Prüfbericht-Nr.: *Test report no.:*	**CN23D9MI 001**	**Auftrags-Nr.:** *Order no.*:	244490500	**Seite 1 von 10** *Page 1 of 10*
Kunden-Referenz-Nr.: *Client reference no.:*	2177511	**Auftragsdatum:** *Order date:*	2023.01.16	
Auftraggeber: *Client:*	Ginlong technologies Co., Ltd. No.57 Jintong Road, Binhai, (seafront) industrial Park, Xiangshan, Ningbo, zhejiang, 315712, P.R. China			
Prüfgegenstand: *Test item:*	Grid Connected PV Inverter			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	Solis-80K-5G-PRO, Solis-100K-5G-PRO, Solis-110K-5G-PRO			
Auftrags-Inhalt: *Order content*:	AK certificate			
Prüfgrundlage: *Test specification:*	G99/1-9 *Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019*			

Wareneingangsdatum: *Date of sample receipt:*	2023.01.16
Prüfmuster-Nr.: *Test sample no:*	A003539961-001
Prüfzeitraum: *Testing period:*	2023.01.16 – 2023.12.22
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shanghai) Co., Ltd.
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shanghai) Co., Ltd.
Prüfergebnis*: *Test result*:*	Pass

geprüft von: *tested by:*	Eva Wu	**genehmigt von:** *authorized by:*	Allen Hu
Datum: *Date:* 2023.12.22	Eva Wu	**Ausstellungsdatum:** *Issue date:* 2023.12.22	Allen Hu
Stellung / *Position:*	Engineer	**Stellung** / *Position:*	Reviewer

Sonstiges /
Other:

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* *Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TUV Rheinland (Shanghai) Co., Ltd. No.177, 178, Lane 777 West Guangzhong Road, Jing'an District,Shanghai, China
Mail: service-gc@tuv.com · Web: www.tuv.com

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.*

Liste der verwendeten Prüfmittel
List of used test equipment

Equip.	Description	Model	Manufacturer
G1819285	Data Acquisiton/Switch Unit	34970A	Agilent
G1819284	Caliper	0~ 150mm	Shang Liang
G1819283	AC Test Load	ACLT-6150R	INNET INTERNAT IONAL
G1819282	Anti-islanding Protection test Load	ACLT-3830H	INNET INTERNAT IONAL
G1819280	PV array simulator	62150H-1000S	Chroma Co.
G1819279	PV array simulator	62150H-1000S	Chroma Co.
G1819278	PV array simulator	62150H-1000S	Chroma Co.
G1819277	PV array simulator	62150H-1000S	Chroma Co.
G1819275	Temperature and Humidity	175H1	testo
G1819274	Impedance Network Device	ACLT-6150	QUNLING Energy Resources
G1819268	Anti-islanding test detection devices	ACLT-4830H	QUNLING Energy Resources
G1819267	T-Power Software	TP100-P-LVHA/STP	JAPAN, Yokogawa
G1819266	Power Analyser(WT3000)	WT3000	JAPAN, Yokogawa
G1819265	ScopeCoder	DL850	JAPAN, Yokogawa
9057436	Regenerative Grid Simulator	61800-100	Chroma
9057434	Regenerative Grid Simulator	61800-100	Chroma
9017080	Oscilloscope	MDO3024	Tektronix
9017078	Programmable AC Source(61860)	61860	Chroma ATE INC.
9017077	Current Sensor(For WT3000)	IT 200-S	LEM
9017076	Current Sensor(For WT3000)	IT 200-S	LEM
9017075	Current Sensor(For WT3000)	IT 200-S	LEM
9017074	Current Sensor(For WT3000)	IT 200-S	LEM

Produktbeschreibung
Product description

Copy of marking plate:

solis

Model: Solis-80K-5G-PRO

Max.input voltage d.c.	1100V
Mppt voltage range d.c.	160-1000 V
Max.input current d.c.	40A*3+32A*3
Isc PV(absolute maximum) d.c.	50A*6
Rated grid voltage a.c.	3/N/PE,220/380V 3/N/PE,230/400V
Rated grid frequency	50/60Hz
Rated output power	80000W
Max.AC output active power	88000W
Max.AC output apparent power	88000VA
Max.continuous output current a.c.	133.7A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-30...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N:
120030199180008

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park,
Xiangshan,Ningbo,Zhejiang,315712,P.R.China
www.solisinverters.com Made in China

solis

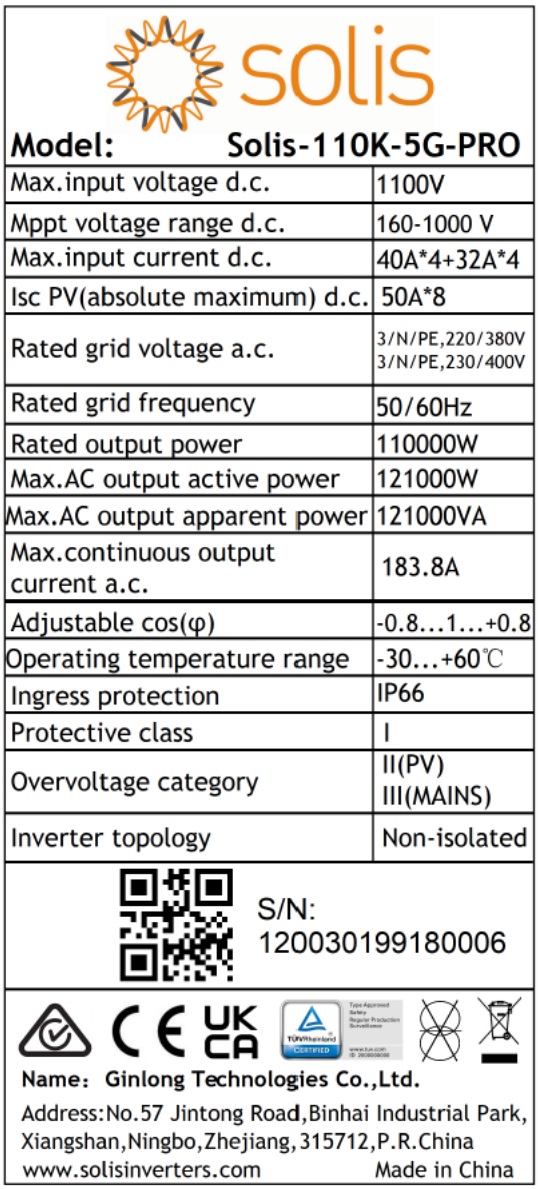
Model: Solis-100K-5G-PRO

Max.input voltage d.c.	1100V
Mppt voltage range d.c.	160-1000 V
Max.input current d.c.	40A*4+32A*4
Isc PV(absolute maximum) d.c.	50A*8
Rated grid voltage a.c.	3/N/PE,220/380V 3/N/PE,230/400V
Rated grid frequency	50/60Hz
Rated output power	100000W
Max.AC output active power	110000W
Max.AC output apparent power	110000VA
Max.continuous output current a.c.	167.1 A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-30...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N:
120030199180005

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park,
Xiangshan,Ningbo,Zhejiang,315712,P.R.China
www.solisinverters.com Made in China

Produktbeschreibung
Product description



Model:	Solis-110K-5G-PRO
Max.input voltage d.c.	1100V
Mppt voltage range d.c.	160-1000 V
Max.input current d.c.	40A*4+32A*4
Isc PV(absolute maximum) d.c.	50A*8
Rated grid voltage a.c.	3/N/PE,220/380V 3/N/PE,230/400V
Rated grid frequency	50/60Hz
Rated output power	110000W
Max.AC output active power	121000W
Max.AC output apparent power	121000VA
Max.continuous output current a.c.	183.8A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-30...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N:
120030199180006

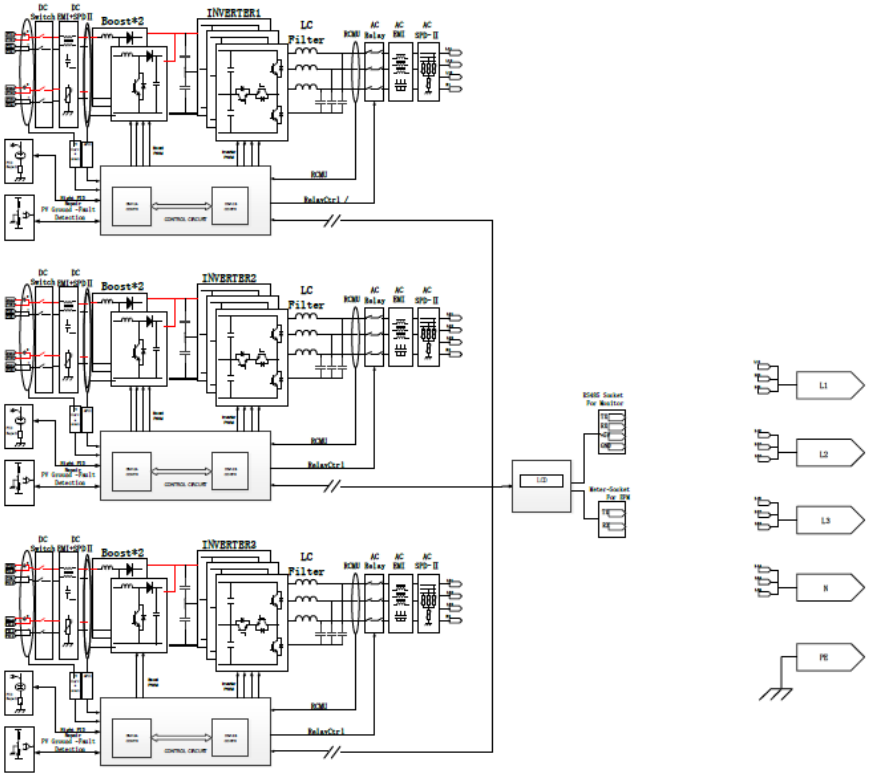
Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park,
Xiangshan,Ningbo,Zhejiang,315712,P.R.China
www.solisinverters.com Made in China

Produktbeschreibung
Product description

Brief description:

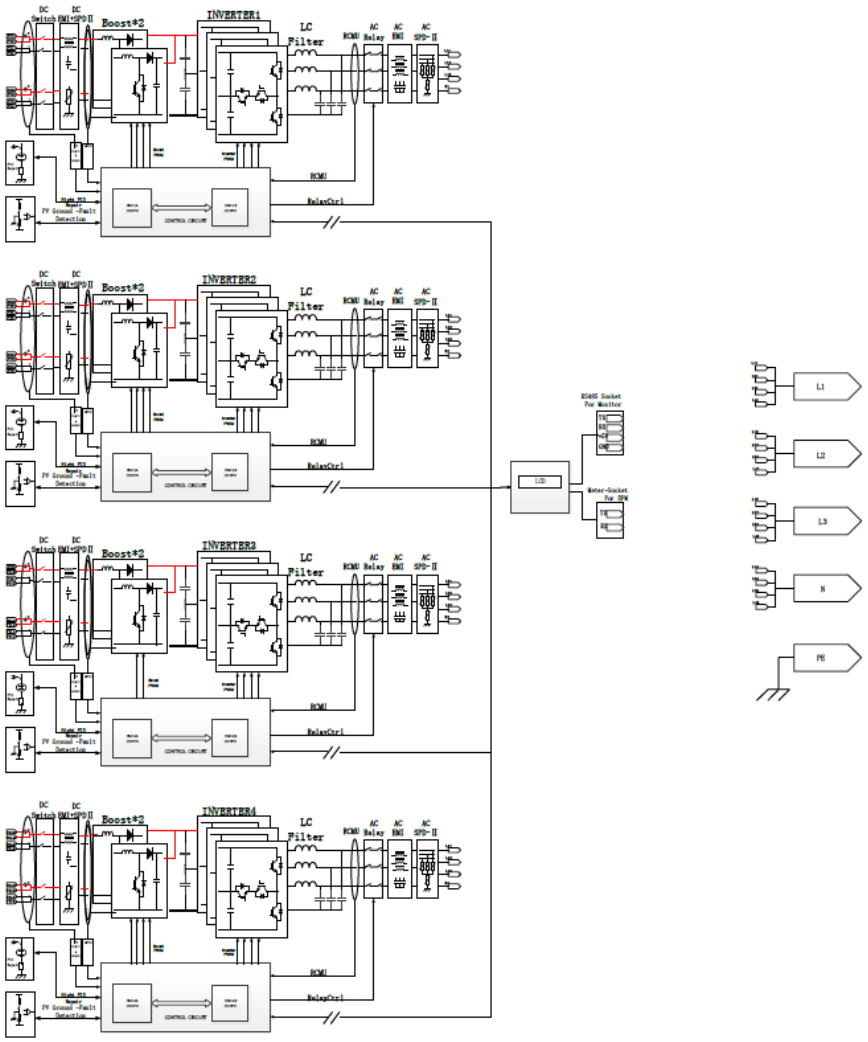
The PCEs under Solis-80K-5G-PRO, Solis-100K-5G-PRO and Solis-110K-5G-PRO are three-phase grid connected inverter for solar power generation. The Grid-connected PV Inverter utilize the advanced power conversion technology IGBT to convert the DC power normally from the photovoltaic array to stable three-phase AC power and then feed the power to the utility grid.

See the block diagram for details.



Block diagram of Solis-80K-5G-PRO

Produktbeschreibung
Product description



Block diagram of Solis-100K-5G-PRO, Solis-110K-5G-PRO

Description of the differences of the models within a series:

The models Solis-80K-5G-PRO, Solis-100K-5G-PRO and Solis-110K-5G-PRO are identical in hardware and software with Solis-110K-5G-PRO, except for MPPT numbers, electrical ratings and model name. Electrical ratings see below model list.

The product was tested on:

Unless otherwise specified, all tests were conducted on basic model of Solis-110K-5G-PRO to represent the other models.

Produktbeschreibung
Product description

Model List:

MODELS LIST		Solis-80K-5G-PRO	Solis-100K-5G-PRO	Solis-110K-5G-PRO
PV INPUT	$V_{MAX\ PV}$ [Vdc]	1100		
	MPP Voltage Range V_{MPP} [Vdc]	160-1000		
	MPP Full Power Voltage Range [Vdc]	580-850		
	$I_{SC\ PV}$ [A]	50*6	50*8	50*8
	Max. Input Current I_{MAX} [A]	40A/32A/40A/32A/40A/32A	40A/32A/40A/32A/40A/32A/40A/32A	
	Overvoltage Category (OVC)	II		
AC OUTPUT	Rated Output Voltage Un [Vac]	3/N/PE, 220/380 V, 230/400 V		
	Rated Output Frequency Fn [Hz]	50/60		
	Grid frequency range[Hz]	45-55/55-65		
	Rated Output Power P_n [W]	80000	100000	110000
	Max. Active Power P_{Emax} [W]	88000	110000	121000
	Max. Output Current I_{max} [A]	133.7	167.1	183.8
	Power Factor Range cosφ [λ]	0.8 leading - 0.8 lagging		
	Overvoltage Category (OVC)	III		
General Data	Operation Temperature (℃)	-30°C to +60°C		
	Enclosure Protection (IP)	IP66		
	Protective class	I		
	Dimensions (W*H*D)[mm]	1065* 585 * 363（with AC switch）	1183* 585 * 363	
	Weight [kg]	79.5	93	
	Firmware version	A1		

Absatz *Clause*	Anforderungen - Prüfungen *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
10	Protection	Considered, see appended test table for detail.	P
11	Type B Power Generating Module Technical Requirements	Considered, see appended test table for detail.	P

ANLAGE zum Prüfbericht-Nr.: CN23D9MI 001
APPENDIX to Test Report No.:

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

See attachment for test data.

Project Engineer:	Eva Wu	Reviewer:	Allen Hu
Signature:	Eva Wu	Signature:	Allen Hu

Testing Location:	
Name:	TÜV Rheinland (Shanghai) Co., Ltd.
Address:	No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China

Absatz	**G99/1-9/10.22**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	Evaluation

Clause	Test items	Remark
1	Normal operating range (Operation range)	
2.1	Harmonics current (THDi)	For PGU ≤ 75A, per IEC 61000-3-12
2.2	Harmonics current (Iinter & Ihigher)	Extra test than A2-3 report form, particular for PGU > 75A
3.1	Voltage fluctuations (Flicker)	For PGU ≤ 75A, per IEC 61000-3-11
3.2	Voltage fluctuations (Flicker)	Extra test than A2-3 report form, particular for PGU > 75A
4	DC Injection (Idc)	
5	Power factor	
6	Protection-Frequency tests (OF/UF)	
7	Protection-Frequency tests (OV/UV)	
8.1	Protection-Loss of mains test (Anti-islanding)	
8.2	Vector shift stability test	
8.3	RoCoF stability test (RoCoF)	
9.1	Limited Frequency Sensitive Mode-Over frequency test (LFSM-O)	
9.2	Limited Frequency Sensitive Mode-Under frequency test (LFSM-U)	Extra test than A2-3 report form, particular for type C and type D plant
9.3	Frequency Sensitive Mode (FSM-O)	Extra test than A2-3 report form, particular for type C and type D plant
9.4	Frequency Sensitive Mode (FSM-U)	Extra test than A2-3 report form, particular for type C and type D plant
10	Protection-Reconnection timer (Reconnection)	
11	Fault level contribution	
12	Self-Monitoring solid state switching	N/A, only for solid state switching
13	Wiring functional tests	N/A, none on-site test.
14	Logic interface (input port)	
15	Cyber security	
16	P&Q range	Extra test than A2-3 report form, particular for type B, type C and type D plant
17	Fault Voltage-Ride Through (FVRT)	Extra test than A2-3 report form, particular for type B, type C and type D plant
18	Loss of Mains Protection per B2-2	Extra test than A2-3 report form. Site Compliance and Commissioning test requirements for Type B Power Generating Modules, conducted on power unit

Absatz	**G99/1-9/10.22**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	Evaluation

Clause	Test items	Remark
19	Frequency Response per B.6.2	Extra test than A2-3 report form. Compliance Testing of Power Park Modules, conducted on power unit

1	TABLE: Normal operating range (Operation range)				P
Test Conditions				Measurements	Limitation
U/Un	f [Hz]	cosφ	t [s]		
85%(195.5 V)	47.0	1.00	20	No disconnect	No disconnect
85%(195.5 V)	47.5	1.00	5400	No disconnect	No disconnect
110%(253 V)	51.5	1.00	5400	No disconnect	No disconnect
110%(253 V)	52.0	1.00	900	No disconnect	No disconnect
100%(230 V)	50.0	1.00	5400	No disconnect	No disconnect
100%(230 V)	49.0	1.00	5400	No disconnect	No disconnect
100%(230 V)	51.0	1.00	5400	No disconnect	No disconnect
RoCoF-frequency change rate 1Hz/s, 500ms				No disconnect	No disconnect

Note(s):

***** Function of interface protection and activating active power response to over/under frequency and voltage shall be disable.

2.2	TABLE: Harmonics current (Iinter & Ihigher) per BS EN 61000-4-7 (Extra test other than form A2-3)										P
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100
Order No.	I/In [%]										
1	1.33	10.09	20.04	30.03	40.03	50.10	60.38	70.08	79.86	90.02	99.36
2	0.00	0.04	0.04	0.05	0.06	0.26	0.79	0.96	0.79	0.36	0.41
3	0.00	0.04	0.03	0.03	0.03	0.11	0.09	0.12	0.15	0.27	0.12
4	0.00	0.02	0.02	0.03	0.04	0.09	0.06	0.08	0.08	0.12	0.06
5	0.00	0.07	0.48	0.12	0.40	0.52	0.62	0.70	0.77	0.79	0.79
6	0.00	0.02	0.02	0.01	0.02	0.04	0.06	0.07	0.06	0.04	0.03
7	0.00	0.16	0.04	0.22	0.08	0.21	0.31	0.37	0.43	0.45	0.46
8	0.00	0.01	0.02	0.01	0.01	0.03	0.04	0.04	0.04	0.02	0.02
9	0.00	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
10	0.00	0.01	0.02	0.02	0.01	0.03	0.02	0.02	0.02	0.02	0.02
11	0.00	0.08	0.20	0.02	0.02	0.12	0.24	0.31	0.36	0.39	0.41
12	0.00	0.02	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.01
13	0.00	0.08	0.08	0.17	0.02	0.08	0.15	0.21	0.26	0.29	0.30
14	0.00	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01
15	0.00	0.00	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01
16	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
17	0.00	0.06	0.07	0.18	0.08	0.10	0.10	0.15	0.20	0.23	0.24
18	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01
19	0.00	0.07	0.04	0.10	0.12	0.13	0.08	0.11	0.14	0.17	0.19
20	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
21	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
22	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
23	0.00	0.06	0.08	0.05	0.12	0.10	0.07	0.08	0.10	0.12	0.13
24	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
25	0.00	0.04	0.10	0.06	0.10	0.11	0.07	0.07	0.08	0.09	0.10
26	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
27	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00
28	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
29	0.00	0.04	0.05	0.08	0.07	0.10	0.07	0.06	0.07	0.07	0.07
30	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
31	0.00	0.04	0.03	0.08	0.06	0.15	0.07	0.06	0.06	0.07	0.06
32	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
33	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
34	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
35	0.00	0.04	0.05	0.06	0.06	0.08	0.06	0.06	0.06	0.06	0.06
36	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00
37	0.00	0.03	0.05	0.05	0.06	0.11	0.06	0.05	0.05	0.05	0.05
38	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
39	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
40	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
41	0.00	0.02	0.04	0.04	0.05	0.01	0.05	0.05	0.04	0.04	0.04
42	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
43	0.00	0.02	0.03	0.04	0.04	0.01	0.05	0.04	0.04	0.04	0.04
44	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
46	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
47	0.00	0.02	0.03	0.03	0.04	0.01	0.04	0.04	0.04	0.04	0.03
48	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
49	0.00	0.01	0.03	0.03	0.03	0.01	0.04	0.04	0.03	0.03	0.03
50	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00

THD	0.00	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02
PWHD	0.00	0.07	0.05	0.04	0.03	0.01	0.02	0.02	0.02	0.02	0.02
Inter-harmonics											
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100
f [Hz]	I/In [%]										
75	0.04	0.05	0.82	1.01	0.85	0.48	0.16	0.10	0.11	0.12	0.14
125	0.08	0.11	0.14	0.32	0.20	0.15	0.12	0.12	0.13	0.15	0.13
175	0.05	0.05	0.13	0.10	0.14	0.08	0.08	0.08	0.09	0.09	0.09
225	0.09	0.10	0.13	0.18	0.15	0.15	0.15	0.15	0.15	0.15	0.15
275	0.04	0.04	0.06	0.10	0.07	0.07	0.07	0.07	0.07	0.07	0.07
325	0.02	0.03	0.05	0.07	0.05	0.05	0.04	0.05	0.05	0.06	0.06
375	0.02	0.02	0.04	0.14	0.04	0.05	0.04	0.04	0.04	0.05	0.04
425	0.03	0.03	0.06	0.08	0.06	0.05	0.05	0.05	0.06	0.07	0.07
475	0.02	0.02	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
525	0.05	0.06	0.09	0.10	0.10	0.08	0.09	0.09	0.08	0.08	0.09
575	0.02	0.03	0.05	0.04	0.04	0.03	0.04	0.04	0.04	0.03	0.04
625	0.05	0.06	0.07	0.09	0.08	0.08	0.08	0.08	0.09	0.09	0.08
675	0.02	0.01	0.04	0.08	0.06	0.04	0.03	0.03	0.03	0.03	0.03
725	0.01	0.01	0.03	0.06	0.03	0.03	0.02	0.02	0.03	0.03	0.03
775	0.01	0.03	0.04	0.05	0.04	0.03	0.03	0.03	0.04	0.04	0.04
825	0.02	0.04	0.05	0.07	0.05	0.04	0.04	0.04	0.04	0.05	0.05
875	0.01	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.03	0.04	0.04
925	0.03	0.04	0.05	0.06	0.05	0.05	0.04	0.05	0.05	0.06	0.06
975	0.01	0.01	0.02	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02
1025	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
1075	0.01	0.02	0.03	0.03	0.02	0.03	0.02	0.02	0.03	0.03	0.03
1125	0.01	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.03
1175	0.01	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
1225	0.01	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04
1275	0.01	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
1325	0.01	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.02
1375	0.01	0.02	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
1425	0.01	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.03	0.03	0.04
1475	0.01	0.03	0.03	0.05	0.04	0.03	0.04	0.04	0.04	0.03	0.04
1525	0.01	0.02	0.03	0.05	0.04	0.04	0.03	0.04	0.05	0.04	0.04
1575	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.02	0.02	0.02	0.02
1625	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.02	0.02	0.02
1675	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02
1725	0.01	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.02	0.03
1775	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
1825	0.01	0.02	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04
1875	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01
1925	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1975	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Higher frequency harmonics											
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100
f [kHz]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
2.1	0.14	0.09	0.10	0.10	0.10	0.11	0.12	0.13	0.14	0.12	0.12
2.3	0.07	0.06	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2.5	0.07	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.08	0.08
2.7	0.08	0.06	0.05	0.06	0.06	0.06	0.07	0.09	0.09	0.08	0.08
2.9	0.05	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.05	0.05
3.1	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03
3.3	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
3.5	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
3.7	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
3.9	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
4.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02
4.3	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02
4.5	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02
4.7	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4.9	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5.1	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5.9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6.3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6.9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
7.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
7.3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
7.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
7.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
7.9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
8.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
8.3	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
8.5	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
8.7	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
8.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01
Note(s):											

3.2	TABLE: Voltage fluctuations (Flicker) per BS EN 61400-21 (Extra test other than form A2-3)	P

30° impedance angle			
Measurement	P/Pn [%]	Pst	Cφk
1	10	0.04	0.60
2	20	0.09	1.35
3	30	0.09	1.35
4	40	0.10	1.50
5	50	0.10	1.50
6	60	0.19	2.85
7	70	0.24	3.60
8	80	0.48	7.20
9	90	0.56	8.40
10	100	0.62	9.30
11	100	0.62	9.30
12	100	0.62	9.30
50° impedance angle			
Measurement	P/Pn [%]	Pst	Cφk
1	10	0.03	0.45
2	20	0.08	1.20
3	30	0.08	1.20
4	40	0.13	1.95
5	50	0.14	2.10
6	60	0.20	3.00
7	70	0.22	3.30
8	80	0.46	6.90
9	90	0.51	7.65
10	100	0.59	8.85
11	100	0.59	8.85
12	100	0.59	8.85
70° impedance angle			
Measurement	P/Pn [%]	Pst	Cφk

1	10	0.03	0.45
2	20	0.06	0.90
3	30	0.07	1.05
4	40	0.15	2.25
5	50	0.15	2.25
6	60	0.19	2.85
7	70	0.20	3.00
8	80	0.43	6.45
9	90	0.46	6.90
10	100	0.55	8.25
11	100	0.55	8.25
12	100	0.55	8.25
85° impedance angle			
Measurement	P/Pn [%]	Pst	Cφk
1	10	0.03	0.45
2	20	0.06	0.90
3	30	0.07	1.05
4	40	0.15	2.25
5	50	0.16	2.40
6	60	0.19	2.85
7	70	0.19	2.85
8	80	0.42	6.30
9	90	0.43	6.45
10	100	0.54	8.10
11	100	0.54	8.10
12	100	0.54	8.10
Note(s):			

4	TABLE: Power quality – DC injection:		P
Test power level	10%	55%	100%
Recorded DC value in Amps	0.06	0.14	0.25
as % of rated AC current	0.038%	0.085%	0.152%
Limit	0.25%	0.25%	0.25%
Note(s):			

5	TABLE: Power Factor							P
Test Conditions			Measurements					Limit
P/Pn	cosφ	U/Un	P [kW]	Q [kVar]	cosφ	U [V]	I [A]	cosφ
100%	1.00	0.94	110.524	1.307	0.9998	217.2	169.7	>0.95
100%	1.00	1.0	110.442	2.073	0.9996	231.1	159.4	>0.95
100%	1.00	1.1	94.369	2.606	0.9996	253.9	123.4	>0.95
Note(s):								

6	TABLE: Protection-Frequency tests (OF/UF)		P
Condition	Setting [Hz]	Measurement	Limitation
		Trip value [Hz]	
F>>	52.0	52.05Hz	± 0.1% of f_n
F<	47.5	47.46Hz	
F<<	47	46.96Hz	
Condition	Setting [ms]	Measurement	Limitation [ms]
		Time delay	
F>>	500	536	500-1000
F<	20000	20000	20000-20500
F<<	500	538	500-1000
Condition		Measurement	limitation
F [Hz]	t [s]		
47.7	30	No trip	No trip
47.2	19.5	No trip	No trip
46.8	0.45	No trip	No trip
51.8	120	No trip	No trip
52.2	0.45	No trip	No trip
Note(s):			

7	TABLE: Protection – Voltage tests (OV/UV)					P
Condition	Setting [U/Un]	Measurement				Limitation
		Trip value [V]				
		L1	L2	L3	L123	
U>>	1.19 (273.7 V)	273.95	273.88	273.92	273.91	± 1% of U_n
U>	1.14 (262.2 V)	263.54	263.53	263.48	263.52	
U<<	0.80(184 V)					
Condition	Setting [ms]	Measurement				Limitation
		Time delay				
		L1	L2	L3	L123	
U>>	500	525	525	525	525	500-1000
U>	1000	1000	1000	1000	1000	1000-1500
U<<	2500	2510	2510	2510	2510	2500-3000
Condition		Measurement				limitation
U/Un	time [s]					
0.82(188 V)	5	No trip				No trip
0.78(180 V)	2.45	No trip				No trip
1.12(258.2 V)	5	No trip				No trip
1.17(269.2 V)	0.95	No trip				No trip
1.20(277.7 V)	0.45	No trip				No trip
Note(s):						

