3@TRIONet3_1455 [A]	27.75848	-2.103686	-29.86217	131.1339
AI 1/U1@TRIONet3_1455 [V]	545.3773	4.134178	-541.2431	198.3852
AI 1/U2@TRIONet3_1455 [V]	-392.5019	401.8429	794.3447	303.5582
AI 1/U3@TRIONet3_1455 [V]	-152.9267	-406.0760	-253.1493	303.8863
AI 1/U4@TRIONet3_1455 [V]	-4.924536	-0.015020	4.909516	0.180774
U31_tRMS@AC [V]	398.5762	301.1148	-97.46136	304.3310
U12_tRMS@AC [V]	398.1953	195.2529	-202.9424	199.8993
U23_tRMS@AC [V]	398.3182	300.8391	-97.47906	304.3177
F_fund@AC [Hz]	49.99788	49.87194	-0.125938	49.99947

Over-voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	0:17.577900	0:22.158500	4.580600	
AI 1/I1@TRIONet3_1455 [A]	-92.92687	-5.434871	87.49199	72.34240
AI 1/I2@TRIONet3_1455 [A]	-31.01790	3.487230	34.50513	79.61408
AI 1/I3@TRIONet3_1455 [A]	119.8701	-2.064467	-121.9345	76.41568
AI 1/U1@TRIONet3_1455 [V]	-145.6361	-61.62644	84.00965	522.3116
AI 1/U2@TRIONet3_1455 [V]	-398.3402	-503.5689	-105.2287	461.9351
AI 1/U3@TRIONet3_1455 [V]	544.0026	565.2032	21.20066	462.1706
AI 1/U4@TRIONet3_1455 [V]	-4.916191	-0.014544	4.901648	0.261548
U31_tRMS@AC [V]	398.5583	462.3298	63.77151	461.6445
U12_tRMS@AC [V]	398.0986	522.5649	124.4663	521.4139
U23_tRMS@AC [V]	398.4253	462.2124	63.78708	461.4434
F_fund@AC [Hz]	49.99711	49.99530	-1.808e-3	49.99997

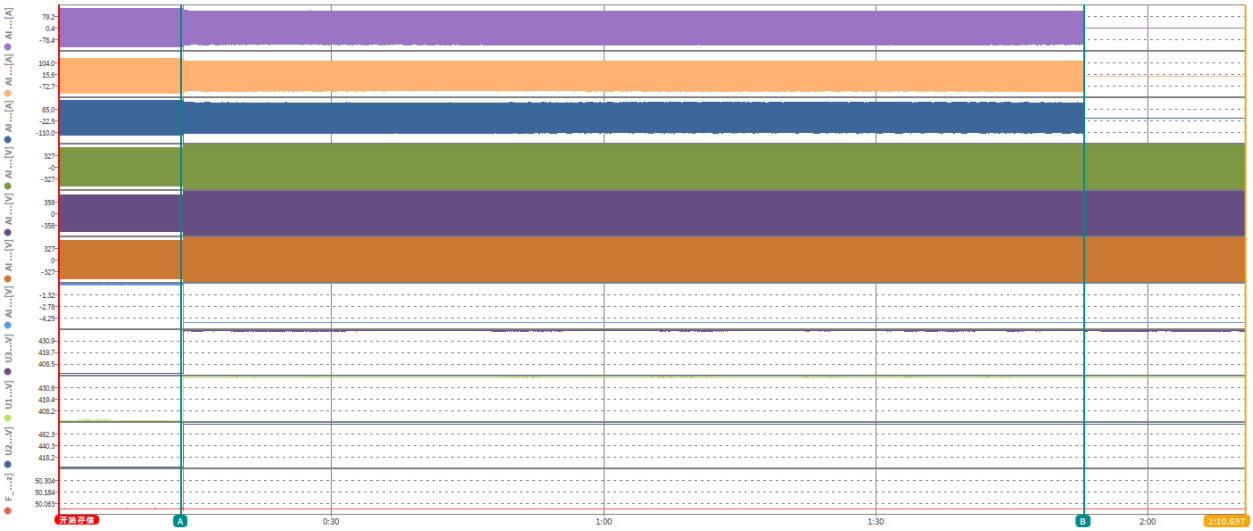
5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L2-L3)				P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz			
Stage 1	**Under-voltage**		**Over-voltage**	
Parameter	Voltage	Time	Voltage	Time
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s
Trip value [V]	341.2		481.1	
	341.1		481.2	
	340.8		480.6	
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.233	U_n To $U_{th\text{-}high}$ + 5%U_n	99.440
		99.236		99.334
		99.129		99.368
Stage 2	**Under-voltage**		**Over-voltage**	
Parameter	Voltage	Time	Voltage	Time
Limit	$0.5U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s
Trip value [V]	201.1		521.6	
	200.9		521.3	
	200.9		521.4	
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.554	U_n To $U_{th\text{-}high}$ + 5%U_n	4.551
		4.567		4.543
		4.567		4.568

Scope pictures of the disconnection time

Under -voltage – Stage 1

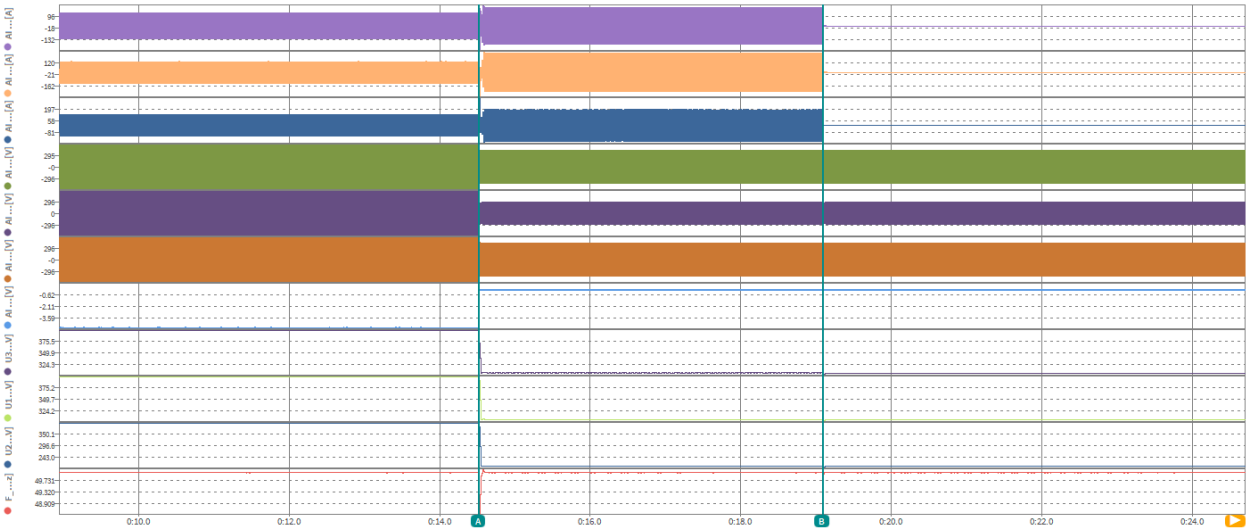
时间 [s]	A	B	间隔	有效值
	0:37.4231	2:16.6587	1:39.2356	
AI 1/I1@TRIONet3_1455 [A]	-125.1948	-1.178265	124.0165	99.55748
AI 1/I2@TRIONet3_1455 [A]	12.81655	-0.954628	-13.77118	107.0022
AI 1/I3@TRIONet3_1455 [A]	108.1208	-2.025247	-110.1461	100.2814
AI 1/U1@TRIONet3_1455 [V]	-336.4024	-443.6379	-107.2354	368.3237
AI 1/U2@TRIONet3_1455 [V]	-182.3742	409.3962	591.7704	337.9219
AI 1/U3@TRIONet3_1455 [V]	518.7466	34.20258	-484.5441	368.6886
AI 1/U4@TRIONet3_1455 [V]	-0.010967	-0.015736	-4.768e-3	0.013877
U31_tRMS@AC [V]	368.7756	368.5046	-0.270966	368.6751
U12_tRMS@AC [V]	368.5616	367.9688	-0.592804	368.3361
U23_tRMS@AC [V]	337.9714	337.5856	-0.385773	337.9249
F_fund@AC [Hz]	50.01779	50.00073	-0.017063	49.99994

Over-voltage – Stage 1



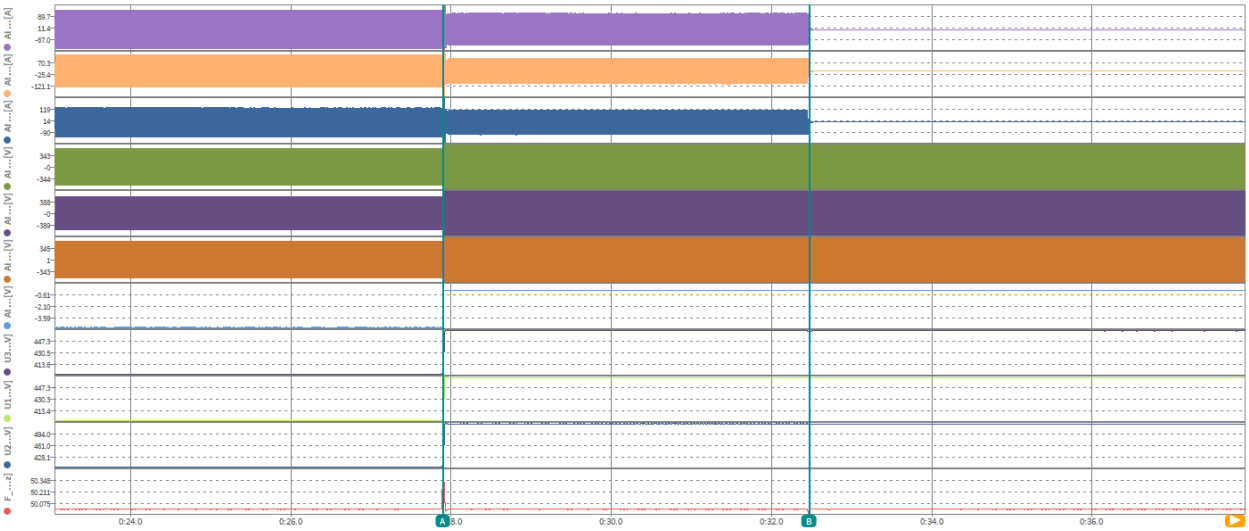
时间 [s]	A	B	间隔	有效值
	0:13.45930	1:52.89890	1:39.43960	
AI 1/I1@TRIONet3_1455 [A]	-62.85692	-1.178265	61.67865	79.71956
AI 1/I2@TRIONet3_1455 [A]	131.1095	-0.982165	-132.0916	80.23366
AI 1/I3@TRIONet3_1455 [A]	-72.44909	-2.049446	70.39965	81.17053
AI 1/U1@TRIONet3_1455 [V]	-478.0481	-482.4634	-4.415274	440.2837
AI 1/U2@TRIONet3_1455 [V]	499.5334	648.3794	148.8459	481.3803
AI 1/U3@TRIONet3_1455 [V]	-21.56735	-165.9980	-144.4306	440.7455
AI 1/U4@TRIONet3_1455 [V]	-0.013590	-4.915715	-4.902125	4.914920
U31_tRMS@AC [V]	398.5253	440.7060	42.18066	440.7131
U12_tRMS@AC [V]	398.2492	439.8861	41.63687	440.2770
U23_tRMS@AC [V]	398.3061	481.1950	82.88889	481.3643
F_fund@AC [Hz]	50.00398	49.99766	-6.317e-3	50.00001

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	0:14.52030	0:19.08750	4.56720	
AI 1/I1@TRIONet3_1455 [A]	-50.92323	-4.161477	46.76175	130.8689
AI 1/I2@TRIONet3_1455 [A]	130.2358	1.387715	-128.8481	164.6338
AI 1/I3@TRIONet3_1455 [A]	-83.42565	-1.414418	82.01123	132.1647
AI 1/U1@TRIONet3_1455 [V]	-445.6775	-77.22569	368.4519	303.6268
AI 1/U2@TRIONet3_1455 [V]	521.7364	-238.3592	-760.0956	198.1198
AI 1/U3@TRIONet3_1455 [V]	-76.09201	315.5694	391.6614	303.7613
AI 1/U4@TRIONet3_1455 [V]	-4.914999	-0.012636	4.902363	0.136328
U31_tRMS@AC [V]	398.5056	303.7901	-94.71545	304.4859
U12_tRMS@AC [V]	398.2948	303.4769	-94.81784	304.3054
U23_tRMS@AC [V]	398.3878	198.1365	-200.2513	200.4677
F_fund@AC [Hz]	50.00326	49.99841	-4.852e-3	49.99361

Over-voltage – Stage 2

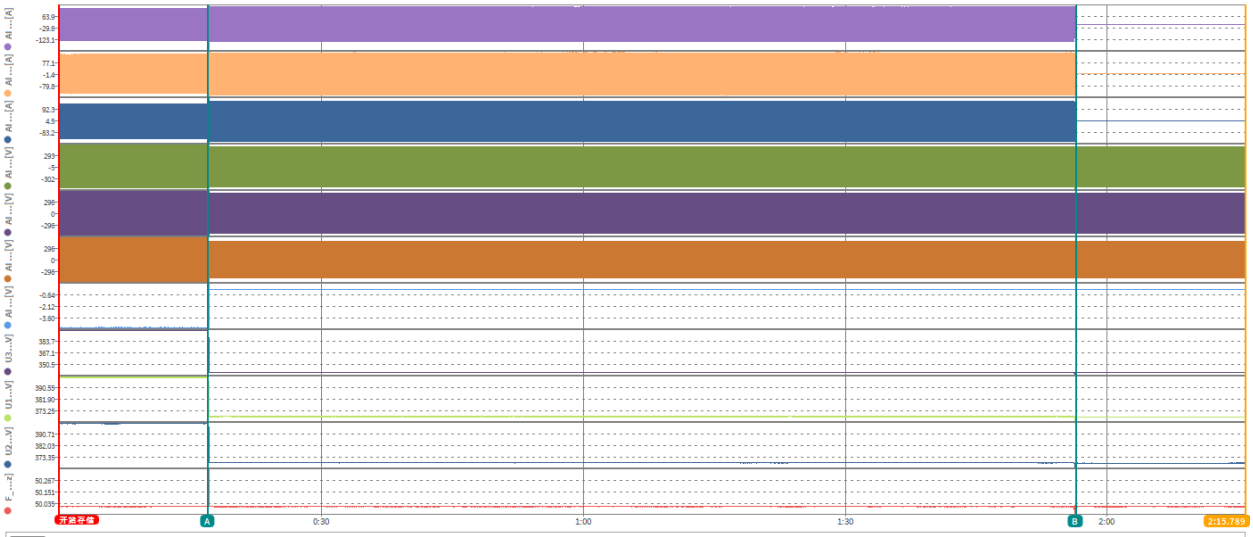


	A	B	间隔	有效值
时间 [s]	0:27.90740	0:32.47550	4.56810	
AI 1/I1@TRIONet3_1455 [A]	57.16586	3.020764	-54.14510	76.50909
AI 1/I2@TRIONet3_1455 [A]	-60.77576	-2.303124	58.47264	75.38278
AI 1/I3@TRIONet3_1455 [A]	-0.337958	-4.772306	-4.434347	76.87204
AI 1/U1@TRIONet3_1455 [V]	638.4006	-449.8163	-1088.217	461.8188
AI 1/U2@TRIONet3_1455 [V]	-534.0569	726.6925	1260.749	522.9249
AI 1/U3@TRIONet3_1455 [V]	-104.3983	-276.9201	-172.5218	462.3637
AI 1/U4@TRIONet3_1455 [V]	-0.015497	-0.016212	-7.153e-4	0.014876
U31_tRMS@AC [V]	400.4247	460.8546	60.42996	462.0173
U12_tRMS@AC [V]	400.0745	460.9935	60.91898	461.6283
U23_tRMS@AC [V]	400.9964	522.5541	121.5576	522.5277
F_fund@AC [Hz]	50.47127	49.95172	-0.519550	50.00253

5.8 Interface protection 5.8.5.1 Voltage protections (Three-phase type, L3-L1)					P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz				
Stage 1	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.85U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	$1.2U_n \pm 1\%\ U_n$	99s ≤ t ≤ 100s	
Trip value [V]	340.3		479.8		
	340.1		479.7		
	339.9		480.0		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	99.135	U_n To $U_{th\text{-}high}$ + 5%U_n	99.234	
		99.327		99.311	
		99.094		99.109	
Stage 2	**Under-voltage**		**Over-voltage**		
Parameter	Voltage	Time	Voltage	Time	
Limit	$0.5U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	$1.3U_n \pm 1\%\ U_n$	4s ≤ t ≤ 5s	
Trip value [V]	200.1		520.3		
	200.8		520.1		
	200.2		520.4		
Trip time [s]	U_n To $U_{th\text{-}low}$ – 5%Un	4.556	U_n To $U_{th\text{-}high}$ + 5%U_n	4.566	
		4.572		4.558	
		4.569		4.570	

Scope pictures of the disconnection time

Under -voltage – Stage 1

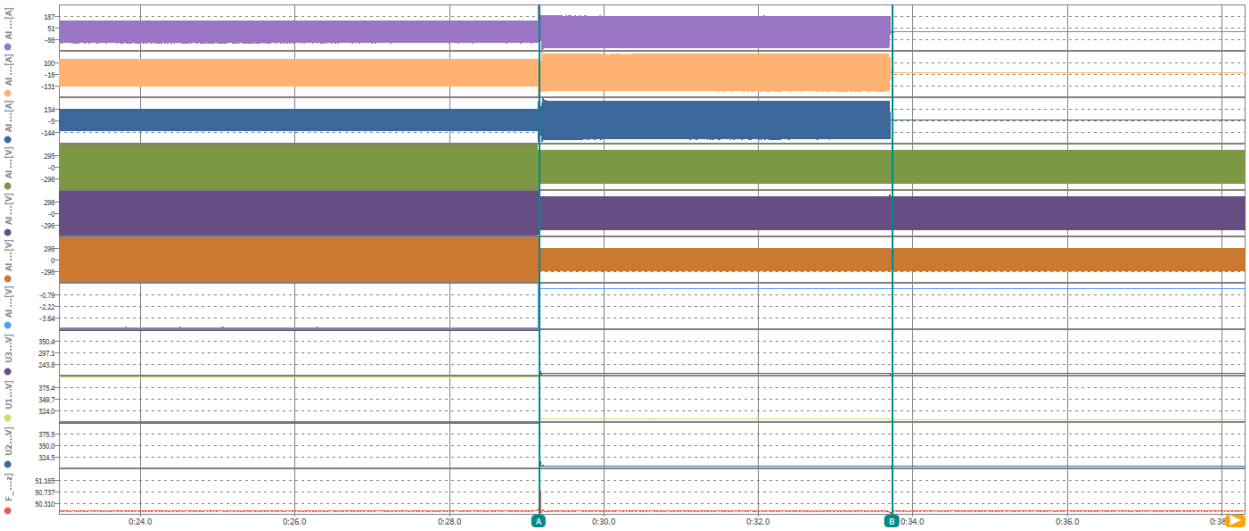


	A	B	间隔	有效值
时间 [s]	0:17.07750	1:56.40400	1:39.32650	
AI 1/I1@TRIONet3_1455 [A]	60.97687	-1.136541	-62.11341	99.24584
AI 1/I2@TRIONet3_1455 [A]	-132.4221	-0.963807	131.4583	102.7081
AI 1/I3@TRIONet3_1455 [A]	67.18028	-1.963496	-69.14378	104.3969
AI 1/U1@TRIONet3_1455 [V]	477.4077	39.13379	-438.2739	368.3819
AI 1/U2@TRIONet3_1455 [V]	-499.8985	400.7216	900.6200	368.5688
AI 1/U3@TRIONet3_1455 [V]	22.51363	-439.9395	-462.4532	338.0841
AI 1/U4@TRIONet3_1455 [V]	-4.919768	-0.010967	4.908800	0.133320
U31_tRMS@AC [V]	398.4945	337.8439	-60.65063	338.0847
U12_tRMS@AC [V]	398.0790	367.9909	-30.08810	368.3899
U23_tRMS@AC [V]	398.3697	368.4590	-29.91074	368.5889
F_fund@AC [Hz]	49.99982	49.99945	-3.700e-4	50.00003

Over-voltage – Stage 1

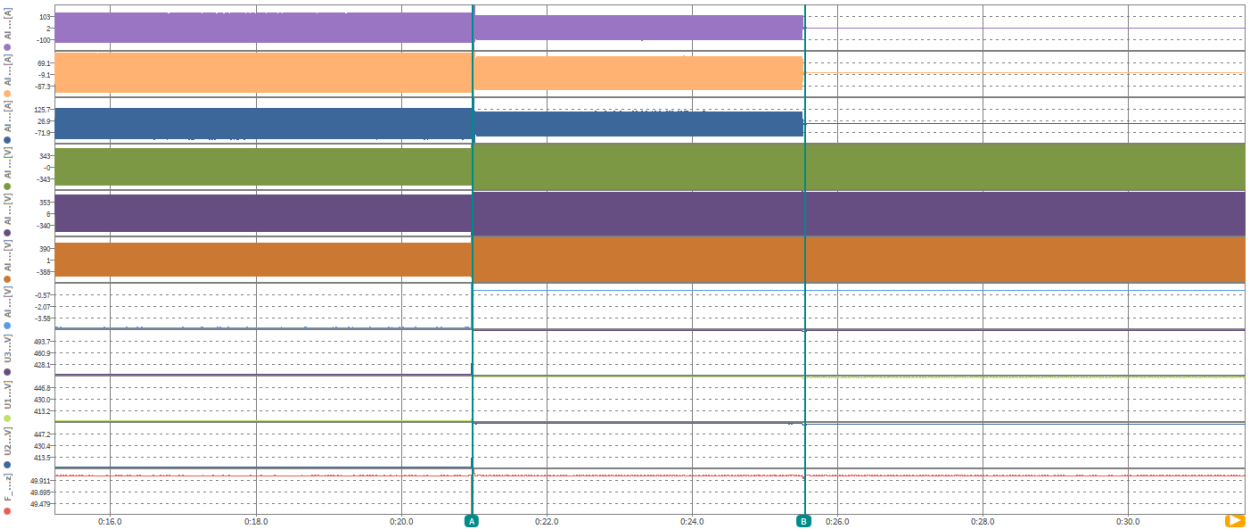
	A	B	间隔	有效值
时间 [s]	0:15.1786	1:54.4894	1:39.3108	
AI 1/I1@TRIONet3_1455 [A]	67.38305	-1.176596	-68.55965	80.32535
AI 1/I2@TRIONet3_1455 [A]	-141.4510	-0.998855	140.4522	83.75779
AI 1/I3@TRIONet3_1455 [A]	69.78715	-2.065301	-71.85245	77.57002
AI 1/U1@TRIONet3_1455 [V]	565.4927	-605.7811	-1171.274	440.3431
AI 1/U2@TRIONet3_1455 [V]	-468.1211	374.9497	843.0708	440.6270
AI 1/U3@TRIONet3_1455 [V]	-97.41068	230.8107	328.2213	481.6415
AI 1/U4@TRIONet3_1455 [V]	-4.916430	-4.910231	6.199e-3	4.917440
U31_tRMS@AC [V]	473.6382	481.5971	7.958984	481.6228
U12_tRMS@AC [V]	434.5279	440.1250	5.597107	440.3497
U23_tRMS@AC [V]	428.2441	440.3407	12.09656	440.6363
F_fund@AC [Hz]	49.54417	50.00154	0.457371	49.99983