8.1	TABLE: Protection-Loss of mains test	P

Power 100%

Input : 850Vdc

Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R : -10% Q_C : +10%	L1: 29.4	L1: 27.5	L1: 31.5	1.001	171	500
	L2: 29.5	L2: 27.7	L2: 31.5	1.001		
	L3: 29.4	L3: 27.5	L3: 31.5	1.001		
P_R : -10% Q_C : +5%	L1: 29.3	L1: 28.1	L1: 30.2	0.994	325	500
	L2: 29.5	L2: 28.2	L2: 30.4	0.993		
	L3: 29.3	L3: 28.4	L3: 30.5	1.004		
P_R : -10% Q_C : 0%	L1: 29.5	L1: 29.0	L1: 29.5	0.991	393	500
	L2: 29.5	L2: 29.2	L2: 29.5	0.995		
	L3: 29.5	L3: 29.1	L3: 29.5	0.993		
P_R : -10% Q_C : -5%	L1: 29.4	L1: 30.1	L1: 29.0	1.005	159	500
	L2: 29.5	L2: 30.1	L2: 28.9	1.000		
	L3: 29.4	L3: 30.2	L3: 28.8	1.003		
P_R : -10% Q_C : -10%	L1: 29.4	L1: 31.0	L1: 28.3	1.007	143	500
	L2: 29.5	L2: 31.1	L2: 28.2	1.004		
	L3: 29.4	L3: 31.2	L3: 28.2	1.009		
P_R : -5% Q_C : +10%	L1: 31.1	L1: 29.1	L1: 33.2	0.999	177	500
	L2: 31.2	L2: 29.2	L2: 33.2	0.998		
	L3: 31.1	L3: 29.2	L3: 33.2	1.001		
P_R : -5% Q_C : -10%	L1: 31.0	L1: 32.6	L1: 29.6	1.002	133	500
	L2: 31.1	L2: 32.6	L2: 29.7	1.001		
	L3: 31.1	L3: 32.5	L3: 29.5	0.996		
P_R : 0% Q_C : +10%	L1: 32.8	L1: 31.0	L1: 35.1	1.006	201	500
	L2: 32.8	L2: 30.7	L2: 34.5	0.992		
	L3: 32.7	L3: 30.7	L3: 34.4	0.994		

P_R : -5% Q_C : +5%	L1: 31.1 L2: 31.1 L3: 31.0	L1: 29.9 L2: 30.1 L3: 29.9	L1: 32.2 L2: 32.1 L3: 32.0	0.998 0.999 0.998	318	500
P_R : -5% Q_C : 0%	L1: 31.0 L2: 31.1 L3: 31.1	L1: 30.5 L2: 30.8 L3: 31.4	L1: 31.1 L2: 31.1 L3: 31.0	0.994 0.995 0.990	467	500
P_R : -5% Q_C : -5%	L1: 31.0 L2: 31.1 L3: 31.0	L1: 31.7 L2: 31.4 L3: 31.6	L1: 30.3 L2: 30.3 L3: 30.1	0.995 0.997 0.992	169	500
P_R : 0% Q_C : +5%	L1: 32.7 L2: 32.8 L3: 32.6	L1: 31.6 L2: 31.5 L3: 32.5	L1: 33.9 L2: 33.7 L3: 33.6	1.001 0.995 0.998	281	500
P_R : 0% Q_C : 0%	L1: 32.7 L2: 32.8 L3: 32.6	L1: 32.6 L2: 32.5 L3: 33.5	L1: 33.1 L2: 33.1 L3: 33.0	1.003 1.001 1.005	294	500
P_R : 0% Q_C : -5%	L1: 32.7 L2: 32.8 L3: 32.6	L1: 33.6 L2: 33.5 L3: 33.5	L1: 32.2 L2: 32.4 L3: 32.3	1.004 1.006 1.009	236	500
P_R : +5% Q_C : +5%	L1: 34.3 L2: 34.4 L3: 34.6	L1: 33.7 L2: 33.5 L3: 33.8	L1: 35.8 L2: 35.8 L3: 35.7	1.010 1.010 0.999	267	500
P_R : +5% Q_C : 0%	L1: 34.3 L2: 34.5 L3: 34.5	L1: 34.2 L2: 34.5 L3: 33.4	L1: 34.5 L2: 34.5 L3: 34.9	0.996 0.996 1.006	486	500
P_R : +5% Q_C : -5%	L1: 34.3 L2: 34.4 L3: 34.5	L1: 33.7 L2: 33.4 L3: 34.4	L1: 32.3 L2: 32.3 L3: 32.3	0.958 0.959 0.952	171	500
P_R : 0%	L1: 32.7 L2: 32.8	L1: 34.7 L2: 34.0	L1: 31.7 L2: 31.6	1.010 1.010		

Q_C : -10%	L3: 32.6	L3: 32.5	L3: 31.0	0.996	143	500
P_R : +5% Q_C : +10%	L1: 34.4	L1: 32.6	L1: 36.5	1.001	201	500
	L2: 34.5	L2: 32.6	L2: 36.5	1.000		
	L3: 34.4	L3: 35.4	L3: 36.3	1.000		
P_R : +5% Q_C : -10%	L1: 34.3	L1: 35.6	L1: 32.6	0.990	163	500
	L2: 34.4	L2: 36.0	L2: 32.6	0.990		
	L3: 34.5	L3: 34.0	L3: 33.0	0.999		
P_R : +10% Q_C : +10%	L1: 36.0	L1: 34.4	L1: 38.1	1.000	213	500
	L2: 36.2	L2: 34.2	L2: 38.1	1.000		
	L3: 36.2	L3: 35.0	L3: 38.0	0.996		
P_R : +10% Q_C : +5%	L1: 36.1	L1: 35.0	L1: 37.3	1.001	251	500
	L2: 36.3	L2: 35.0	L2: 37.2	0.994		
	L3: 36.2	L3: 35.5	L3: 37.2	0.997		
P_R : +10% Q_C : 0%	L1: 36.0	L1: 36.0	L1: 36.0	0.993	483	500
	L2: 36.2	L2: 36.0	L2: 36.4	1.000		
	L3: 36.2	L3: 36.4	L3: 36.4	1.000		
P_R : +10% Q_C : -5%	L1: 36.0	L1: 36.7	L1: 35.3	0.996	172	500
	L2: 36.2	L2: 36.6	L2: 35.3	0.994		
	L3: 36.2	L3: 37.5	L3: 35.2	0.992		
P_R : +10% Q_C : -10%	L1: 36.1	L1: 37.6	L1: 34.6	0.998	162	500
	L2: 36.2	L2: 37.5	L2: 34.6	0.996		
	L3: 36.1	L3: 31.4	L3: 34.5	0.996		

Power 66%						
Input :600 Vdc						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
	L1: 21.4	L1: 21.9	L1: 21.2	1.007		

P_R : 0% Q_C : -5%	L2: 21.5 L3: 21.4	L2: 21.9 L3: 22.1	L2: 21.3 L3: 21.0	1.005 1.007	254	500
P_R : 0% Q_C : -4%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.6 L2: 21.7 L3: 21.7	L1: 21.0 L2: 21.2 L3: 21.0	0.995 0.998 0.998	272	500
P_R : 0% Q_C : -3%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.6 L2: 21.5 L3: 21.7	L1: 21.2 L2: 21.2 L3: 21.2	1.000 0.993 1.002	281	500
P_R : 0% Q_C : -2%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.6 L2: 21.5 L3: 21.6	L1: 21.5 L2: 21.4 L3: 21.3	1.007 0.998 1.002	317	500
P_R : 0% Q_C : -1%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.4 L2: 21.2 L3: 21.6	L1: 21.5 L2: 21.5 L3: 21.4	1.002 0.993 1.005	322	500
P_R : 0% Q_C : 0%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.1 L2: 21.5 L3: 21.1	L1: 21.4 L2: 21.9 L3: 21.3	0.993 1.009 0.991	489	500
P_R : 0% Q_C : +1%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.1 L2: 21.0 L3: 21.2	L1: 21.6 L2: 21.7 L3: 21.5	0.998 0.993 0.998	402	500
P_R : 0% Q_C : +2%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.1 L2: 21.0 L3: 21.2	L1: 21.8 L2: 21.8 L3: 21.8	1.002 0.995 1.005	363	500
P_R : 0% Q_C : +3%	L1: 21.4 L2: 21.5 L3: 21.4	L1: 21.1 L2: 20.9 L3: 21.1	L1: 22.1 L2: 22.1 L3: 22.0	1.009 1.000 1.007	329	500
P_R : 0%	L1: 21.4 L2: 21.5	L1: 21.0 L2: 20.9	L1: 22.1 L2: 22.3	1.007 1.004		

Q_C : +4%	L3: 21.4	L3: 21.0	L3: 22	1.004	322	500
P_R : 0% Q_C : +5%	L1: 21.4	L1: 20.9	L1: 22.3	1.009	291	500
	L2: 21.5	L2: 20.9	L2: 22.4	1.006		
	L3: 21.4	L3: 21.0	L3: 22.2	1.009		

Power 33%						
Input : 350 Vdc						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R : 0% Q_C : -5%	L1: 10.7	L1: 10.9	L1: 10.6	1.005	270	500
	L2: 10.7	L2: 10.9	L2: 10.6	1.005		
	L3: 10.8	L3: 11	L3: 10.5	0.995		
P_R : 0% Q_C : -4%	L1: 10.7	L1: 10.9	L1: 10.6	1.005	341	500
	L2: 10.7	L2: 10.9	L2: 10.7	1.009		
	L3: 10.8	L3: 11	L3: 10.7	1.005		
P_R : 0% Q_C : -3%	L1: 10.7	L1: 10.9	L1: 10.7	1.009	272	500
	L2: 10.7	L2: 10.8	L2: 10.7	1.005		
	L3: 10.8	L3: 11	L3: 10.7	1.005		
P_R : 0% Q_C : -2%	L1: 10.7	L1: 10.7	L1: 10.8	1.005	363	500
	L2: 10.7	L2: 10.8	L2: 10.7	1.005		
	L3: 10.8	L3: 10.9	L3: 10.8	1.005		
P_R : 0% Q_C : -1%	L1: 10.7	L1: 10.6	L1: 10.7	0.995	438	500
	L2: 10.7	L2: 10.6	L2: 10.7	0.995		
	L3: 10.8	L3: 10.8	L3: 10.7	0.995		
P_R : 0% Q_C : 0%	L1: 10.7	L1: 10.6	L1: 10.9	1.005	329	500
	L2: 10.7	L2: 10.5	L2: 10.7	0.991		
	L3: 10.8	L3: 10.7	L3: 10.8	0.995		
	L1: 10.7	L1: 10.6	L1: 10.9	1.005		

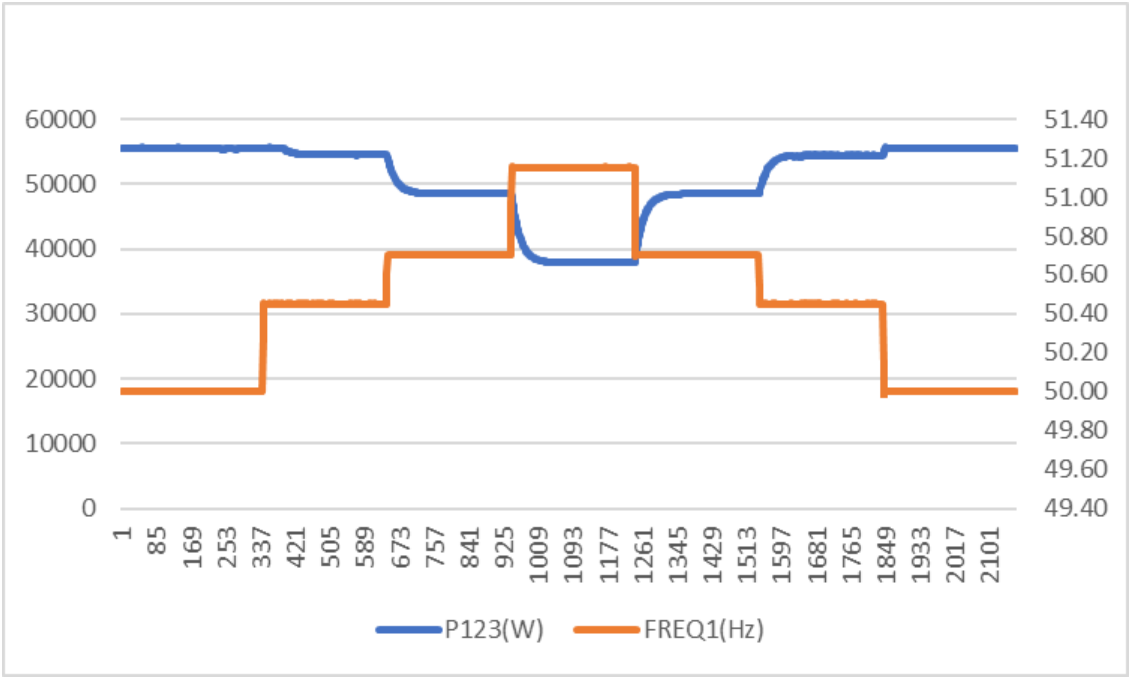
P_R : 0% Q_C : +1%	L2: 10.7	L2: 10.5	L2: 10.8	0.995	402	500
	L3: 10.8	L3: 10.7	L3: 10.9	1.000		
P_R : 0% Q_C : +2%	L1: 10.7	L1: 10.6	L1: 11.0	1.009	322	500
	L2: 10.7	L2: 10.5	L2: 11.0	1.004		
	L3: 10.8	L3: 10.7	L3: 10.9	1.000		
P_R : 0% Q_C : +3%	L1: 10.7	L1: 10.5	L1: 11.0	1.004	403	500
	L2: 10.7	L2: 10.4	L2: 11.0	1.000		
	L3: 10.8	L3: 10.6	L3: 11.0	1.000		
P_R : 0% Q_C : +4%	L1: 10.7	L1: 10.5	L1: 11.1	1.009	452	500
	L2: 10.7	L2: 10.4	L2: 11.1	1.004		
	L3: 10.8	L3: 10.6	L3: 11.1	1.004		
P_R : 0% Q_C : +5%	L1: 10.7	L1: 10.4	L1: 11.1	1.004	398	500
	L2: 10.7	L2: 10.3	L2: 11.1	0.999		
	L3: 10.8	L3: 10.5	L3: 11.1	1.000		
Note(s):						

8.2	TABLE: Loss of Mains Protection, Vector Shift Stability test:			P
	Start Frequency	Change	Measurement	Limit
Positive Vector Shift	49.5Hz	+50degree	No trip	No trip
Negative Vector Shift	50.5Hz	-50degree	No trip	No trip

8.3	TABLE: Loss of Mains Protection, RoCoF Stability test:			P
Ramp range	Test frequency ramp	Test Duration	Measurement	Limit
49.0 Hz to 51.0 Hz	+ 0.95 Hz/s	2.1 s	No trip	No trip
51.0 Hz to 49.0 Hz	- 0.95 Hz/s	2.1 s	No trip	No trip

9.1	TABLE: Limitest frequency sensitive mode-over frequency (LFSM-O)									P
Test No. 1										
Test Conditions	Measurements							Limitation		
f [Hz]	P [W]	P/Pn	f [Hz]	T_{rise} [s]	$T_{settling}$ [s]	Tv [s]	Droop	Droop	T_{rise} [s]	Tv [s]
a) 50	110645	100.47%	50.00	--	--	--	--	8.5%≤Droop≤12.8%	≤10	≤2
b) 50.45	109228	99.30%	50.45	6.0	7.4	0.4	9.62%			
c) 50.7	103469	94.03%	50.70	4.2	4.2	0.4	9.68%			
d) 51.15	92834	84.40%	51.15	7.4	7.4	0.4	9.27%			
e) 50.7	103461	94.05%	50.70	5.4	5.4	0.4	9.32%			
f) 50.45	109316	99.38%	50.45	5.6	5.6	0.4	8.96%			
g) 50	110486	100.44%	50.00	0.6	3.8	0.4	--			

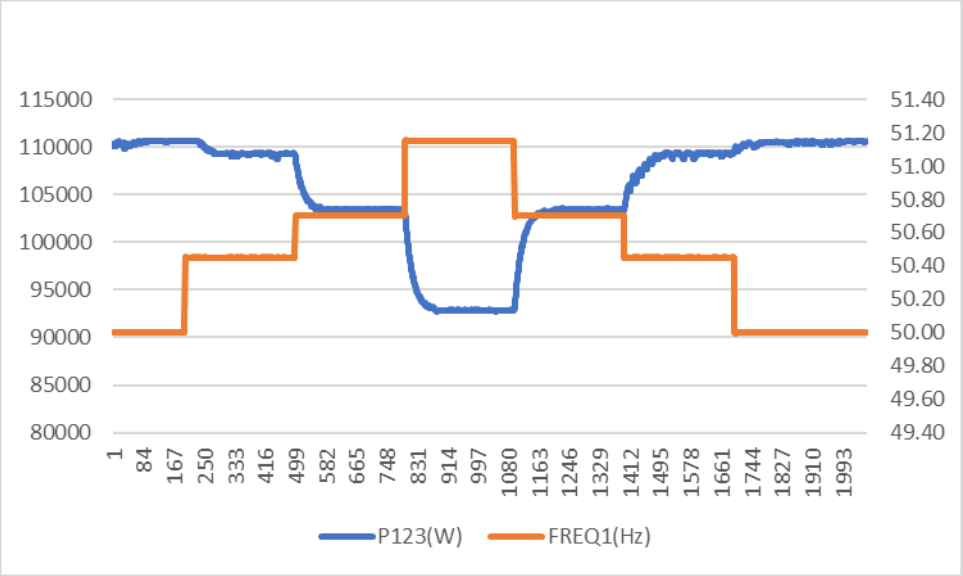
Plotting P(f):



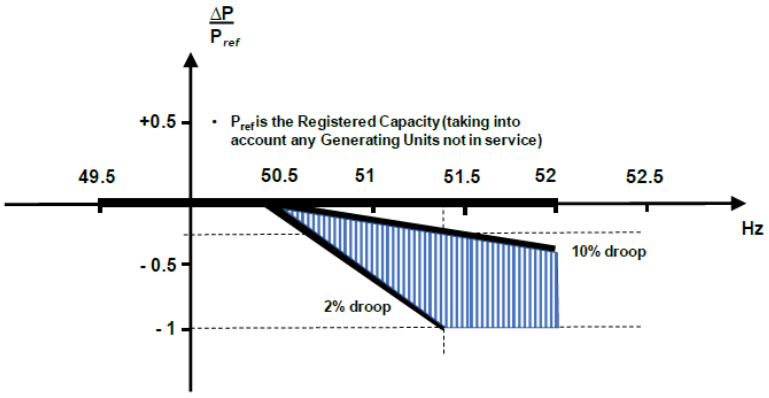
Test No. 2

Test Conditions	Measurements							Limitation		
f [Hz]	P [W]	P/Pn	f [Hz]	T_{rise} [s]	$T_{settling}$ [s]	Tv [s]	Droop	Droop	T_{rise} [s]	Tv [s]
a) 50	55532	50.48%	50.00	--	--	--	--	8.5%≤Droop≤12.8%	≤10	≤2
b) 50.45	54515	49.56%	50.45	5.8	7.2	0.4	9.70%			
c) 50.7	48645	44.22%	50.70	6.2	6.2	0.6	9.31%			
d) 51.15	38019	34.56%	51.15	5.8	5.8	0.6	9.30%			
e) 50.7	48623	44.20%	50.70	6.4	6.4	0.4	9.36%			
f) 50.45	54451	49.50%	50.45	4.0	4.0	0.4	9.45%			
g) 50	55520	50.47%	50.00	0.6	0.6	0.4	--			

Plotting P(f):



Note(s):
P(f) curve setting for test: f1: 50.4Hz; fstop: 50.4Hz (Deactivated); Droop: 10%



11	TABLE: Fault level contribution		P
Test Condition	Measurement		
	U [V]	I [A]	
20ms after fault	55.5V	384A	
100ms after fault	55.4V	0A	
250ms after fault	55.2V	0A	
500ms after fault	55.2V	0A	
Trip time [s]	0.045		

12	TABLE: Self-Monitoring solid state switching	N/A
It has been verified that in the event of the solid state switching device failing to disconnect the Power Park Module, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.		N/A

13	TABLE: Wiring functional tests	N/A
Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning)		N/A

14	TABLE: Logic interface (input port).	P
Confirm that an input port is provided and can be used to shut down the module.		P

Logic interface marked “DRM” on inverter which can be operated by a simple switch or contactor. When the switch is closed the inverter can operated normally. When the switch is opened, the inverter will reduce it’s output power to zero within 5s. The signal from the inverter that is being switched is DC about 10 V.

4.3 Logic interface connection

Logic interface is required by some local regulations that can be operated by a simple switch or contactor(Not available in South Africa).
When the switch is closed the inverter can operated normally. When the switch is opened, the inverter will reduce it’s output power to zero within 5s.
Pin5 and Pin6 of RJ45 terminal is used for the logic interface connection.

Please follow below steps to assemble RJ45 connector.

1.Insert the network cable into the communication connection terminal of RJ45.

2.Use the network wire stripper to strip the insulation layer of the communication cable. According to the standard line sequence of figure 4.9 connect the wire to the plug of RJ45, and then use a network cable crimping tool to make it tight.

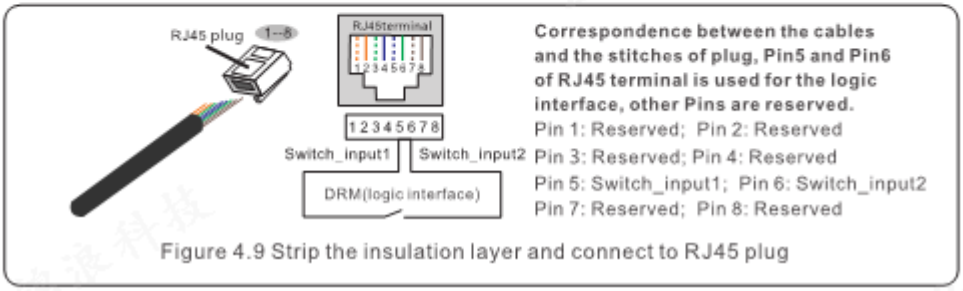


Figure 4.9 Strip the insulation layer and connect to RJ45 plug

15	TABLE: Cyber security	P
Confirm that the Power Generating Module has been designed to comply with cyber security requirements, as detailed in 9.1.7.		P

16.1	TABLE: Measurement of active- and reactive power ranges (P&Q range) (Extra test other than form A2-3)	P

Test Conditions		Measurements					Limitation		
U/Un	cosφ	U [V]	P_{max} [kW]	Q[kVA]	cosφ	S_{max} [kVA]	cosφ	P_{max}/ P_{Emax}	S_{max}/ S_{Emax}
0.95	Max.un	219.75	109.03	-36.36	0.95	114.95	≤0.95	--	--
1.0		231.70	109.22	-50.12	0.91	120.20			
1.05		241.78	109.24	-49.93	0.91	120.13			
0.95	Max.ov	219.21	108.95	51.64	0.90	120.59			
1.0		230.22	109.27	52.03	0.90	121.05			
1.05		242.26	109.25	52.25	0.90	121.13			
Note(s):									

16.2	TABLE: Fixed Q (P&Q range) (Extra test other than form A2-3)	P

Test Conditions		Measurements				Limitation
P/Pn	Q	U [V]	P [kW]	Q [kVA]	S [kVA]	Q/Pn
20%	Max. un	229.50	21.21	-66.32	69.65	<-33%
50%		229.74	54.22	-66.38	54.22	
100%		230.23	109.21	-50.16	120.19	
20%	Max. ov	230.20	22.49	65.81	69.57	>33%
50%		230.43	55.53	65.83	86.14	
100%		230.73	109.30	52.04	121.08	
Note(s):						

16.3	TABLE: Fixed Q (P&Q range) (Extra test other than form A2-3)	P

Q_{set}=0

Setpoint P/P_n [%]	P [W]	Q [Var]	Cos φ	Upos [V]	Number of records
0	1036.02	659.17	0.51	230.34	3
10	10982.86	571.94	0.98	230.42	3
20	21994.28	445.96	0.97	230.66	3
30	32987.67	391.81	0.95	230.85	3
40	43970.07	338.79	0.91	231.08	3
50	54972.47	297.26	0.91	231.30	3
60	65942.65	243.73	0.86	231.53	3
70	76930.18	195.78	0.87	231.75	3
80	87943.49	125.55	0.90	231.97	3
90	98923.83	75.41	0.91	232.18	3
100	110085.62	-125.38	0.91	232.41	3

Q_{set}=Max. ue

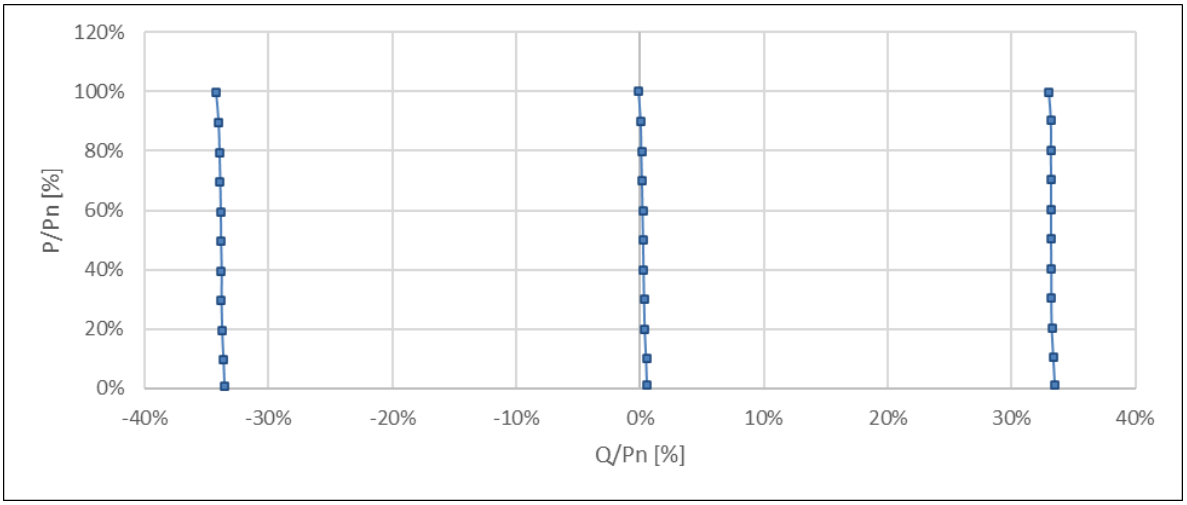
Setpoint P/P_n [%]	P [kW]	Q [kVar]	Cos φ	Upos [V]	Number of records
0	601.61	-36938.91	-0.02	228.65	3
10	10509.42	-37030.90	-0.27	228.85	3
20	21578.57	-37149.11	-0.50	229.09	3
30	32605.74	-37206.15	-0.66	229.29	3
40	43550.53	-37185.78	-0.76	229.51	3
50	54558.45	-37244.82	-0.82	229.74	3
60	65509.90	-37268.65	-0.87	229.96	3
70	76502.64	-37312.64	-0.90	230.19	3

80	87495.11	-37376.97	-0.92	230.40	3
90	98493.01	-37456.56	-0.93	230.61	3
100	109777.03	-37678.15	-0.94	230.81	3

Q_{set}=Max. oe

Setpoint P/P_n [%]	P [kW]	Q [kVar]	Cos φ	Upos [V]	Number of records
0	1436.97	36834.83	0.04	231.64	3
10	11373.42	36721.36	0.30	231.84	3
20	22389.76	36590.20	0.52	232.05	3
30	33399.82	36563.23	0.67	232.27	3
40	44438.59	36557.07	0.77	232.48	3
50	55382.22	36536.45	0.83	232.71	3
60	66376.61	36539.36	0.87	232.93	3
70	77365.20	36537.85	0.90	233.14	3
80	88348.70	36526.40	0.92	233.38	3
90	99342.25	36529.07	0.94	233.60	3
100	109910.70	36356.79	0.95	233.81	3

Diagram



17	TABLE: Fault Voltage-Ride Through (FVRT) (Extra test other than form A2-3)						P
Test	Voltage depth U/Un [p.u.]	Fault type	Fault duration [ms]	Power P/Pn [p.u.]	Reactive power Q/Pn [p.u.]	K	Test No.
1	≤0.05	Three phase	≥140	1.0	0…±0.1	K=2	0.1
				0.2…0.6			0.2
		Two phase		1.0			0.3
				0.2…0.6			0.4
2	0.45….0.60	Three phase	For 0.45pu ≥1230 For 0.60pu ≥ 1600	1.0	0…±0.1	K=2	50.1
				0.2…0.6			50.2
		Two phase		1.0			50.3
				0.2…0.6			50.4
3	0.70….0.80	Three phase	For 0.7pu ≥1840 For 0.8pu ≥ 2080	0.2…0.6	0…±0.1	K=2	75.5
		Two phase		0.2…0.6	0…±0.1	K=2	75.8

Note: The product could inject reactive current in both pos. and neg. sequence during the fault, the magnitude of additional reactive current is configurable by K(2-6) value follow the ΔU-ΔIq curve in figure 1. The max. reactive current do not exceed the rated max. current of the product. In balanced faults, the reactive current magnitude in pos. sequence could be kept above the heavy black line in figure 2.