Under -voltage – Stage 2



	A	B	间隔	有效值
时间 [s]	0:29.16470	0:33.73630	4.57160	
AI 1/I1@TRIONet3_1455 [A]	-64.78453	-1.297593	63.48694	130.3888
AI 1/I2@TRIONet3_1455 [A]	112.8481	-3.304482	-116.1525	133.2908
AI 1/I3@TRIONet3_1455 [A]	-52.22166	0.362158	52.58382	159.9600
AI 1/U1@TRIONet3_1455 [V]	-429.1840	389.9420	819.1259	303.5846
AI 1/U2@TRIONet3_1455 [V]	355.3279	-199.2805	-554.6084	303.4979
AI 1/U3@TRIONet3_1455 [V]	73.82799	-190.7318	-264.5598	198.0136
AI 1/U4@TRIONet3_1455 [V]	-0.021458	-1.907e-3	0.019550	0.014654
U31_tRMS@AC [V]	398.3759	195.6040	-202.7719	199.4406
U12_tRMS@AC [V]	398.5674	300.8105	-97.75699	304.0333
U23_tRMS@AC [V]	398.3501	301.4737	-96.87634	304.0698
F_fund@AC [Hz]	50.07535	49.98553	-0.089821	50.00668

Over-voltage – Stage 2

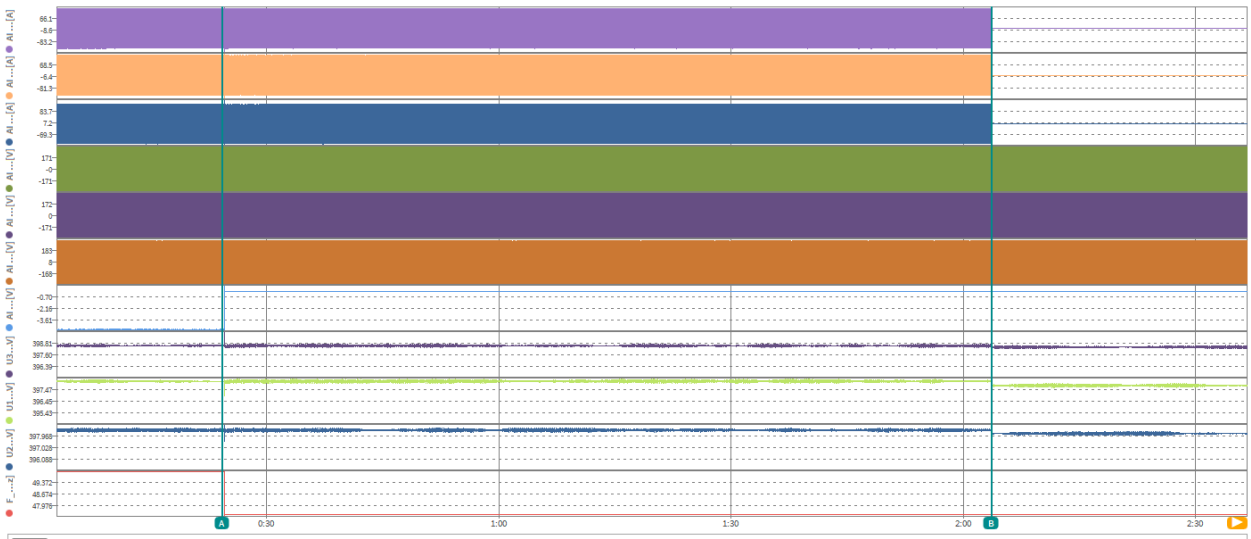


	A	B	间隔	有效值
时间 [s]	0:20.98110	0:25.55130	4.57020	
AI 1/I1@TRIONet3_1455 [A]	51.12517	-5.454898	-56.58007	76.95584
AI 1/I2@TRIONet3_1455 [A]	72.96229	2.649427	-70.31286	79.64539
AI 1/I3@TRIONet3_1455 [A]	-127.9610	-1.309276	126.6518	72.66894
AI 1/U1@TRIONet3_1455 [V]	64.53038	-31.80599	-96.33637	461.8236
AI 1/U2@TRIONet3_1455 [V]	586.4258	-596.4876	-1182.913	462.1538
AI 1/U3@TRIONet3_1455 [V]	-651.0384	628.3141	1279.353	523.1518
AI 1/U4@TRIONet3_1455 [V]	-0.018358	-0.018358	0.000000	0.014439
U31_tRMS@AC [V]	429.3556	521.3071	91.95151	522.7579
U12_tRMS@AC [V]	400.3036	459.4897	59.18604	461.6034
U23_tRMS@AC [V]	411.3365	460.6387	49.30215	461.9562
F_fund@AC [Hz]	49.28399	49.94451	0.660522	49.99709

5.8 Interface protection 5.8.5.3 Frequency protections					P
Test conditions	Output power: ≥50%Pn $U_n = 1.0U_n$				
Stage 1	**Under-frequency**		**Over-frequency**		
Parameter	Frequency	Time	Frequency	Time	
Limit	47.50 Hz±0.05 Hz	99s ≤ t ≤ 100s	51.50 Hz±0.05 Hz	99s ≤ t ≤ 100s	
Trip value [Hz]	47.51		51.50		
	47.50		51.50		
	47.50		51.50		
Trip time [s]	50.0 Hz To 47.4 Hz	99.084	50.0 Hz To 51.6 Hz	99.086	
		99.048		99.146	
		99.264		99.177	
Stage 2	**Under-frequency**		**Over-frequency**		
Parameter	Frequency	Time	Frequency	Time	
Limit	47.00 Hz±0.05 Hz	4s ≤ t ≤ 5s	52.00 Hz±0.05 Hz	4s ≤ t ≤ 5s	
Trip value [Hz]	47.01		52.01		
	47.00		52.00		
	47.00		52.00		
Trip time [s]	50.0 Hz To 46.9 Hz	4.623	50.0 Hz To 52.1 Hz	4.564	
		4.599		4.580	
		4.604		4.558	

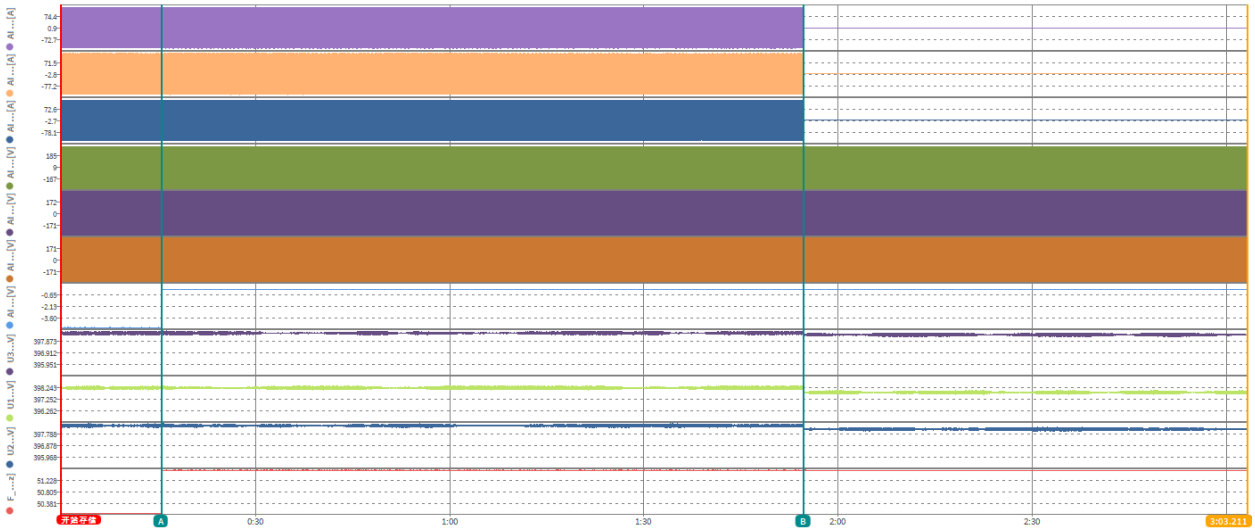
Scope pictures of the disconnection time

Under-frequency stage1



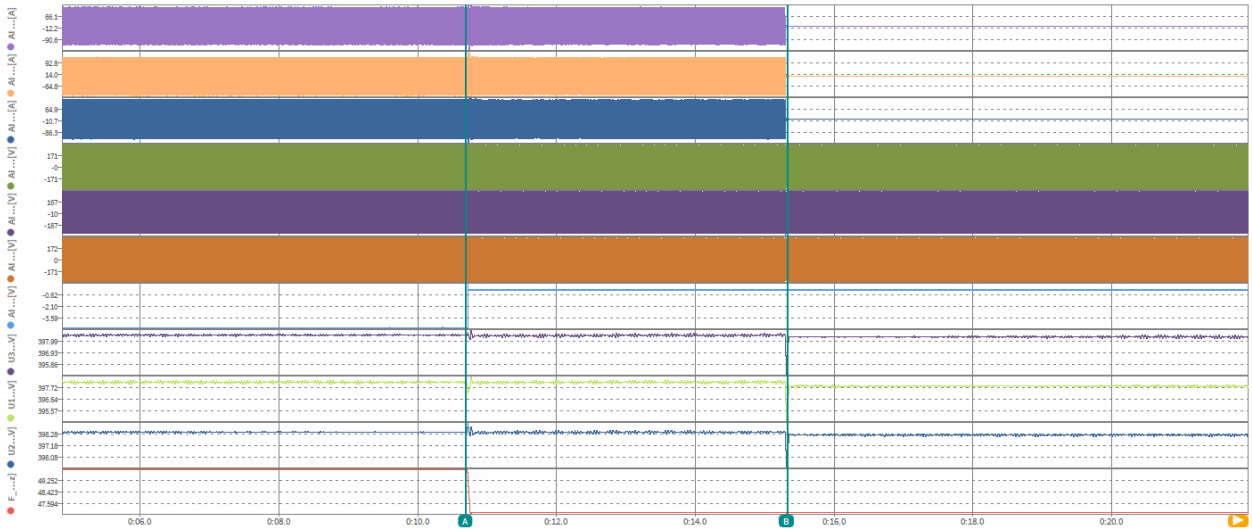
	A	B	间隔	有效值
时间 [s]	0:24.36740	2:03.63140	1:39.26400	
AI 1/I1@TRIONet3_1455 [A]	119.7416	-1.218319	-120.9599	90.79142
AI 1/I2@TRIONet3_1455 [A]	-33.71823	-0.965476	32.75275	92.22525
AI 1/I3@TRIONet3_1455 [A]	-92.69238	-2.067804	90.62458	91.82622
AI 1/U1@TRIONet3_1455 [V]	312.3851	-324.0142	-636.3993	230.0274
AI 1/U2@TRIONet3_1455 [V]	-82.96299	147.5387	230.5017	229.9663
AI 1/U3@TRIONet3_1455 [V]	-233.1801	179.1153	412.2954	230.0488
AI 1/U4@TRIONet3_1455 [V]	-4.919291	-0.013351	4.905939	0.184315
U31_tRMS@AC [V]	398.5483	398.0208	-0.527496	398.5228
U12_tRMS@AC [V]	398.2094	397.3922	-0.817108	398.2079
U23_tRMS@AC [V]	398.5735	397.7847	-0.788757	398.4337
F_fund@AC [Hz]	50.00007	47.39974	-2.600330	47.40458

Over-frequency stage1



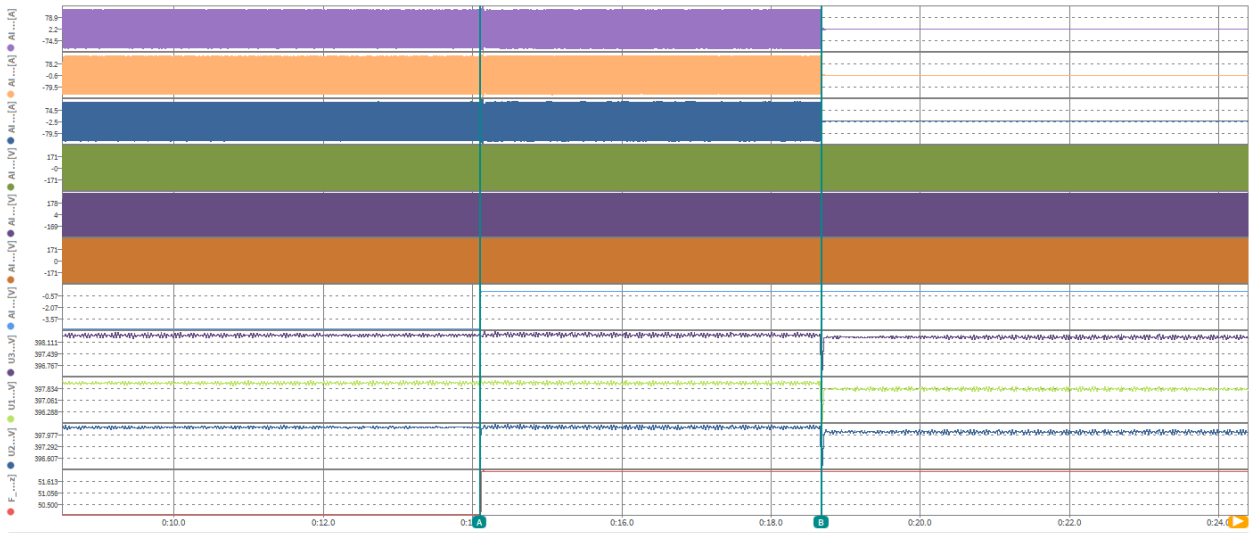
	A	B	间隔	有效值
时间 [s]	0:15.5158	1:54.6929	1:39.1771	
AI 1/I1@TRIONet3_1455 [A]	-98.68301	-1.159906	97.52310	90.76679
AI 1/I2@TRIONet3_1455 [A]	121.1318	-0.983834	-122.1156	92.27602
AI 1/I3@TRIONet3_1455 [A]	-28.19908	-2.107859	26.09122	91.82488
AI 1/U1@TRIONet3_1455 [V]	-248.7471	278.4257	527.1728	230.0346
AI 1/U2@TRIONet3_1455 [V]	305.2545	-283.5050	-588.7595	229.9676
AI 1/U3@TRIONet3_1455 [V]	-59.78608	5.460501	65.24659	230.0503
AI 1/U4@TRIONet3_1455 [V]	-4.926205	-0.013590	4.912615	0.030315
U31_tRMS@AC [V]	398.4277	398.4817	0.053986	398.5416
U12_tRMS@AC [V]	398.1484	397.8189	-0.329529	398.2012
U23_tRMS@AC [V]	398.3760	398.2190	-0.157013	398.4393
F_fund@AC [Hz]	50.00015	51.59964	1.599491	51.59937

Under-frequency stage2



	A	B	间隔	有效值
时间 [s]	0:10.69950	0:15.32220	4.62270	
AI 1/I1@TRIONet3_1455 [A]	105.8043	-5.028487	-110.8328	90.37231
AI 1/I2@TRIONet3_1455 [A]	-118.3146	-0.633359	117.6813	91.70011
AI 1/I3@TRIONet3_1455 [A]	5.851269	0.716806	-5.134464	91.33131
AI 1/U1@TRIONet3_1455 [V]	268.8749	131.7616	-137.1133	230.0131
AI 1/U2@TRIONet3_1455 [V]	-292.1026	-320.5524	-28.44978	229.9166
AI 1/U3@TRIONet3_1455 [V]	24.84799	192.9317	168.0837	230.0666
AI 1/U4@TRIONet3_1455 [V]	-4.917145	-0.011206	4.905939	0.427166
U31_tRMS@AC [V]	398.5962	394.8929	-3.703339	398.4987
U12_tRMS@AC [V]	398.2657	394.6024	-3.663269	398.1749
U23_tRMS@AC [V]	398.4065	395.0925	-3.313995	398.4135
F_fund@AC [Hz]	49.99905	46.84422	-3.154831	46.94211

Over-frequency stage2



	A	B	间隔	有效值
时间 [s]	0:14.09980	0:18.68000	4.58020	
AI 1/I1@TRIONet3_1455 [A]	-105.1509	-0.744343	104.4066	90.69774
AI 1/I2@TRIONet3_1455 [A]	117.7789	-4.455209	-122.2341	92.23135
AI 1/I3@TRIONet3_1455 [A]	-14.16421	1.199126	15.36334	91.82716
AI 1/U1@TRIONet3_1455 [V]	-265.2807	320.2944	585.5751	230.0700
AI 1/U2@TRIONet3_1455 [V]	294.6878	-132.1685	-426.8563	229.9478
AI 1/U3@TRIONet3_1455 [V]	-32.26876	-190.5811	-158.3123	229.9937
AI 1/U4@TRIONet3_1455 [V]	-4.913092	-0.014305	4.898787	0.171589
U31_tRMS@AC [V]	398.5463	396.1585	-2.387787	398.5184
U12_tRMS@AC [V]	398.3199	395.5883	-2.731628	398.1845
U23_tRMS@AC [V]	398.4543	395.9870	-2.467316	398.4215
F_fund@AC [Hz]	49.99953	52.03582	2.036289	52.08315

5.8 Interface protection 5.8.3.2.4 Reset time and reset ratio								P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0,2Hz							
Stage 1	**Under-voltage**			**Over-voltage**				
Parameter	Voltage /Time			Voltage /Time				
Setting value	0.85U_n / 99000ms			1.2U_n / 99000ms				
1.00Un→0.82Un(98940ms)→0.87Un(99200ms)→1.00Un	Phase	Reset time	Result	1.00Un→1.23Un(98940ms)→1.18Un(99200ms)→1.00Un	Phase	Reset time	Result	
	L1-N, L2-N, L3-N	≤50ms	No trip		L1-N, L2-N, L3-N	≤50ms	No trip	
	L1-N	≤50ms	No trip		L1-N	≤50ms	No trip	
	L2-N	≤50ms	No trip		L2-N	≤50ms	No trip	
	L3-N	≤50ms	No trip		L3-N	≤50ms	No trip	
	L1-L2	≤50ms	No trip		L1-L2	≤50ms	No trip	
	L2-L3	≤50ms	No trip		L2-L3	≤50ms	No trip	
	L3-L1	≤50ms	No trip		L3-L1	≤50ms	No trip	
Stage 2	**Under-voltage**			**Over-voltage**				
Parameter	Voltage /Time			Voltage /Time				
Setting value	0.5U_n / 4000ms			1.3U_n / 4000ms				
1.00Un→0.47Un(3940ms)→0.52Un(4200ms)→1.00Un	Phase	Reset time	Result	1.00Un→1.33Un(3940ms)→1.28Un(4200ms)→1.00Un	Phase	Reset time	Result	
	L1-N, L2-N, L3-N	≤50ms	No trip		L1-N, L2-N, L3-N	≤50ms	No trip	
	L1-N	≤50ms	No trip		L1-N	≤50ms	No trip	
	L2-N	≤50ms	No trip		L2-N	≤50ms	No trip	
	L3-N	≤50ms	No trip		L3-N	≤50ms	No trip	
	L1-L2	≤50ms	No trip		L1-L2	≤50ms	No trip	
	L2-L3	≤50ms	No trip		L2-L3	≤50ms	No trip	
	L3-L1	≤50ms	No trip		L3-L1	≤50ms	No trip	
Stage 1	**Under-frequency**			**Over-frequency**				
Parameter	Frequency /Time			Frequency /Time				
Setting value	47.5Hz / 99000ms			51.5Hz / 99000ms				

50Hz→47.2Hz(98940ms)→47.7Hz(99200ms)→50Hz	Reset time	Result	50Hz→51.8Hz(98940ms)→51.3Hz(99200ms)→50Hz	Reset time	Result
	≤50ms	No trip		≤50ms	No trip
Stage 2	**Under-frequency**		**Over-frequency**		
Parameter	Frequency /Time		Frequency /Time		
Setting value	47.0Hz / 4000ms		52.0Hz / 4000ms		
50Hz→46.7Hz(3940ms)→47.2Hz(4200ms)→50Hz	Reset time	Result	50Hz→52.3Hz(3940ms)→51.8Hz(4200ms)→50Hz	Reset time	Result
	≤50ms	No trip		≤50ms	No trip

5.8.5.2 Overvoltage 10 min mean protection			P
Setting values of the protection:	Trip value Setting [V]	253	
	Setting $T_{disconnection\ trip\ value}$ [s]	600	
	Setting $T_{disconnection}$ [ms]	200	
Test:			
		Disconnection time [s]	Limit [s]
a)	The voltage is set to 100% U_n and held for 600 s. Thereafter the voltage is set to 112% U_n. Disconnection must take place within 600 s.		
	Phase L1-N	500.395	450s-550s
	Phase L2-N	499.916	
	Phase L3-N	498.864	
b)	The voltage is set to U_n for 600 s and then to 108% U_n for 600 s. No disconnection should take place.		
	Phase L1-N	No disconnection	Disconnection should not take place.
	Phase L2-N	No disconnection	
	Phase L3-N	No disconnection	
c)	The voltage is set to 106 % U_n and held for 600 s. Thereafter the voltage is set to 114 % U_n. The disconnection should last for half the period as in Point a)*		
	Phase L1-N	300.020	The disconnection time should be about 50 % of the value measured in a). *(225s-375s)
	Phase L2-N	299.389	
	Phase L3-N	300.337	

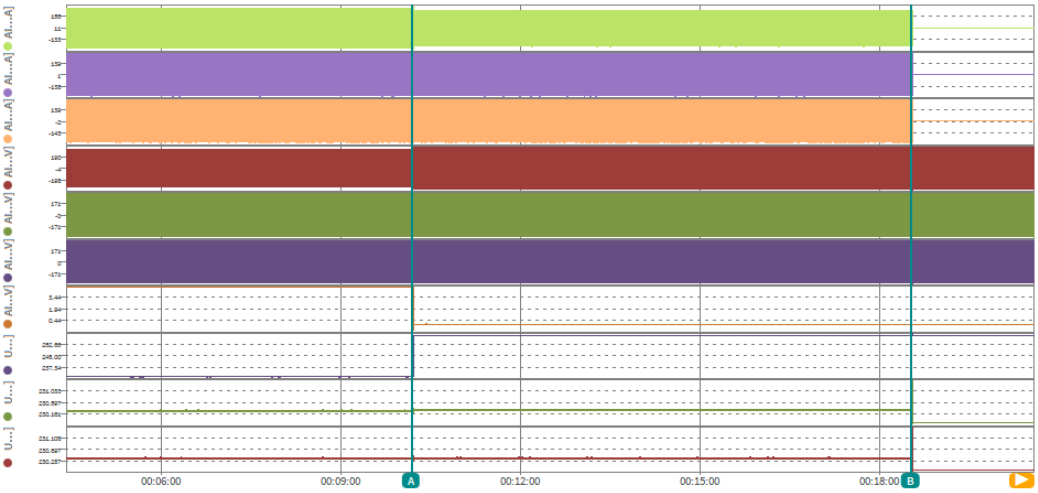
Test:
a) This test serves as proof of the measurement accuracy and the maximum set time.
b) This test serves as proof of the measurement accuracy
c) This test serves as proof of the correct formation of the 1-minute running mean value.