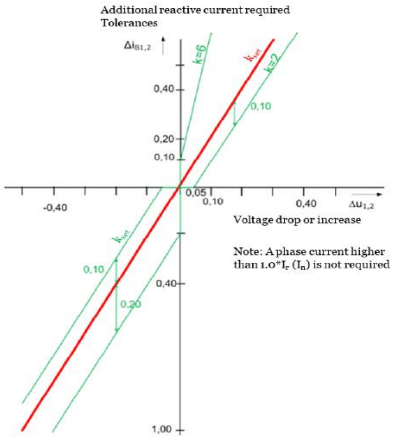


Figure 1

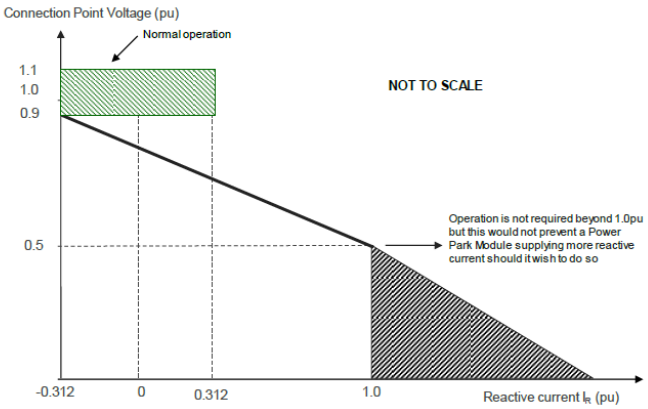


Figure 2

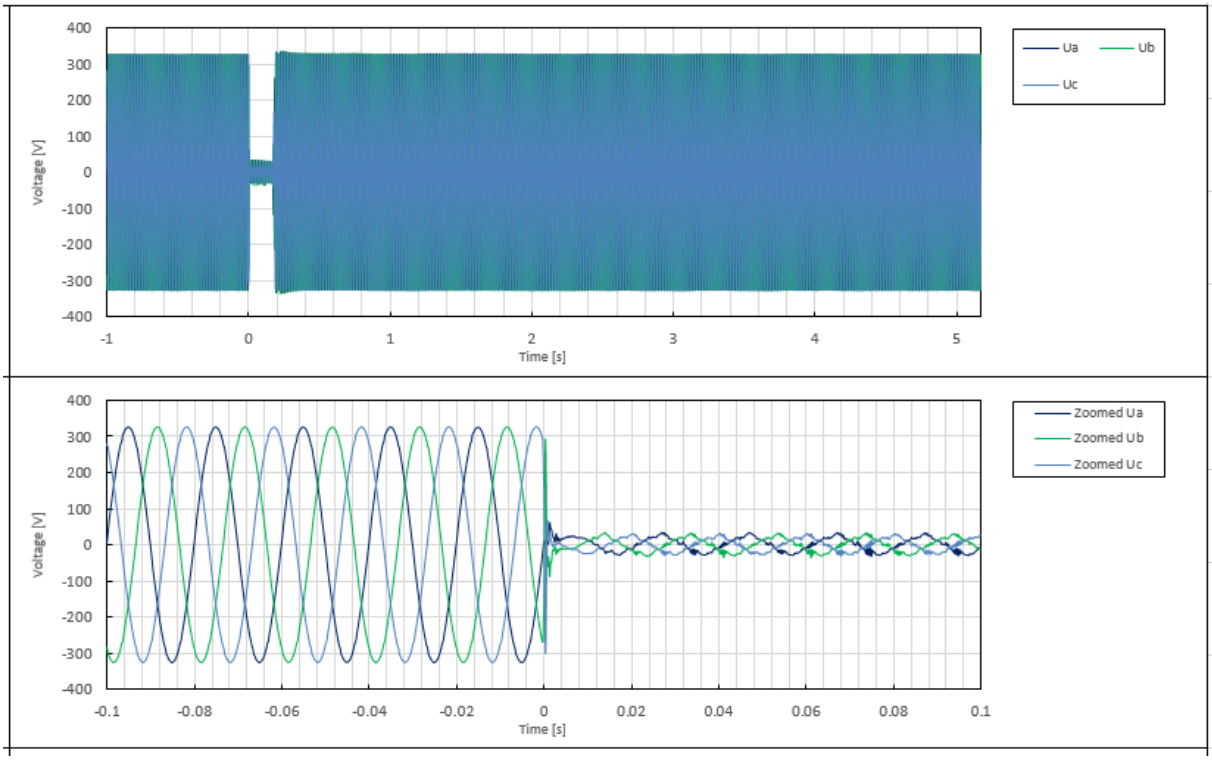
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	0.1
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	2:59:00 PM
	4	Type of fault	--	--	--	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.07
	6	Drop duration setpoint	--	--	ms	173
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	173
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	173
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.07
	17		pos			0.08

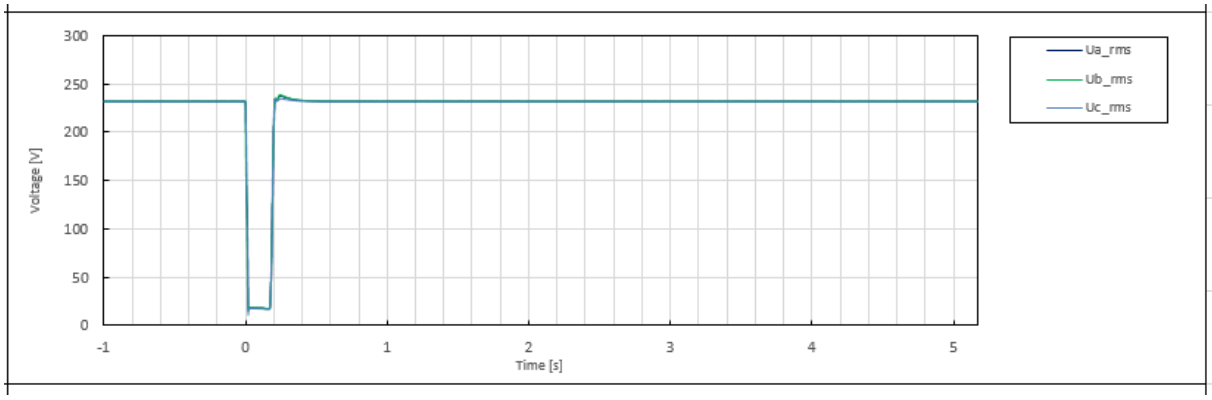
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.01
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.01
	32	Active power	total	t1-10s to t1	p.u.	1.02
	33		total	t1-2s to t1	p.u.	1.02
	34		pos	t1-500ms to t1-100ms	p.u.	1.02
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.000420076
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.10
	38		neg	--	--	N/A
	39	Reactive current settling up time	pos	--	ms	24
	40		neg	--	ms	N/A

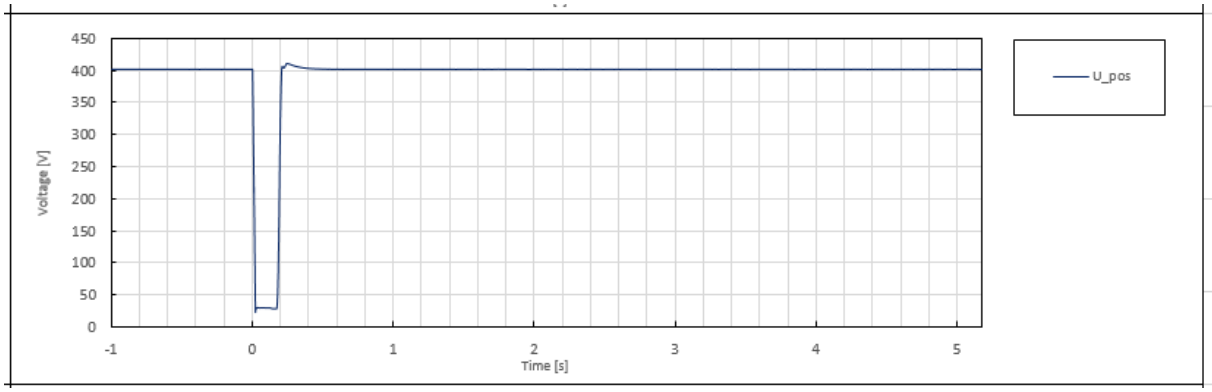
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	41	Reactive current settling time	pos	--	ms	24
	42		neg	--	ms	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.08
	44		neg	t1+100ms to t2-20ms	p.u.	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	1.02
	46		neg	t1+100ms to t2-20ms	p.u.	-0.01
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.06
	48		neg	t1+100ms to t2-20ms	p.u.	0.01
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	253.58
	52		phase2	t1 to t1+20ms	A	339.08
	53		phase3	t1 to t1+20ms	A	334.59
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.80
	55		phase 2	t1+20ms	p.u.	0.95
	56		phase 3	t1+20ms	p.u.	0.63
	57		phase 1	t1+100ms	p.u.	1.06
	58		phase 2	t1+100ms	p.u.	1.08
	59		phase 3	t1+100ms	p.u.	1.07
	60		phase 1	t1+150ms	p.u.	1.06
	61		phase 2	t1+150ms	p.u.	1.06
	62		phase 3	t1+150ms	p.u.	1.06
	63		phase 1	t1+300ms	p.u.	0.98

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	64		phase 2	t1+300ms	p.u.	0.98
	65		phase 3	t1+300ms	p.u.	0.98
	66		phase 1	t1+500ms	p.u.	1.01
	67		phase 2	t1+500ms	p.u.	1.01
	68		phase 3	t1+500ms	p.u.	1.01
	69		phase 1	t1+1000ms	p.u.	1.01
	70		phase 2	t1+1000ms	p.u.	1.01
	71		phase 3	t1+1000ms	p.u.	1.01
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.02
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.078

Idle result

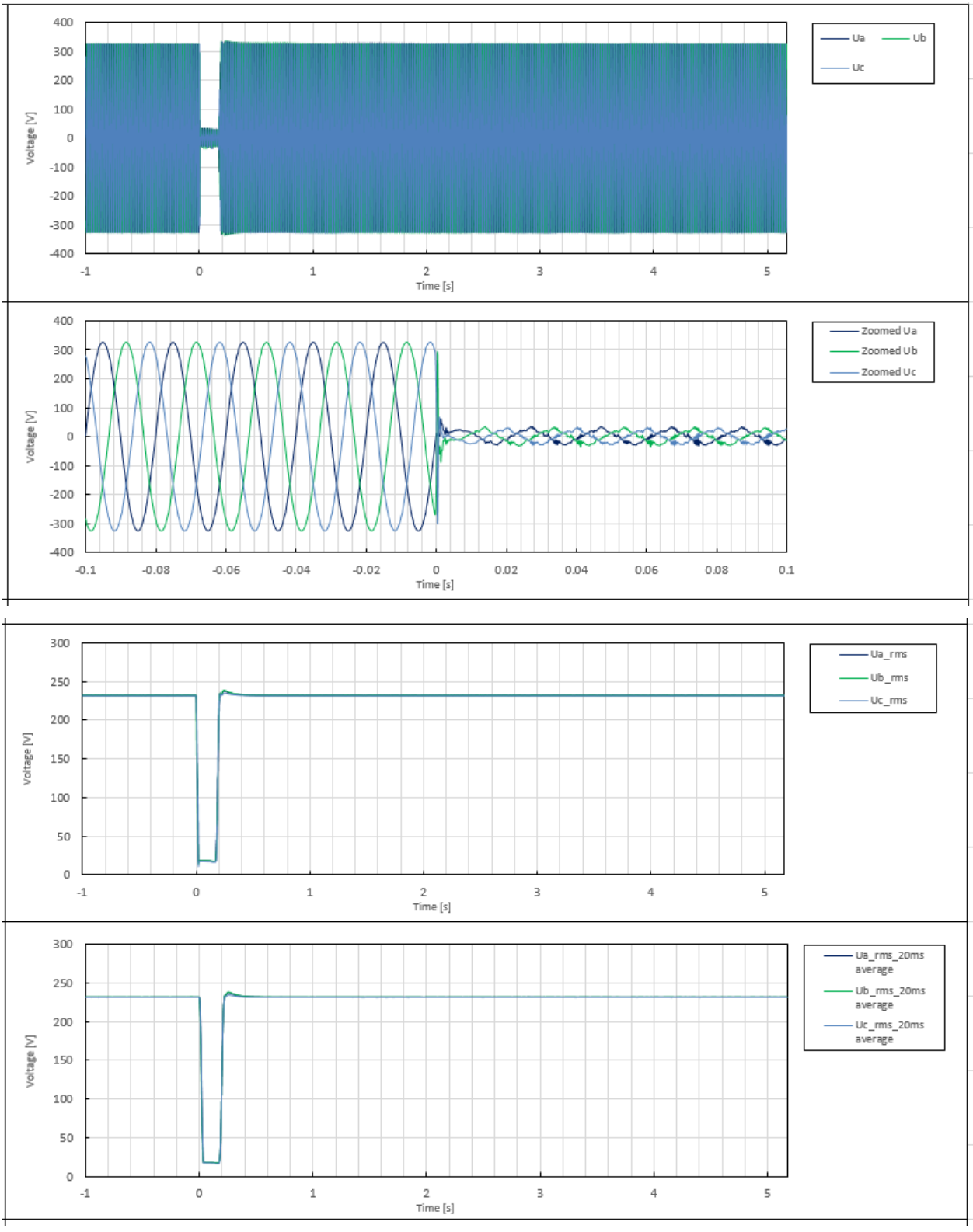


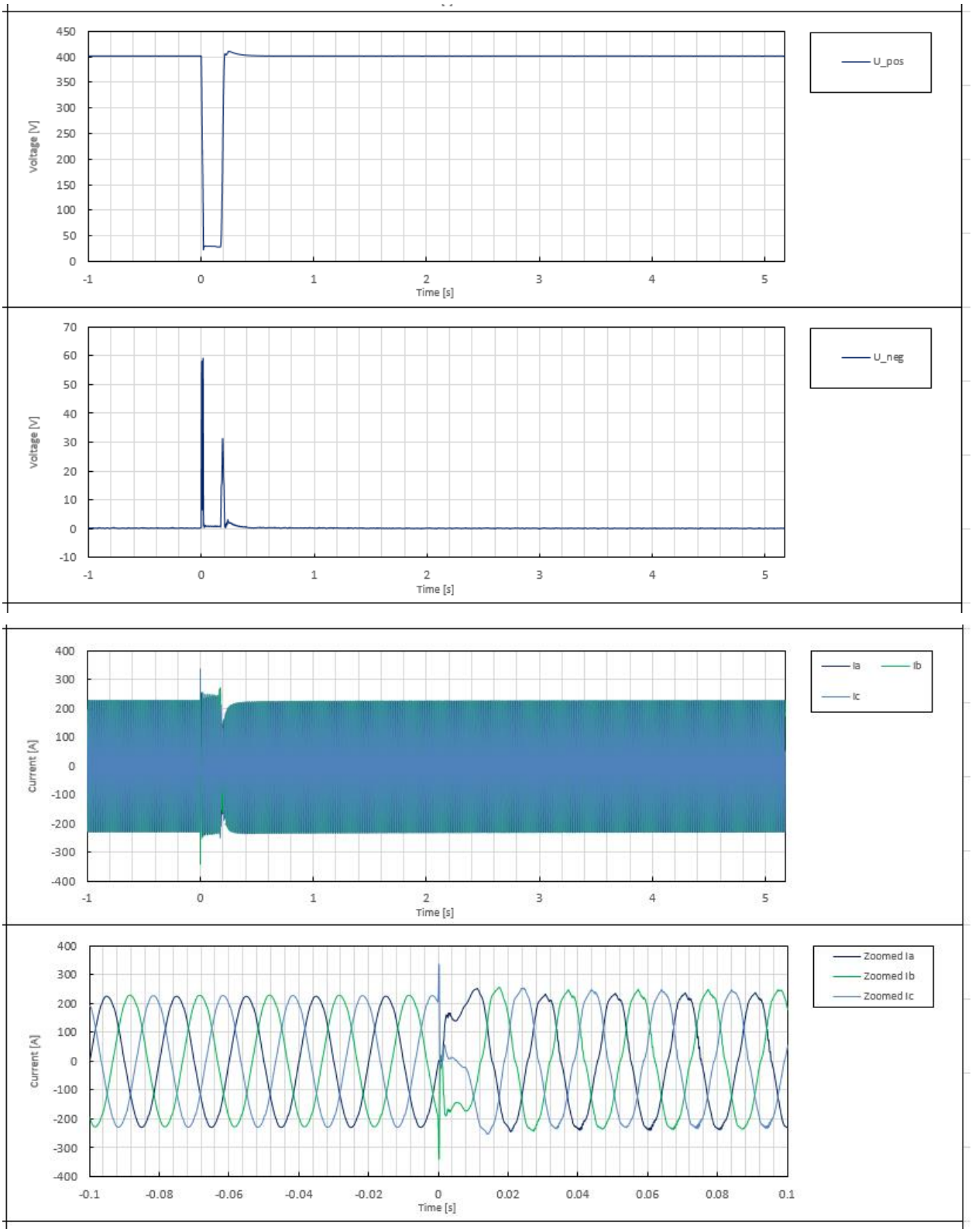


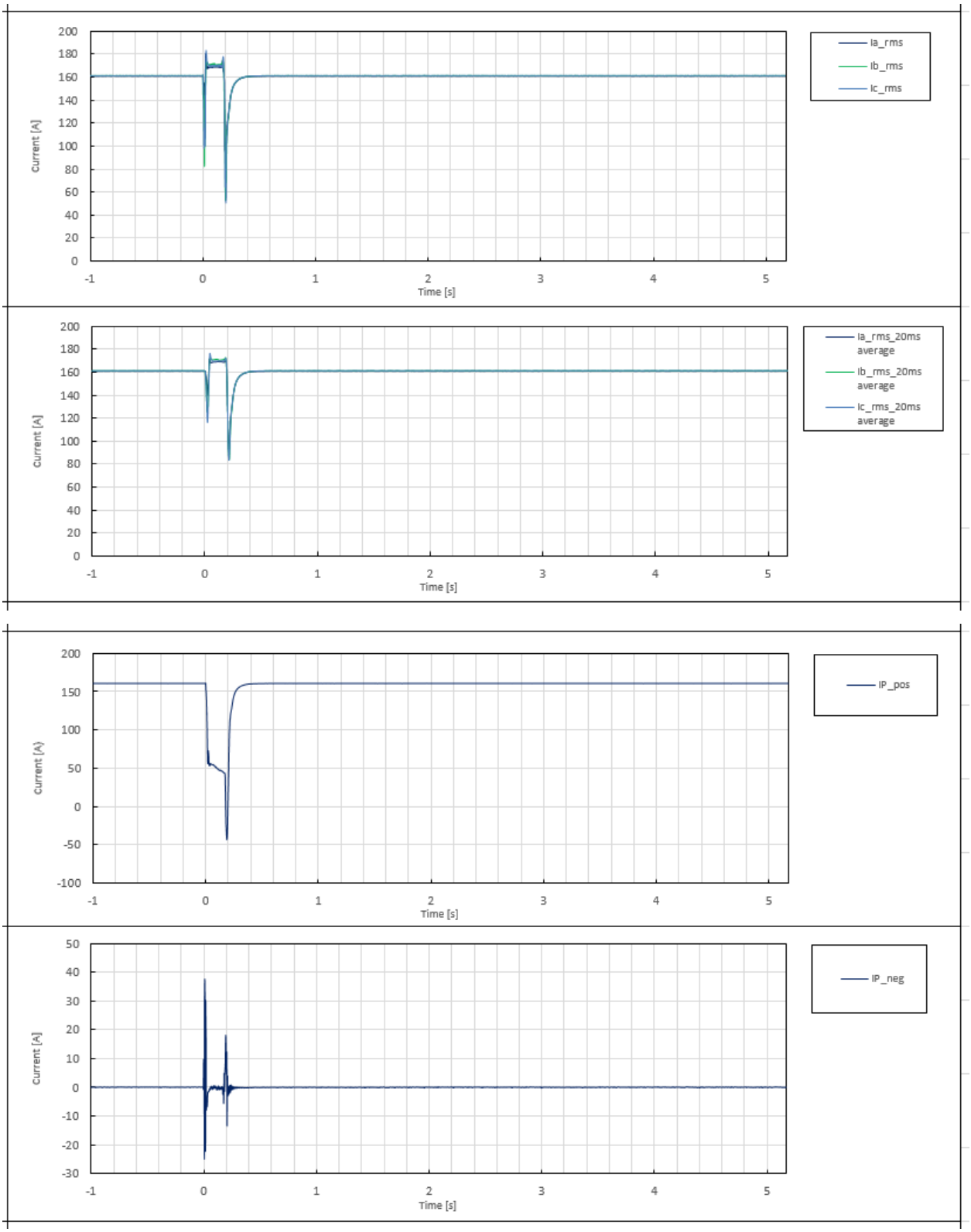


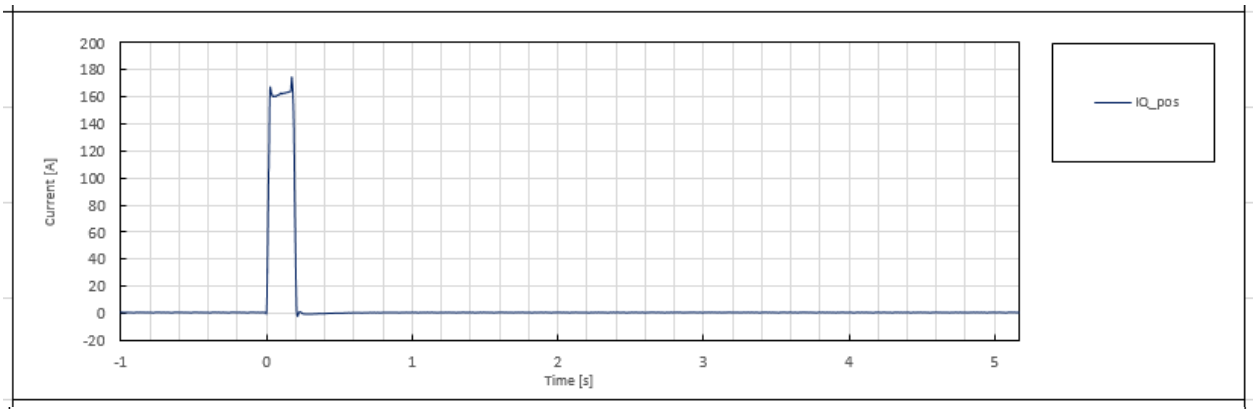
Load result

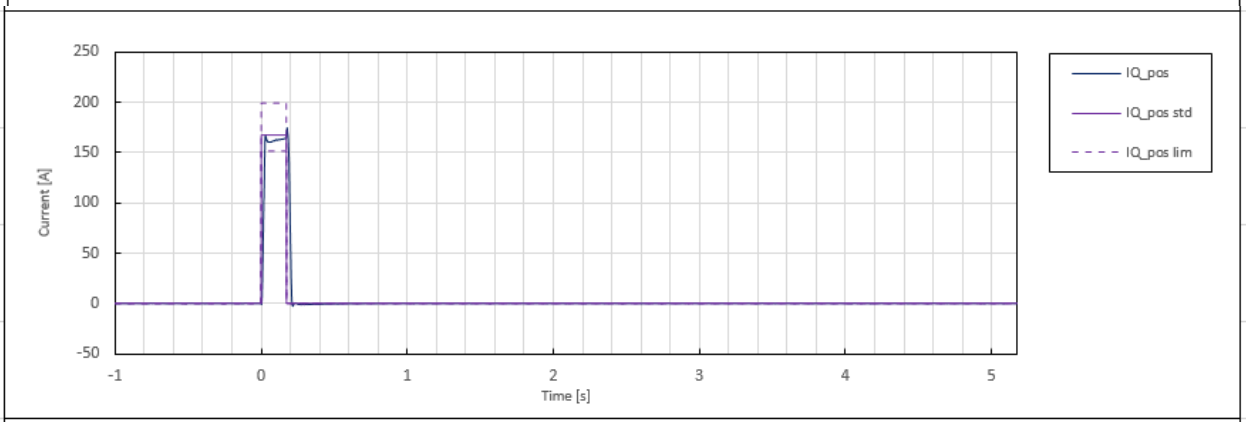
G99: 2020 Type A/B/C/D

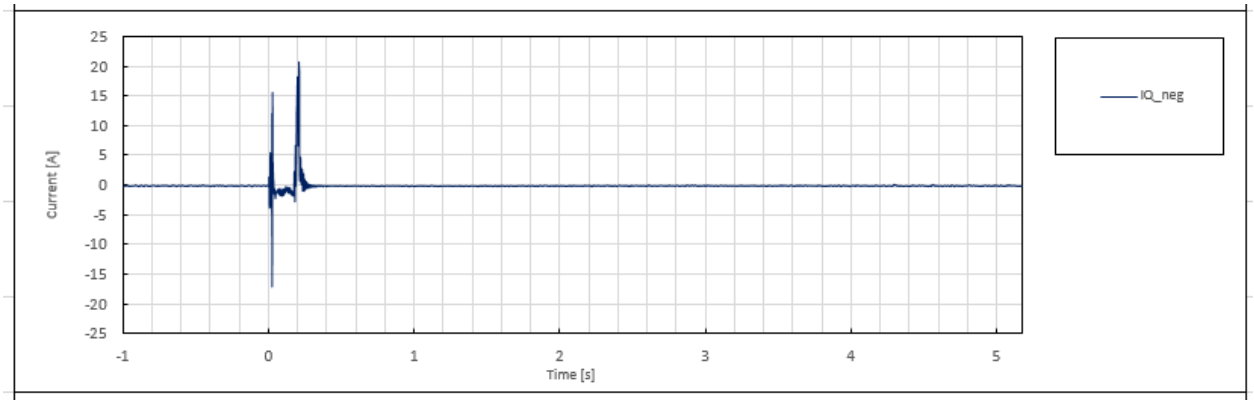

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

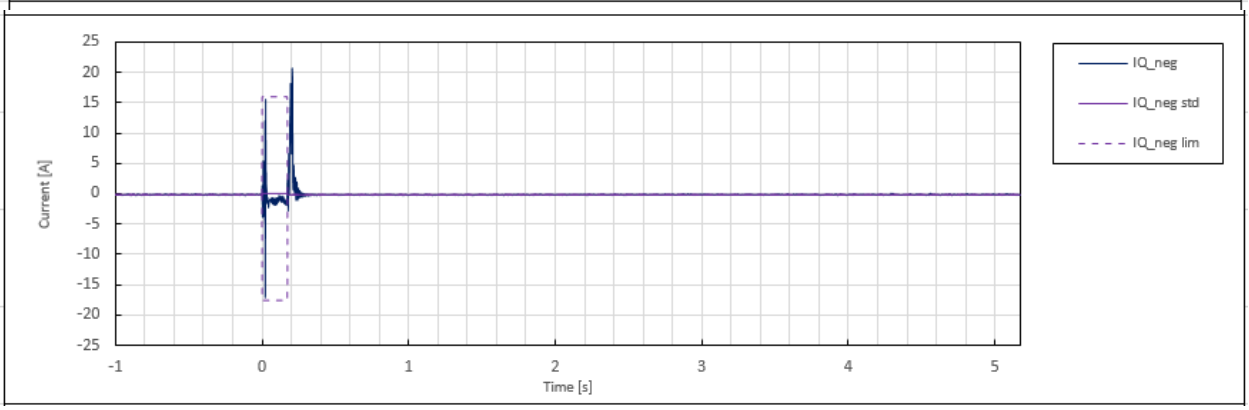

U_pos
Voltage [V]
Time [s]
U_neg
Voltage [V]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic
Current [A]
Time [s]

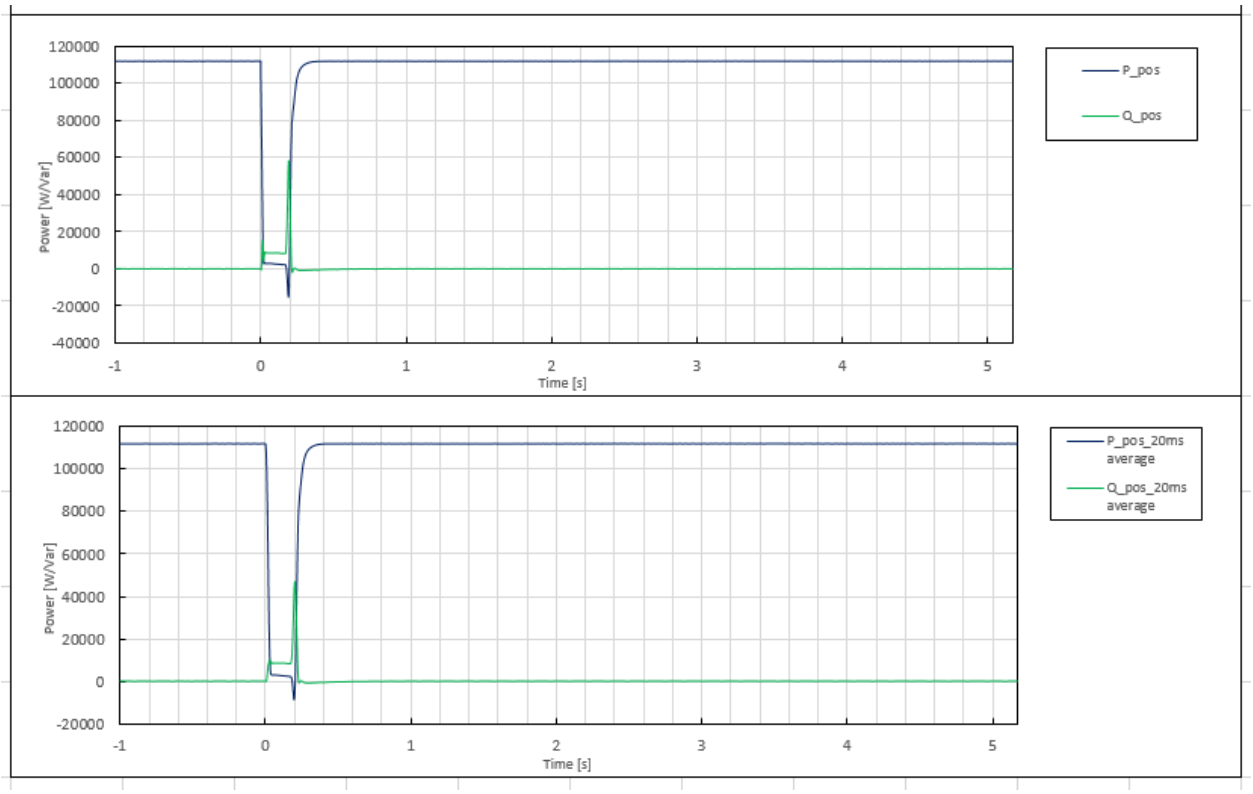

Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	0.2
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:01:02 PM
	4	Type of fault	--	--	--	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.07
	6	Drop duration setpoint	--	--	ms	173
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A