Assessment criterion:
The permitted tolerance between setting value and trip value of the voltage may not exceed ± 1 % of U_N.
Limit values:
Rise-in voltage protection 1.1 U_N after a max. 600 s, the switch off after 200 ms.

Note:
If only one integrated protection is used for the power generation systems, the value of the rise-in voltage protection of 1.1 U_N may not be changed.
*If the setting value is set to 600 s, then the disconnection time can be in the range between 225 s and 375 s.

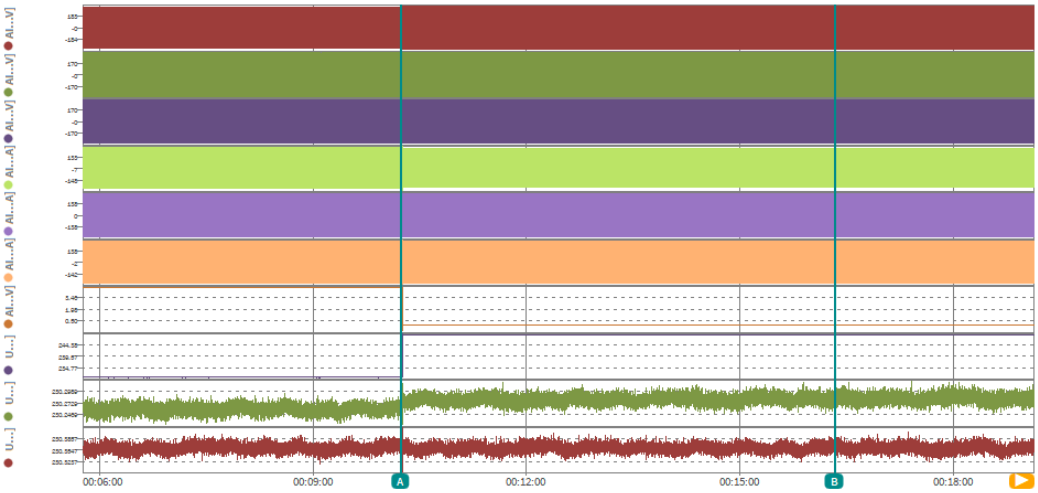
L1-N

Voltage: a) 112%Un



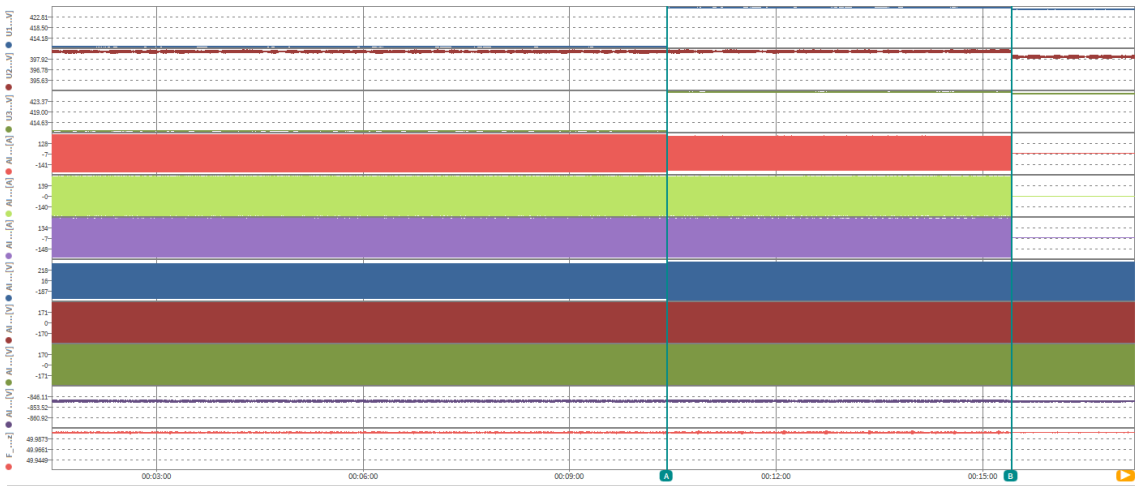
	A	B	间隔
时间 [s]	00:10:11.2851	00:18:31.6797	8:20.3946
AI 1/I1@TRIONet3_1342 [A]	-222.2639	-2.828002	219.4359
AI 1/I2@TRIONet3_1342 [A]	-4.386783	223.9429	228.3297
AI 1/I3@TRIONet3_1342 [A]	222.2331	-226.2836	-448.5166
AI 1/U1@TRIONet3_1342 [V]	-282.5458	12.81643	295.3623
AI 1/U2@TRIONet3_1342 [V]	7.025004	278.1625	271.1375
AI 1/U3@TRIONet3_1342 [V]	281.0633	-284.6584	-565.7218
AI 1/U4@TRIONet3_1342 [V]	4.783869	-0.125885	-4.909754
U1_tRMS@AC [V]	230.4949	258.4771	27.98219
U2_tRMS@AC [V]	230.2631	230.2974	0.034317
U3_tRMS@AC [V]	230.3682	230.3684	1.984e-4

Voltage: b) 108%Un



	A	B	间隔
时间 [s]	00:10:14.665	00:16:20.024	6:05.360
AI 1/U1@TRIONet3_1342 [V]	-125.2401	-238.9896	-113.7495
AI 1/U2@TRIONet3_1342 [V]	-212.0454	-101.7449	110.3005
AI 1/U3@TRIONet3_1342 [V]	317.7586	316.0882	-1.670361
AI 1/I1@TRIONet3_1342 [A]	-78.39382	-157.3459	-78.95208
AI 1/I2@TRIONet3_1342 [A]	-170.8642	-77.66533	93.19890
AI 1/I3@TRIONet3_1342 [A]	253.6040	249.9640	-3.639937
AI 1/U4@TRIONet3_1342 [V]	-0.125170	-0.123024	2.146e-3
U1_tRMS@AC [V]	248.5821	248.4834	-0.098724
U2_tRMS@AC [V]	230.2260	230.2736	0.047623
U3_tRMS@AC [V]	230.4009	230.3784	-0.022583

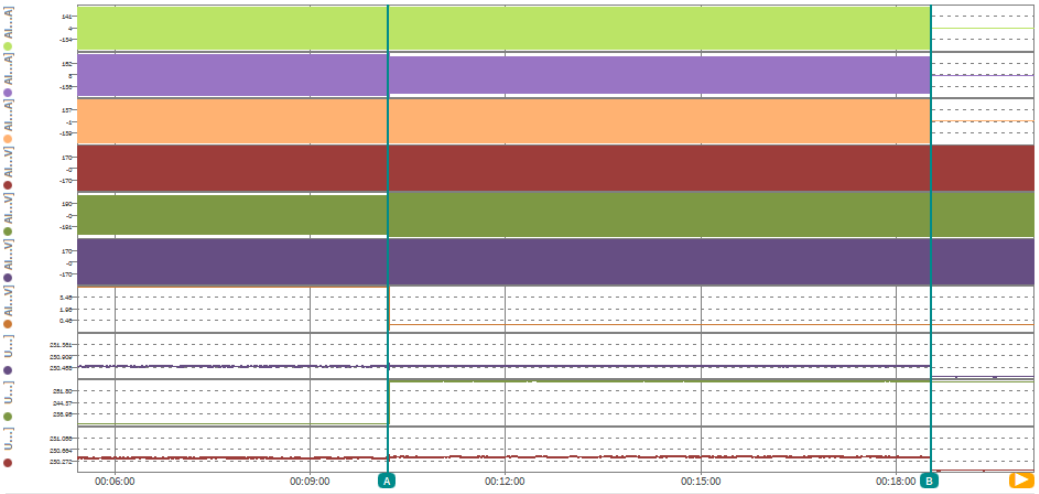
Voltage: c) 114%Un



	A	B	间隔
时间 [s]	00:10:24.671	00:15:24.691	5:00.020
U12_tRMS_rc@AC [V]	420.1506	426.5693	6.418732
U23_tRMS_rc@AC [V]	398.8503	398.8949	0.044556
U31_tRMS_rc@AC [V]	420.9724	427.2223	6.249969
AI 1/I1@TRIONet3_1455 [A]	184.5144	152.9199	-31.59452
AI 1/I2@TRIONet3_1455 [A]	-251.8399	-256.2242	-4.384280
AI 1/I3@TRIONet3_1455 [A]	51.54240	81.94364	30.40123
AI 1/U1@TRIONet3_1455 [V]	279.6951	250.5477	-29.14739
AI 1/U2@TRIONet3_1455 [V]	-307.0357	-316.8445	-9.808779
AI 1/U3@TRIONet3_1455 [V]	64.66604	101.3818	36.71575
AI 1/U4@TRIONet3_1455 [V]	-848.9273	-849.3002	-0.372887
F_fund@AC [Hz]	50.00647	50.00645	-1.907e-5

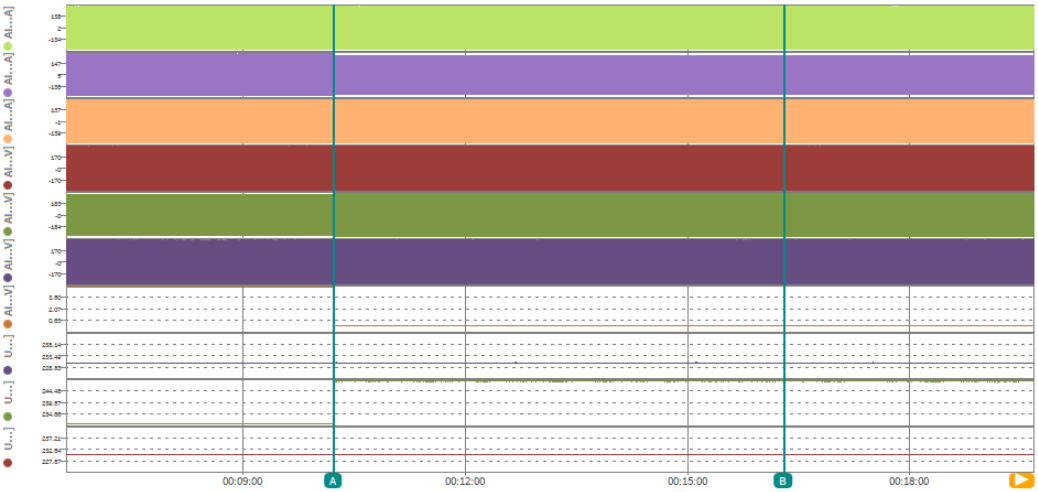
L2-N

Voltage: a) 112%Un



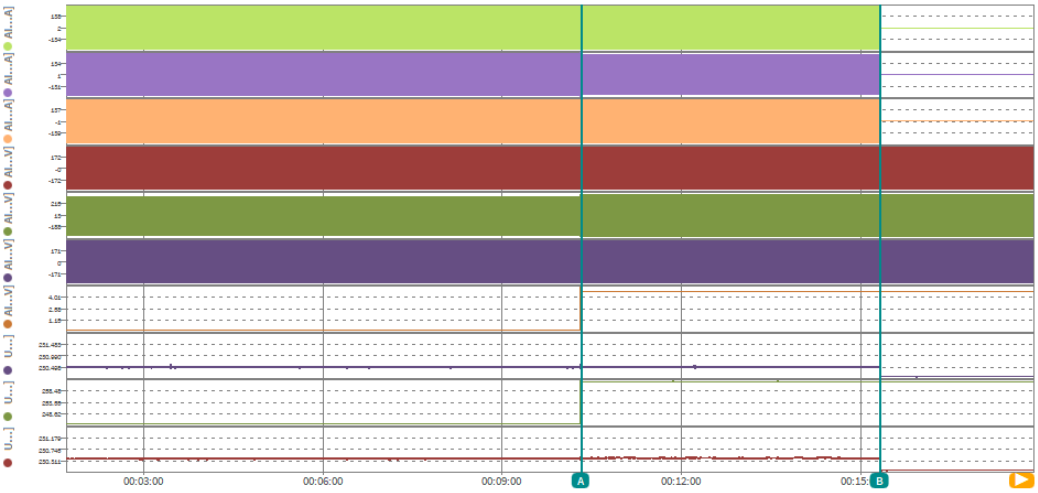
	A	B	间隔
时间 [s]	00:10:11.5768	00:18:31.4930	8:19.9162
AI 1/I1@TRIONet3_1342 [A]	250.7442	32.72271	-218.0215
AI 1/I2@TRIONet3_1342 [A]	-90.48272	-215.0825	-124.5998
AI 1/I3@TRIONet3_1342 [A]	-164.2720	205.8433	370.1153
AI 1/U1@TRIONet3_1342 [V]	318.9223	42.43446	-276.4878
AI 1/U2@TRIONet3_1342 [V]	-120.5411	-335.7384	-215.1973
AI 1/U3@TRIONet3_1342 [V]	-208.6799	258.2133	466.8932
AI 1/U4@TRIONet3_1342 [V]	4.786492	-0.123978	-4.910469
U1_tRMS@AC [V]	230.4620	230.4908	0.028809
U2_tRMS@AC [V]	230.2556	258.1550	27.89938
U3_tRMS@AC [V]	230.3526	230.3934	0.040817

Voltage: b) 108%Un



	A	B	间隔
时间 [s]	00:10:13.88860	00:16:17.98210	6:04.09350
AI 1/I1@TRIONet3_1342 [A]	-225.4566	237.4545	462.9112
AI 1/I2@TRIONet3_1342 [A]	202.5722	-42.42671	-244.9989
AI 1/I3@TRIONet3_1342 [A]	8.452297	-199.9512	-208.4035
AI 1/U1@TRIONet3_1342 [V]	-288.1086	304.5173	592.6259
AI 1/U2@TRIONet3_1342 [V]	296.6464	-66.99801	-363.6444
AI 1/U3@TRIONet3_1342 [V]	8.324147	-251.2231	-259.5472
AI 1/U4@TRIONet3_1342 [V]	-0.121593	-0.128031	-6.437e-3
U1_tRMS@AC [V]	230.4781	230.4926	0.014557
U2_tRMS@AC [V]	248.6856	248.7117	0.026154
U3_tRMS@AC [V]	230.3842	230.4018	0.017563

Voltage: c) 114%Un



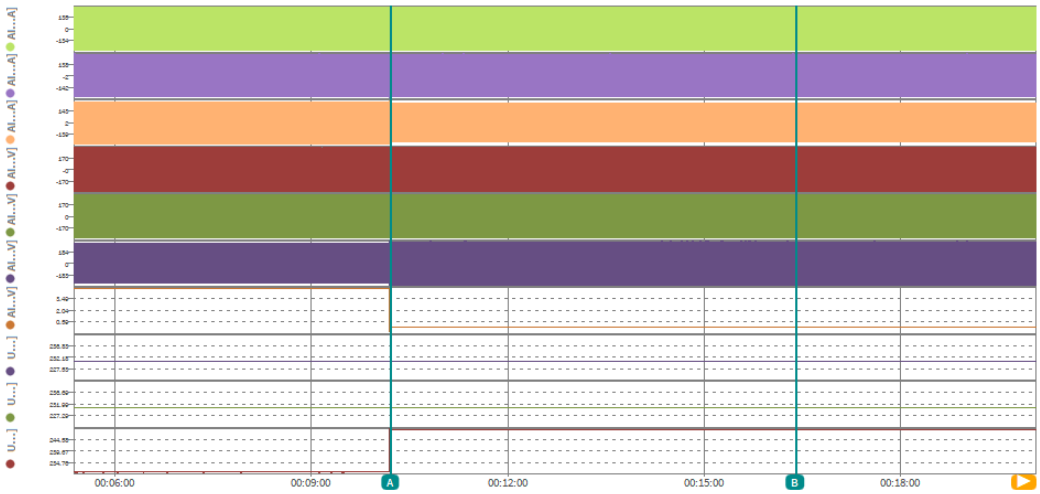
	A	B	间隔
时间 [s]	00:10:19.3612	00:15:18.7503	4:59.3891
AI 1/I1@TRIONet3_1342 [A]	-175.3211	61.81884	237.1400
AI 1/I2@TRIONet3_1342 [A]	234.5873	-218.8852	-453.4725
AI 1/I3@TRIONet3_1342 [A]	-68.93015	186.0941	255.0242
AI 1/U1@TRIONet3_1342 [V]	-229.8982	83.36974	313.2680
AI 1/U2@TRIONet3_1342 [V]	332.0749	-354.6925	-686.7674
AI 1/U3@TRIONet3_1342 [V]	-93.37473	234.6494	328.0242
AI 1/U4@TRIONet3_1342 [V]	-0.124931	4.783631	4.908562
U1_tRMS@AC [V]	230.4877	230.4958	8.133e-3
U2_tRMS@AC [V]	244.1810	262.6426	18.46159
U3_tRMS@AC [V]	230.3848	230.3943	9.460e-3

L3-N

Voltage: a) 112%Un

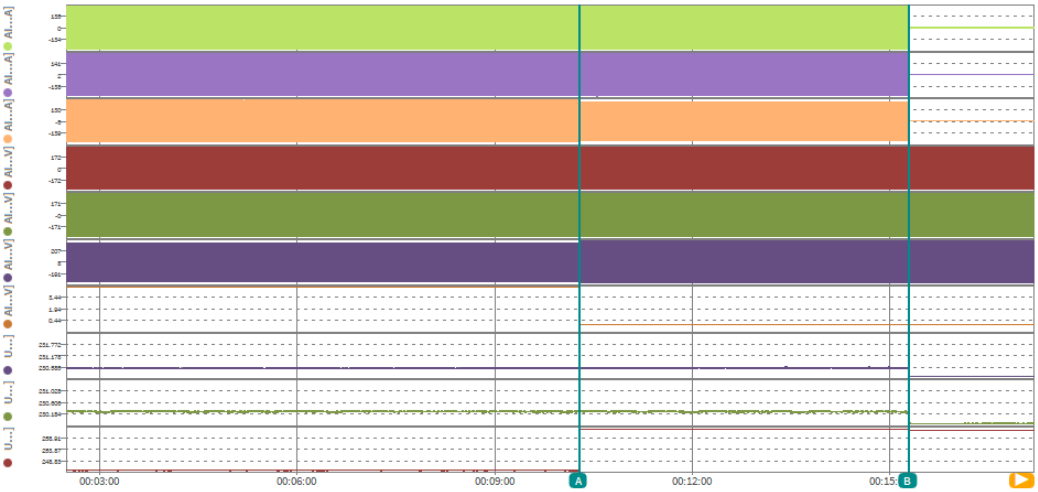
	A	B	间隔
时间 [s]	00:10:29.477	00:18:48.340	8:18.864
AI 1/I1@TRIONet3_1342 [A]	82.60036	0.156045	-82.44432
AI 1/I2@TRIONet3_1342 [A]	168.1914	0.108480	-168.0830
AI 1/I3@TRIONet3_1342 [A]	-227.7781	-0.186086	227.5920
AI 1/U1@TRIONet3_1342 [V]	111.7461	-134.6102	-246.3563
AI 1/U2@TRIONet3_1342 [V]	215.4186	322.3813	106.9627
AI 1/U3@TRIONet3_1342 [V]	-355.8507	-217.7665	138.0842
AI 1/U4@TRIONet3_1342 [V]	-0.127554	-0.127554	0.000000
U1_tRMS@AC [V]	230.5263	230.7247	0.198318
U2_tRMS@AC [V]	230.2654	230.3755	0.110062
U3_tRMS@AC [V]	258.2761	258.3062	0.030090

Voltage: b) 108%Un



	A	B	间隔
时间 [s]	00:10:13.3618	00:16:24.1028	6:10.7410
AI 1/I1@TRIONet3_1342 [A]	124.7993	115.0243	-9.774924
AI 1/I2@TRIONet3_1342 [A]	131.6310	141.3041	9.673119
AI 1/I3@TRIONet3_1342 [A]	-239.6609	-242.4238	-2.762914
AI 1/U1@TRIONet3_1342 [V]	165.0775	154.6629	-10.41460
AI 1/U2@TRIONet3_1342 [V]	168.2325	178.4437	10.21123
AI 1/U3@TRIONet3_1342 [V]	-349.0947	-348.7056	0.389099
AI 1/U4@TRIONet3_1342 [V]	-0.125885	-0.127077	-1.192e-3
U1_tRMS@AC [V]	230.5065	230.4984	-8.102e-3
U2_tRMS@AC [V]	230.2518	230.2624	0.010635
U3_tRMS@AC [V]	248.7984	248.8061	7.645e-3