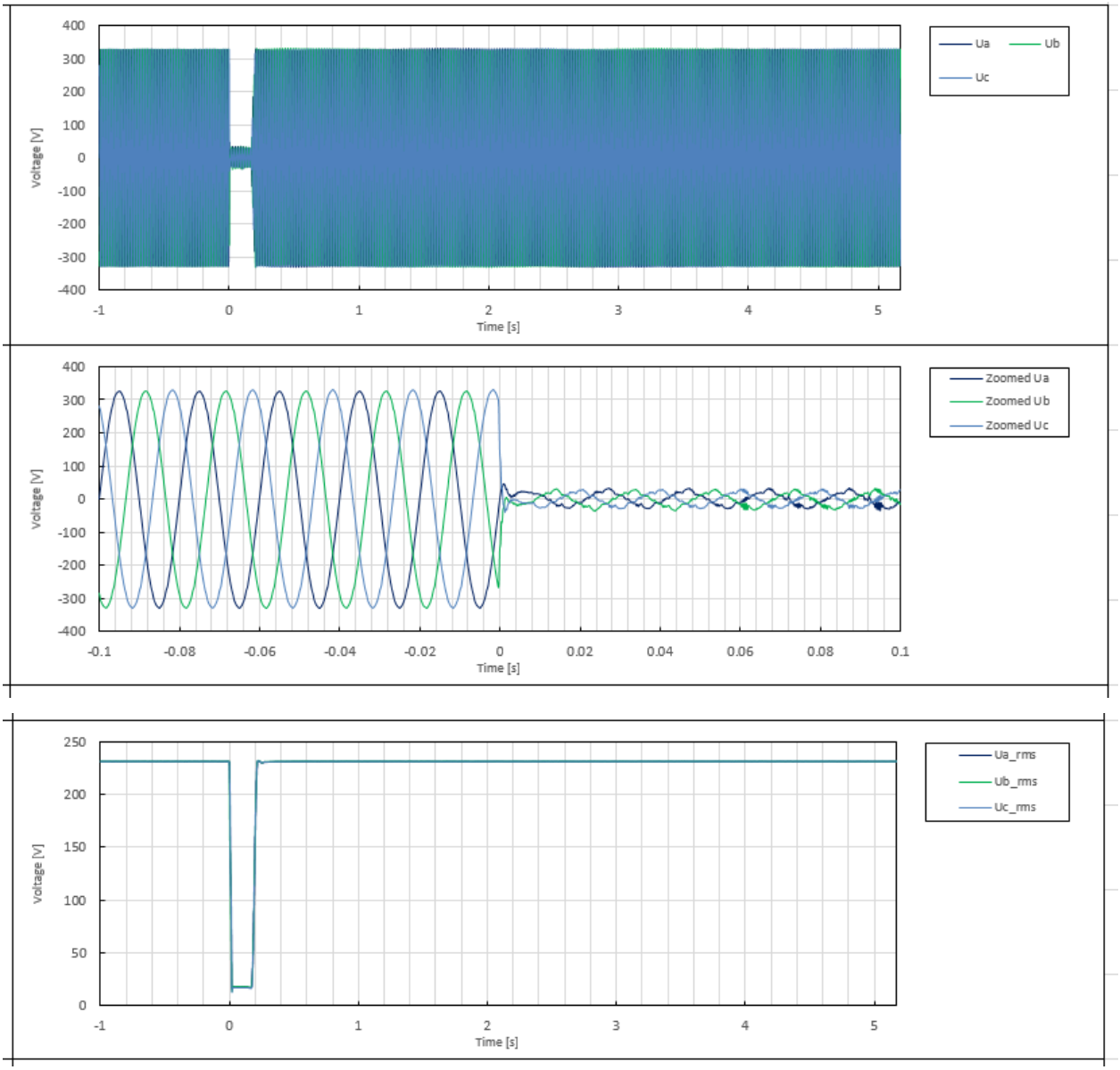
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	173
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	173
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.07
	17		pos			0.08
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00

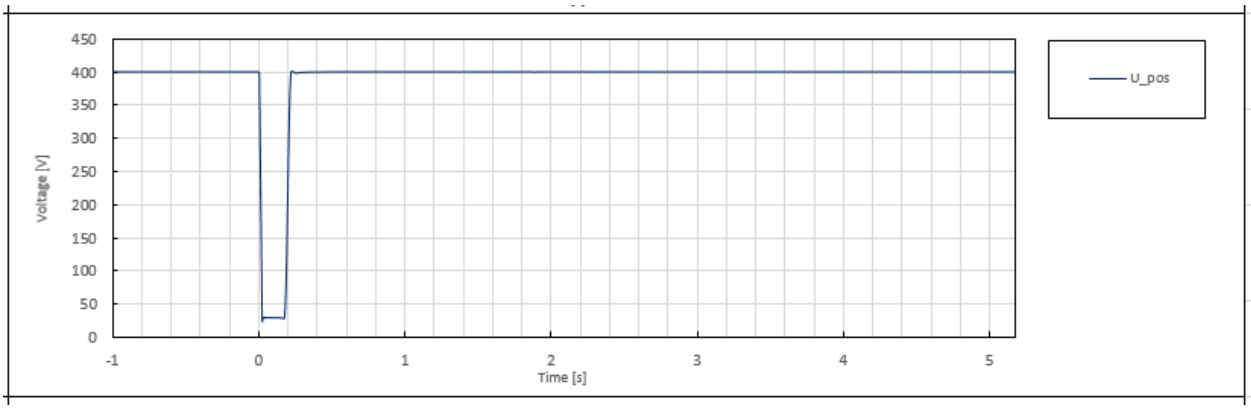
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.20
	32	Active power	total	t1-10s to t1	p.u.	0.20
	33		total	t1-2s to t1	p.u.	0.20
	34		pos	t1-500ms to t1-100ms	p.u.	0.20
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.004227575
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.10
	38		neg	--	--	N/A
	39	Reactive current settling up time	pos	--	ms	25
	40		neg	--	ms	N/A
	41	Reactive current settling time	pos	--	ms	25
	42		neg	--	ms	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.08
	44		neg	t1+100ms to t2-20ms	p.u.	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	1.02
	46		neg	t1+100ms to t2-20ms	p.u.	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.07
	48		neg	t1+100ms to t2-20ms	p.u.	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02
	51		phase1	t1 to t1+20ms	A	242.87

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	52	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase2	t1 to t1+20ms	A	322.59
	53		phase3	t1 to t1+20ms	A	262.52
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.74
	55		phase 2	t1+20ms	p.u.	0.91
	56		phase 3	t1+20ms	p.u.	0.58
	57		phase 1	t1+100ms	p.u.	1.06
	58		phase 2	t1+100ms	p.u.	1.07
	59		phase 3	t1+100ms	p.u.	1.07
	60		phase 1	t1+150ms	p.u.	1.07
	61		phase 2	t1+150ms	p.u.	1.07
	62		phase 3	t1+150ms	p.u.	1.07
	63		phase 1	t1+300ms	p.u.	0.20
	64		phase 2	t1+300ms	p.u.	0.20
	65		phase 3	t1+300ms	p.u.	0.20
	66		phase 1	t1+500ms	p.u.	0.20
	67		phase 2	t1+500ms	p.u.	0.20
	68		phase 3	t1+500ms	p.u.	0.20
	69		phase 1	t1+1000ms	p.u.	0.20
	70		phase 2	t1+1000ms	p.u.	0.20
	71		phase 3	t1+1000ms	p.u.	0.20
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A

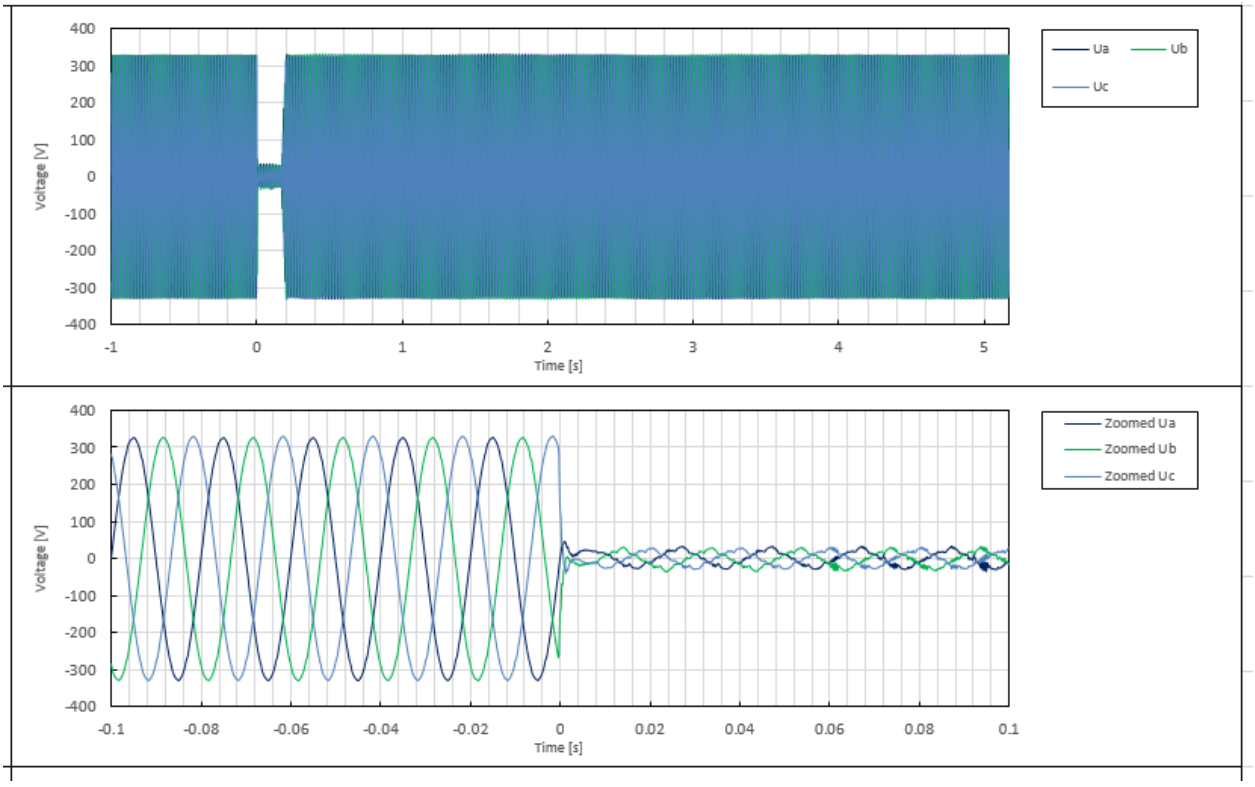
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	74	Active current rise time	pos	--	s	0.087

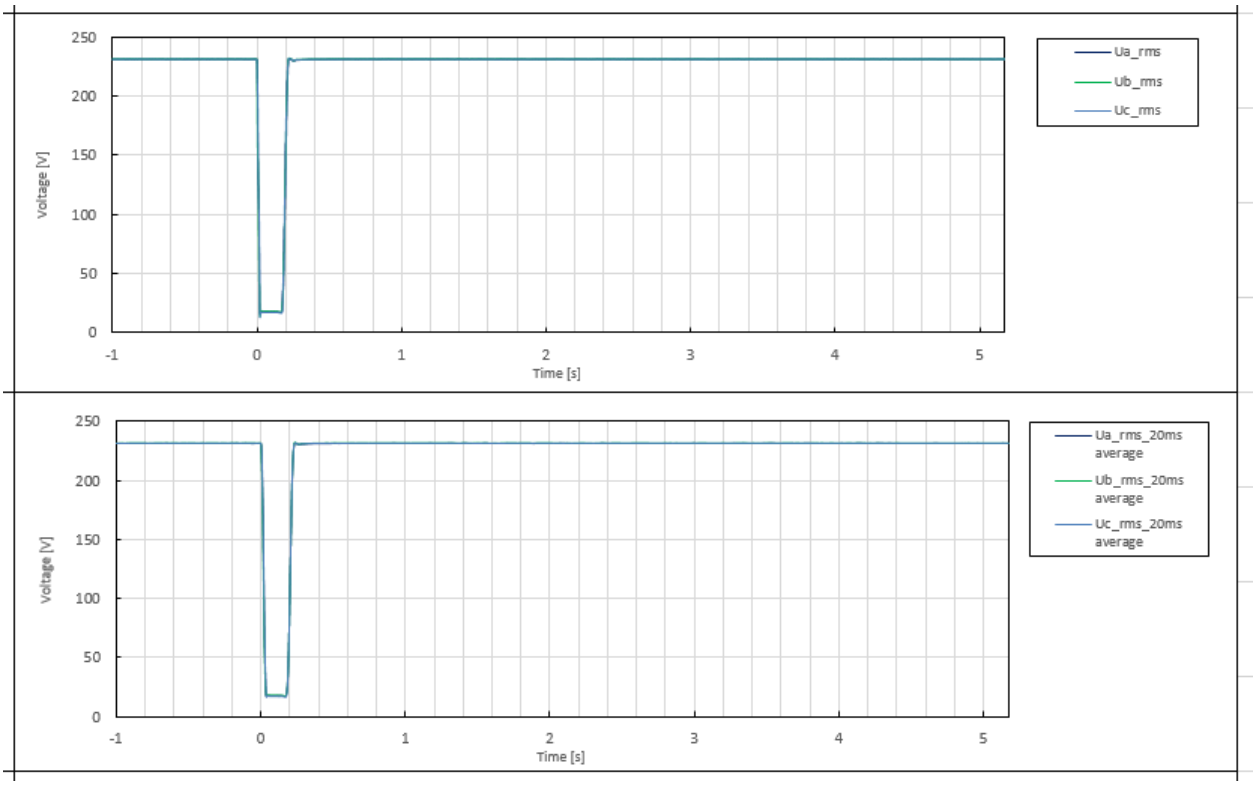
Idle result

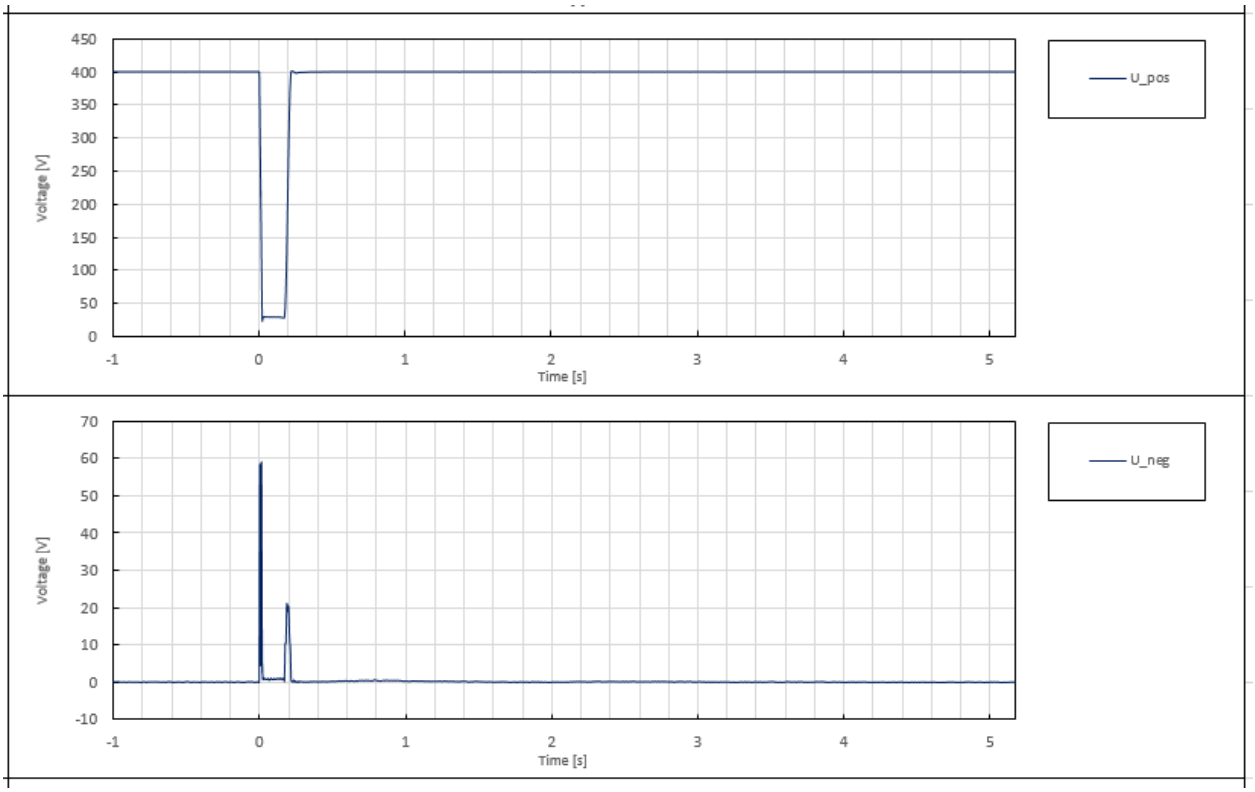


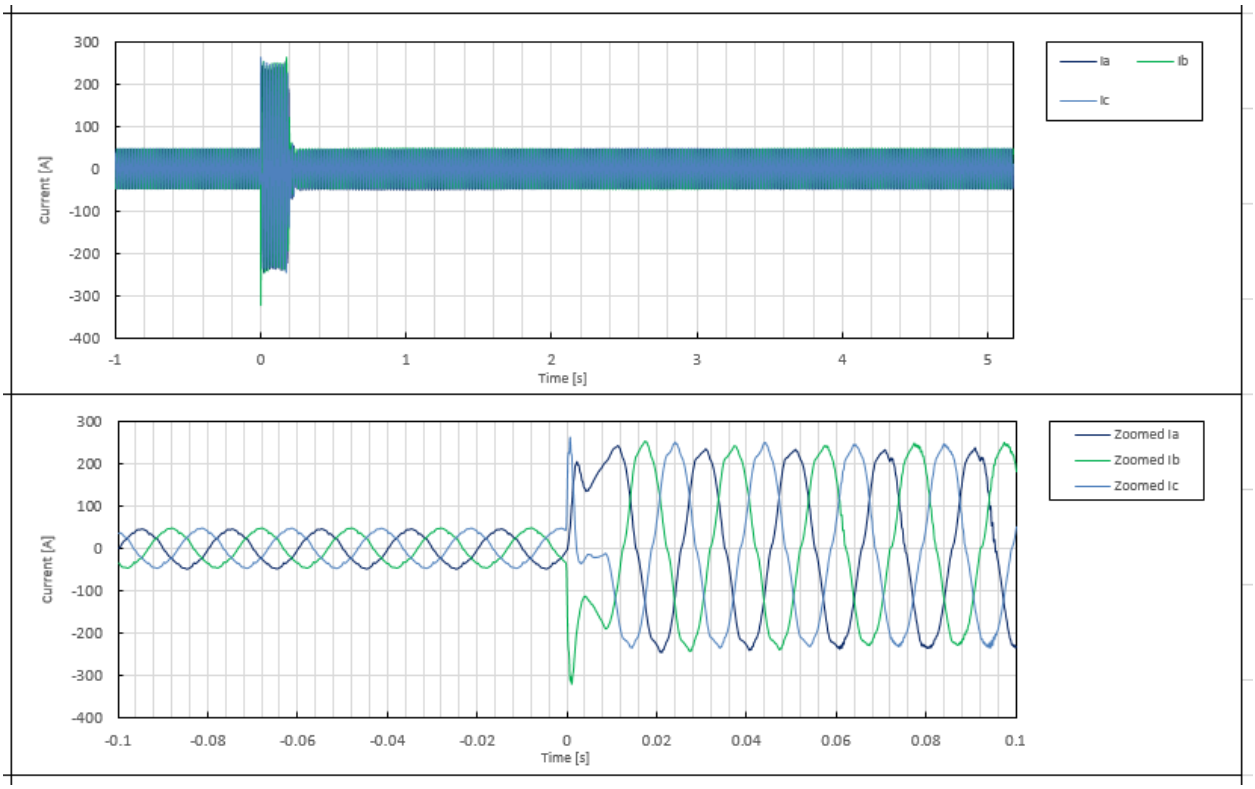

U_pos
Voltage [V]
Time [s]

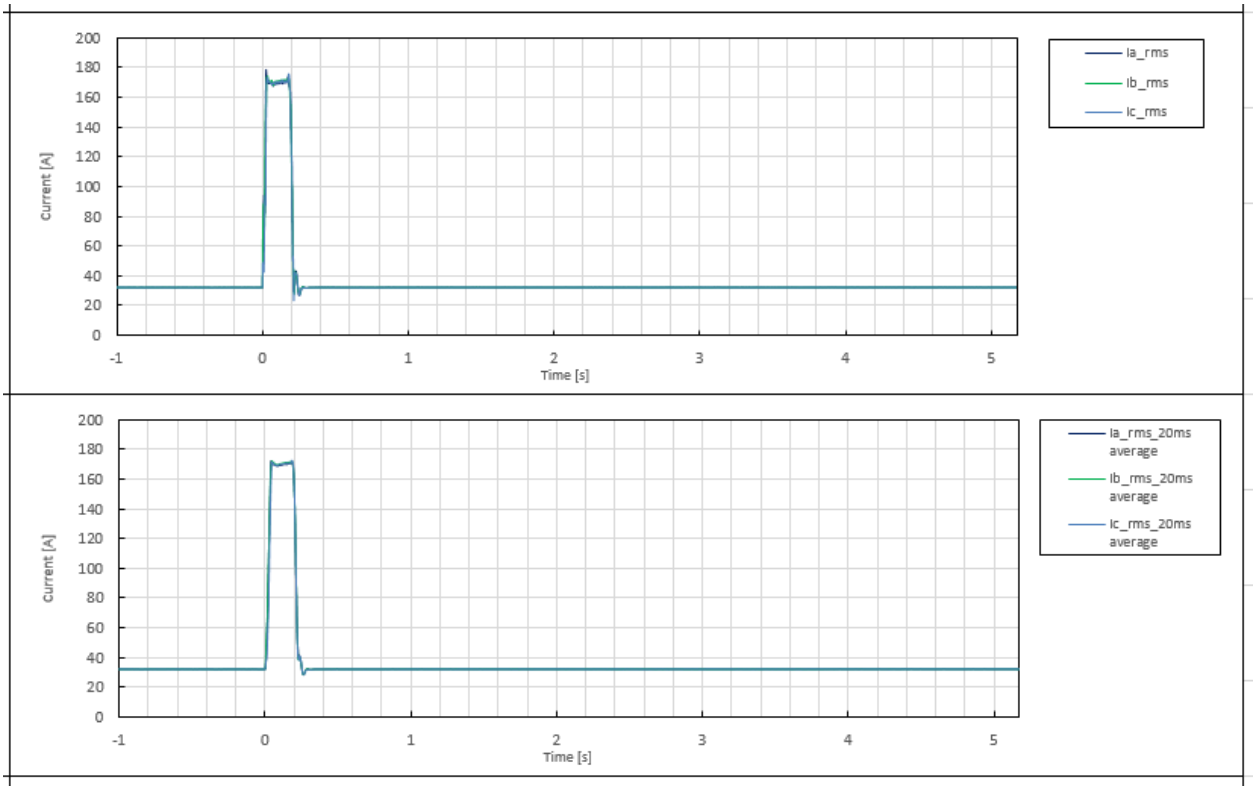
Load result

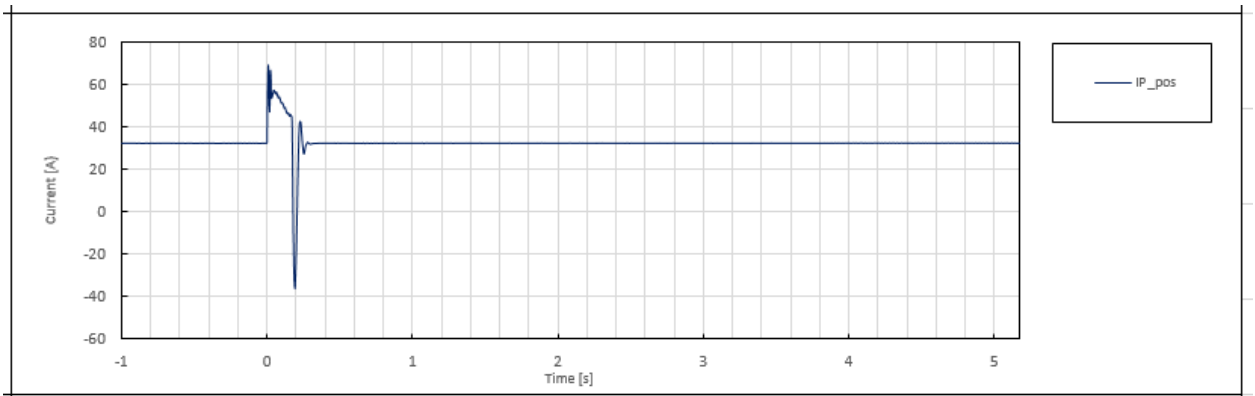

Ua
Ub
Uc
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc
Voltage [V]
Time [s]