Voltage: c) 114%Un



	A	B	间隔
时间 [s]	00:10:16.6881	00:15:17.0247	5:00.3366
AI 1/I1@TRIONet3_1342 [A]	-161.9405	0.054240	161.9947
AI 1/I2@TRIONet3_1342 [A]	255.8403	0.058413	-255.7819
AI 1/I3@TRIONet3_1342 [A]	-77.36326	-0.146031	77.21723
AI 1/U1@TRIONet3_1342 [V]	-211.2215	197.6364	408.8578
AI 1/U2@TRIONet3_1342 [V]	318.2414	130.9791	-187.2623
AI 1/U3@TRIONet3_1342 [V]	-134.4428	-367.0514	-232.6086
AI 1/U4@TRIONet3_1342 [V]	-0.127554	-0.123978	3.576e-3
U1_tRMS@AC [V]	230.5212	230.0633	-0.457825
U2_tRMS@AC [V]	230.2624	229.8157	-0.446777
U3_tRMS@AC [V]	262.7411	262.4197	-0.321411

5.8.3.4 ROCOF protect 5.8.3.4.1 Accuracy of the ROCOF setting values and operate time: verification method				P
Setting values	Frequency change df/dt [Hz/s] .....:			2.0Hz/s
	Disconnecting time [s] .....:			＜1s
Test:				
P_{Emax} in %	100% ±5%			
Test condition	Start Frequency	Change	End Frequency	Connection
Test 1: (*)	49.0 Hz	1.9Hz/s	50.9 Hz	Always connected
Test 2: (*)	49.0 Hz	2.1Hz/s	51.1 Hz	Disconnected at 0.9s
Test 3: (*)	51.0 Hz	1.9Hz/s	49.1 Hz	Always connected
Test 4: (*)	51.0 Hz	2.1Hz/s	48.9 Hz	Disconnected at 0.9s
Limit	disconnected time ＜1s			

Note:

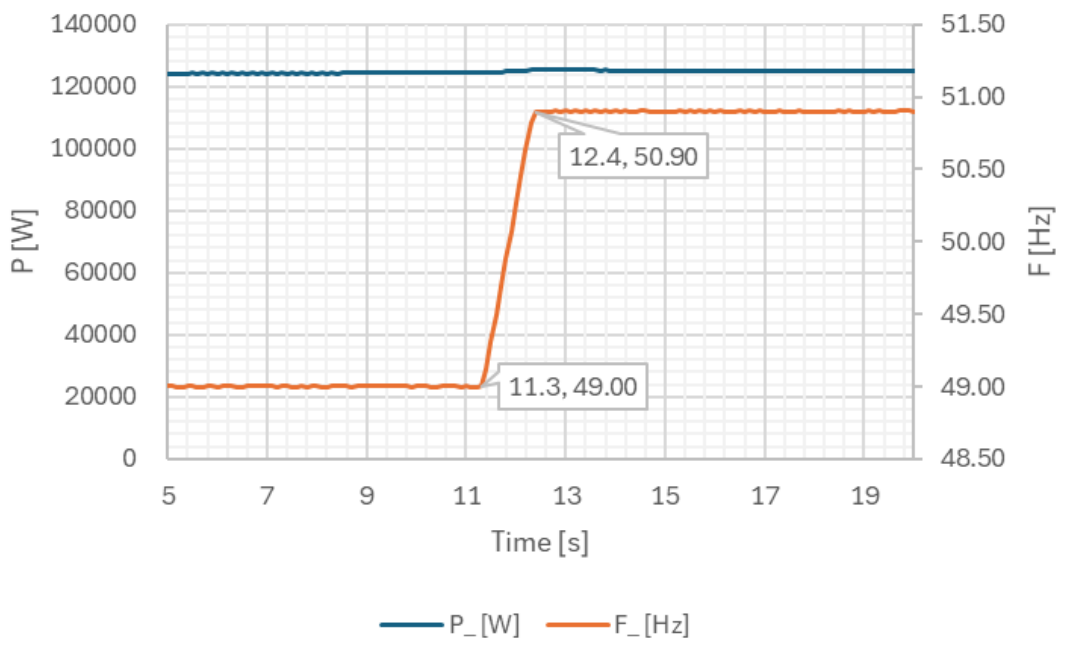
Table 30 — ROCOF protection test items, accuracy of the setting values and operate time measurements (1/2)

Test item	Protection function	ROCOF direction	Test signal start frequency (Hz)	ROCOF of the test (Hz/s)	Test signal end frequency (Hz)	Step remain times
RVAL POS 1	ROCOF	Increase	$fn - ROCOF \times 0,5\,s$	$ROCOF = G_S + 2 \times A_r$	$fn + ROCOF \times 0,5\,s$	$1\,s$
RVAL POS 2	ROCOF	Increase	$fn - ROCOF \times 0,5\,s$	$ROCOF = G_S - 2 \times A_r$	$fn - ROCOF \times 0,5\,s$	$1\,s$
RVAL NEG 1	ROCOF	Decrease	$fn + ROCOF \times 0,5\,s$	$ROCOF = G_S + 2 \times A_r$	$fn + ROCOF \times 0,5\,s$	$1\,s$
RVAl NEG 2	ROCOF	Decrease	$fn + ROCOF \times 0,5\,s$	$ROCOF = G_S - 2 \times A_r$	$fn - ROCOF \times 0,5\,s$	$1\,s$

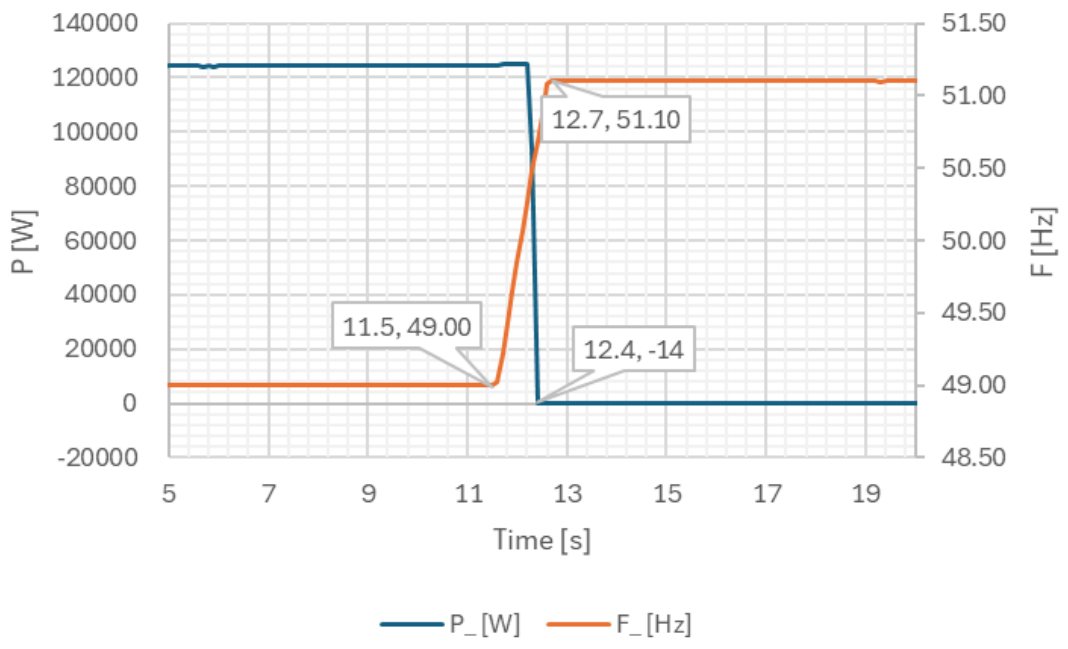
For each test the signal shall be applied and the ROCOF shall be increased or decreased, as appropriate, according to the criteria below (statements below apply for a positive ROCOF):

1. to start the test, a signal which is at frequency f = fn ± $ROCOF_{test}$X(Δt_2/2), where Δt_2 is defined inthe next step, is applied for Δt_1, equal to at least 1 s and longer than the time delay setting plus 200 ms;
2. then a ROCOF equal to the activation setting value minus twice its required accuracy, or if no requirementis made, twice the manufacturer stated accuracy, in direction of the setting value, is applied to the signaland shall be maintained constant for $\Delta t2=T_{op}-(T_{Res}+T_{ov})$ where T_{op} is the operate time, T_{Res} is the maximum required reset time and T_{ov} is the overshoot time, a tolerance margin equal to 10 ms
3. if the reset value is:
   within the band between the setting value and the setting values minus twice its required accuracy, then the signal is suddenly adjusted to the setting values minus twice its required accuracy (case shown in the Figure 42) for at least Δ_{t1}
4. below the setting value minus twice its accuracy, the signal is suddenly adjusted the reset value minus twice its accuracy for at least Δt_1.

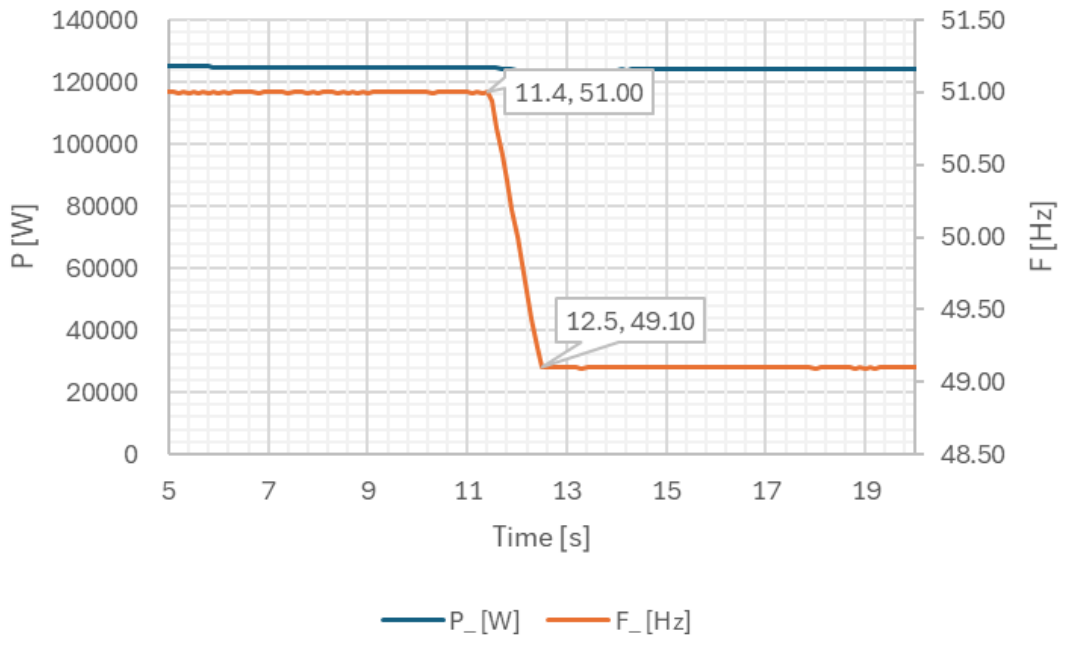
Test 1


140000
120000
100000
80000
60000
40000
20000
0
P [W]
51.50
51.00
50.50
50.00
49.50
49.00
48.50
F [Hz]
12.4, 50.90
11.3, 49.00
5
7
9
11
13
15
17
19
Time [s]
P_[W]
F_[Hz]

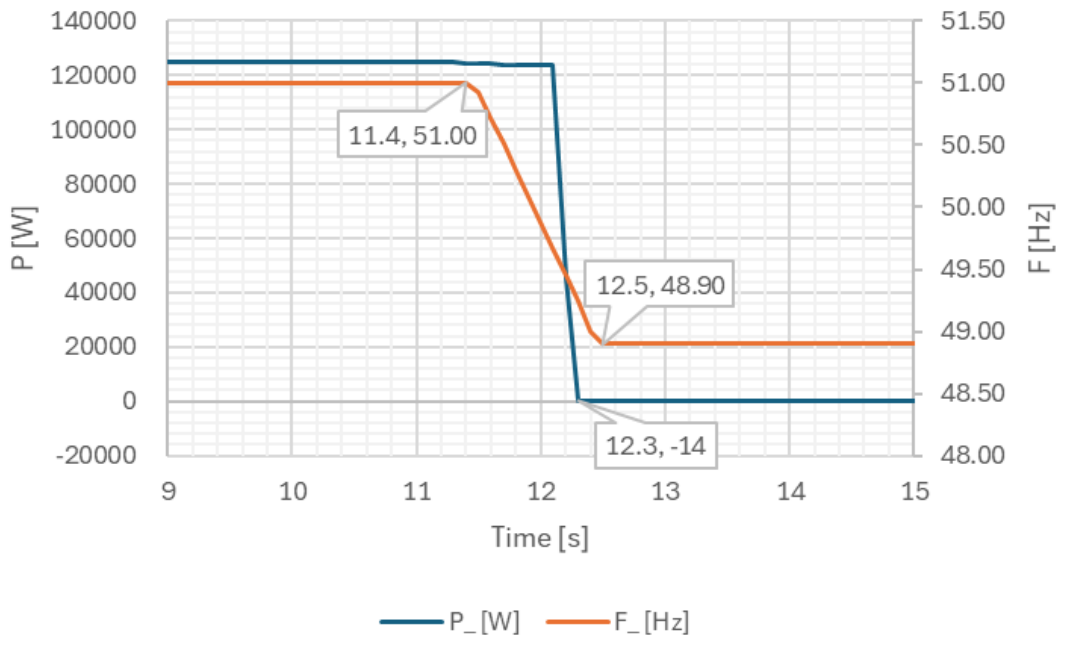
Test 2


140000
120000
100000
80000
60000
40000
20000
0
-20000
P [W]
51.50
51.00
50.50
50.00
49.50
49.00
48.50
F [Hz]
12.7, 51.10
11.5, 49.00
12.4, -14
5
7
9
11
13
15
17
19
Time [s]
P_[W]
F_[Hz]

Test 3


140000
120000
100000
80000
60000
40000
20000
0
P [W]
51.50
51.00
50.50
50.00
49.50
49.00
48.50
F [Hz]
11.4, 51.00
12.5, 49.10
5
7
9
11
13
15
17
19
Time [s]
P_ [W]
F_ [Hz]

Test 4


140000
120000
100000
80000
60000
40000
20000
0
-20000
P [W]
51.50
51.00
50.50
50.00
49.50
49.00
48.50
48.00
F [Hz]
11.4, 51.00
12.5, 48.90
12.3, -14
9
10
11
12
13
14
15
Time [s]
P_ [W]
F_ [Hz]

5.8.3.4 ROCOF protect 5.8.3.4.2 Reset time and reset ratio						P
Test conditions	Output power: >=50%Pn, Frequency: 50+/-0.2Hz					
	NOP POS		**NOP NEG**			
Parameter	ROCOF /Time		ROCOF /Time			
Setting value	2.0 Hz/s / 500ms		2.0 Hz/s / 500ms			
0Hz/s (49.56Hz hold at least 1s)→2.1 Hz/s (440ms)→1.9Hz/s(1000ms)	Reset time	Result	0Hz/s (50.44Hz hold at least 1s)→-2.1 Hz/s (440ms)→ -1.9Hz/s(1000ms)	Reset time	Result	
	≤50ms	No trip		≤50ms	No trip	
	≤50ms	No trip		≤50ms	No trip	
	≤50ms	No trip		≤50ms	No trip	

Assessment criterion:

Table 31 — ROCOF protection test items, reset time and reset ratio requirements (2/2) (under consideration)

Test-item		NOP POS	NOP NEG
Protection function		ROCOF	ROCOF
ROCOF direction		Increase ($G_S > 0$)	Decrease ($G_S < 0$)
Step 0	Test signal frequency (Hz)	$f_n - ROCOF_1\left(\frac{T_{Op} - T_{Res} - 10\,ms}{2}\right)$	$f_n + ROCOF_1\left(\frac{T_{Op} - T_{Res} - 10\,ms}{2}\right)$
	Remain time	$1\,s$	$1\,s$
Step 1	ROCOF (Hz/s)	$ROCOF_1 = G_S + 2 \times A_r$	$ROCOF_1 = G_S - 2 \times A_r$
	Remain time	$T_{Op} - T_{Res} - 10\,ms$	$T_{Op} - T_{Res} - 10\,ms$
	Test signal end frequency (Hz)	$f_{1-2} = f_n + Roc_1\left(\frac{T_{Op} - T_{Res} - 10\,ms}{2}\right)$	$f_{1-2} = f_n - ROCOF_1\left(\frac{T_{Op} - T_{Res} - 10\,ms}{2}\right)$
Step 2	ROCOF (Hz/s)	$ROCOF_2 = min\left(G_S - 2 \times Ac\ , Res - 2 \times A_r\ \right)$	$ROCOF_2 = max\left(G_S + 2 \times A_r\ , Res + 2 \times A_r\right)$
	Remain time	$1\,s$	$1\,s$
	Test signal end frequency (Hz)	$f_{1-2} + ROCOF_2 \times 1\,s$	$f_{1-2} - ROCOF_2 \times 1\,s$

.

5.8.6 Islanding detection

Test circuit and parameters

Parameter	Symbol	Units
EUT DC Input		
DC voltage	V_{DC}	V
DC Current	I_{DC}	A
DC Power	P_{DC}	W
EUT AC ouput		
AC voltage	V_{EUT}	V
AC current	I_{EUT}	A
Real power	P_{EUT}	W
Reactive power	Q_{EUT}	Var
Test Load		
Resistive load current	I_R	A
Inductive load current	I_L	A
Capacitive load current	I_C	A
AC (utility) power source		
Utility real power	P_{AC}	W
Utility reactive power	Q_{AC}	Var
Utility current	I_{AC}	A

Block diagram test circuit IEC 62116:2014

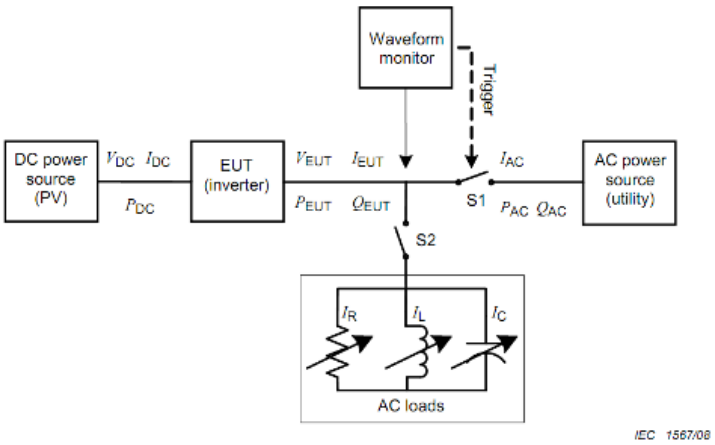


Figure 1 – Test circuit for islanding detection function in a power conditioner (inverter)

Load imbalance (real, reactive load) for test condition A (EUT output = 100%)									P
Test conditions			Frequency: 50+/-0.1Hz U_N=230±2.3Vac Distortion factor of chokes < 2% Quality = 1						
Disconnection limit			2s (IEC 62116)						
No.	P_{EUT} 1) [% of EUT rating]	Reactive load [% of Q_L in 6.1.d] 1]	P_{AC} 2) 5) (% of nominal)	Q_{AC} 3) 5) (% of nominal)	Run on Time [ms]	P_{EUT} Pre-phase [kW]	Q_f	V_{DC} [V]	Remarks 4)
1.	100	100	0	0	1850	125	1.000	740	Test A at BL
2.	100	100	0	-5	1192	125	0.975	740	Test A at IB
3.	100	100	0	+5	1166	125	1.025	740	Test A at IB
4.	100	100	-5	-5	1112	125	1.026	740	Test A at IB
5.	100	100	-5	0	1110	125	1.053	740	Test A at IB
6.	100	100	-5	+5	1174	125	1.079	740	Test A at IB
7.	100	100	+5	-5	1208	125	0.928	740	Test A at IB
8.	100	100	+5	0	964	125	0.952	740	Test A at IB
9.	100	100	+5	+5	1230	125	0.976	740	Test A at IB
10.	100	100	0	-10	950	125	0.949	740	Test A at IB
11.	100	100	0	+10	1160	125	1.049	740	Test A at IB
12.	100	100	-5	-10	1136	125	0.999	740	Test A at IB
13.	100	100	-5	+10	1170	125	1.104	740	Test A at IB
14.	100	100	+5	-10	1186	125	0.904	740	Test A at IB
15.	100	100	+5	+10	1180	125	0.999	740	Test A at IB
16.	100	100	-10	-10	830	125	1.054	740	Test A at IB
17.	100	100	-10	-5	1376	125	1.083	740	Test A at IB
18.	100	100	-10	0	1750	125	1.111	740	Test A at IB
19.	100	100	-10	+5	834	125	1.139	740	Test A at IB
20.	100	100	-10	+10	700	125	1.165	740	Test A at IB
21.	100	100	+10	-10	1172	125	0.862	740	Test A at IB
22.	100	100	+10	-5	988	125	0.886	740	Test A at IB

23.	100	100	+10	0	938	125	0.909	740	Test A at IB
24.	100	100	+10	+5	1380	125	0.932	740	Test A at IB
25.	100	100	+10	+10	1100	125	0.953	740	Test A at IB

Parameter at 0% per phase	L= 4.04 mH	R= 1.27 Ω	C= 2507.13 μF

Note:

RLC is adjusted to min. +/-1% of the inverter rated output power

1) P_{EUT}: EUT output power

2) P_{AC}: Real power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

3) Q_{AC}: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

4) Fundamental of I_{AC} when RLC is adjusted

5) BL: Balance condition, IB: Imbalance condition.

Condition A:

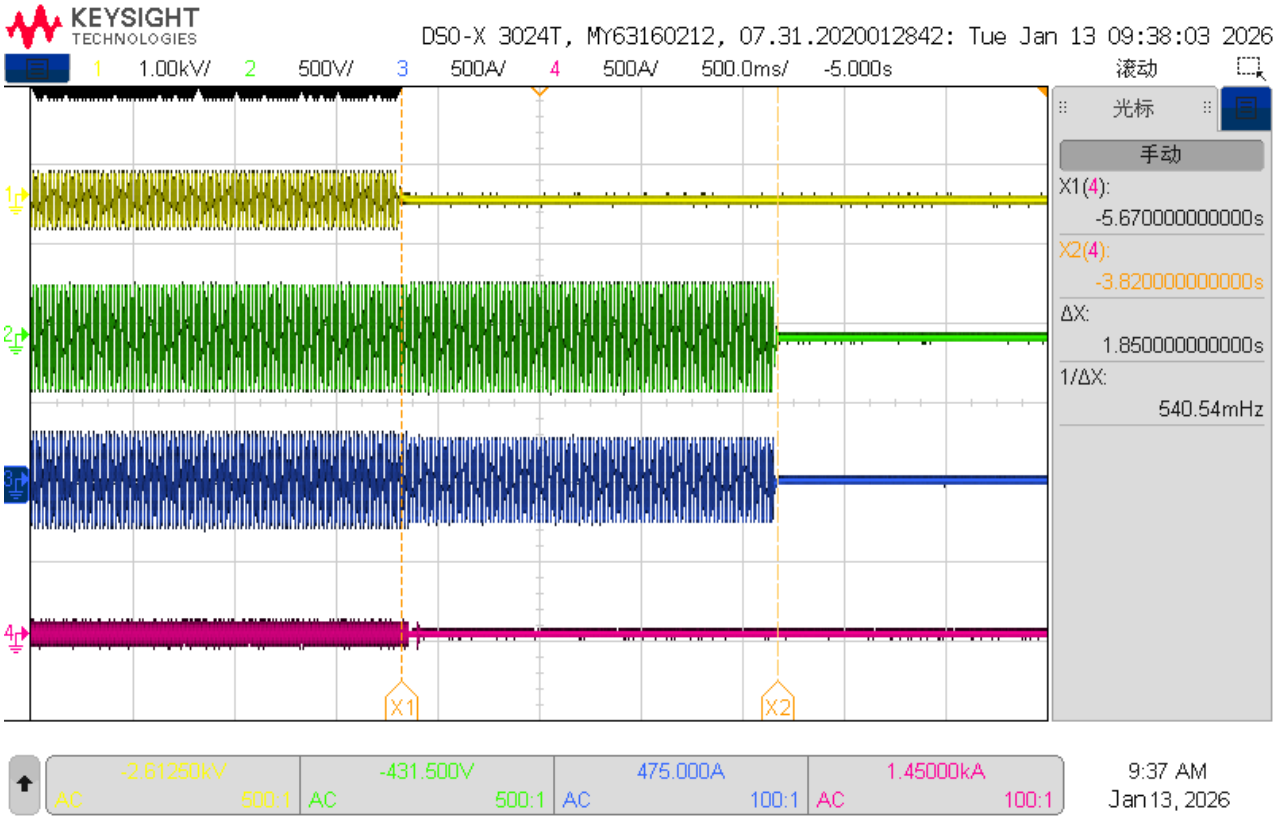
EUT output power P_{EUT} = Maximum 6)

EUT input voltage 6) = >75% of rated input voltage range

6) Maximum EUT output power condition should be achieved using the maximum allowable input power. Actual output power may exceed nominal rated output.

7) Based on EUT rated input operating range. For example, If range is between X volts and Y volts, 75 % of range =X + 0.75 × (Y – X). Y shall not exceed 0.8 × EUT maximum system voltage (i.e., maximum allowable array open circuit voltage). In any case, the EUT should not be operated outside of its allowable input voltage range.

Scope pictures of the disconnection time
Disconnection at No. 1



Note:

Yellow: Feedback current flows into the grid signal

Green: EUT output voltage

Blue: EUT output current

Pink: Grid input current

Load imbalance (reactive load) for test condition B (EUT output = 50 % – 66 %)									P
Test conditions			Frequency: 50+/-0.1Hz U_N=230±2.3Vac Distortion factor of chokes < 2% Quality = 1						
Disconnection limit			2s (IEC 62116)						
No.	P_{EUT} 1) [% of EUT rating]	Reactive load [% of Q_L in 6.1.d] 1]	P_{AC} 2) 5) (% of nominal)	Q_{AC} 3) 5) (% of nominal)	Run on Time [ms]	P_{EUT} Pre-phase [kW]	Q_f	V_{DC} [V]	Remarks 4)
1.	66	66	0	-5	1038	82.5	0.975	720	Test B at IB
2.	66	66	0	-4	1240	82.5	0.980	720	Test B at IB
3.	66	66	0	-3	1052	82.5	0.985	720	Test B at IB
4.	66	66	0	-2	1470	82.5	0.990	720	Test B at IB
5.	66	66	0	-1	1462	82.5	0.995	720	Test B at IB
6.	66	66	0	0	1790	82.5	1.000	720	Test B at BL
7.	66	66	0	1	1528	82.5	1.005	720	Test B at IB
8.	66	66	0	2	1418	82.5	1.010	720	Test B at IB
9.	66	66	0	3	1320	82.5	1.015	720	Test B at IB
10.	66	66	0	4	1200	82.5	1.020	720	Test B at IB
11.	66	66	0	5	982	82.5	1.025	720	Test B at IB
Parameter at 0% per phase			L= 6.12 mH		R= 1.92 Ω			C= 1654.73 μF	

Note:

RLC is adjusted to min. +/-1% of the inverter rated output power

1) P_{EUT}: EUT output power

2) P_{AC}: Real power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

3) Q_{AC}: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

4) Fundamental of I_{AC} when RLC is adjusted

5) BL: Balance condition, IB: Imbalance condition.

Condition B:

EUT output power P_{EUT} = 50 % – 66 % 6) of maximum

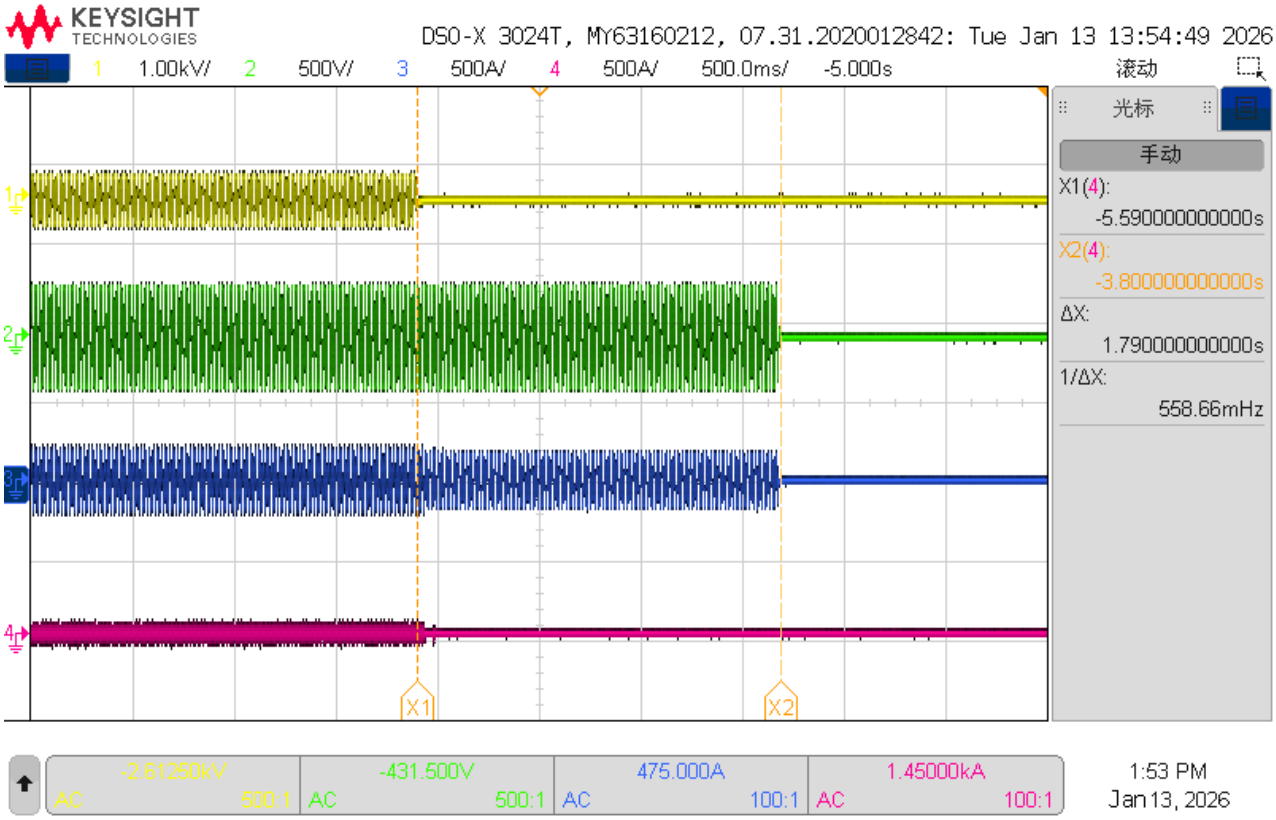
EUT input voltage [7] = 50 % of rated input voltage range

[6] Or minimum allowable EUT output level if greater than 66 %.

[7] Based on EUT rated input operating range. For example, If range is between X volts and Y volts, 20 % of range =X + 0.5 × (Y – X). Y shall not exceed 0.8 × EUT maximum system voltage (i.e., maximum allowable array open circuit voltage). In any case, the EUT should not be operated outside of its allowable input voltage range.

Scope pictures of the disconnection time

Disconnection at No. 6



Note:

Yellow: Feedback current flows into the grid signal

Green: EUT output voltage

Blue: EUT output current

Pink: Grid input current

Load imbalance (reactive load) for test condition C (EUT output = 25 % – 33 %)									P
Test conditions			Frequency: 50+/-0.1Hz U_N=230±2.3Vac Distortion factor of chokes < 2% Quality = 1						
Disconnection limit			2s (IEC 62116)						
No.	P_{EUT} 1) [% of EUT rating]	Reactive load [% of Q_L in 6.1.d] 1]	P_{AC} 2) 5) (% of nominal)	Q_{AC} 3) 5) (% of nominal)	Run on Time [ms]	P_{EUT} Pre-phase [kW]	Q_f	V_{DC} [V]	Remarks 4)
1.	33	33	0	-5	940	41.25	0.975	696	Test C at IB
2.	33	33	0	-4	1540	41.25	0.980	696	Test C at IB
3.	33	33	0	-3	1250	41.25	0.985	696	Test C at IB
4.	33	33	0	-2	1150	41.25	0.990	696	Test C at IB
5.	33	33	0	-1	1480	41.25	0.995	696	Test C at IB
6.	33	33	0	0	1580	41.25	1.000	696	Test C at BL
7.	33	33	0	1	1320	41.25	1.005	696	Test C at IB
8.	33	33	0	2	1128	41.25	1.010	696	Test C at IB
9.	33	33	0	3	1228	41.25	1.015	696	Test C at IB
10.	33	33	0	4	1360	41.25	1.020	696	Test C at IB
11.	33	33	0	5	916	41.25	1.025	696	Test C at IB
Parameter at 0% per phase			L= 6.12 mH		R= 1.92 Ω			C= 1654.73 μF	

Note:

RLC is adjusted to min. +/-1% of the inverter rated output power

1) P_{EUT}: EUT output power

2) P_{AC}: Real power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

3) Q_{AC}: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

4) Fundamental of I_{AC} when RLC is adjusted

5) BL: Balance condition, IB: Imbalance condition.

Condition C:

EUT output power P_{EUT} = 25 % – 33 % 6) of maximum

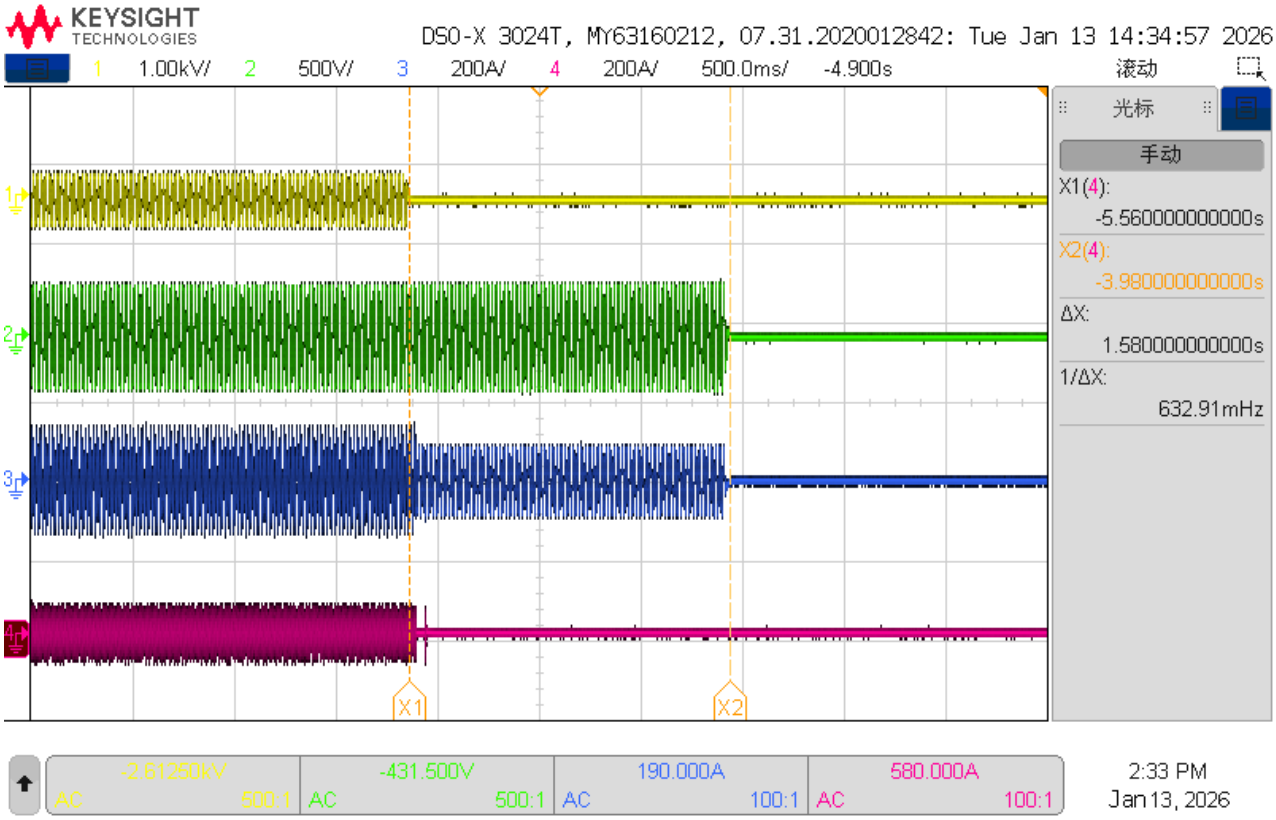
EUT input voltage [7] = <20 % of rated input voltage range

[6] Or minimum allowable EUT output level if greater than 33 %.

[7] Based on EUT rated input operating range. For example, If range is between X volts and Y volts, 20 % of range =X + 0.2 × (Y – X). Y shall not exceed 0.8 × EUT maximum system voltage (i.e., maximum allowable array open circuit voltage). In any case, the EUT should not be operated outside of its allowable input voltage range.

Scope pictures of the disconnection time

Disconnection at No. 6



Note:

Yellow: Feedback current flows into the grid signal

Green: EUT output voltage

Blue: EUT output current

Pink: Grid input current

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.9	**Connection and starting**	
5.9.3	Automatic reconnection after tripping	P
5.9.4	Starting to generate electrical power	P
5.9.7	Synchronisation	P

5.9 Connection and starting 5.9.3 Automatic reconnection after tripping 5.9.4 Starting to generate electrical power		P
Setting value	Min. voltage for connected to grid:	207.0V
	Max. voltage for connected to grid:	253.0V
	Min. Frequency for connected to grid:	49.50Hz
	Max. Frequency for connected to grid:	50.10Hz
	Observation time (≥60s):	60s

Test:

	Voltage conditons	
a) Start up for voltage range	<90% Un for twice of observation time	>110% Un for twice of observation time
Connection:	No connection	No connection
Limit	No connection allowed	
b) In voltage range at start-up	≥90% Un within twice setting observation time	≤110% Un within twice setting observation time
Reconnection time [s]	114.4	107.8
Limit:	Connected after setting observation time (≥60s)	
Gradient:	The maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: disable. For recorded gradient see diagram below.	
c) In voltage range after voltage failure	≥90% Un within twice setting observation time	≤110% Un within twice setting observation time
Reconnection time [s]	115.8	114.6
Limit:	Reconnection after setting observation time (≥60s)	
Gradient:	For adjustable micro generators the maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: 10%P_{Emax}/min. For non or partly adjustable generators the connection after trip of the interface protection is delayed by a randomised value between 1 min and 10 min. For recorded gradient see diagram below.	
	Frequency conditions	
d) Start up for frequency range	<49.50 Hz for twice of setting observation time	>50.10 Hz for twice of setting observation time
Connection:	No connection	No connection
Limit	No connection allowed	
e) In frequency range at start-up	≥49.50 Hz within twice setting observation time	≤50.10 Hz within twice setting observation time
Reconnection time [s]	105.2	107.2
Limit:	Connected after setting delay time(≥60s)	

Gradient:	The maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: disable. For recorded gradient see diagram below.	
f) In frequency range after frequency failure	≥49.50 Hz within twice setting observation time	≤50.10 Hz within twice setting observation time
Reconnection time [s]	108.8	105.8
Limit:	Reconnection after setting observation time (≥60s)	
Gradient:	For adjustable micro generators the maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: 10%Pn/min. For non or partly adjustable generators the connection after trip of the interface protection is delayed by a randomised value between 1 min and 10 min. For recorded gradient see diagram below.	

Test:

Test condition a), b), d) and e): Refer table 4

Test condition c) and f): Refer table 3

In order to avoid continuous starting and disengaging operations of the interface protection relay, the disengaging value of frequency and voltage functions shall be above 2 % deviating from the operate value.

Table 3 – Automatic reconnection after tripping

Parameter	Range	Default setting
Low frequency	47.0-50.0Hz	49.5Hz
High frequency	50.0-52.0Hz	50.2Hz
Low voltage	50%-100%U_n	85%U_n[a]/ 90%U_c[b]
High voltage	100%-120%U_n	110%U_n[a]/ 110%U_c[b]
Observation	10s-600s	60s
Active power	6%-3000%/minute	10%/minute

a: in case of EN 50549-1:2019

b: in case of EN 50549-2:2019

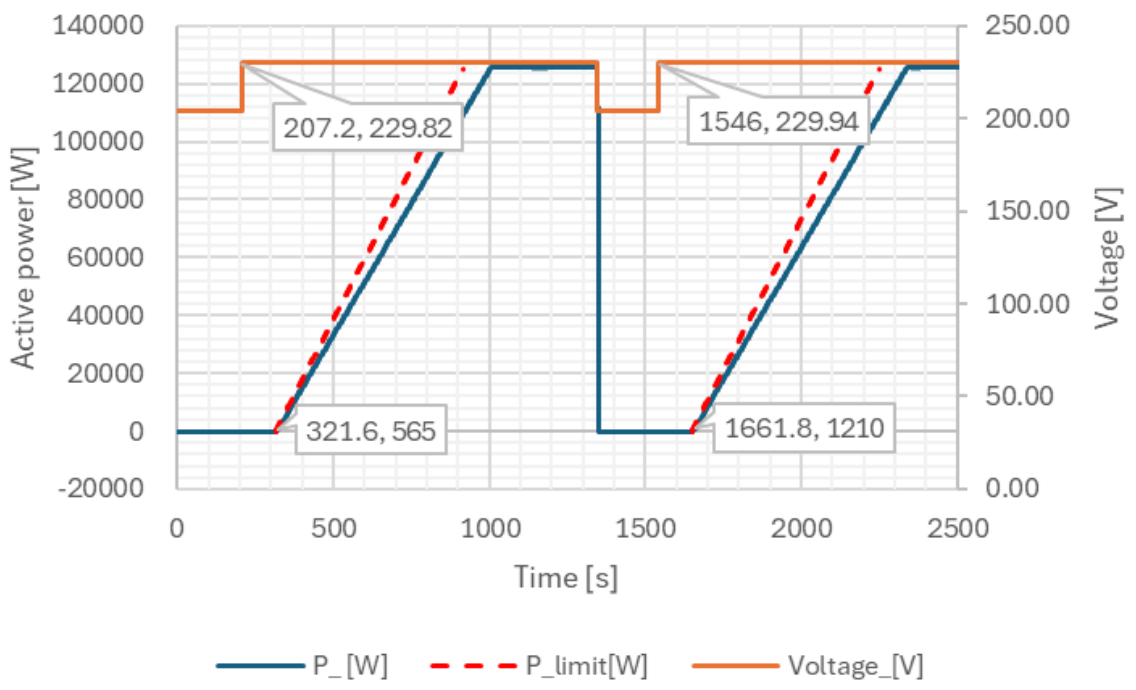
Table 4 – Starting to generate electric power

Parameter	Range	Default setting
Low frequency	47.0-50.0Hz	49.5Hz
High frequency	50.0-52.0Hz	50.1Hz
Low voltage	50%-100%U_n	85%U_n[a]/ 90%U_c[b]
High voltage	100%-120%U_n	110%U_n[a]/ 110%U_c[b]
Observation	10s-600s	60s
Active power	6%-3000%/minute	Disable