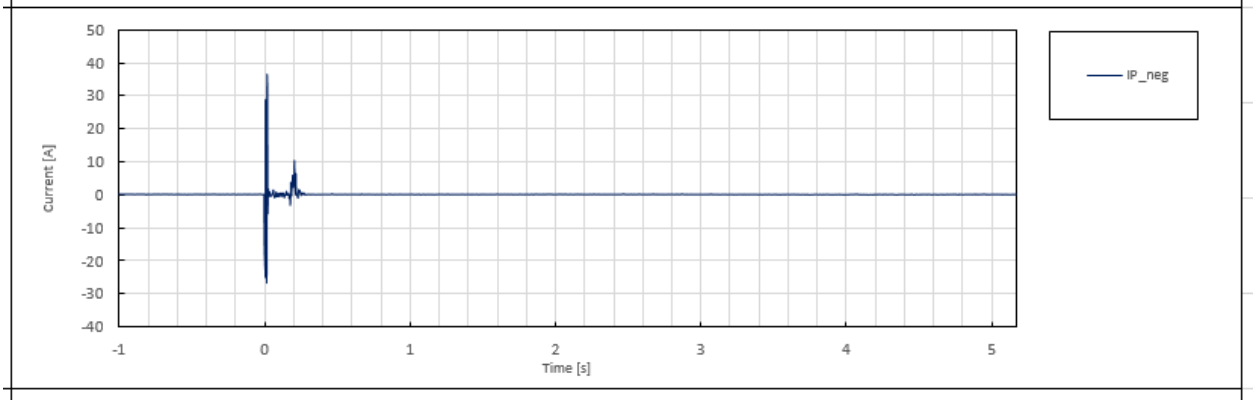

Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

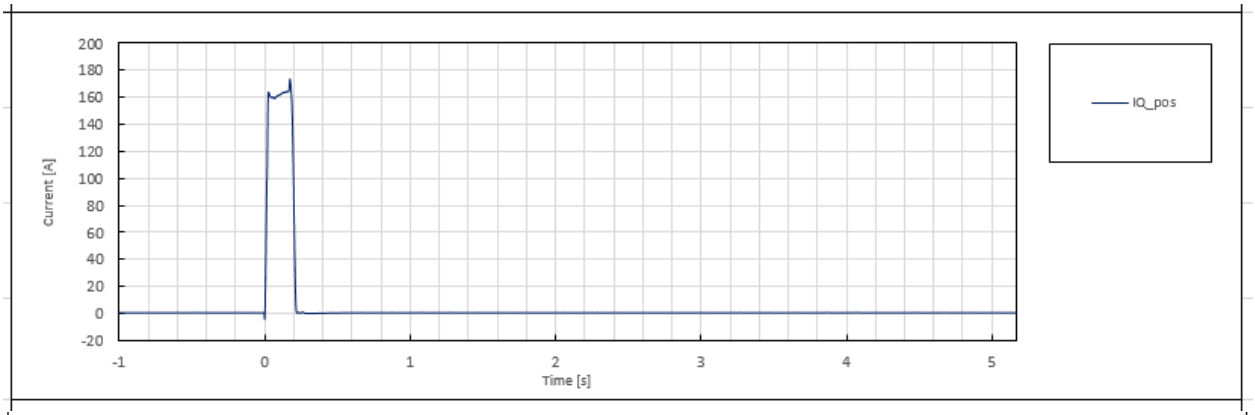

Voltage [V]
Time [s]
U_pos
U_neg

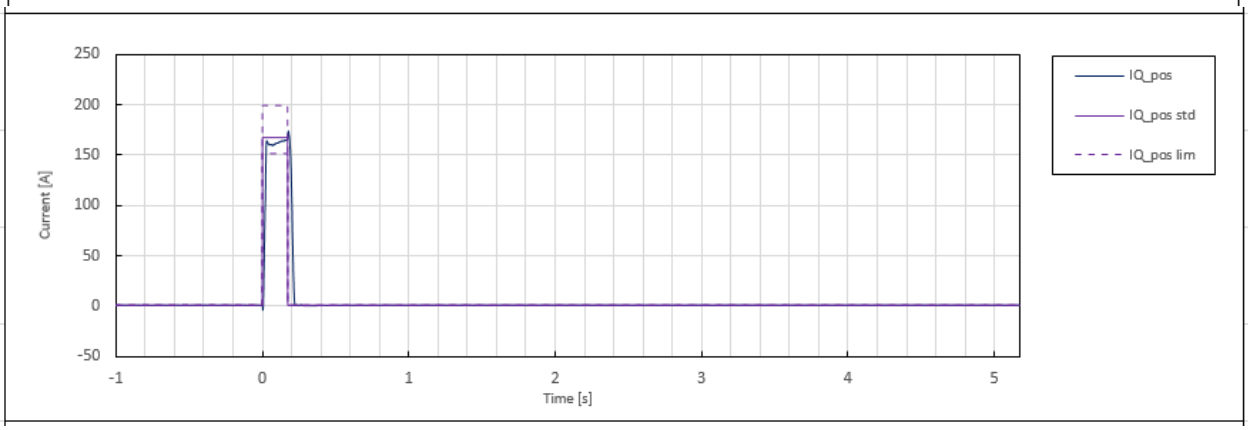

Current [A]
Time [s]
Ia
Ib
Ic
Zoomed Ia
Zoomed Ib
Zoomed Ic

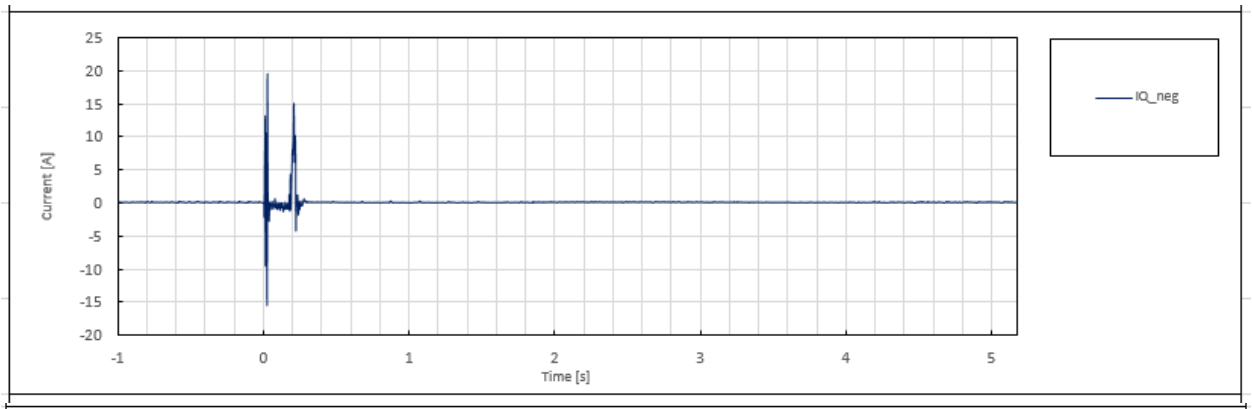

Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

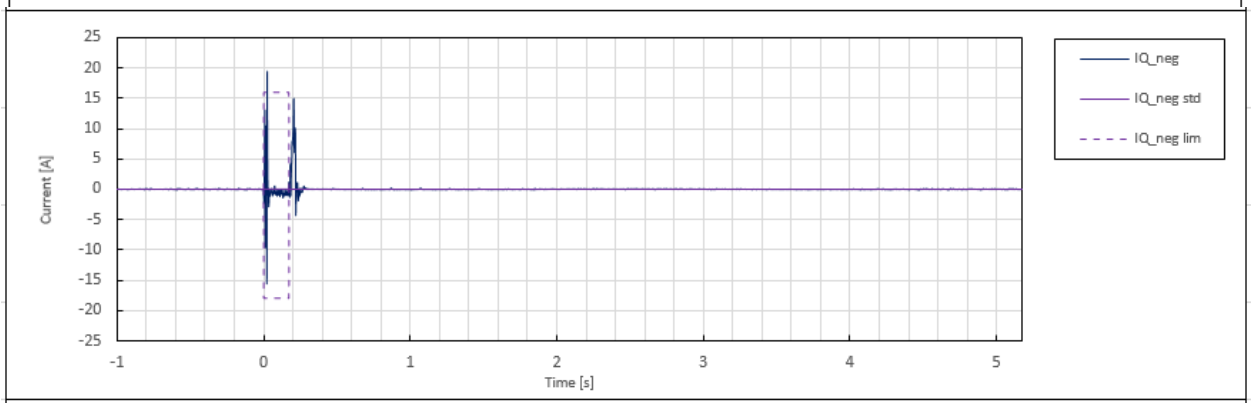

Current [A]
Time [s]
IP_pos

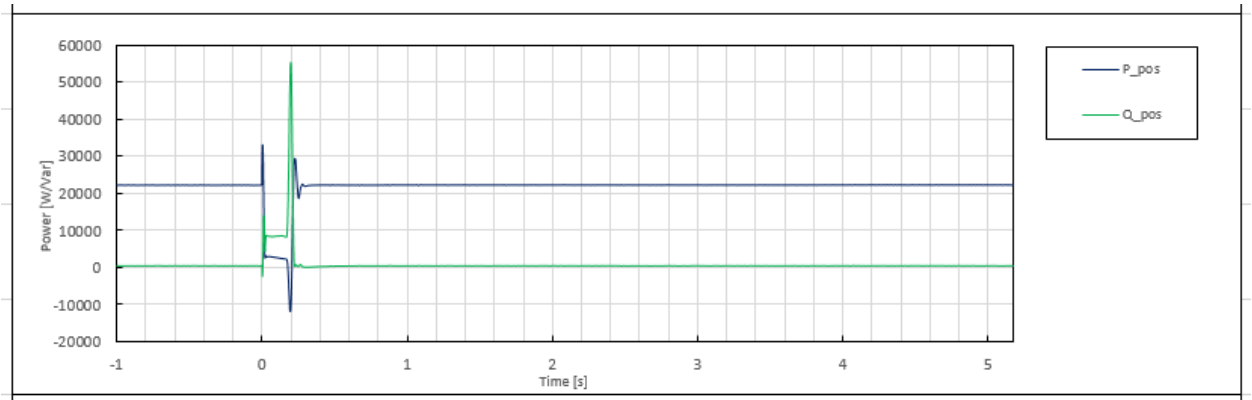

Current [A]
Time [s]
IP_neg

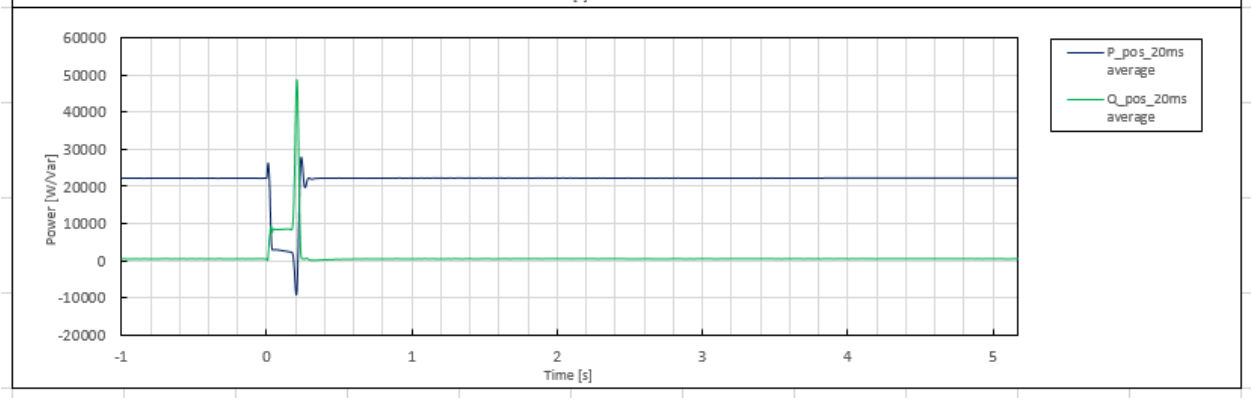

Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


Power [W/Var]
Time [s]
P_pos
Q_pos


Power [W/Var]
Time [s]
P_pos_20ms average
Q_pos_20ms average

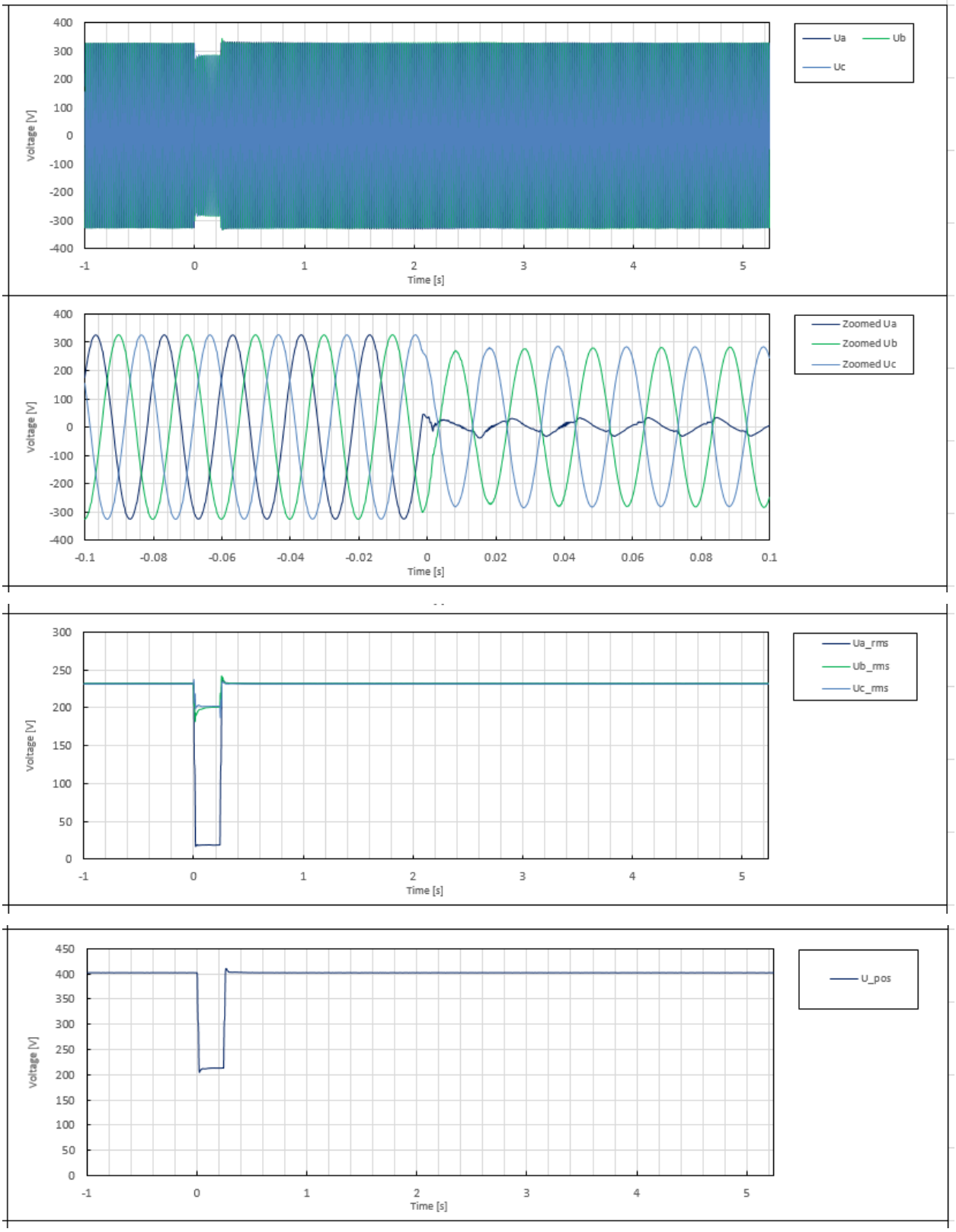
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	0.3
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:07:53 PM
	4	Type of fault	--	--	--	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.08
	6	Drop duration setpoint	--	--	ms	241
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	241
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	241
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.08
	17		pos			0.54
Bef	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.01
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.01
	32	Active power	total	t1-10s to t1	p.u.	1.02
	33		total	t1-2s to t1	p.u.	1.02
	34		pos	t1-500ms to t1-100ms	p.u.	1.02
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	3.48369E-05
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.10
	38		neg	--	--	1.08
	39	Reactive current settling up time	pos	--	ms	20
	40		neg	--	ms	20
	41		pos	--	ms	20

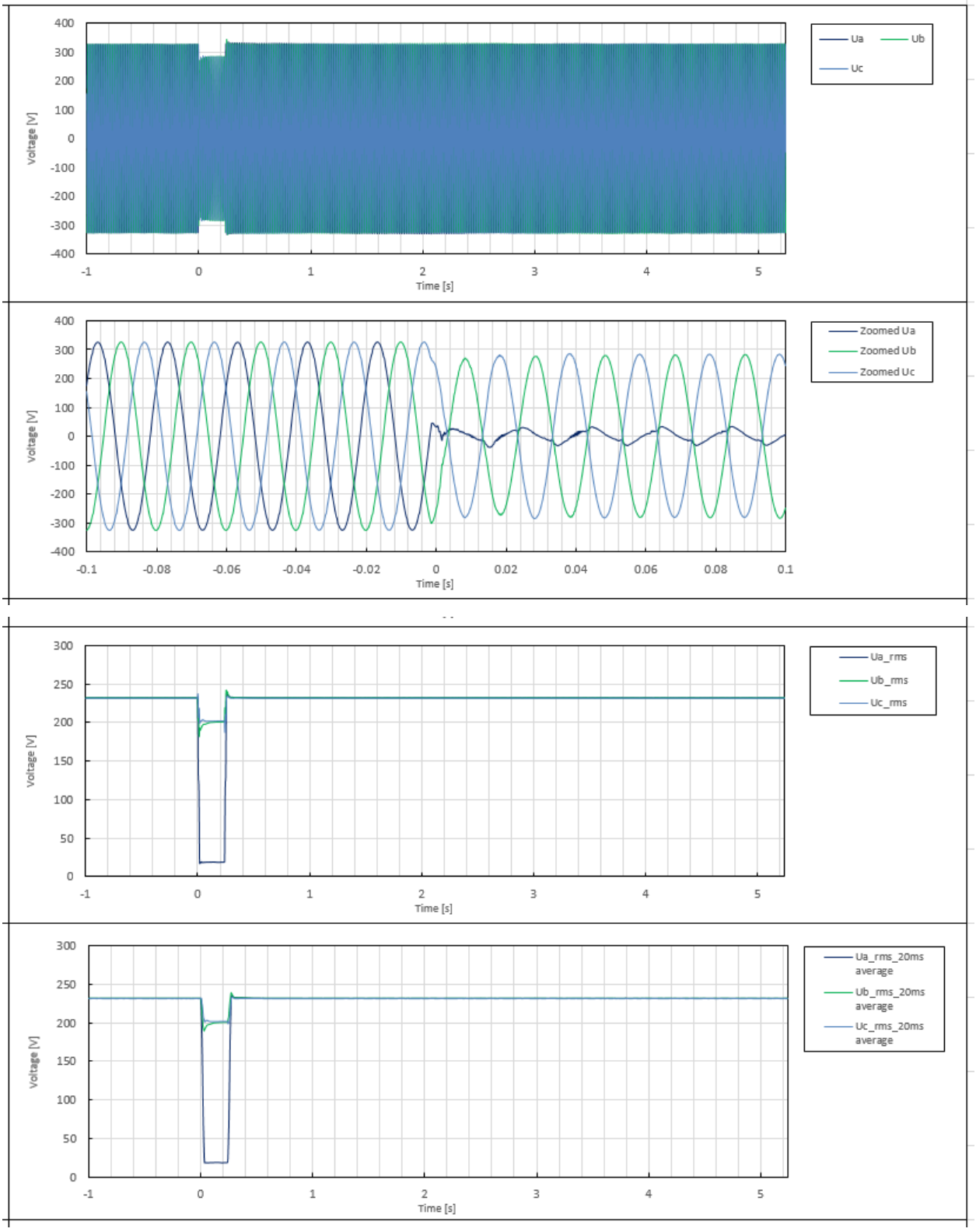
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	42	Reactive current settling time	neg	--	ms	20
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.54
	44		neg	t1+100ms to t2-20ms	p.u.	0.47
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.52
	46		neg	t1+100ms to t2-20ms	p.u.	-0.51
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.53
	48		neg	t1+100ms to t2-20ms	p.u.	0.51
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.31
	50		pos	t1+100ms to t2-20ms	p.u.	0.07
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	N/A
	52		phase2	t1 to t1+20ms	A	N/A
	53		phase3	t1 to t1+20ms	A	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A
	55		phase 2	t1+20ms	p.u.	N/A
	56		phase 3	t1+20ms	p.u.	N/A
	57		phase 1	t1+100ms	p.u.	N/A
	58		phase 2	t1+100ms	p.u.	N/A
	59		phase 3	t1+100ms	p.u.	N/A
	60		phase 1	t1+150ms	p.u.	N/A
	61		phase 2	t1+150ms	p.u.	N/A
	62		phase 3	t1+150ms	p.u.	N/A
	63		phase 1	t1+300ms	p.u.	N/A
	64		phase 2	t1+300ms	p.u.	N/A

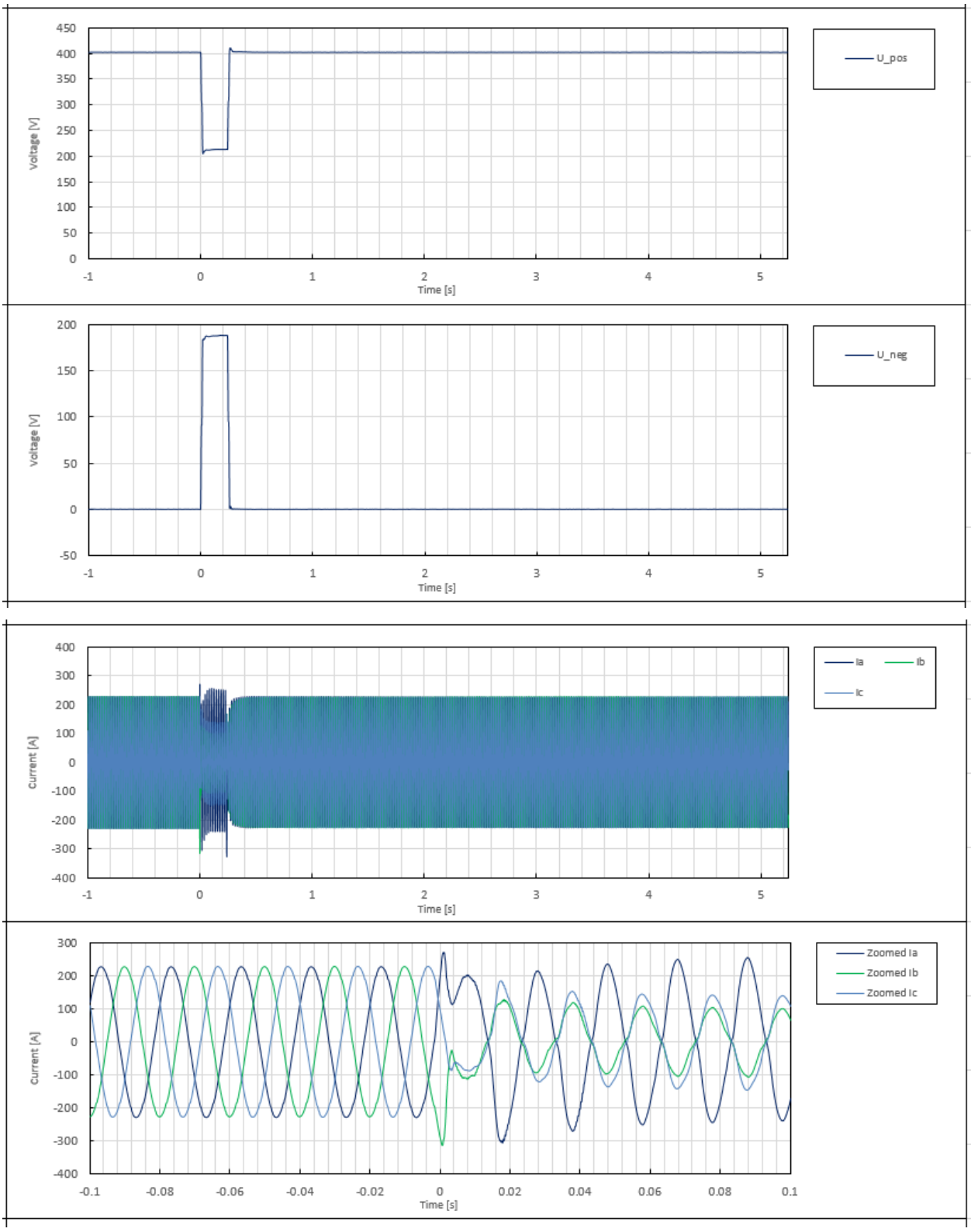
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	65		phase 3	t1+300ms	p.u.	N/A
	66		phase 1	t1+500ms	p.u.	N/A
	67		phase 2	t1+500ms	p.u.	N/A
	68		phase 3	t1+500ms	p.u.	N/A
	69		phase 1	t1+1000ms	p.u.	N/A
	70		phase 2	t1+1000ms	p.u.	N/A
	71		phase 3	t1+1000ms	p.u.	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.01
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.056

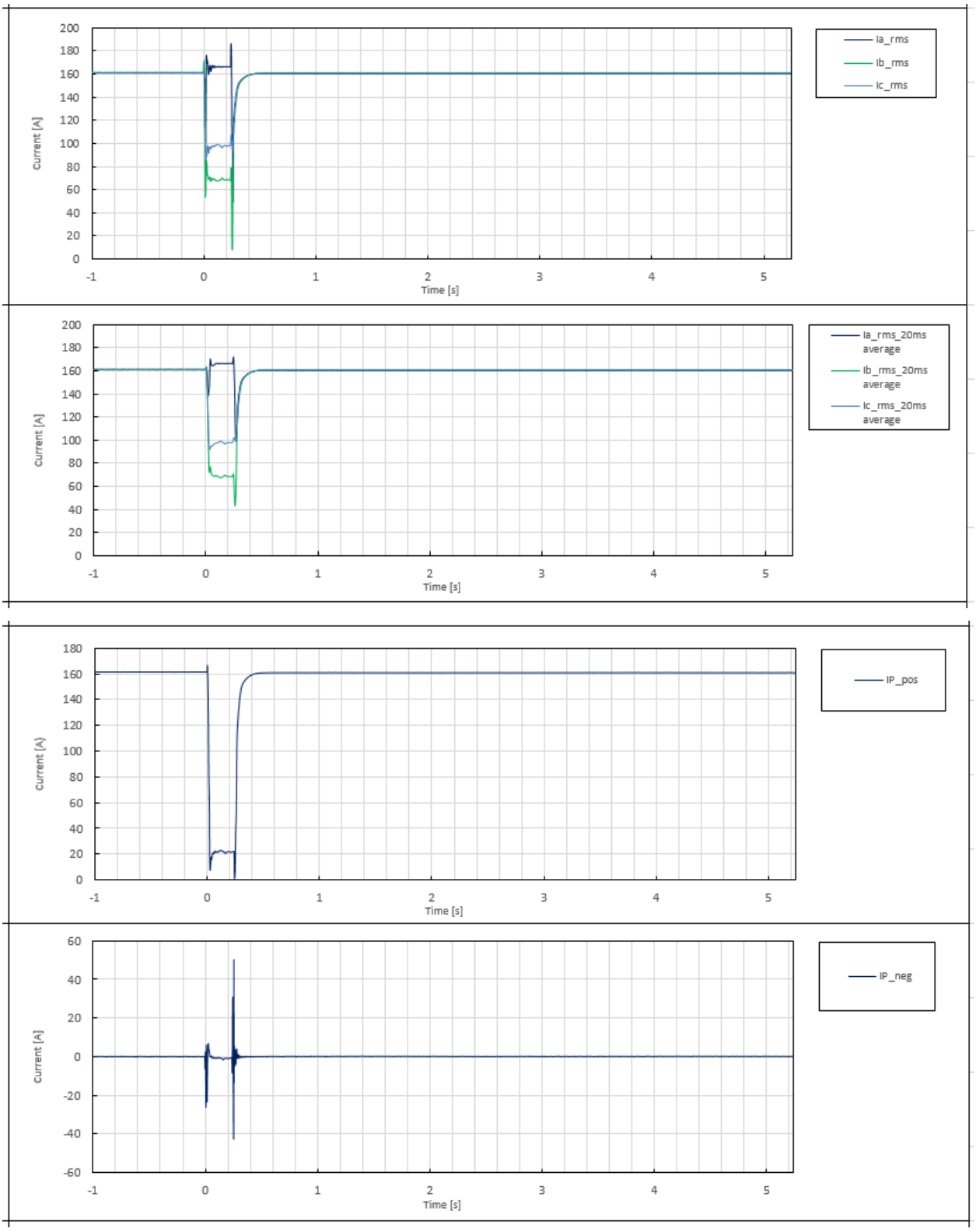
Idle result

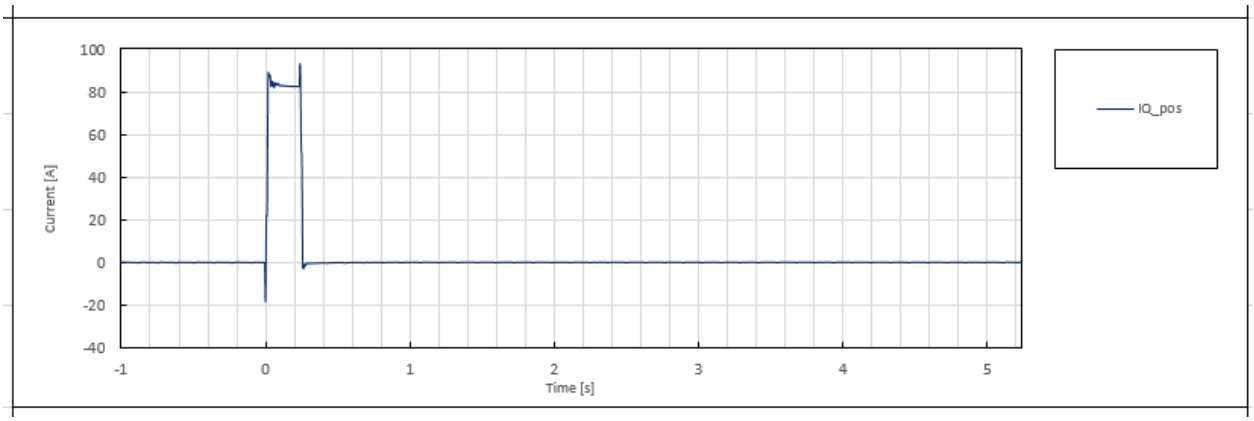

Ua
Ub
Uc
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
U_pos

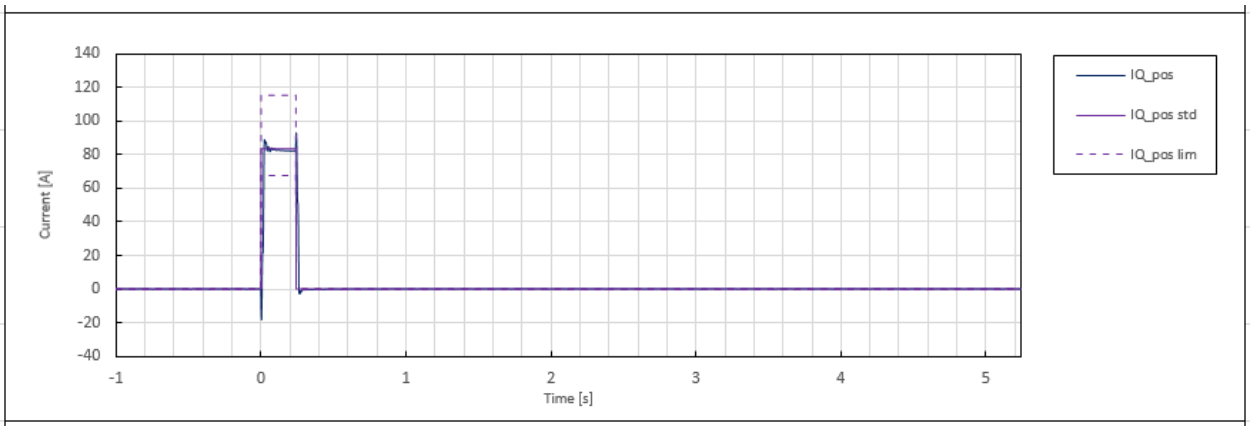
Load result

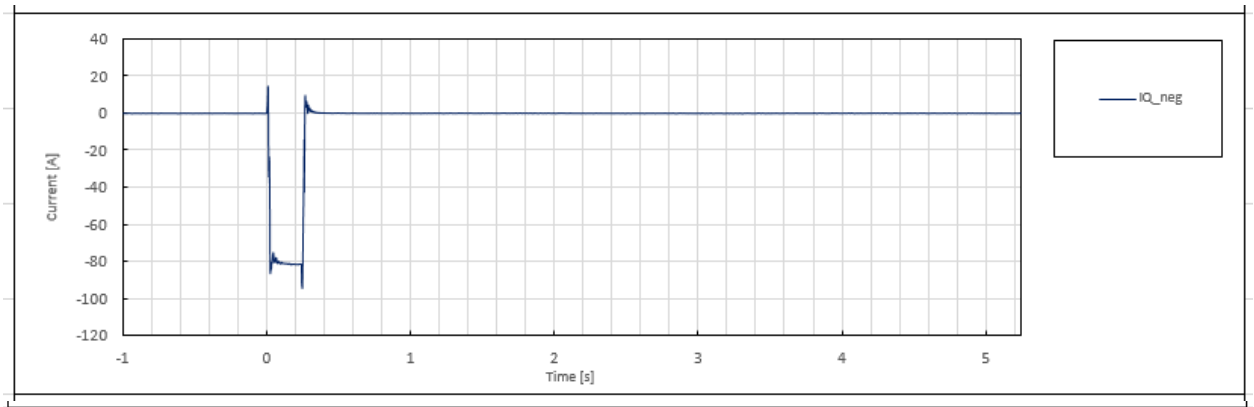

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

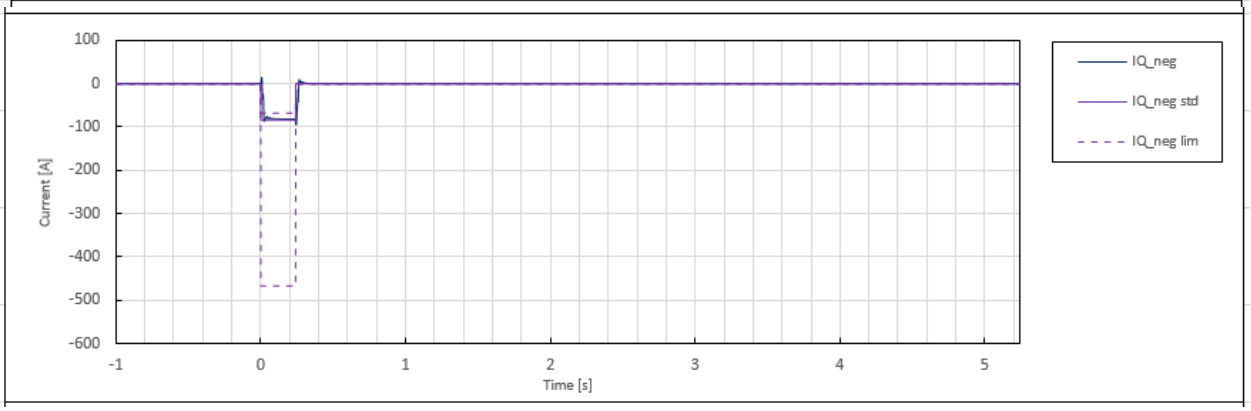

Voltage [V]
Time [s]
U_pos
Voltage [V]
Time [s]
U_neg
Current [A]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic

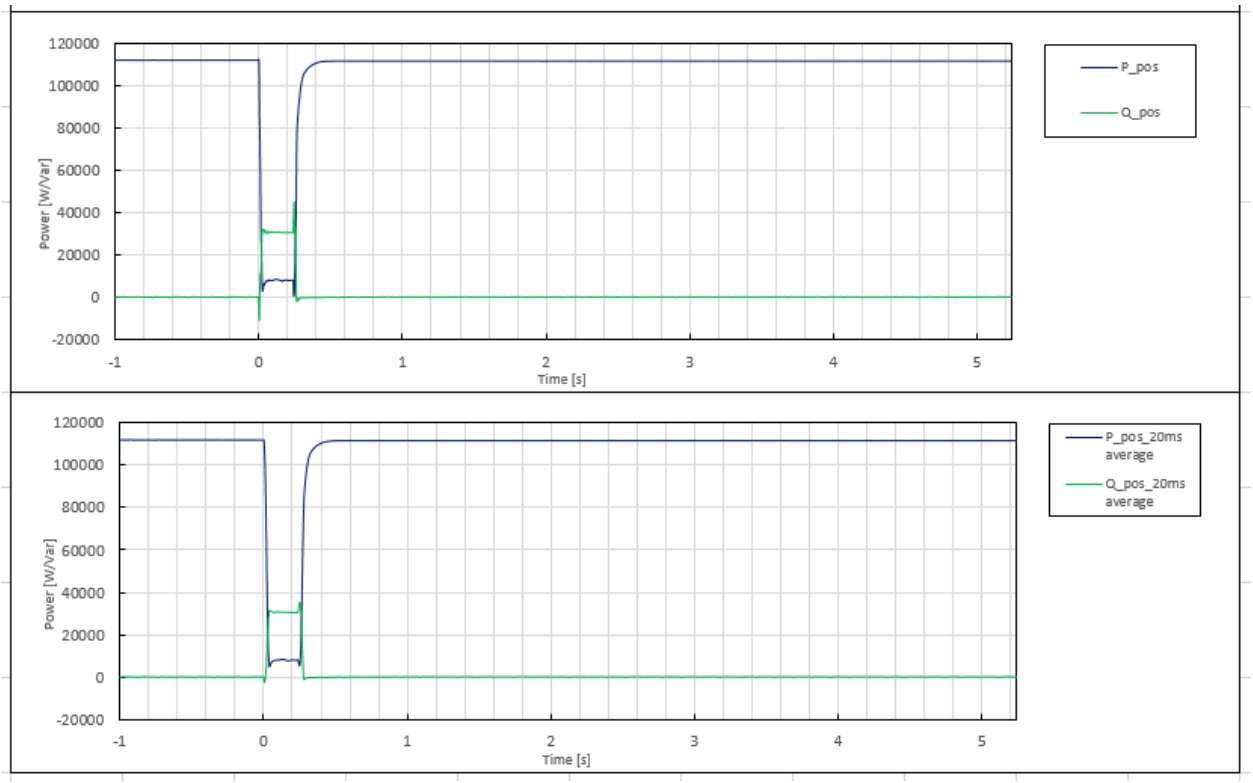

Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	0.4
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:12:46 PM
	4	Type of fault	--	--	--	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.08
	6	Drop duration setpoint	--	--	ms	240
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A

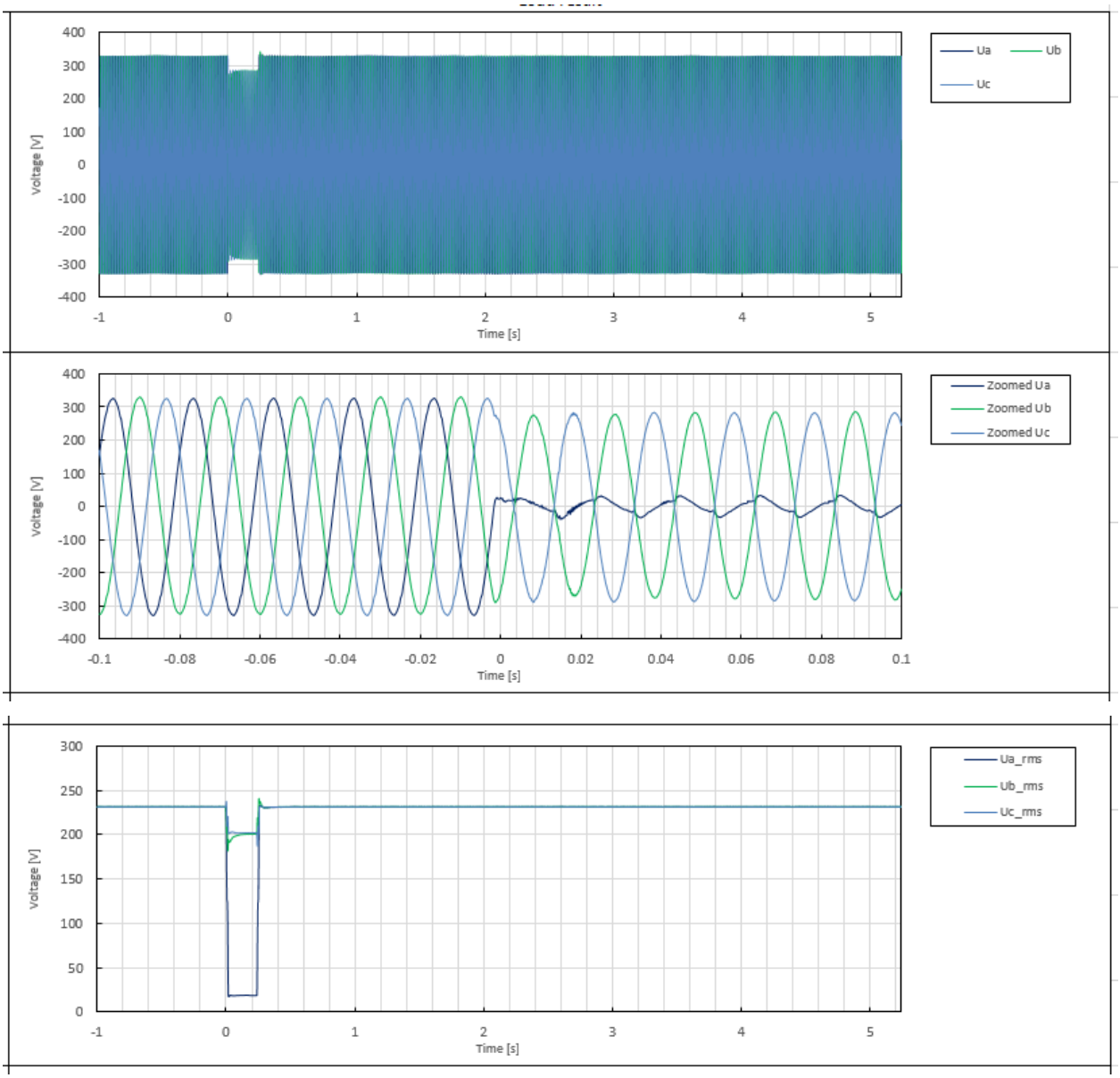
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	240
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	240
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.08
	17		pos			0.54
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00

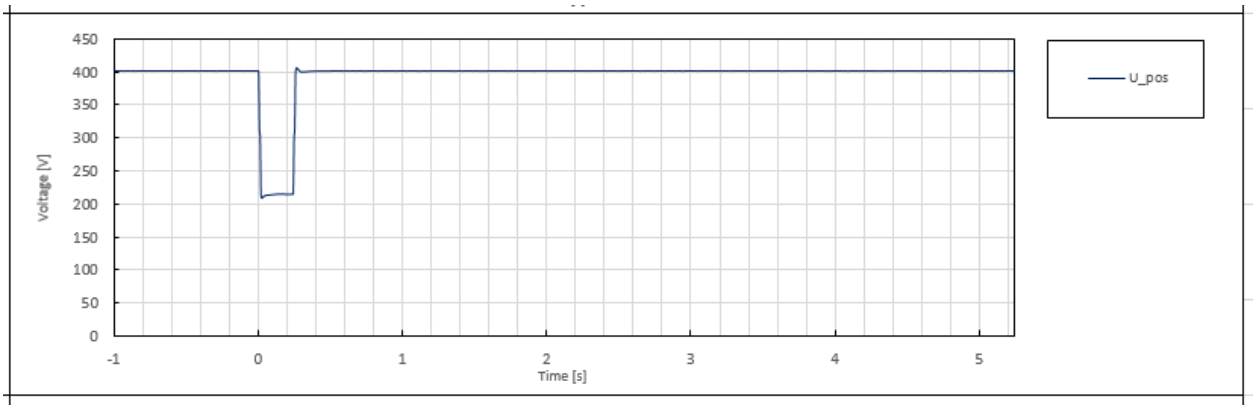
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.20
	32	Active power	total	t1-10s to t1	p.u.	0.20
	33		total	t1-2s to t1	p.u.	0.20
	34		pos	t1-500ms to t1-100ms	p.u.	0.20
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.004129918
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.09
	38		neg	--	--	1.09
	39	Reactive current settling up time	pos	--	ms	20
	40		neg	--	ms	20
	41	Reactive current settling time	pos	--	ms	20
	42		neg	--	ms	20
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.54
	44		neg	t1+100ms to t2-20ms	p.u.	0.47
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.51
	46		neg	t1+100ms to t2-20ms	p.u.	-0.52
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.53
	48		neg	t1+100ms to t2-20ms	p.u.	0.52
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.31
	50		pos	t1+100ms to t2-20ms	p.u.	0.08
	51		phase1	t1 to t1+20ms	A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	52	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase2	t1 to t1+20ms	A	N/A
	53		phase3	t1 to t1+20ms	A	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A
	55		phase 2	t1+20ms	p.u.	N/A
	56		phase 3	t1+20ms	p.u.	N/A
	57		phase 1	t1+100ms	p.u.	N/A
	58		phase 2	t1+100ms	p.u.	N/A
	59		phase 3	t1+100ms	p.u.	N/A
	60		phase 1	t1+150ms	p.u.	N/A
	61		phase 2	t1+150ms	p.u.	N/A
	62		phase 3	t1+150ms	p.u.	N/A
	63		phase 1	t1+300ms	p.u.	N/A
	64		phase 2	t1+300ms	p.u.	N/A
	65		phase 3	t1+300ms	p.u.	N/A
	66		phase 1	t1+500ms	p.u.	N/A
	67		phase 2	t1+500ms	p.u.	N/A
	68		phase 3	t1+500ms	p.u.	N/A
	69		phase 1	t1+1000ms	p.u.	N/A
	70		phase 2	t1+1000ms	p.u.	N/A
	71		phase 3	t1+1000ms	p.u.	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A

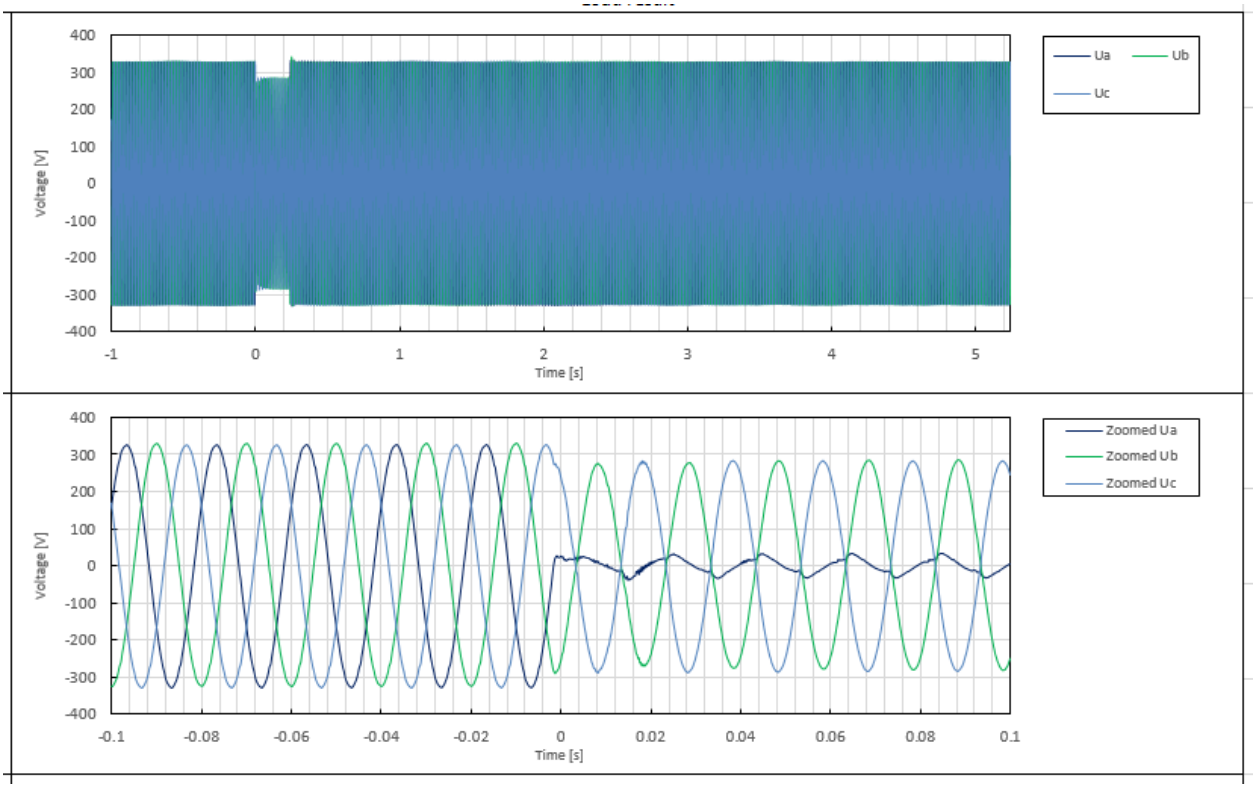
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	74	Active current rise time	pos	--	s	0.022

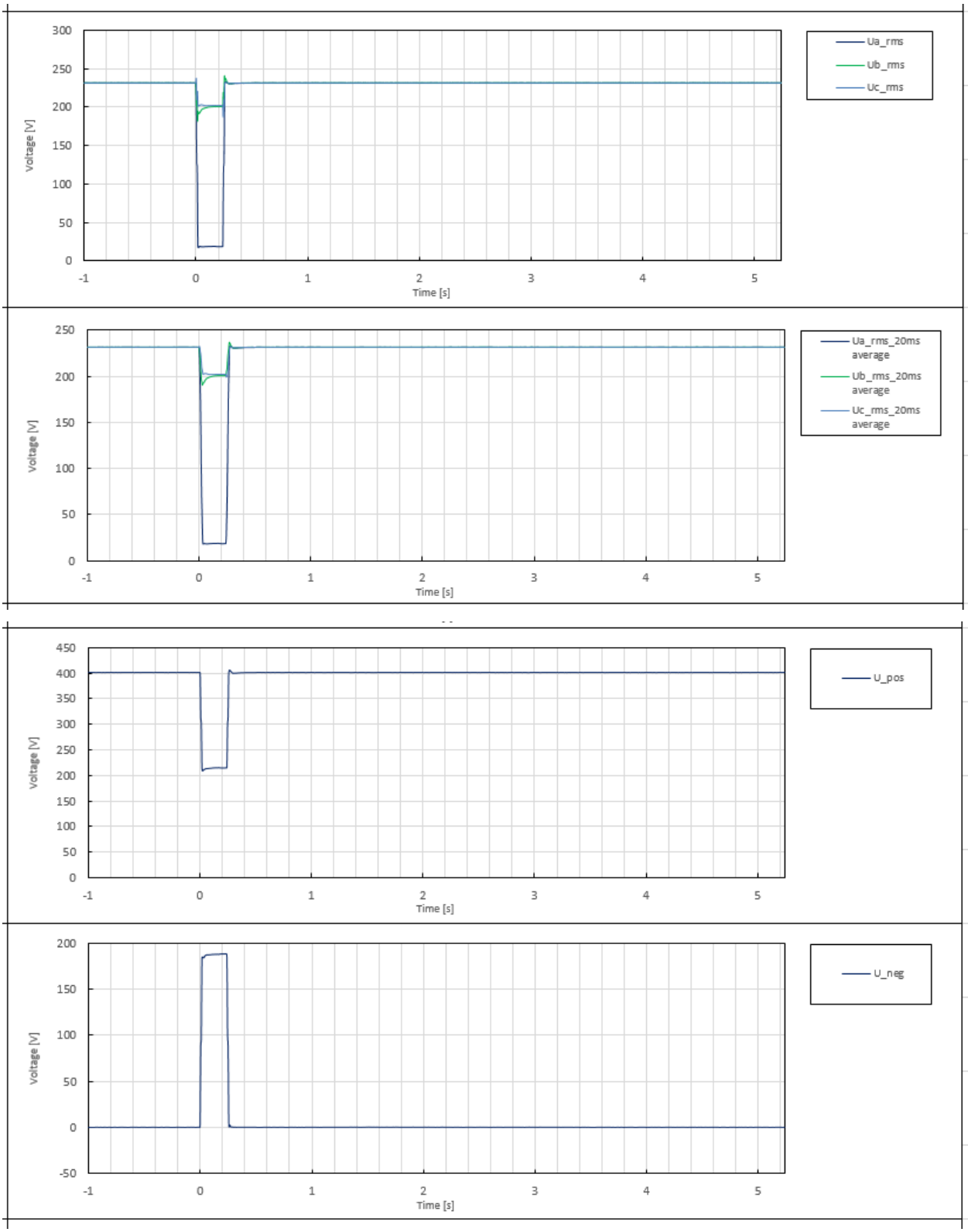
Idle result

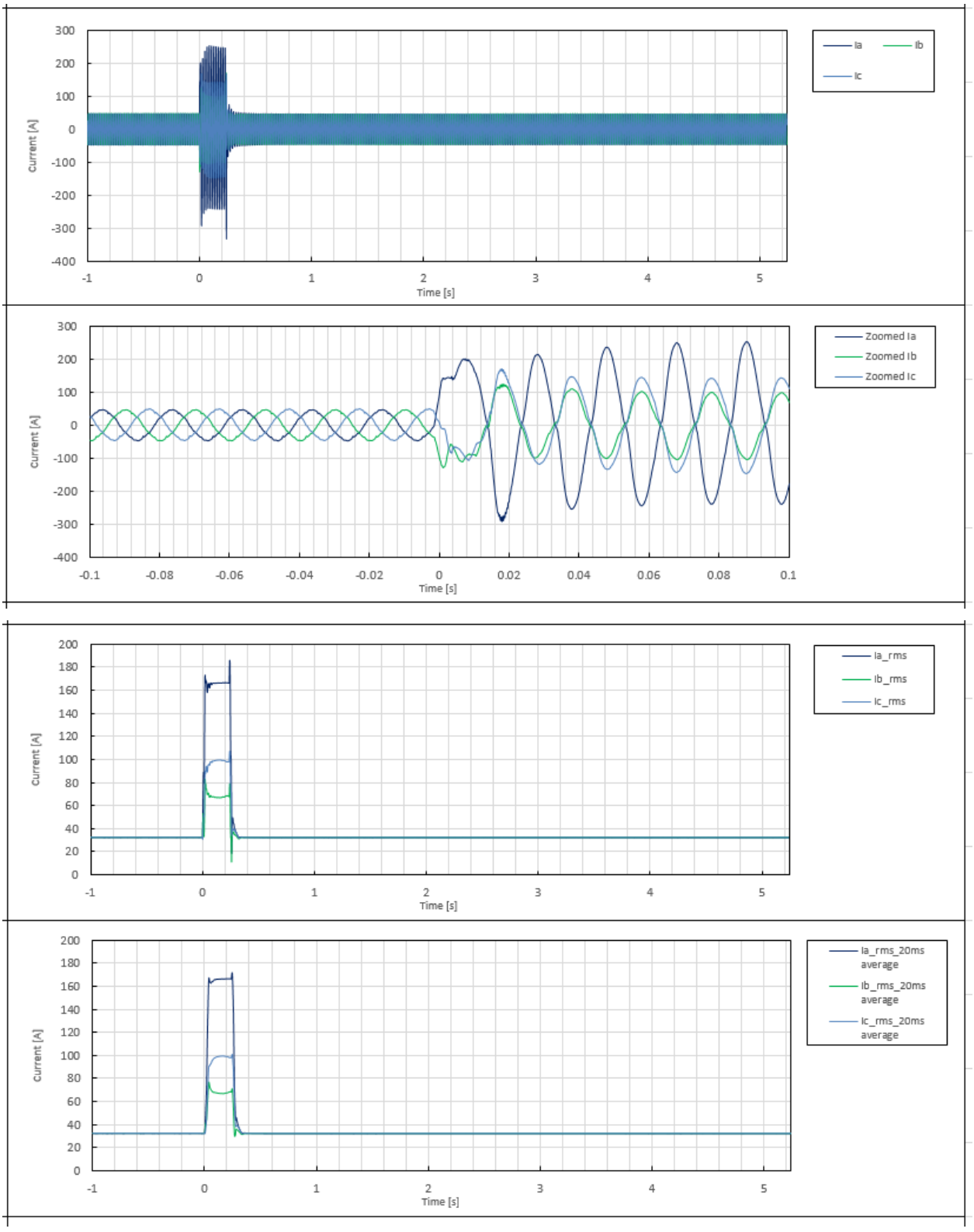


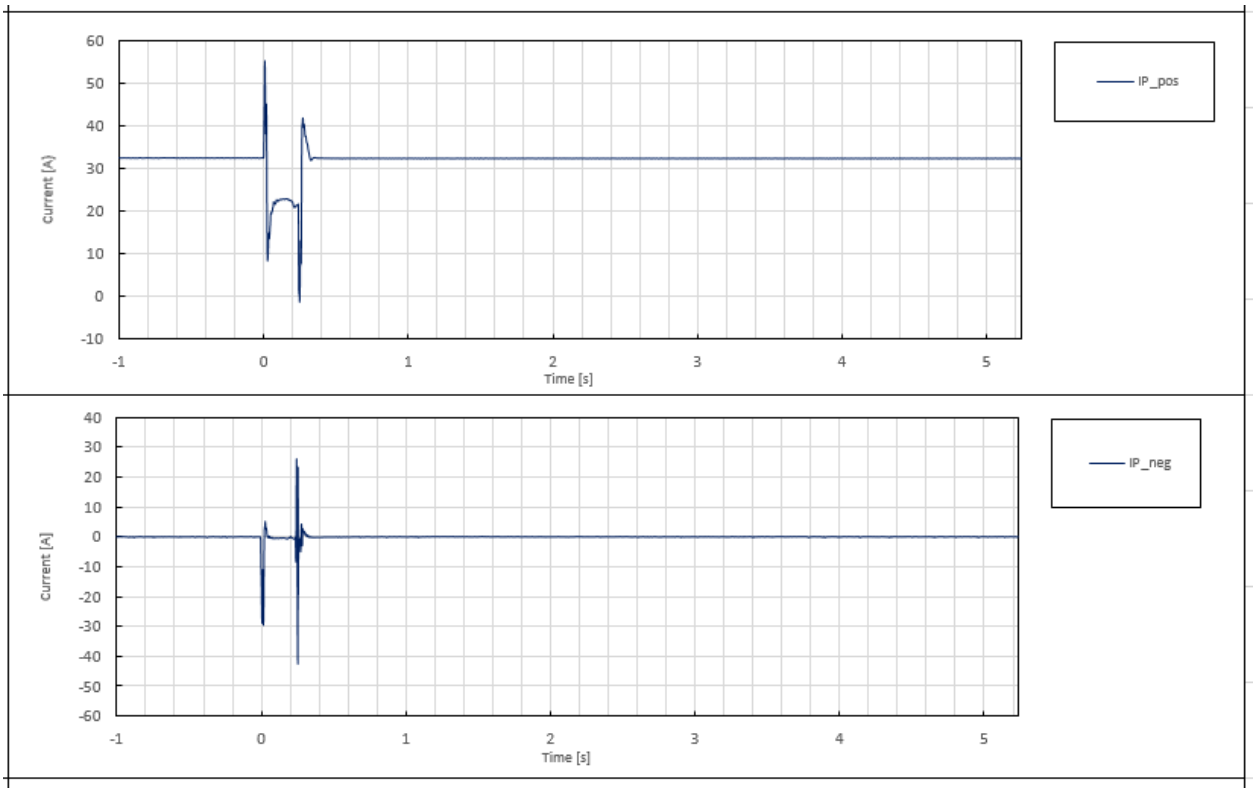

U_pos
Voltage [V]
Time [s]

Load result

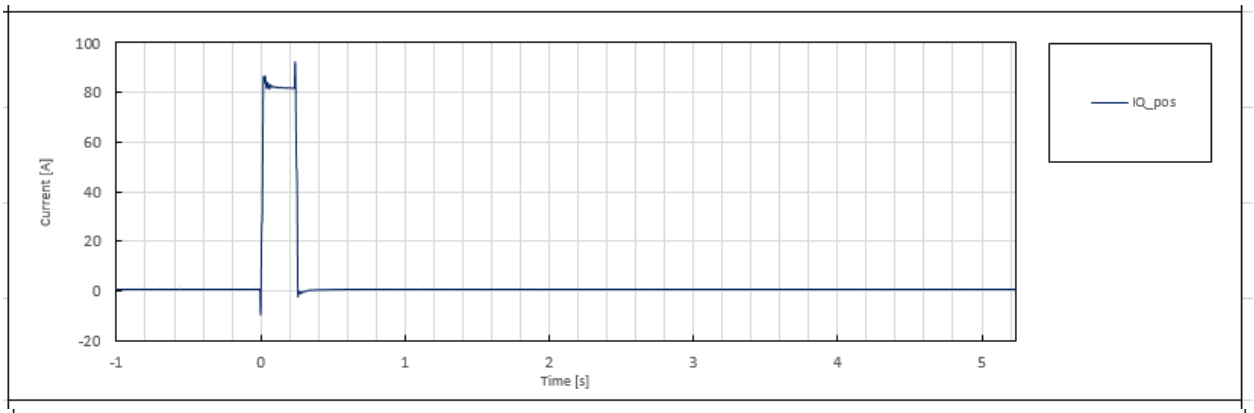

Ua
Ub
Uc
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc
Voltage [V]
Time [s]

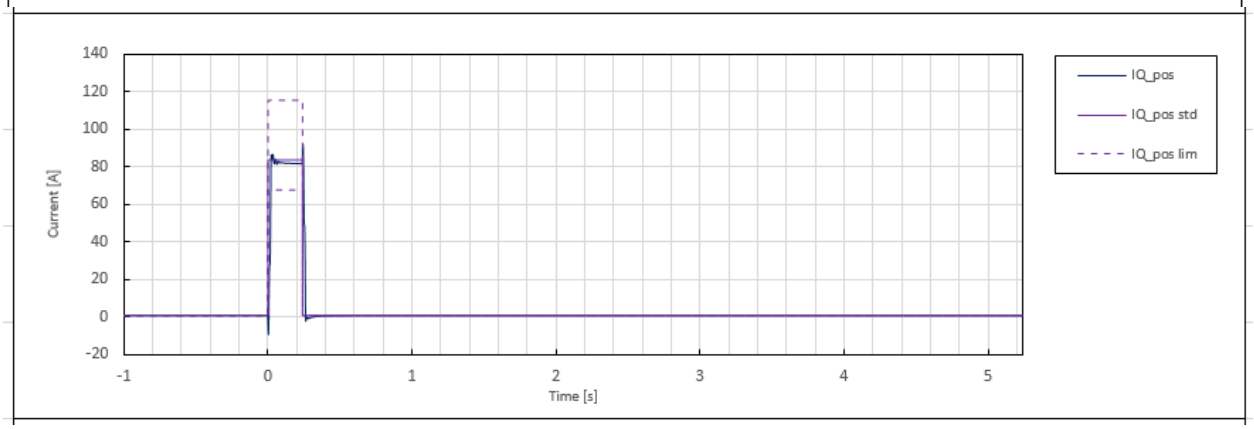

Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average
U_pos
U_neg

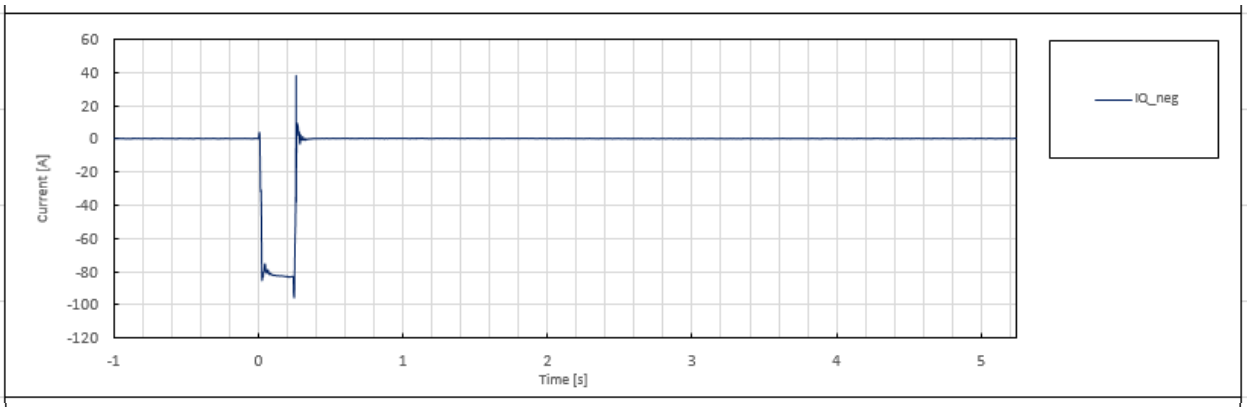

Current [A]
Time [s]
Ia
Ib
Ic
Zoomed Ia
Zoomed Ib
Zoomed Ic
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