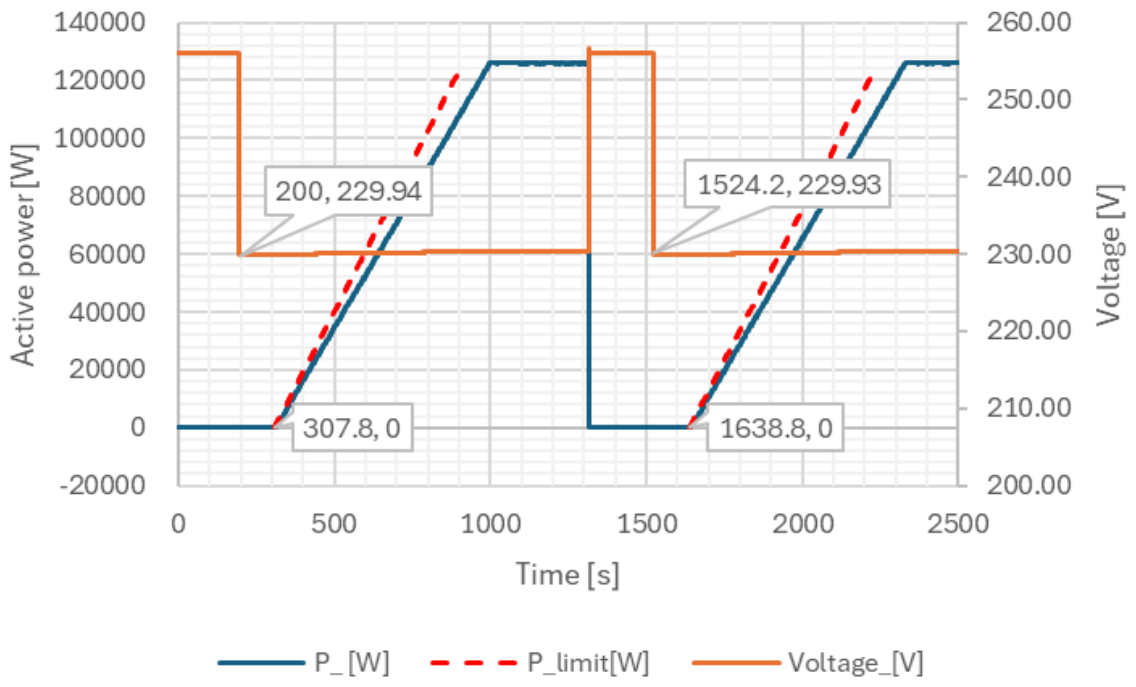
a: in case of EN 50549-1:2019

b: in case of EN 50549-2:2019

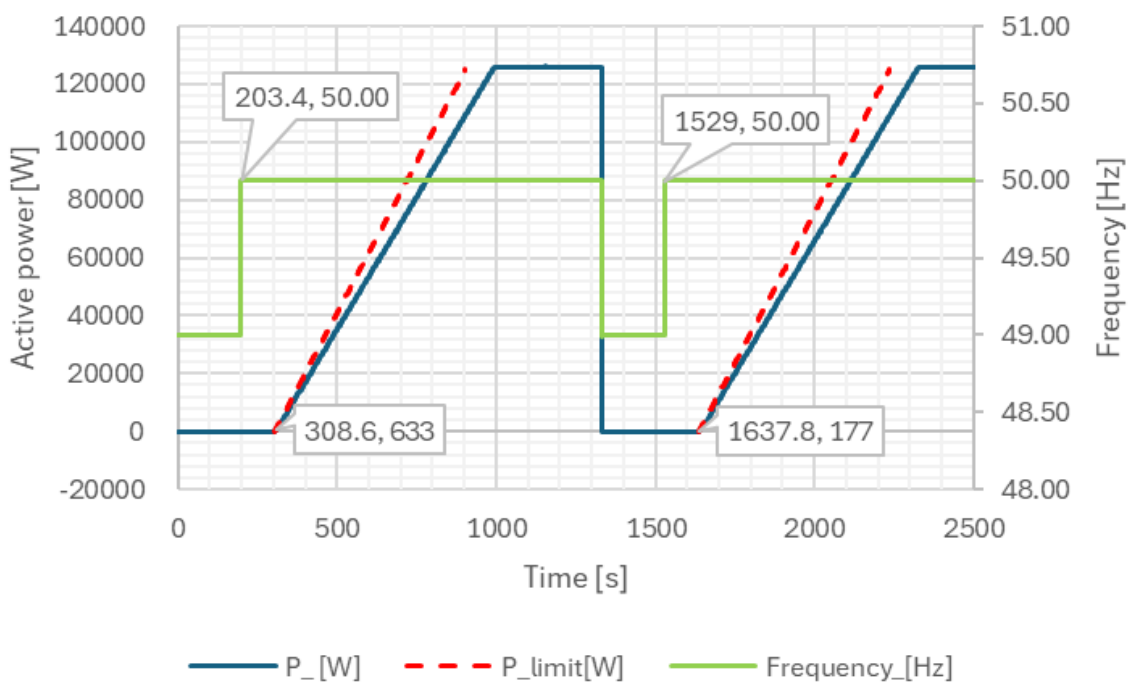
Graph of the gradual power supply: Test 1) for ≥ 90% U_n



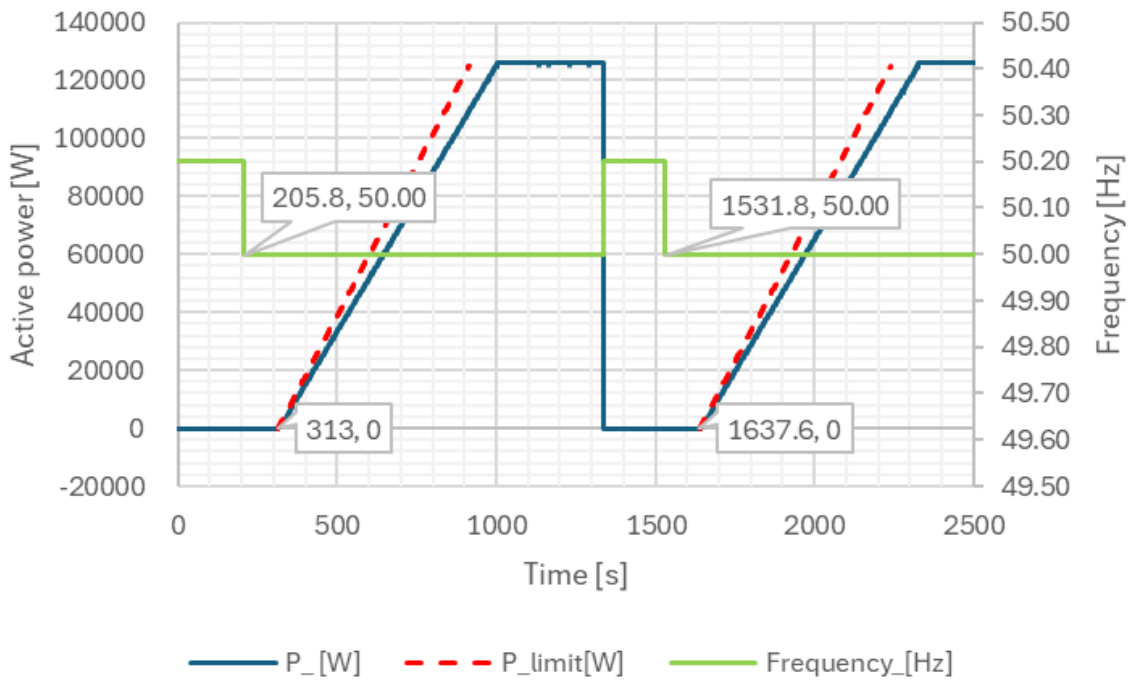
Graph of the gradual power supply: Test 2) for ≤ 110% U_n



Graph of the gradual power supply: Test 3) for ≥ 49.50Hz

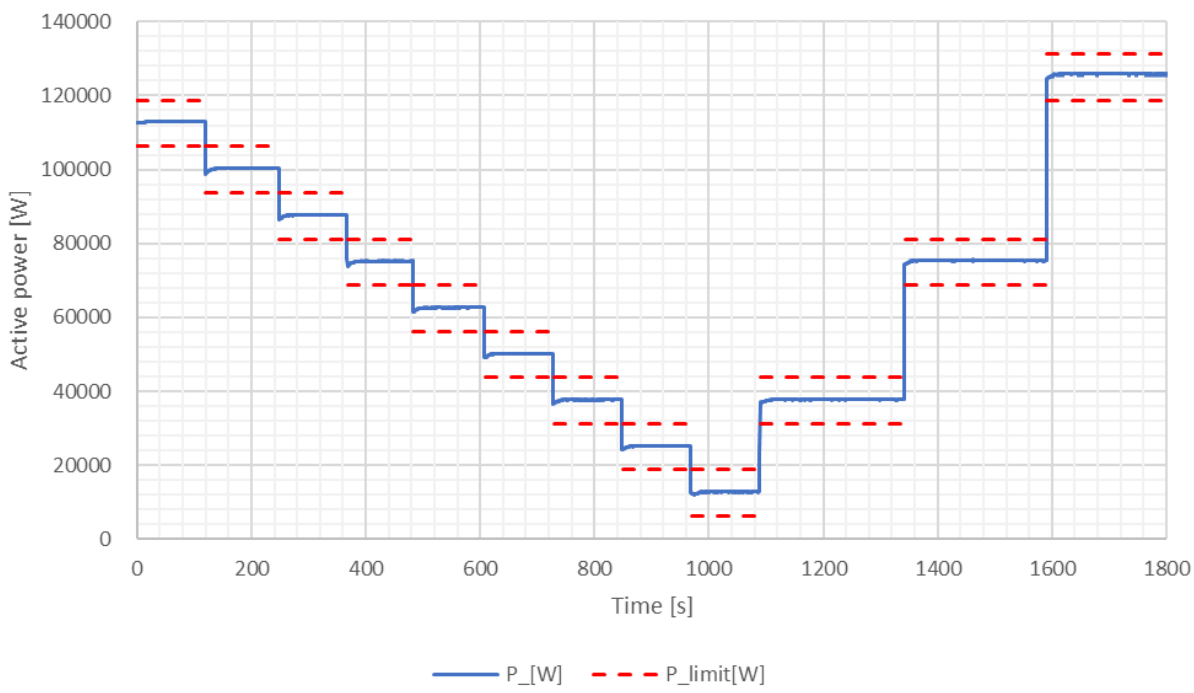


Graph of the gradual power supply: Test 4) for ≤ 50.10Hz



5.10 Active power reduction on set point 5.10.3.2 Verification of the accuracy						P
Test:						
Active power step [% of P_n]	Requested set point value		Actual value		Accuracy Actual value-set point	
	W	P/Pn[%]	W	P/Pn[%]	W	P/Pn[%]
90	112500	90.0	113003	90.40	503	0.40
80	100000	80.0	100322	80.26	322	0.26
70	87500	70.0	87677	70.14	177	0.14
60	75000	60.0	75156	60.12	156	0.12
50	62500	50.0	62602	50.08	102	0.08
40	50000	40.0	50111	40.09	111	0.09
30	37500	30.0	37681	30.14	181	0.14
20	25000	20.0	25190	20.15	190	0.15
10	12500	10.0	12752	10.20	252	0.20
Limit $\Delta P_{E60}/P_{Setpoint}$:	± 5 % of P_{Emax}					
30	37500	30.0	37751	30.20	251	0.20
60	75000	60.0	75330	60.26	330	0.26
100	125000	100.0	125833	100.67	833	0.67
Limit $\Delta P_{E60}/P_{Setpoint}$:	+ 5 % of P_{Emax}					

Graph of active power on set point



Assessment criterion:

a) for adjustable PGUs:

- no network disconnection
- the active power value does not exceed the setpoint by more than 5% P_{Emax}
- the setting time determined this way is ≤ 1min

b) For all other PGUs:

- the active power value does not exceed the setpoint by more than 5% P_{Emax} or
- the setpoint is fallen below within 5 minutes or the PGU has switched off

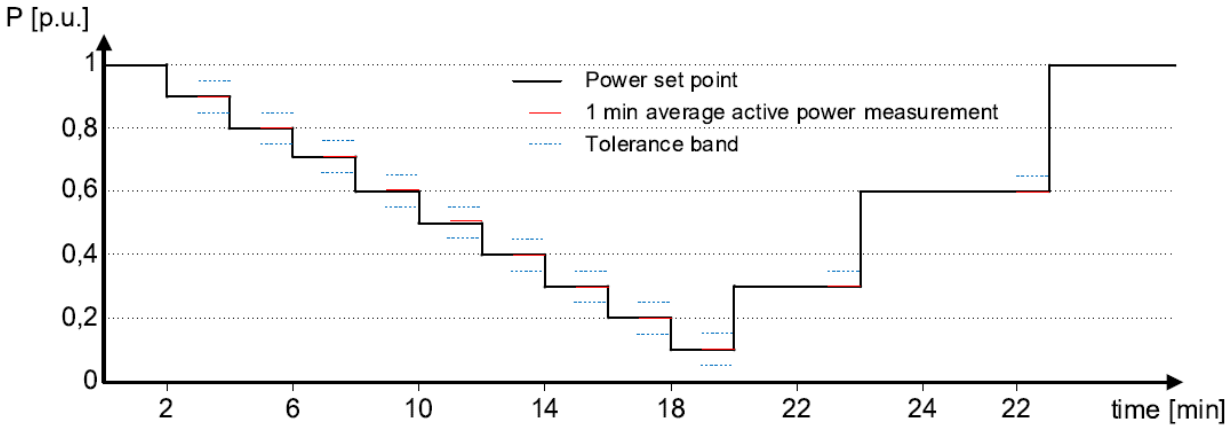


Figure 46 — Test results graph (example)

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.10	**Active power reduction on set point**	
5.10.3.2	Verification of the accuracy	P
5.10.3.3	Test procedure for dynamic behaviour	P
5.11	Remote information exchange	P

5.10 Active power reduction on set point 5.10.3.3 Verification procedure for dynamic behaviour			P
Test:1			
1-min mean value	100% of P_{Emax}	90% of P_{Emax}	10% of P_{Emax}
$P_{Setpoint}$[W]:	125000	112500	12500
P_{E60} [W]:	125165	113996	12844
$\Delta P_{E60}/P_{Setpoint}$ [%]:	100.13	91.20	10.28
Limit $\Delta P_{E60}/P_{Setpoint}$:	± 5%of P_{Emax}		
Condition	100% of P_{Emax} to 90% of P_{Emax}	90% of P_{Emax} to 10% of P_{Emax}	
Measurements $\Delta P/\Delta t$ [%P_{rE}/s]	0.502	0.482	
Limit $\Delta P/\Delta t$ [%P_{rE}/s]	0.33-0.66		
Test:2			
1-min mean value	100% of P_{Emax}	70% of P_{Emax}	50% of P_{Emax}
$P_{Setpoint}$[W]:	125000	87500	62500
P_{E60} [W]:	125192	88584	63235
$\Delta P_{E60}/P_{Setpoint}$ [%]:	100.15	70.87	50.59
Limit $\Delta P_{E60}/P_{Setpoint}$:	± 5%of P_{Emax}		
Condition	100% of P_{Emax} to 70% of P_{Emax}	90% of P_{Emax} to 50% of P_{Emax}	
Measurements $\Delta P/\Delta t$ [%P_{rE}/s]	0.483	0.484	
Limit $\Delta P/\Delta t$ [%P_{rE}/s]	0.33-0.66		

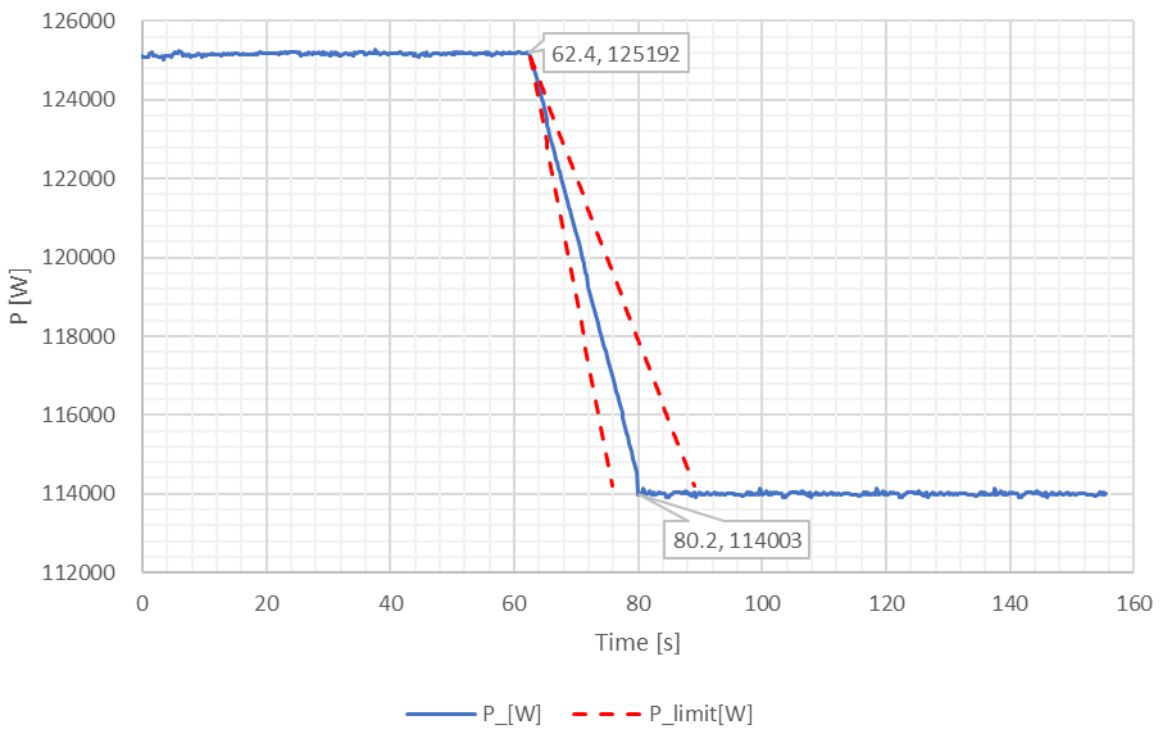
Test method:

The test shall be carried out starting from an initial condition with the generating unit running at 0.9 p.u. active power and applying a step of the active power set point from 0.9 p.u. down to 0.1 p.u. of nominal power or minimum regulating power, whatever is the higher.

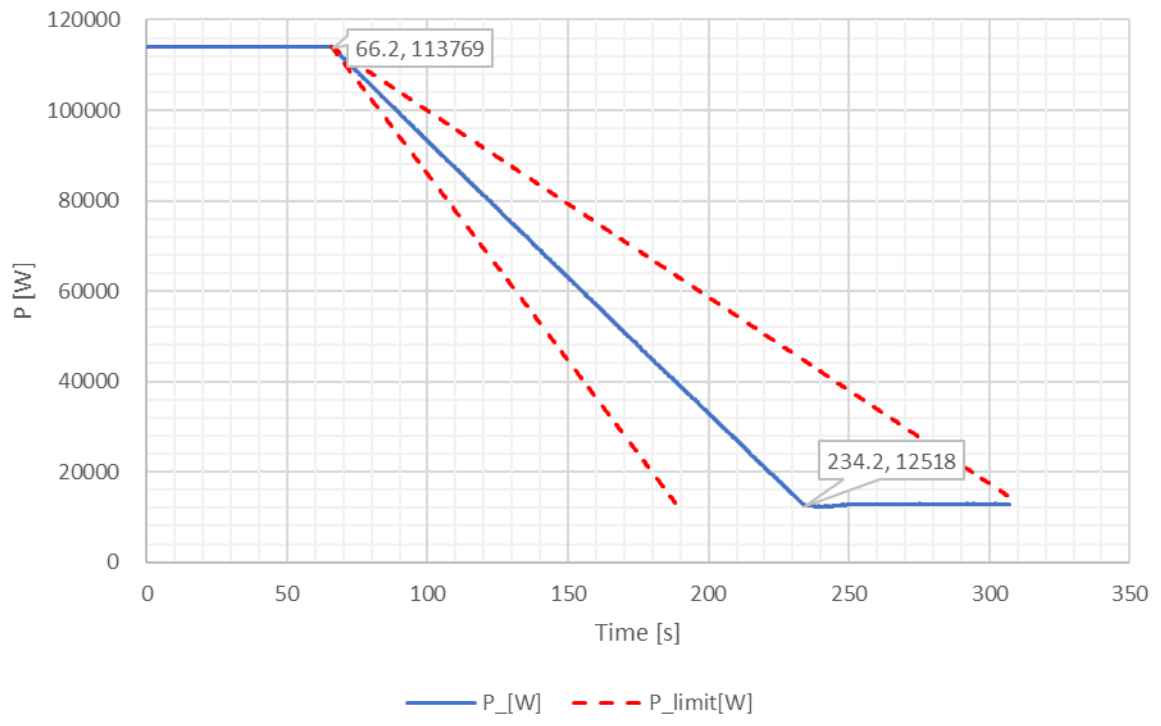
If this is not compatible with the specific test conditions, active power set point shall be stepped from 0.7 p.u. down to 0.5 p.u. of nominal power.

The step response behaviour is measured starting from the instance the set point change is transmitted to the EUT. For the step response time and the settling time a tolerance band of ± 5 % P_{Emax}, to the reactive power set point is considered.

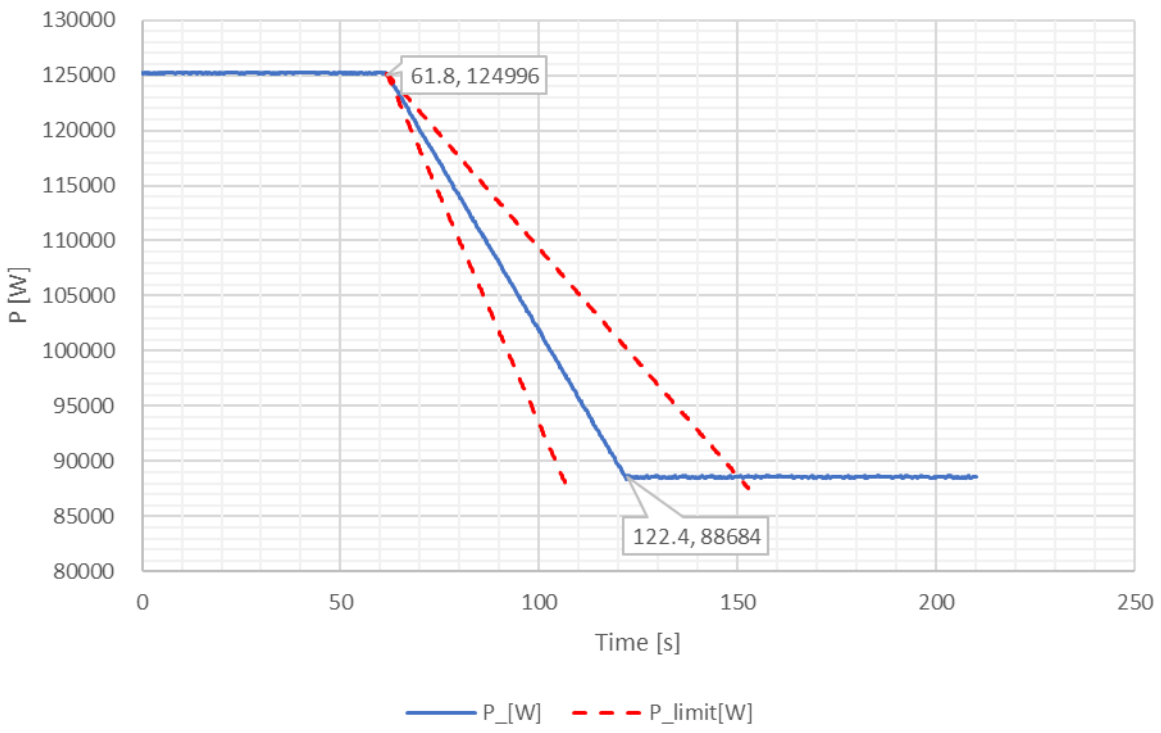
100% of P_{Emax} to 90% of P_{Emax}



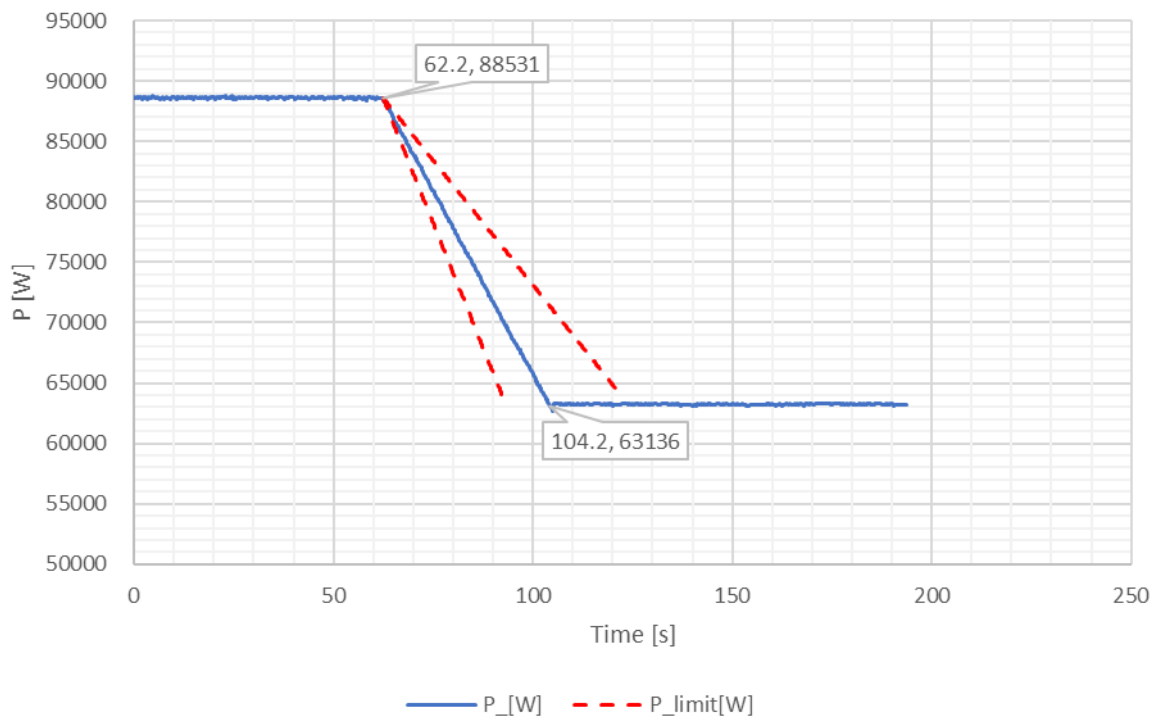
90% of P_{Emax} to 10% of P_{Emax}



100% of P_{Emax} to 70% of P_{Emax}



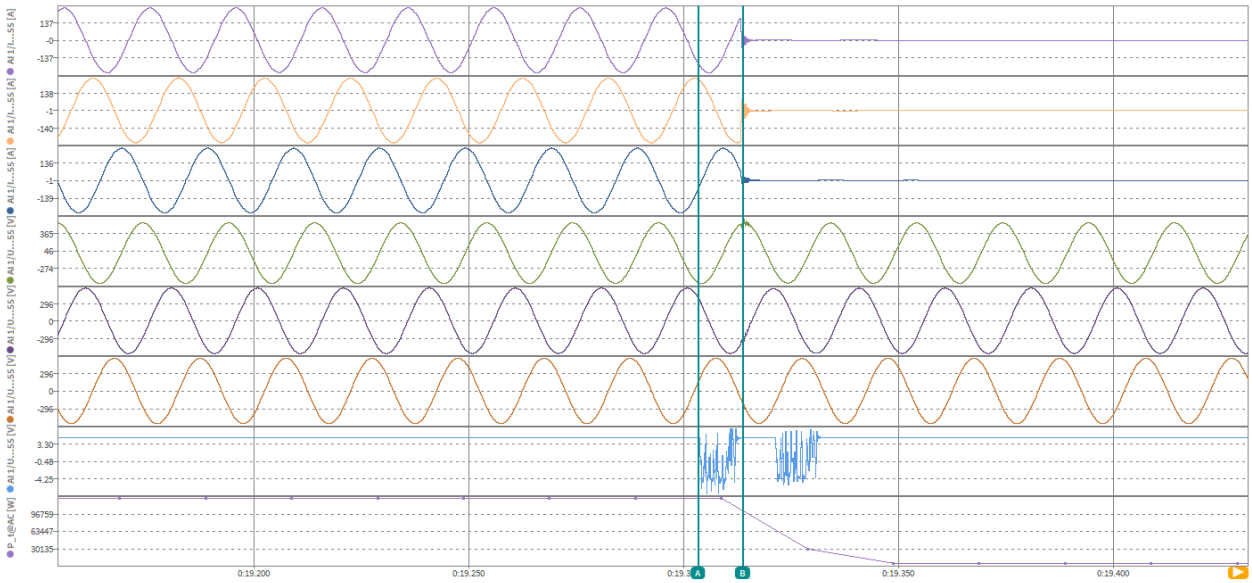
70% of P_{Emax} to 50% of P_{Emax}



5.11 Remote information exchange	P

Operating time of the monitoring device

Test:	Remote tripping signal for the external disconnection
Limit [ms]:	5000
Reaction time of the tripping value [ms]:	10



	A	B	间隔	有效值
时间 [s]	0:19.303500	0:19.313900	0.010400	
AI 1/I1@TRIONet3_1455 [A]	-192.2925	-9.578825	182.7136	177.5169
AI 1/I2@TRIONet3_1455 [A]	245.9611	13.18204	-232.7790	180.5270
AI 1/I3@TRIONet3_1455 [A]	-57.59812	-7.822276	49.77584	177.4382
AI 1/U1@TRIONet3_1455 [V]	-551.5633	445.6287	997.1920	405.5956
AI 1/U2@TRIONet3_1455 [V]	375.7067	-240.7932	-616.4999	395.6366
AI 1/U3@TRIONet3_1455 [V]	175.8833	-204.8984	-380.7817	391.8150
AI 1/U4@TRIONet3_1455 [V]	4.702091	4.684210	-0.017881	4.190471
P_t@AC [W]	126898.8	126774.2	-124.6016	126836.6

Note:

Generating plants shall be equipped with a logic interface (input port) in order to cease active power output within five seconds following an instruction being received at the input port. If required by the DSO, this includes remote operation.

EN 50549-10:2022		
Clause	**Test items**	**Remark**
5.12	**Requirements regarding single fault tolerance of interface protection system and interface switch**	
5.12.2	Single fault tolerance of the interface protection system	P
5.12.3	Single fault tolerance of the interface switch	P

5.12	Requirements regarding single fault tolerance of interface protection system and interface switch							P
		test voltage (V) .....:				See below		—
		Ambient temperature (°C) .....:				25°C, if not stated otherwise		
No.	Component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	
M0, sampling board								
1.	DC sampling circuit, R104	O-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 7 (battery low voltage). No hazard, can resettable.	
2.	DC sampling circuit, R104	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 9 (battery over voltage). No hazard, can resettable.	
3.	Bus sampling circuit, R156	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 4 & 6 (Bus over voltage and Bus unbalance). No hazard, can resettable.	
4.	AC sampling circuit, R691	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit operated normally. No hazard.	
U1, Chip board								
5.	Power supply of U2 Chip, J1, Pin 37 & 45	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit shut down. No hazard, can resettable.	
6.	Power supply of U3 Chip, J1, Pin 37 & 45	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit shut down. No hazard, can resettable.	

M5, BUS balance Board							
7.	Current Sensor, T1, Pin 1 and 2	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit operated normally. No hazard.
M1, convert power board							
8.	Driver circuit of IGBT, R319	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit operated normally. No hazard.
9.	Bus Capacitor, C27	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the capacitor C27 broken, and unit shut down. No hazard, damaged and cannot resettable
10.	Power supply ±15V of Current Sensor, J28	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit shut down. No hazard, can resettable.
M2, AC/DC Power board							
11.	AC Relay RLY1, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 5 (Bus under voltage) and cannot connect to grid. No hazard, can resettable.
12.	AC Relay RLY2, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 5 (Bus under voltage) and cannot connect to grid. No hazard, can resettable.
13.	AC Relay RLY3, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 5 (Bus under voltage) and cannot connect to grid. No hazard, can resettable.

14.	AC Relay RLY5, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 5 (Bus under voltage) and cannot connect to grid. No hazard, can resettable.
15.	AC Relay RLY7, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 5 (Bus under voltage) and cannot connect to grid. No hazard, can resettable.
M4, auxiliary power board							
16.	T1, pin 11 and 14, 24 power source	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit operated normally. No hazard.
17.	T2, pin 9 and 10, driver circuit for Mosfet	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit shut down. No hazard, can resettable.
18.	T4, pin 13 and 14, 15 power source	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit shut down, no software alarm, LED alarm flash. No hazard, can resettable.
19.	AC Relay RLY16, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 8 (AC relay fault) and cannot connect to grid. No hazard, can resettable.
20.	DC contactor RLY17, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 6 (Positive and negative bus unbalanced fault). No hazard, can resettable.
21.	DC contactor on enclosure, signal pin	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 6 (Positive and negative bus unbalanced fault). No hazard, can resettable.
Cooling							
22.	Fan	Bloc ked	800Vdc 400Vac	30min	-	-	The fault applied during operation, after applied the fault, the unit operated for 1minute, then software alarm code: 1

							(Fan fault of hardware). No hazard, can resettable.
23.	Fan driver circuit, M1 board, J24, pin 1 and 2	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit operated for 1minute, then software alarm code: 1 (Fan fault of hardware). No hazard, can resettable.
General input and output							
24.	AC terminal (3 phase)	S-C	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 0 & 1 (Phase A over voltage, Phase B over voltage). No hazard, can resettable.
25.	AC terminal – Phase A & Phase B	MIS	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 8 (Grid phase wrong). No hazard, can resettable.
26.	AC terminal – Phase C	LP	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit protected and software alarm code: 1 & 2 (Phase B over voltage, Phase C overvoltage). No hazard, can resettable.
27.	DC terminal	S-C	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 0 (pre-charge over time for Capacitor) and cannot connect to grid. No hazard, can resettable.
28.	DC terminal	RE	800Vdc 400Vac	10min	-	-	The fault applied before operation, after applied the fault, the software alarm code: 7 & 15 (Battery under voltage, Battery reverse) and cannot connect to grid. No hazard, can resettable.
29.	120% AC output	OL	800Vdc 400Vac	10min	-	-	The fault applied during operation, after applied the fault, the unit keep operated at 110%Pn. No hazard, can resettable.
30.	PE conductor	MIS S	800Vdc 400Vac	10min	-	-	Fault applied before operation, the unit can start up normally. No damage, no hazard.
Legend							

S-C	short-circuited	O-C	open-circuited
OL	Over-load.	MIS	Miss wiring
RE	Reverse polarity	LP	Loss of phase
Note(s): The electric strength test performed after fault condition test and see appended table 7.5.2 for detailed test conditions.			

5.12 Requirements regarding single fault tolerance of interface protection system and interface switch								P
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	
a.	Error of an AD converter or measuring card for voltage measurement		DC:850V AC:230V	10s	--	--	The unit disconnect within 10 s, no damage, no fire, no hazard	
b.	malfunction or freezing of a microprocessor or PLC		DC:850V AC:230V	10s	--	--	The unit disconnect within 10 s, no damage, no fire, no hazard	
c.	Merging or jamming of the contacts of the switching output		DC:850V AC:230V	10s	--	--	The unit disconnect within 10 s, no damage, no fire, no hazard	
d.	overvoltage of the supply voltage		DC:850V AC:230V	10s	--	--	The unit disconnect within 10 s, no damage, no fire, no hazard	
e.	Cable break in connecting cables between the measuring input and the control output to the coupling switch		DC:850V AC:230V	10s	--	--	The unit disconnect within 10 s, no damage, no fire, no hazard	
f.	Failure of the supply voltage (auxiliary voltage)		DC:850V AC:230V	10s	--	--	The unit disconnect within 10 s, no damage, no fire, no hazard	

Pictures of the unit

Figure 1. Front view
(for model TAA-105KW-01, TAA-125KW-01)

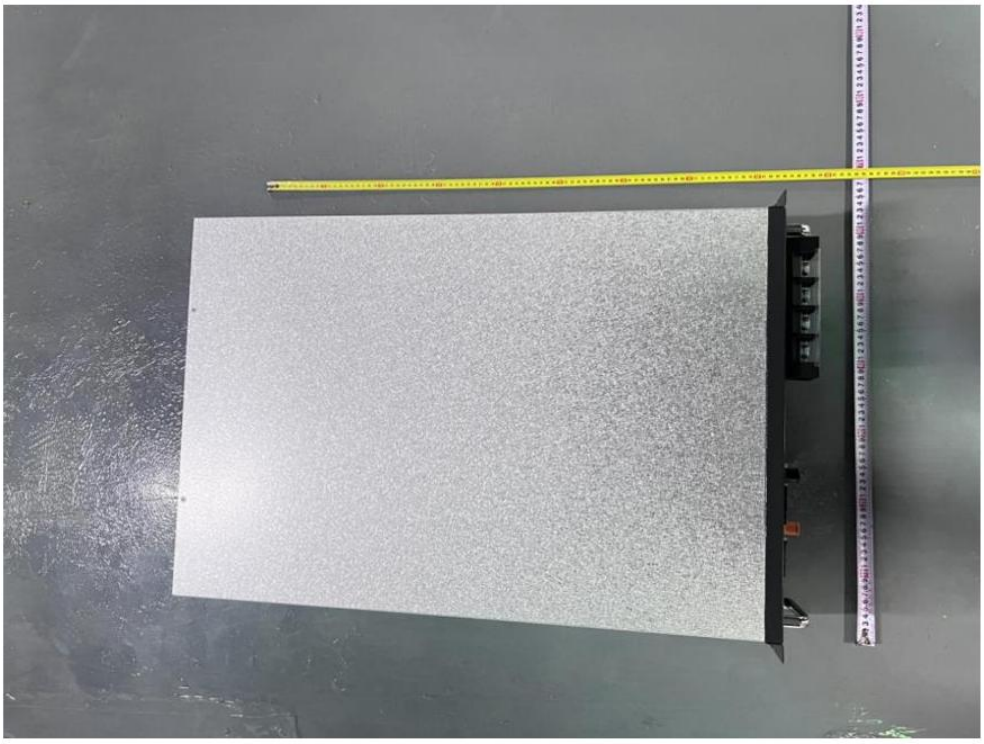


Figure 2. Top view
(for model TAA-105KW-01, TAA-125KW-01)

Pictures of the unit

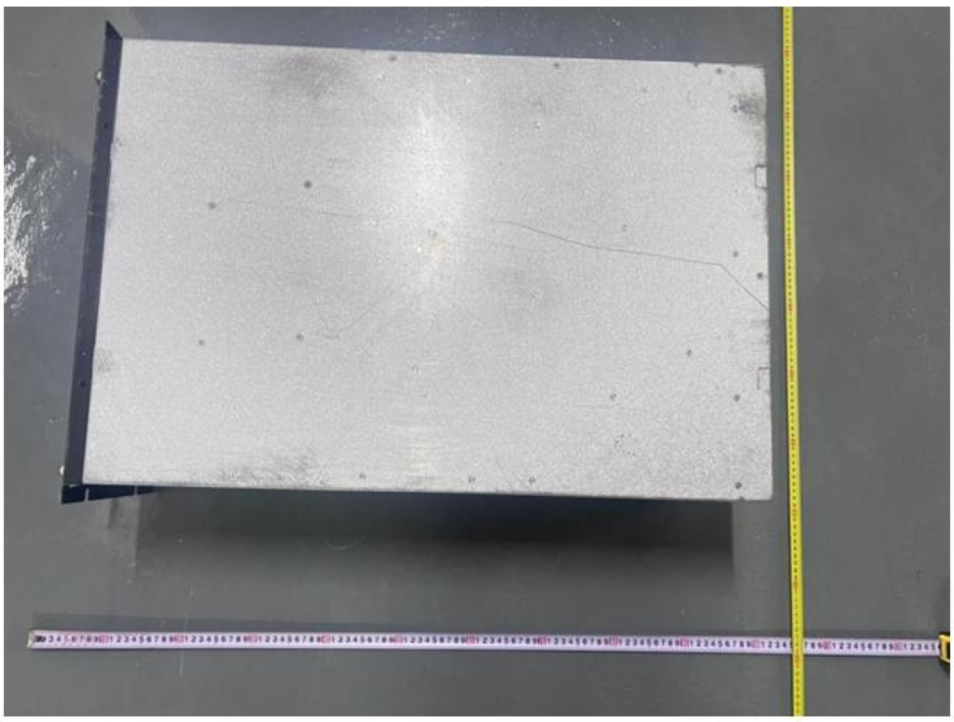


Figure 3. Bottom view
(for model TAA-105KW-01, TAA-125KW-01)

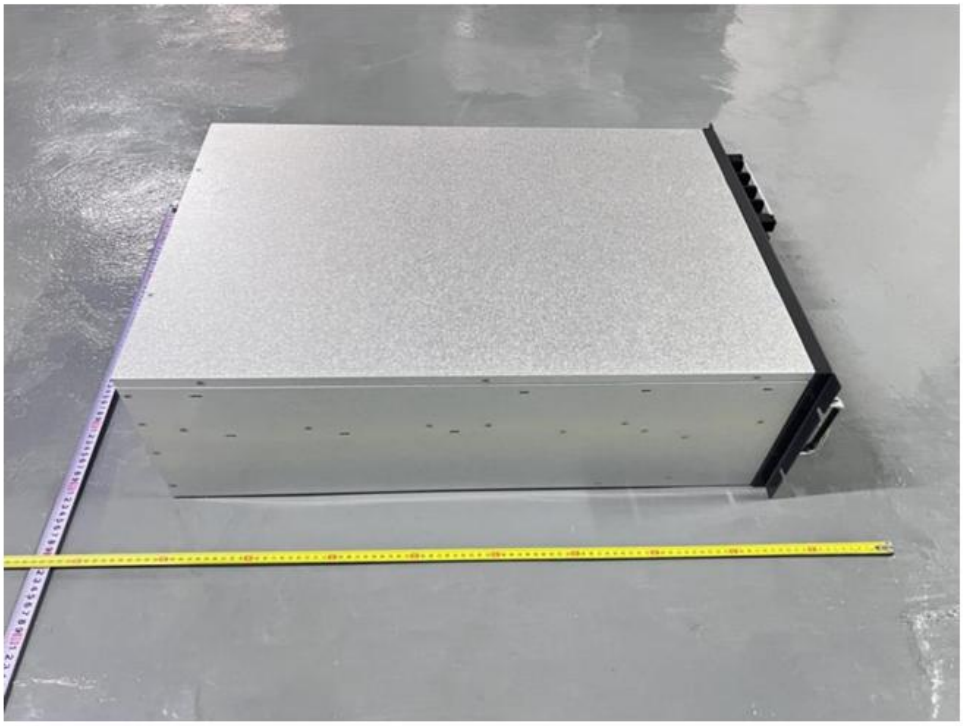


Figure 4. Right view
(for model TAA-105KW-01, TAA-125KW-01)

Pictures of the unit

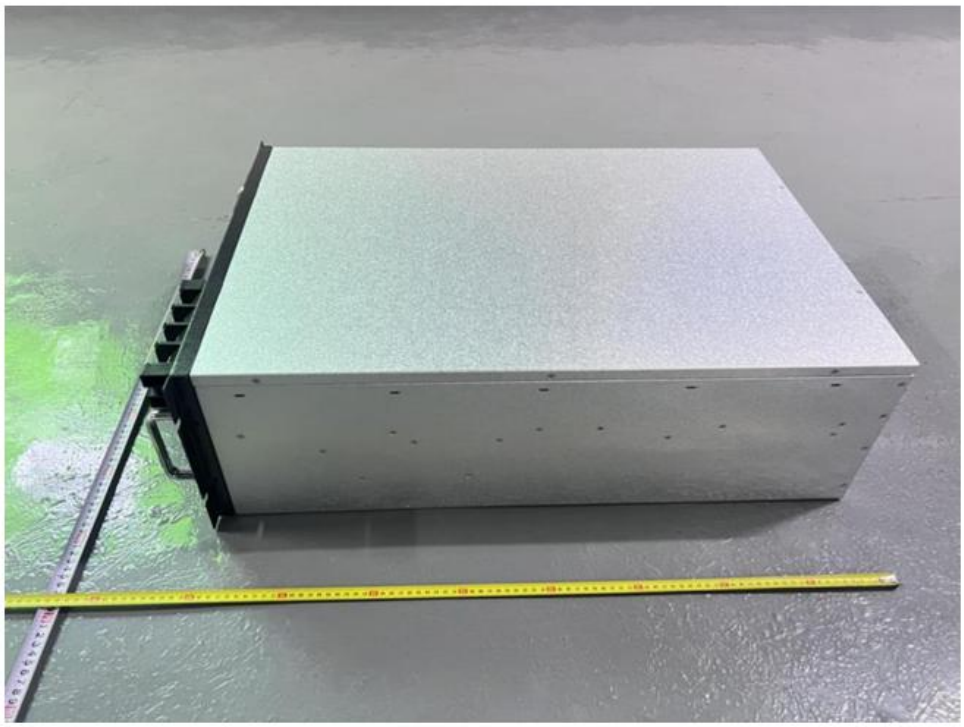


Figure 5. Left view
(for model TAA-105KW-01, TAA-125KW-01)