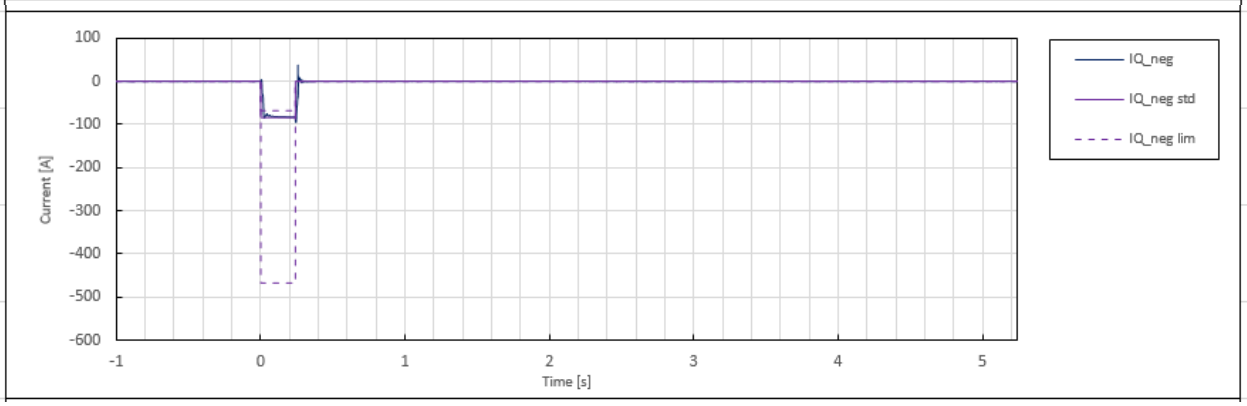

Current [A]
Time [s]
IP_pos

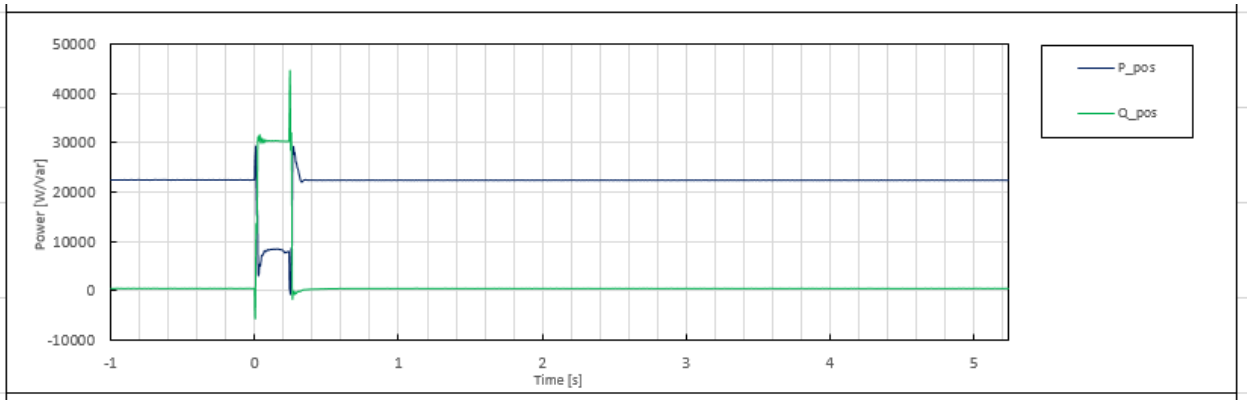
Current [A]
Time [s]
IP_neg

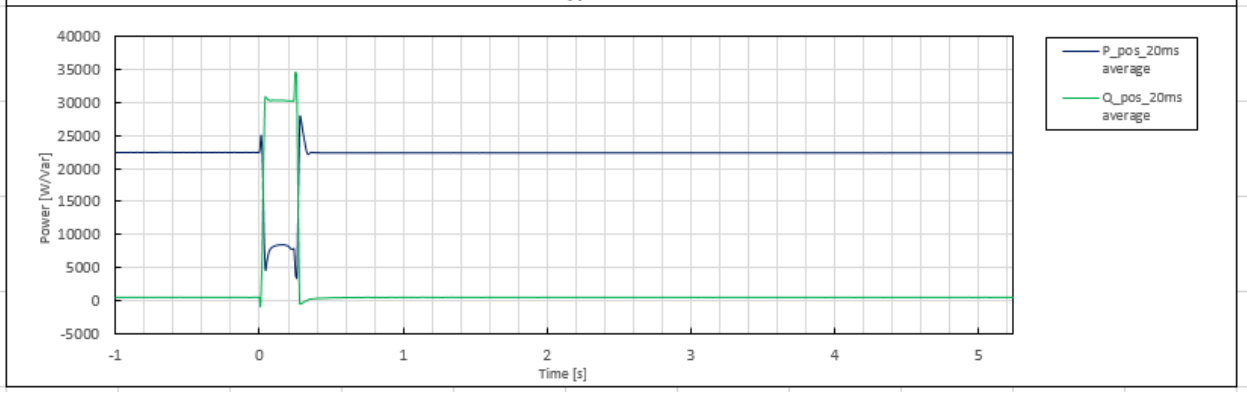

Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


Power [W/Var]
Time [s]
P_pos
Q_pos


Power [W/Var]
Time [s]
P_pos_20ms average
Q_pos_20ms average

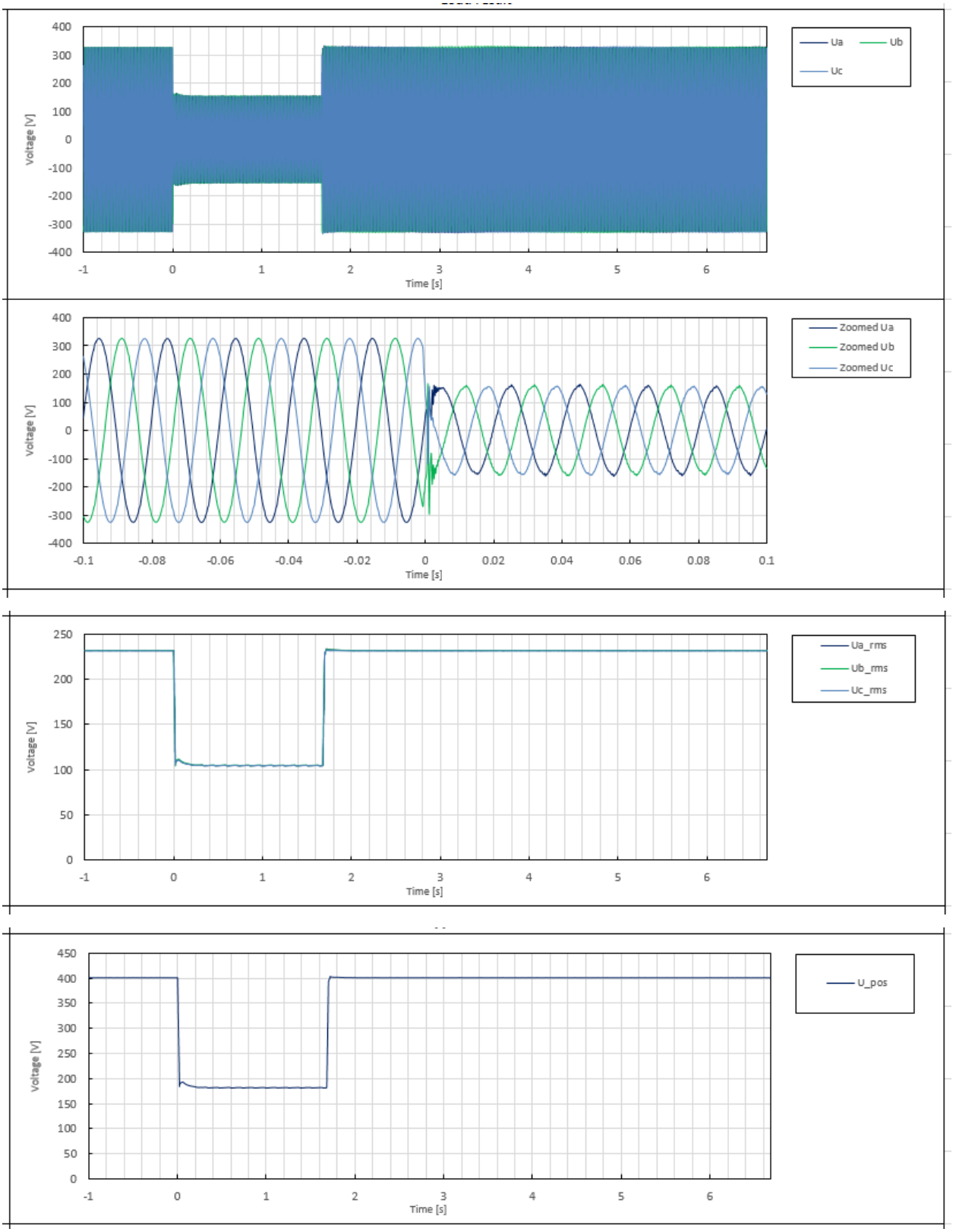
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	50.1
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:50:53 PM
	4	Type of fault	--	--	--	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.46
	6	Drop duration setpoint	--	--	ms	1680
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	1680
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	1680
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.46
	17		pos			0.46
Bef	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.01
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.01
	32	Active power	total	t1-10s to t1	p.u.	1.02
	33		total	t1-2s to t1	p.u.	1.02
	34		pos	t1-500ms to t1-100ms	p.u.	1.02
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.000201753
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.78
	38		neg	--	--	N/A
	39	Reactive current settling up time	pos	--	ms	22
	40		neg	--	ms	N/A
	41		pos	--	ms	22

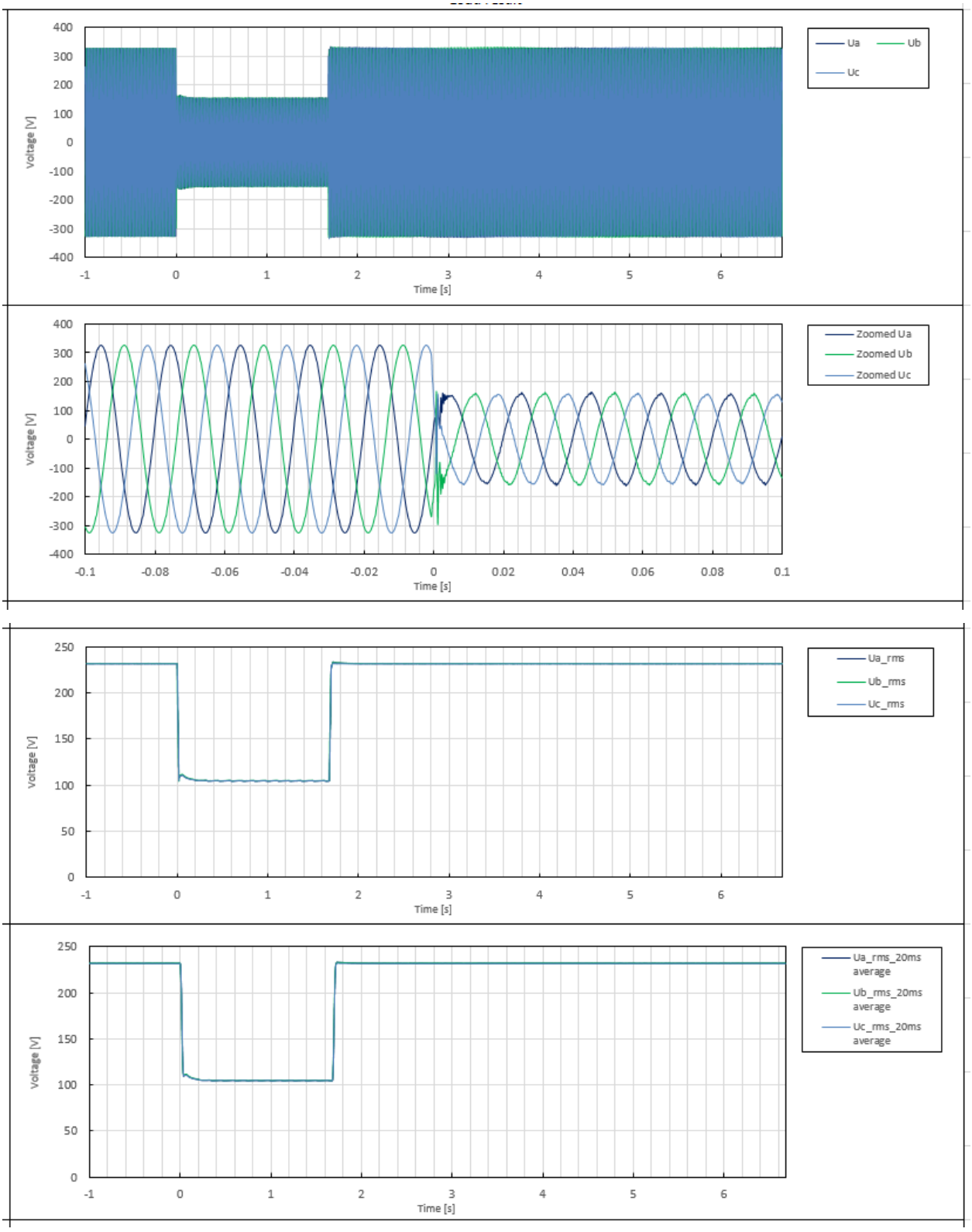
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	42	Reactive current settling time	neg	--	ms	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.46
	44		neg	t1+100ms to t2-20ms	p.u.	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.98
	46		neg	t1+100ms to t2-20ms	p.u.	-0.04
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.99
	48		neg	t1+100ms to t2-20ms	p.u.	0.05
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.07
	50		pos	t1+100ms to t2-20ms	p.u.	0.07
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	239.55
	52		phase2	t1 to t1+20ms	A	374.30
	53		phase3	t1 to t1+20ms	A	310.03
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.87
	55		phase 2	t1+20ms	p.u.	0.96
	56		phase 3	t1+20ms	p.u.	0.66
	57		phase 1	t1+100ms	p.u.	0.97
	58		phase 2	t1+100ms	p.u.	1.05
	59		phase 3	t1+100ms	p.u.	0.97
	60		phase 1	t1+150ms	p.u.	0.97
	61		phase 2	t1+150ms	p.u.	0.97
	62		phase 3	t1+150ms	p.u.	0.97
	63		phase 1	t1+300ms	p.u.	0.97
	64		phase 2	t1+300ms	p.u.	0.97

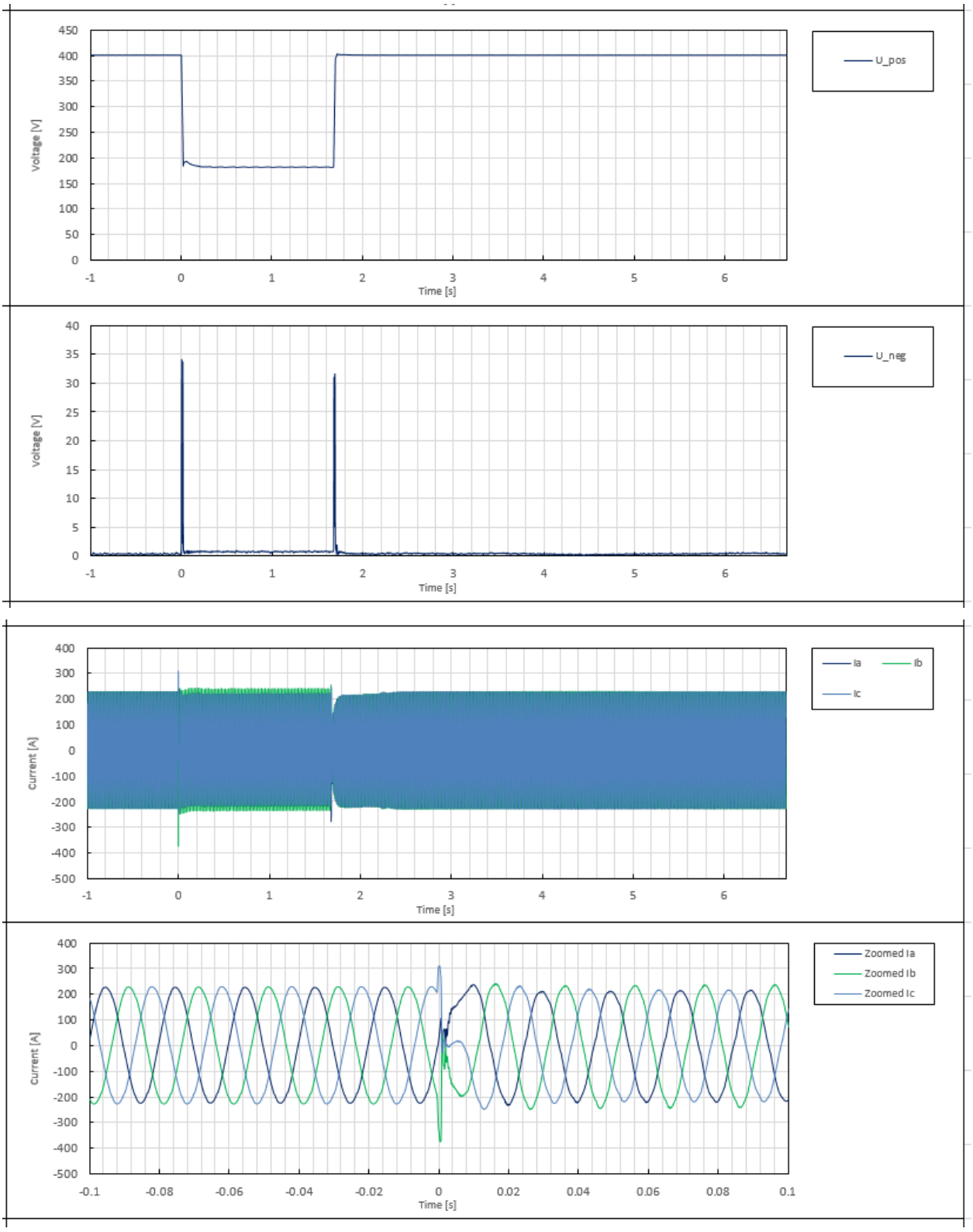
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	65		phase 3	t1+300ms	p.u.	0.97
	66		phase 1	t1+500ms	p.u.	0.97
	67		phase 2	t1+500ms	p.u.	0.97
	68		phase 3	t1+500ms	p.u.	0.97
	69		phase 1	t1+1000ms	p.u.	0.97
	70		phase 2	t1+1000ms	p.u.	0.97
	71		phase 3	t1+1000ms	p.u.	0.97
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.02
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.079

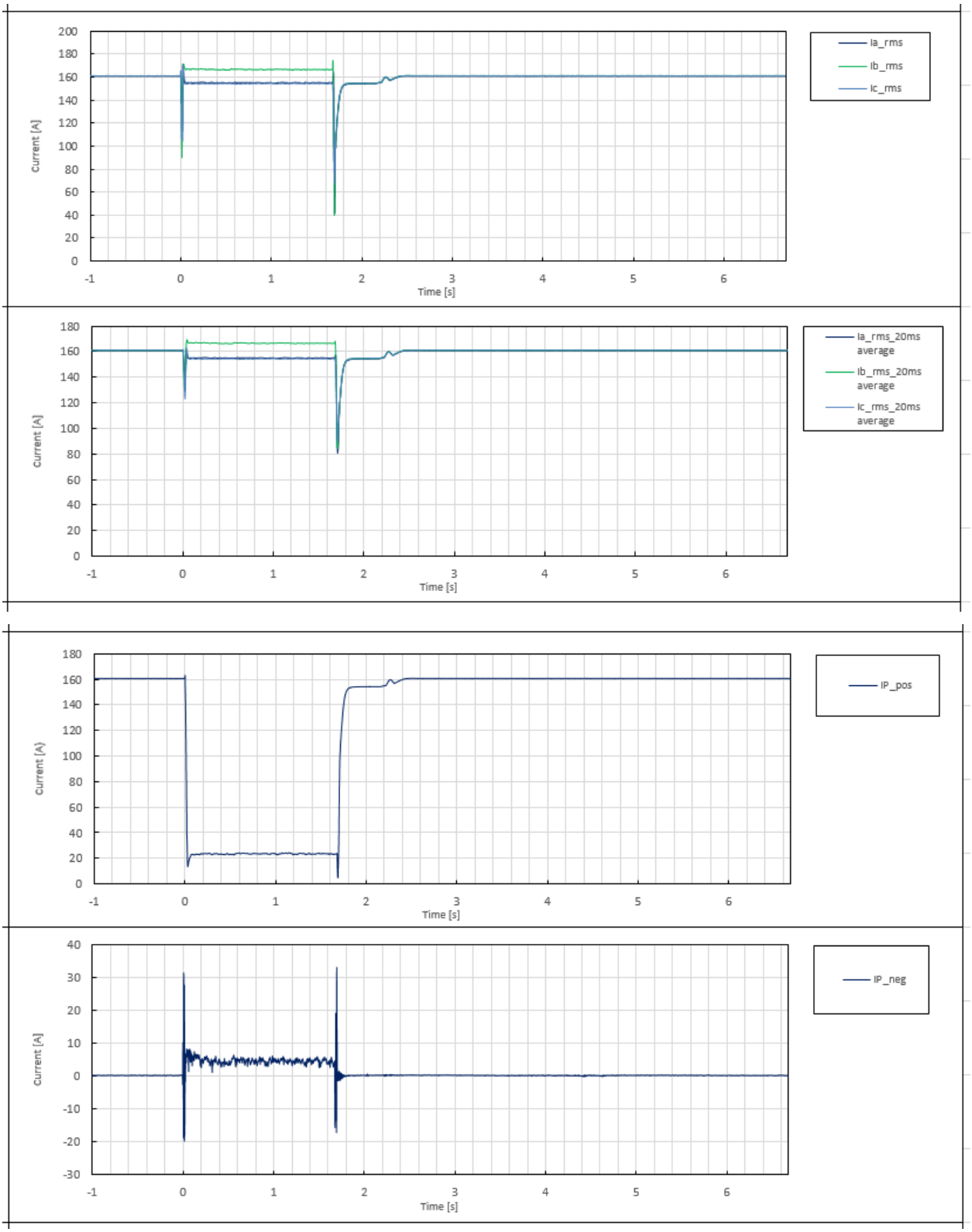
Idle result

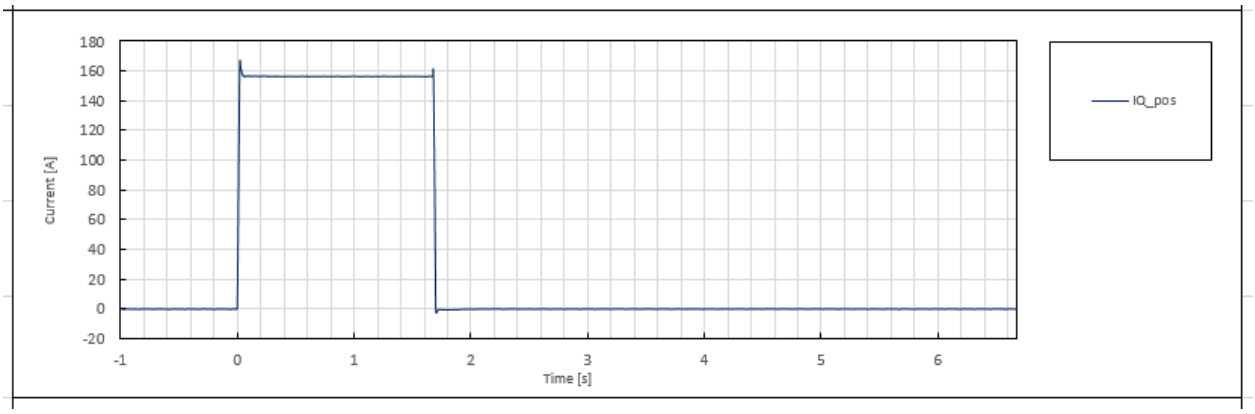

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
U_pos

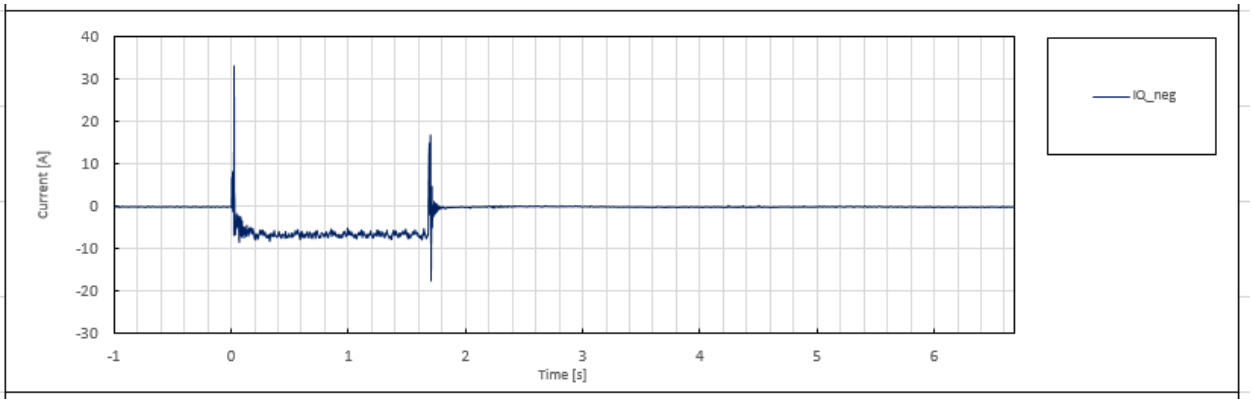
Load result

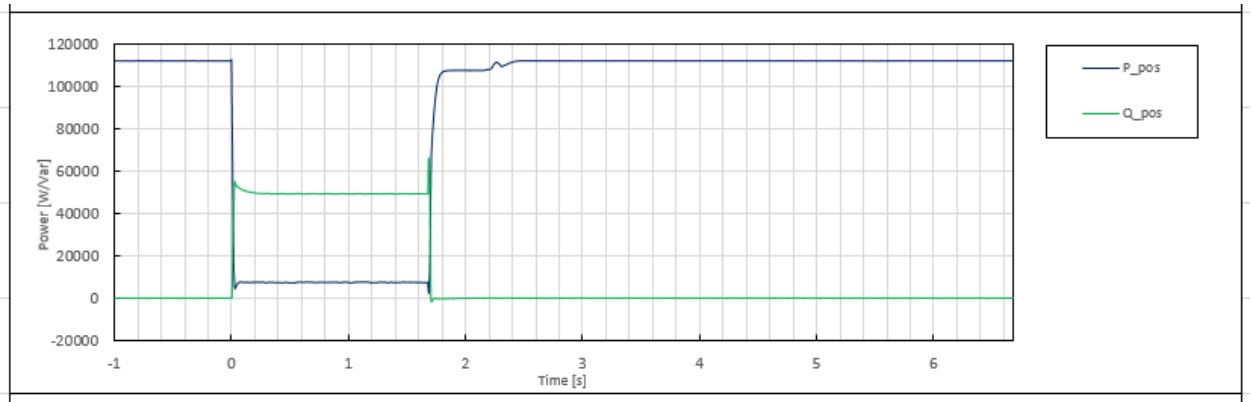

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

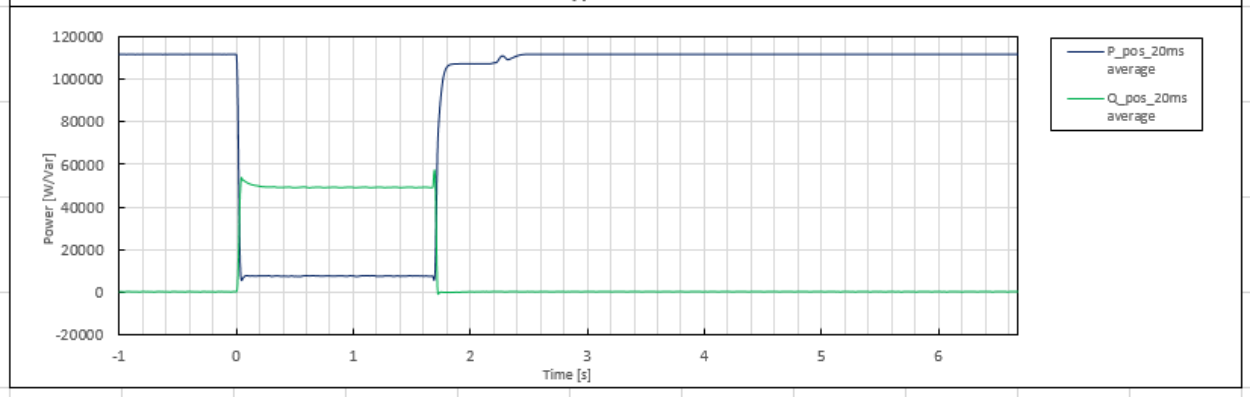

Voltage [V]
Time [s]
U_pos
Voltage [V]
Time [s]
U_neg
Current [A]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic


Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_neg


Power [W/Var]
Time [s]
P_pos
Q_pos


Power [W/Var]
Time [s]
P_pos_20ms average
Q_pos_20ms average

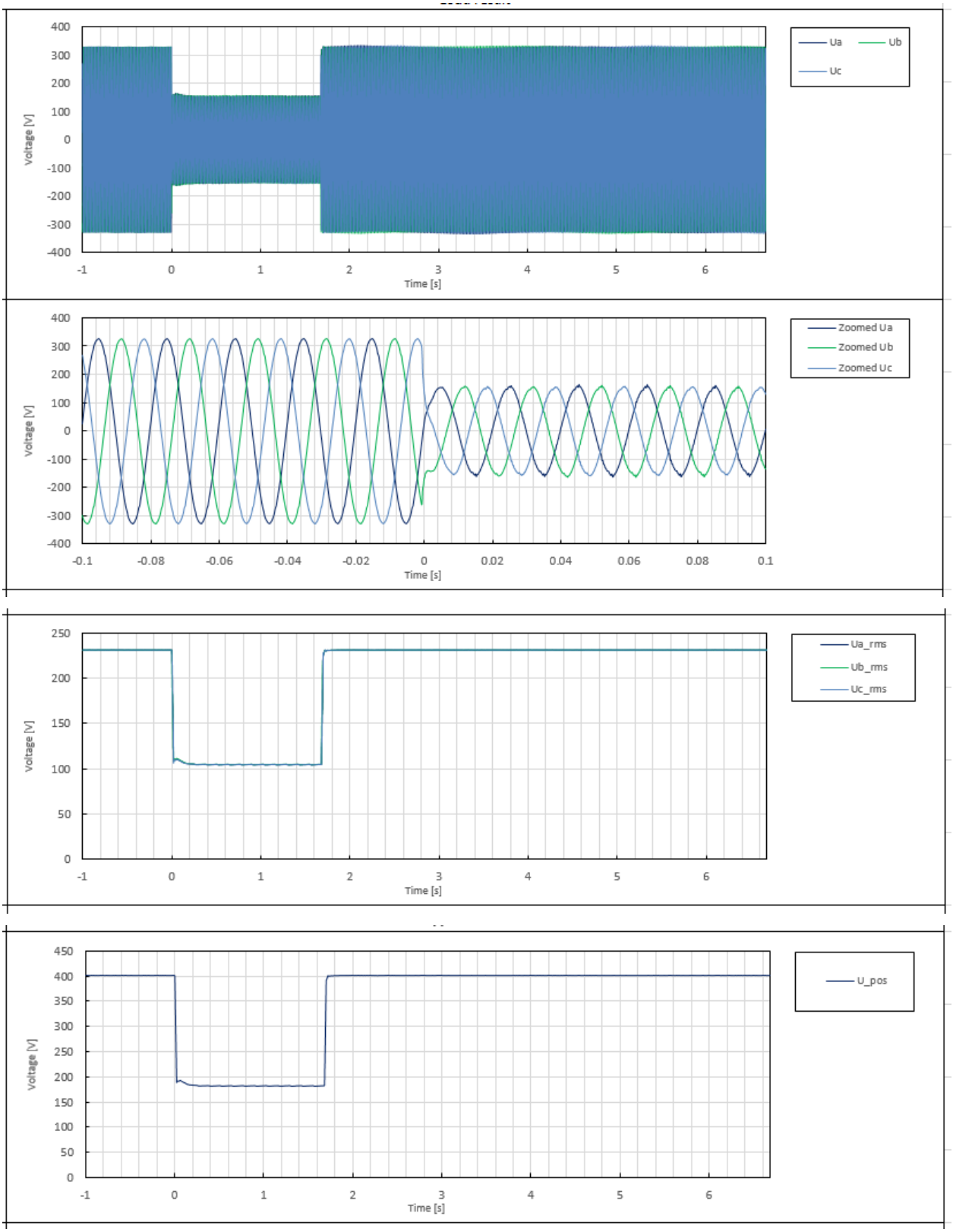
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	50.2
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:52:56 PM
	4	Type of fault	--	--	--	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.46
	6	Drop duration setpoint	--	--	ms	1680
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	1680
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	1680
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.46
	17		pos			0.46
Bef	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.20
	32	Active power	total	t1-10s to t1	p.u.	0.20
	33		total	t1-2s to t1	p.u.	0.20
	34		pos	t1-500ms to t1-100ms	p.u.	0.20
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00383437
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.78
	38		neg	--	--	N/A
	39	Reactive current settling up time	pos	--	ms	22
	40		neg	--	ms	N/A
	41		pos	--	ms	22