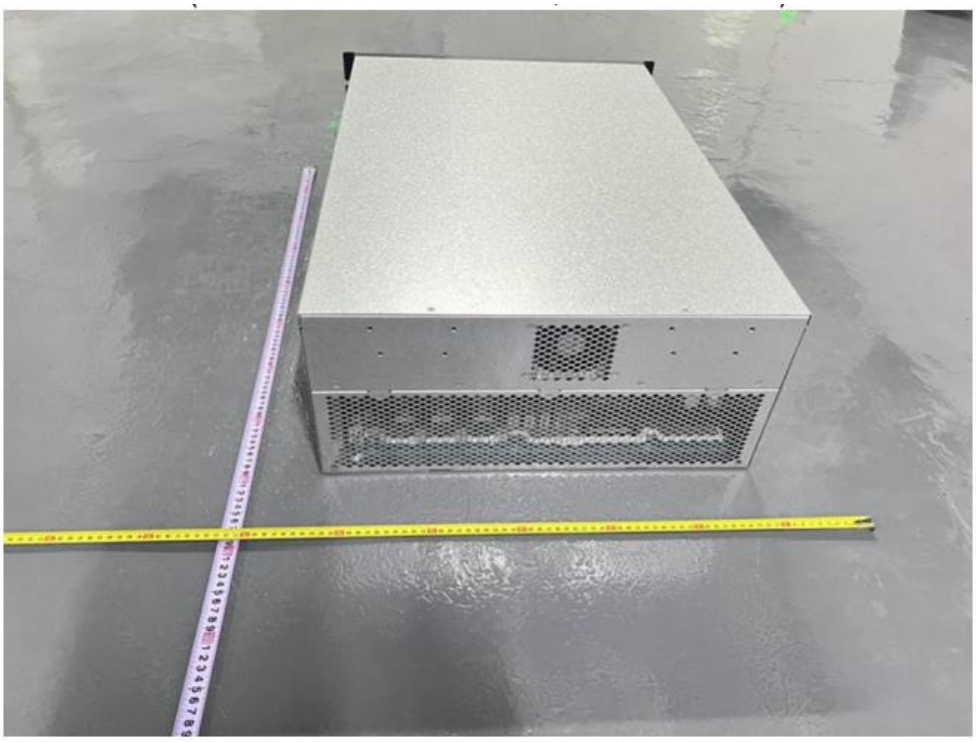


Figure 6. Back view
(for model TAA-105KW-01, TAA-125KW-01)

Pictures of the unit

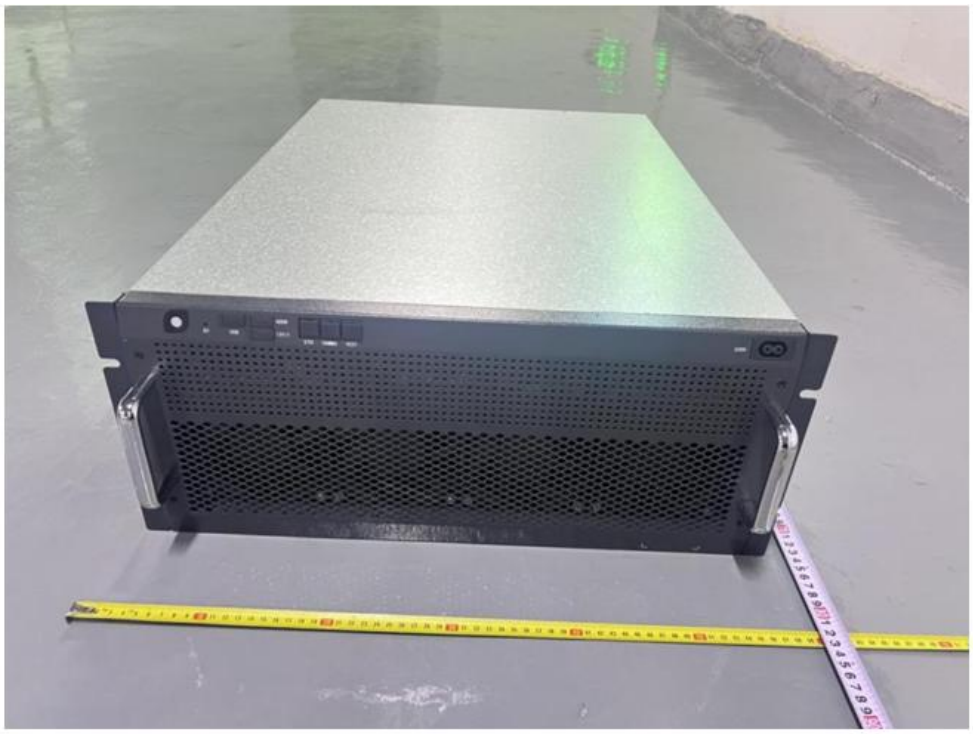


Figure 7. Front view
(for model TAA-105KW-11, TAA-125KW-11)

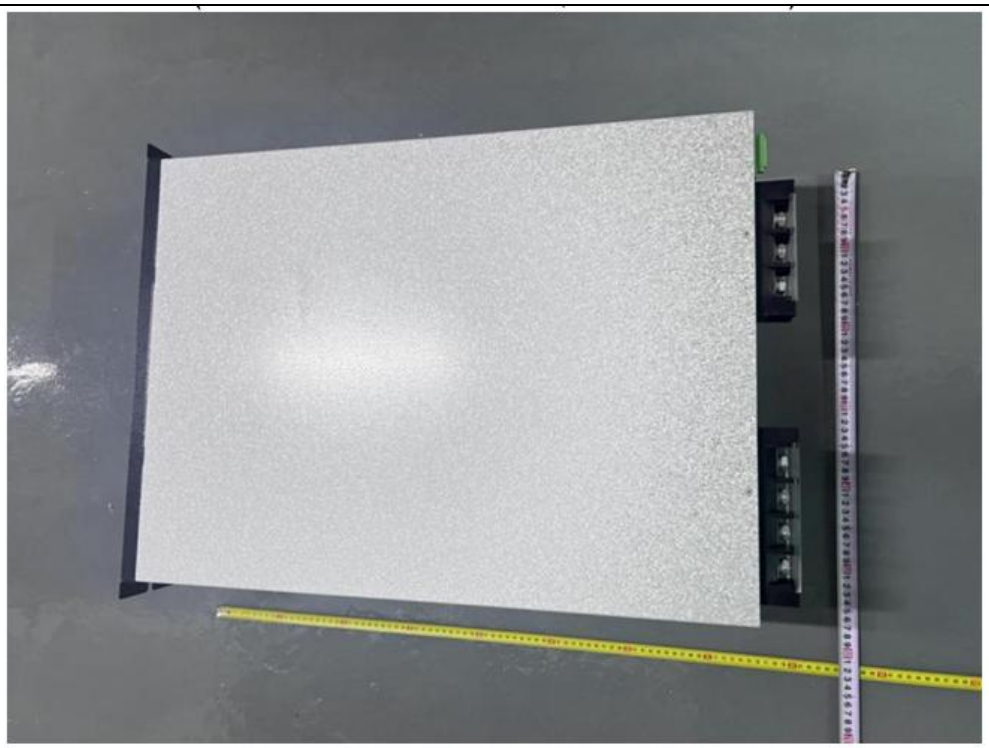


Figure 8. Top view
(for model TAA-105KW-11, TAA-125KW-11)

Pictures of the unit

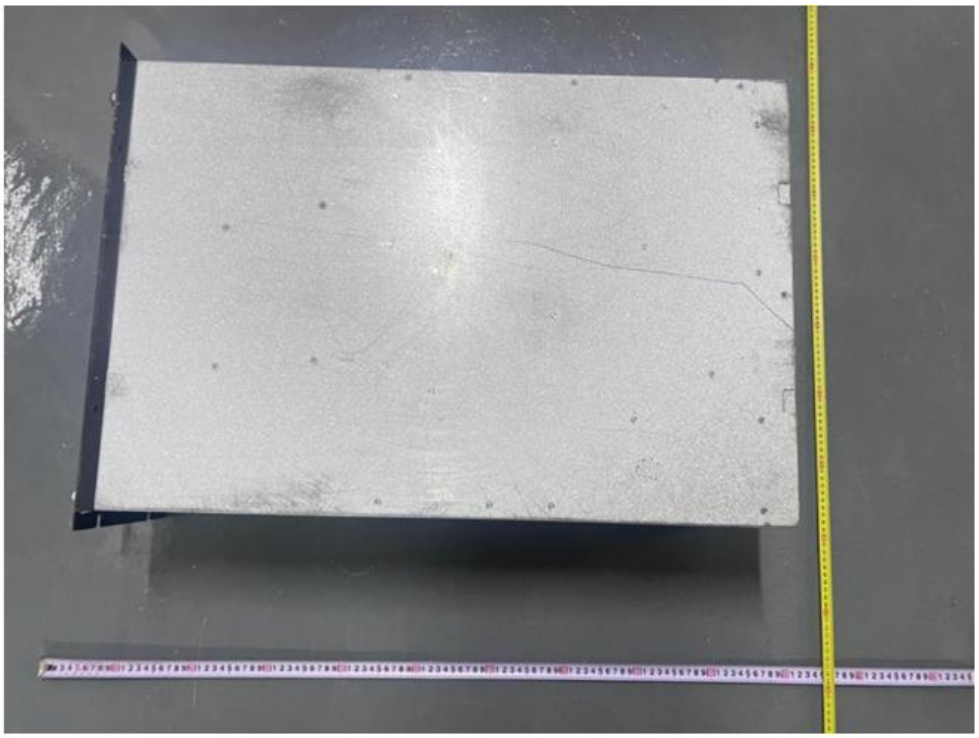


Figure 9. Bottom view

(for model TAA-105KW-11, TAA-125KW-11)

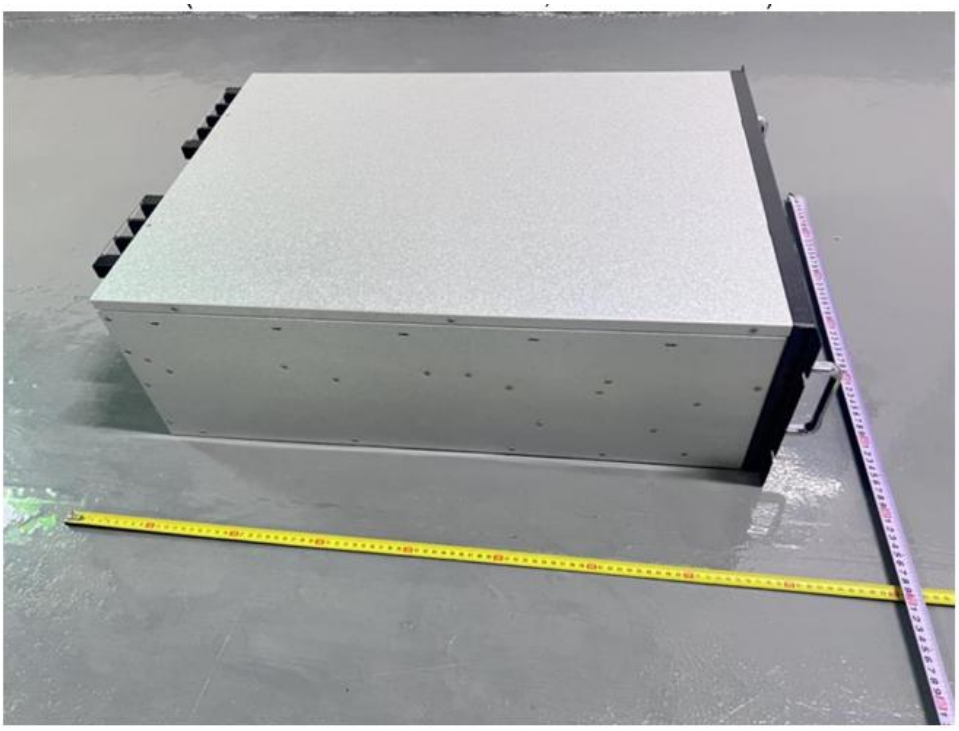


Figure 10. Right view

(for model TAA-105KW-11, TAA-125KW-11)

Pictures of the unit

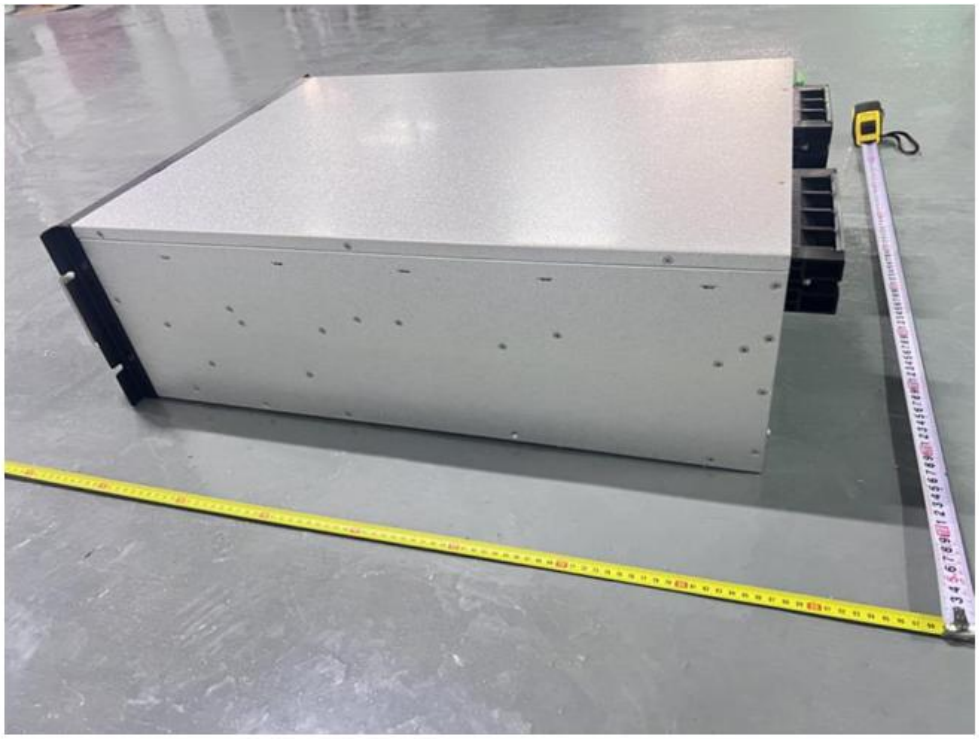


Figure 11. Left view

(for model TAA-105KW-11, TAA-125KW-11)

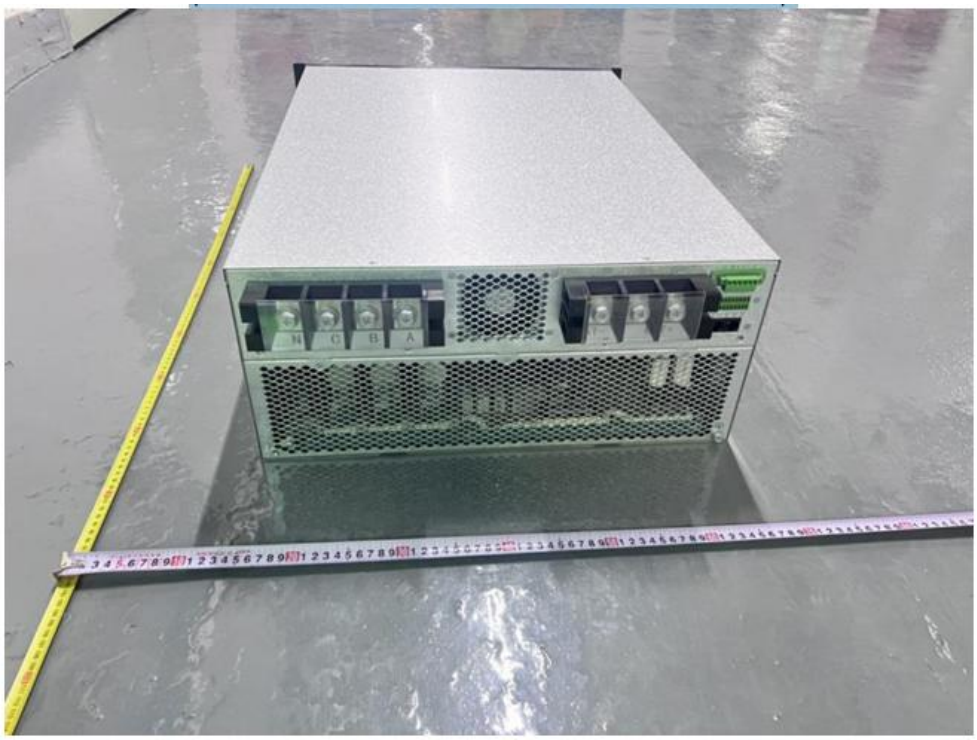


Figure 12. Back view

(for model TAA-105KW-11, TAA-125KW-11)

Pictures of the unit

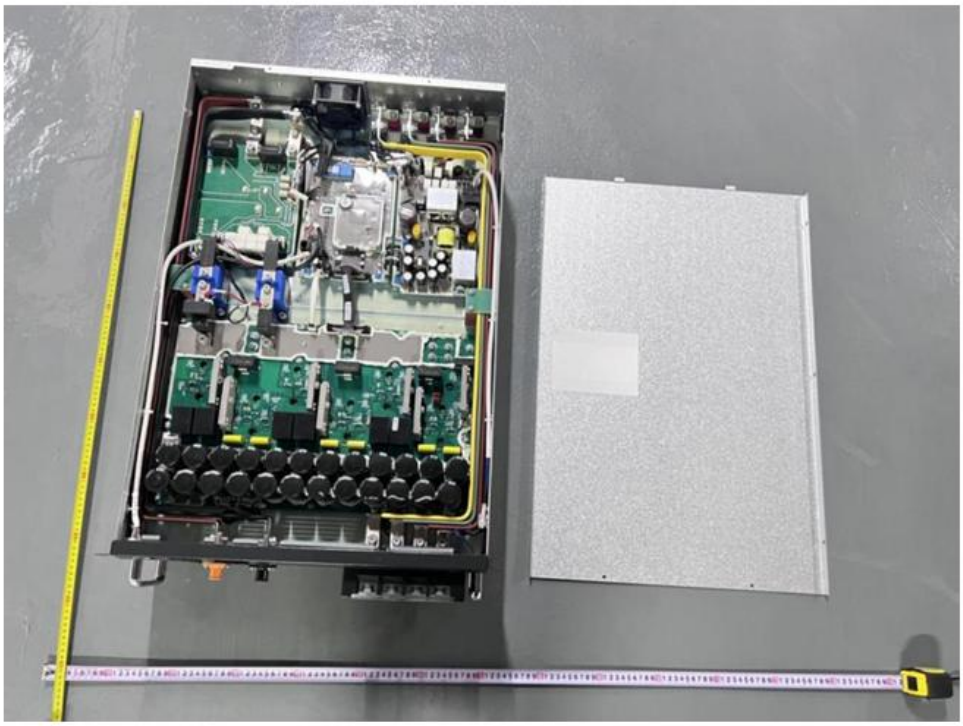


Figure 13. Opening view 1
(for model TAA-105KW-01, TAA-125KW-01)

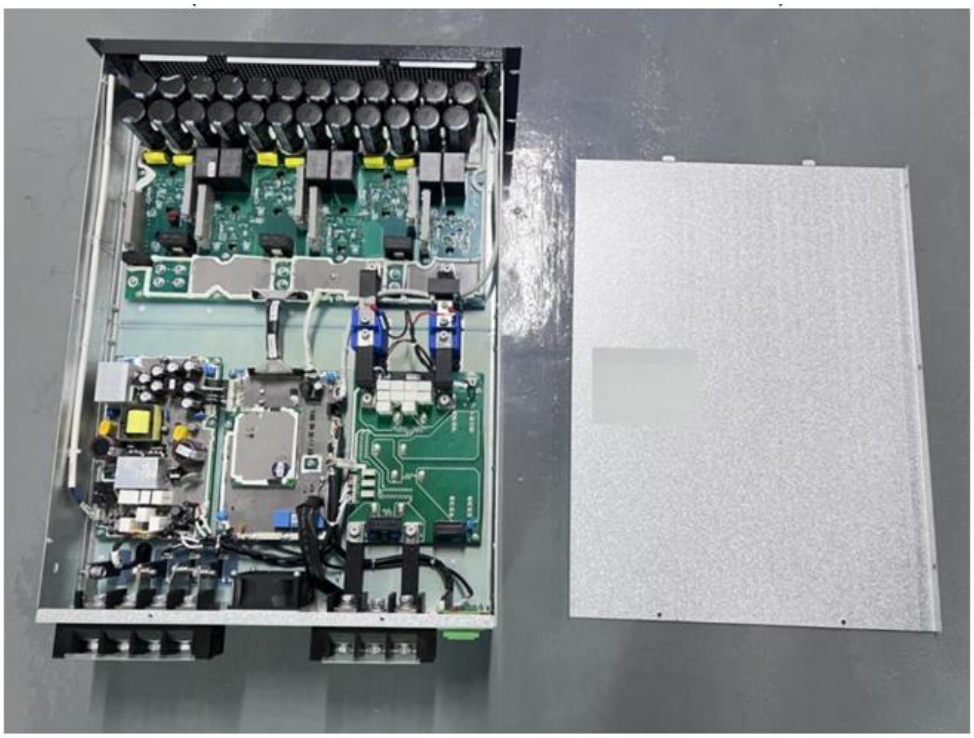


Figure 14. Opening view 2
(for model TAA-105KW-11, TAA-125KW-11)

Test Equipment list				
No	**Test Equipment**	**Equipment model**	**Equipment No.**	**Calibration due date**
1	AC source	WPLA-330200KVA	BZ-DGD-L204	2026/09/01
2	DC source	WPLA-150KW	BZ-DGD-L013	2026/07/29
3	RLC load	ACLT-38160H	BZ-DGD-L003	2026/09/01
4	Power analyzer	DEWE2-PA7	BZ-DGD-L119	2026/07/31
5	Current sensor	CT6863-05	BZ-DGD-L026-1	2027/01/11
6	Current sensor	CT6863-05	BZ-DGD-L026-2	2027/01/11
7	Current sensor	CT6863-05	BZ-DGD-L026-3	2027/01/11
8	Current sensor	CT6863-05	BZ-DGD-L026-4	2027/01/11
9	Oscilloscope	MS04054B	BZ-DGD-L064	2027/01/12

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