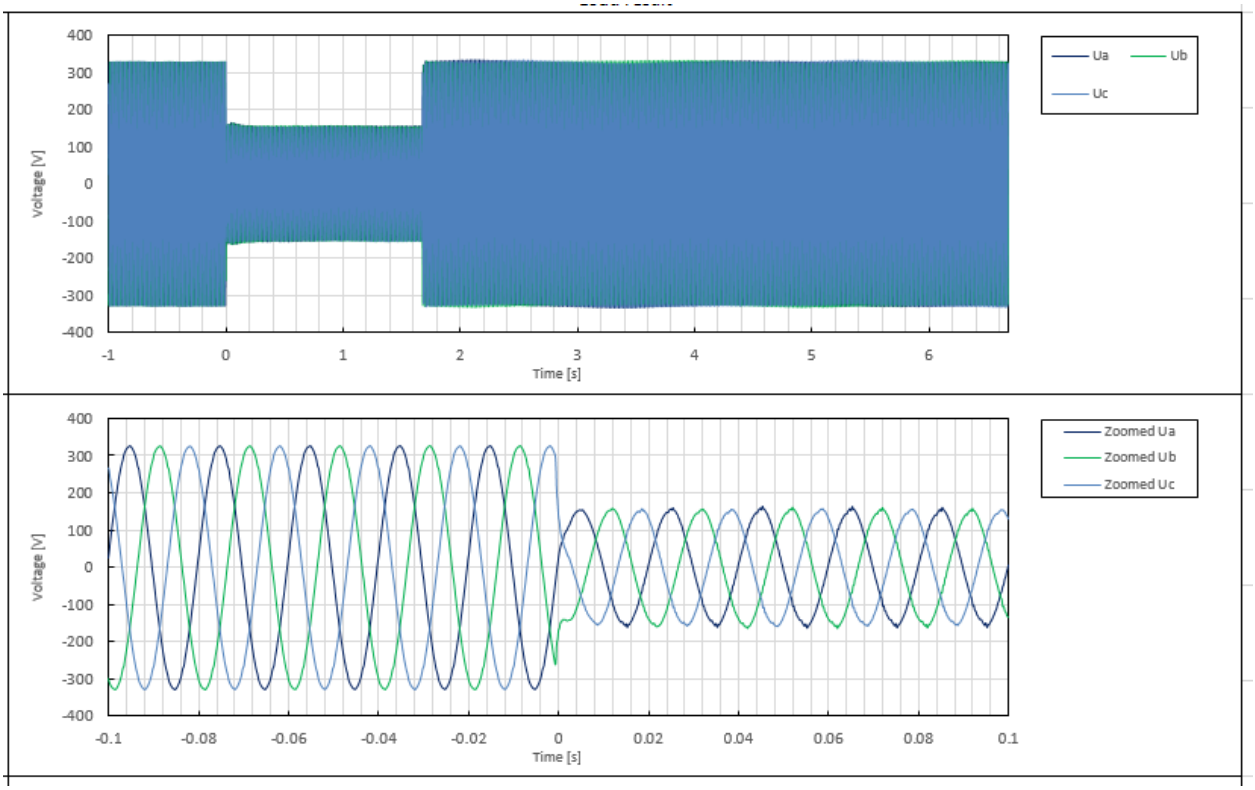
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	42	Reactive current settling time	neg	--	ms	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.46
	44		neg	t1+100ms to t2-20ms	p.u.	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.99
	46		neg	t1+100ms to t2-20ms	p.u.	-0.04
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.00
	48		neg	t1+100ms to t2-20ms	p.u.	0.05
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.07
	50		pos	t1+100ms to t2-20ms	p.u.	0.07
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	229.31
	52		phase2	t1 to t1+20ms	A	242.37
	53		phase3	t1 to t1+20ms	A	228.16
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.79
	55		phase 2	t1+20ms	p.u.	0.95
	56		phase 3	t1+20ms	p.u.	0.56
	57		phase 1	t1+100ms	p.u.	0.98
	58		phase 2	t1+100ms	p.u.	1.05
	59		phase 3	t1+100ms	p.u.	0.97
	60		phase 1	t1+150ms	p.u.	0.98
	61		phase 2	t1+150ms	p.u.	0.98
	62		phase 3	t1+150ms	p.u.	0.98
	63		phase 1	t1+300ms	p.u.	0.98
	64		phase 2	t1+300ms	p.u.	0.98

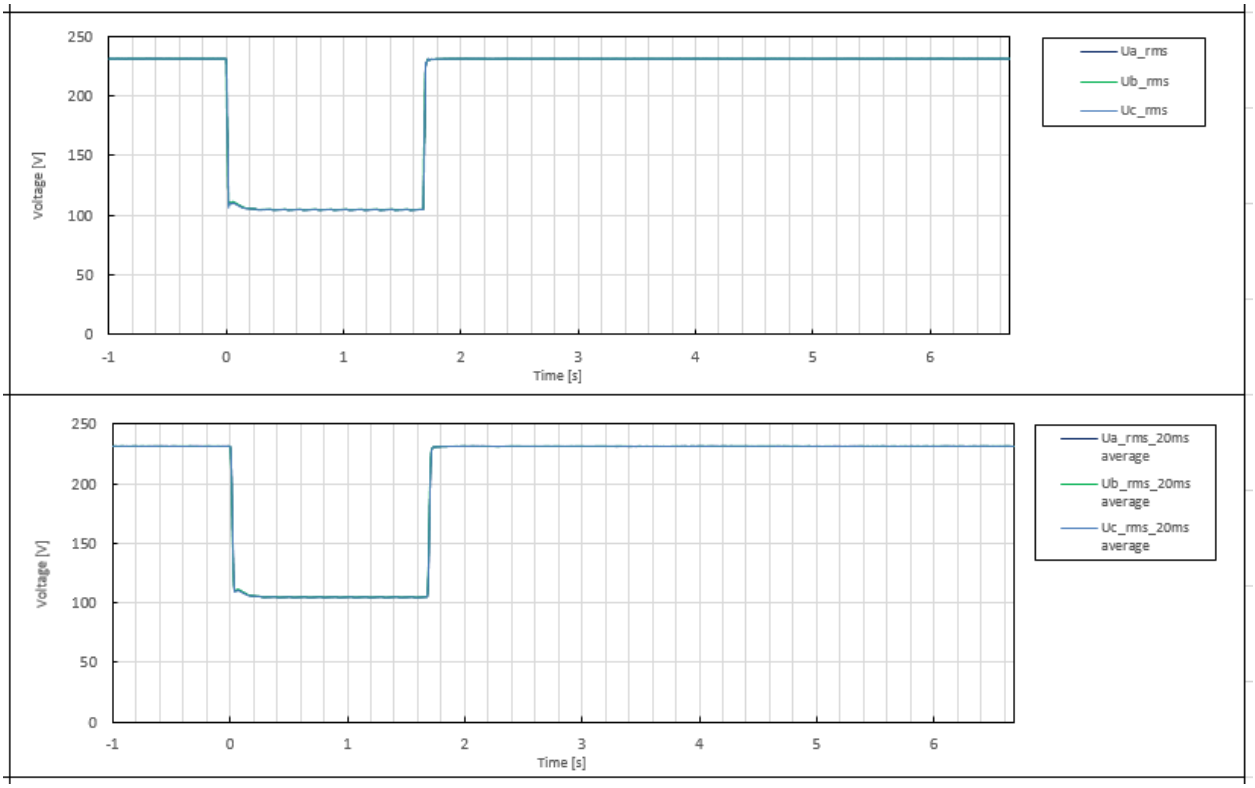
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	65		phase 3	t1+300ms	p.u.	0.98
	66		phase 1	t1+500ms	p.u.	0.97
	67		phase 2	t1+500ms	p.u.	0.97
	68		phase 3	t1+500ms	p.u.	0.97
	69		phase 1	t1+1000ms	p.u.	0.98
	70		phase 2	t1+1000ms	p.u.	0.98
	71		phase 3	t1+1000ms	p.u.	0.98
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.052

Idle result

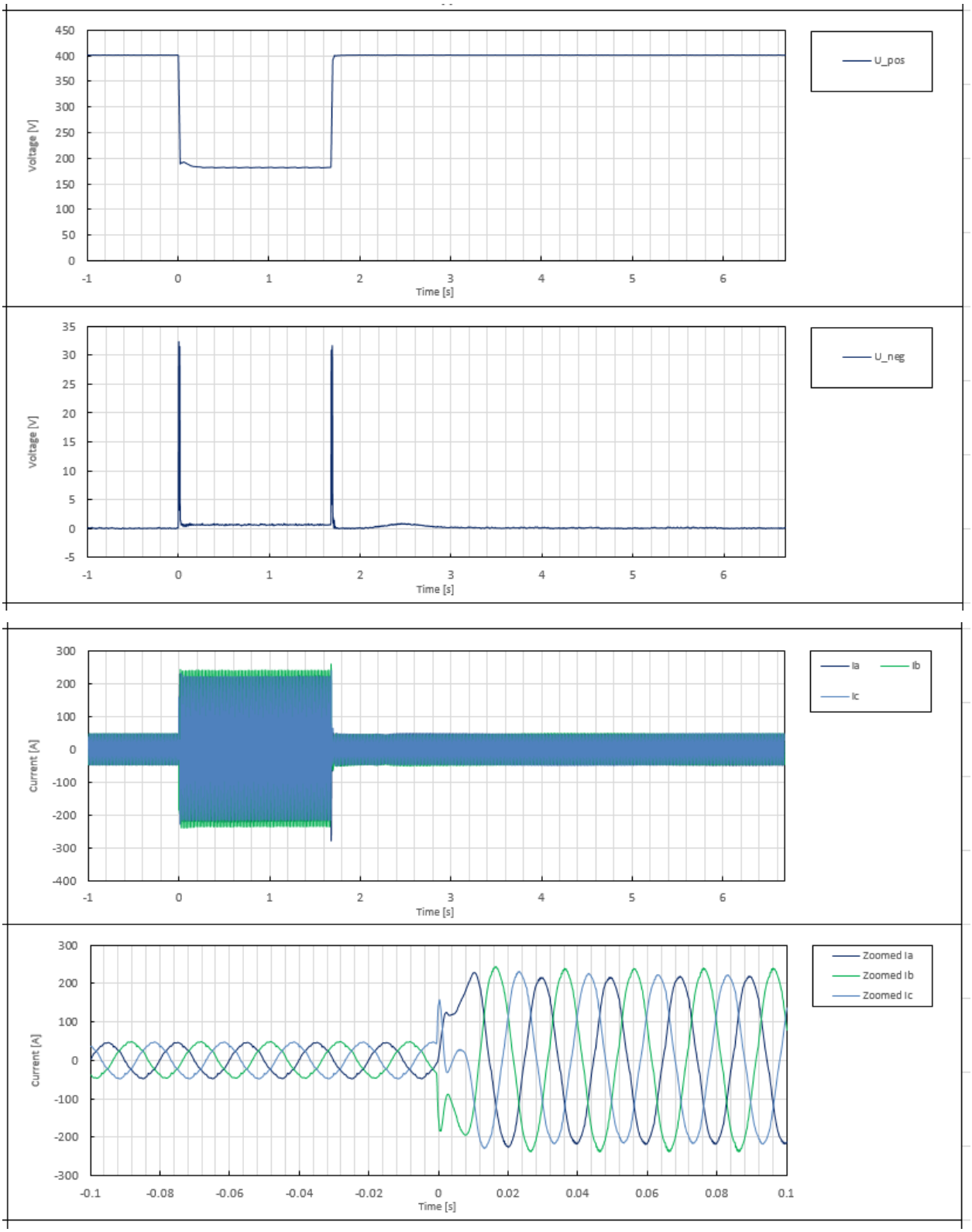

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
U_pos

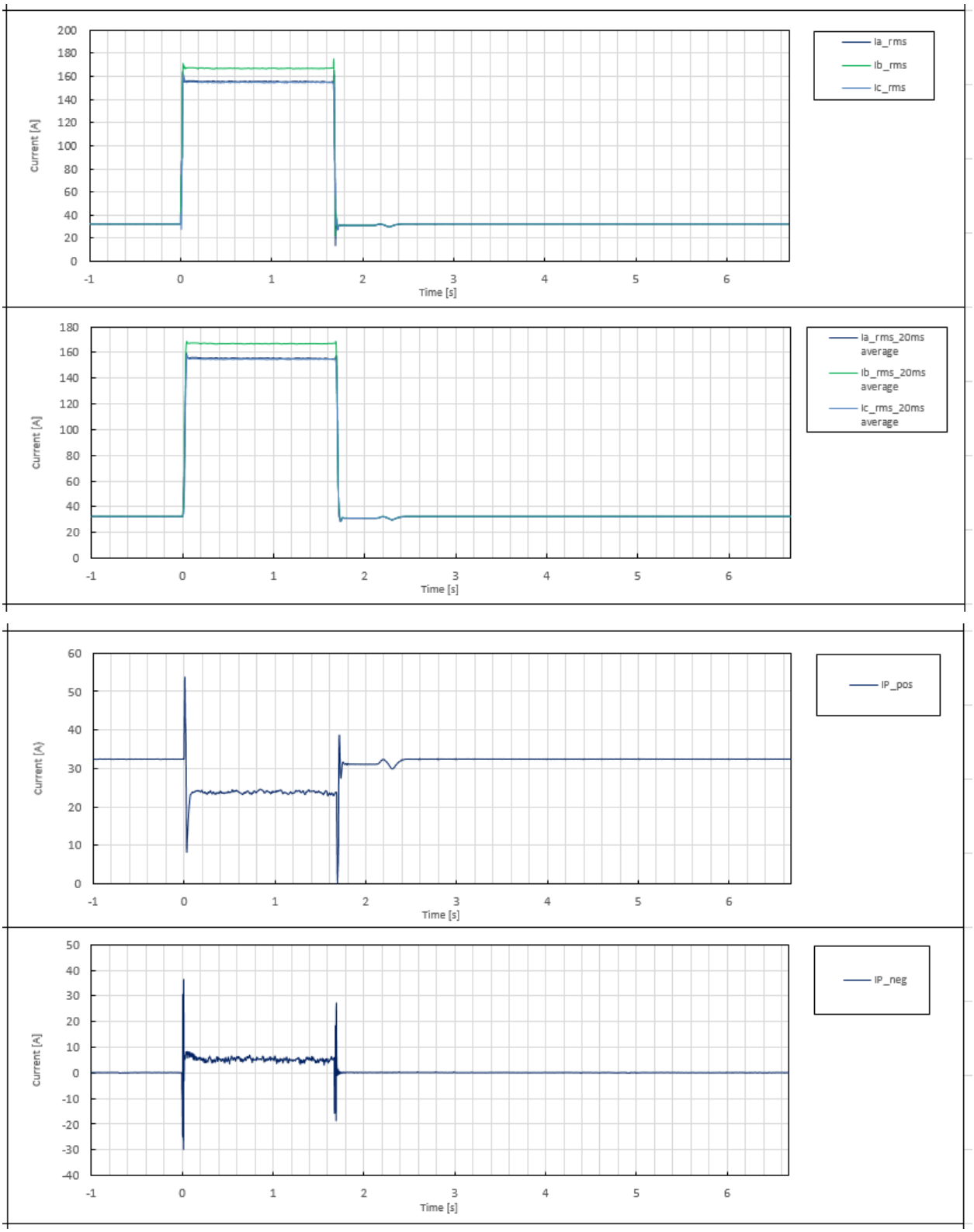
Load result

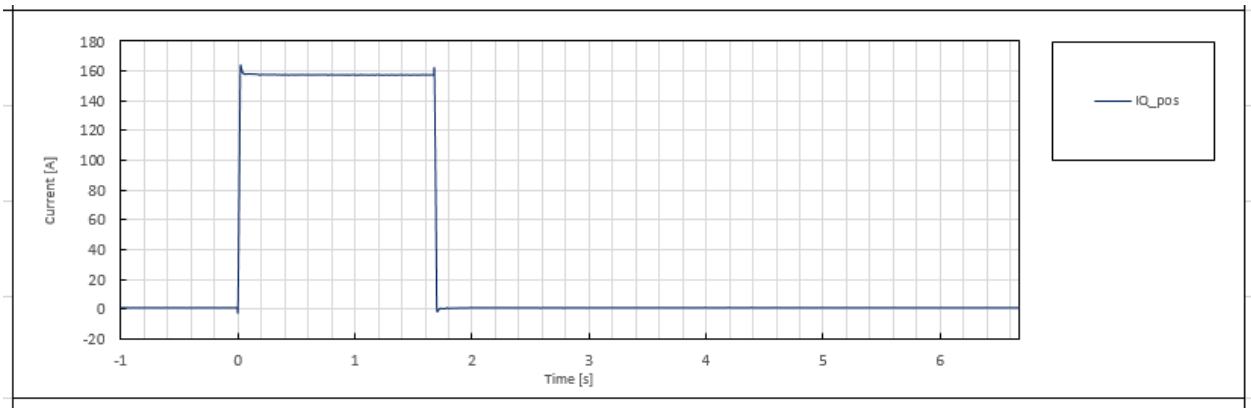

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc

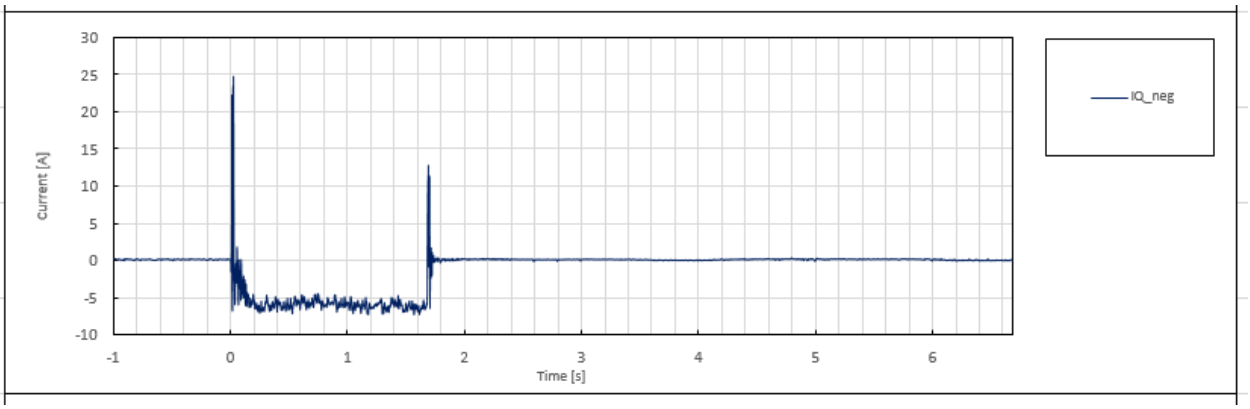

Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms

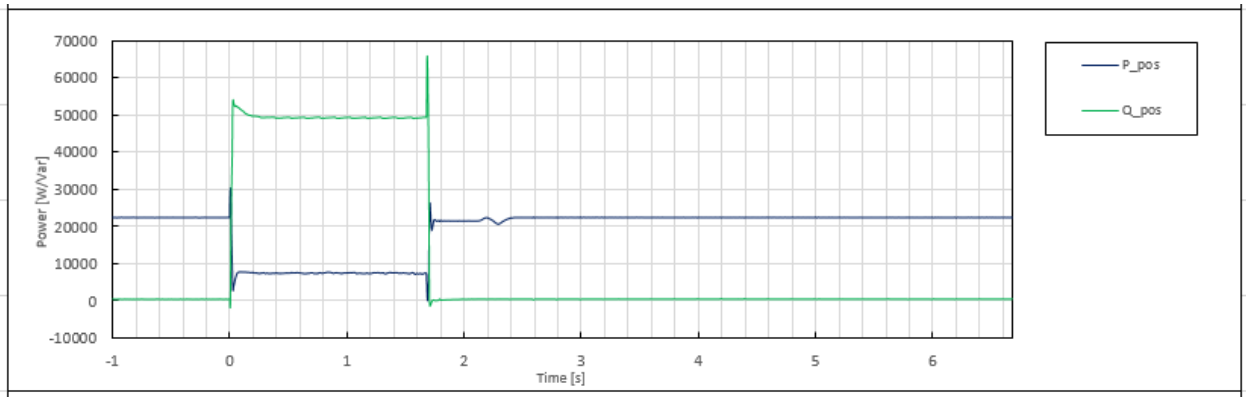
Voltage [V]
Time [s]
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

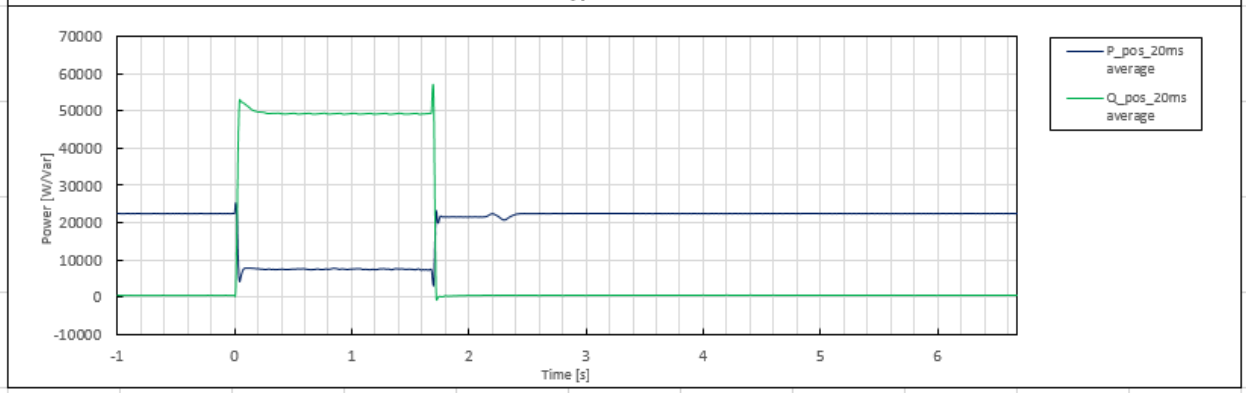

U_pos
Voltage [V]
Time [s]
U_neg
Voltage [V]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic
Current [A]
Time [s]


Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_neg


Power [W/Var]
Time [s]
P_pos
Q_pos


Power [W/Var]
Time [s]
P_pos_20ms average
Q_pos_20ms average

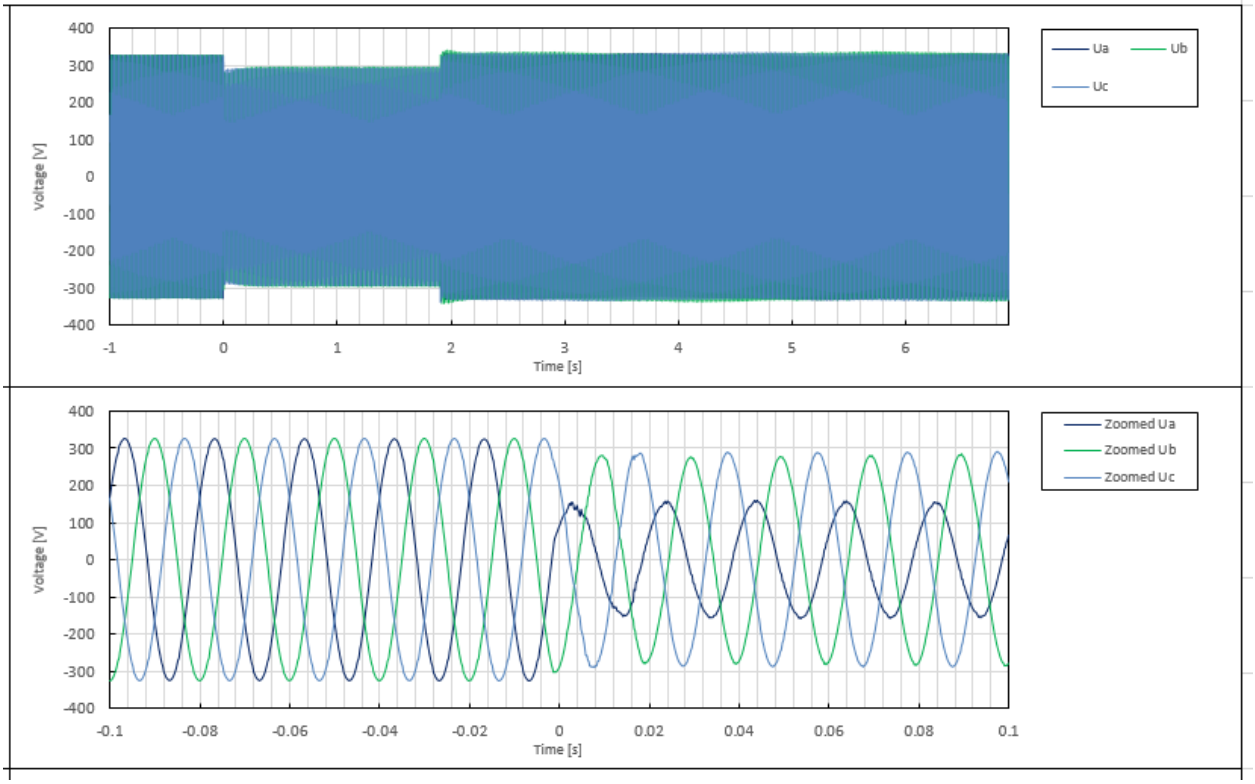
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	50.3
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:55:18 PM
	4	Type of fault	--	--	--	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.46
	6	Drop duration setpoint	--	--	ms	1908
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	1908
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	1908
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.46
	17		pos			0.73
Bef	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.01
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.01
	32	Active power	total	t1-10s to t1	p.u.	1.02
	33		total	t1-2s to t1	p.u.	1.02
	34		pos	t1-500ms to t1-100ms	p.u.	1.02
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.000560762
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.88
	38		neg	--	--	1.94
	39	Reactive current settling up time	pos	--	ms	20
	40		neg	--	ms	22
	41		pos	--	ms	20

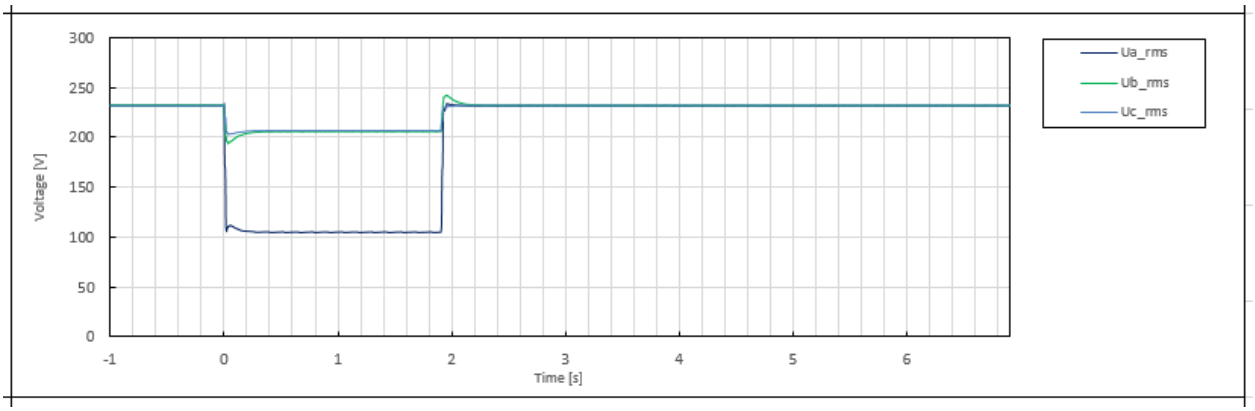
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	42	Reactive current settling time	neg	--	ms	22
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.73
	44		neg	t1+100ms to t2-20ms	p.u.	0.26
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.52
	46		neg	t1+100ms to t2-20ms	p.u.	-0.51
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.54
	48		neg	t1+100ms to t2-20ms	p.u.	0.51
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.33
	50		pos	t1+100ms to t2-20ms	p.u.	0.10
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	N/A
	52		phase2	t1 to t1+20ms	A	N/A
	53		phase3	t1 to t1+20ms	A	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A
	55		phase 2	t1+20ms	p.u.	N/A
	56		phase 3	t1+20ms	p.u.	N/A
	57		phase 1	t1+100ms	p.u.	N/A
	58		phase 2	t1+100ms	p.u.	N/A
	59		phase 3	t1+100ms	p.u.	N/A
	60		phase 1	t1+150ms	p.u.	N/A
	61		phase 2	t1+150ms	p.u.	N/A
	62		phase 3	t1+150ms	p.u.	N/A
	63		phase 1	t1+300ms	p.u.	N/A
	64		phase 2	t1+300ms	p.u.	N/A

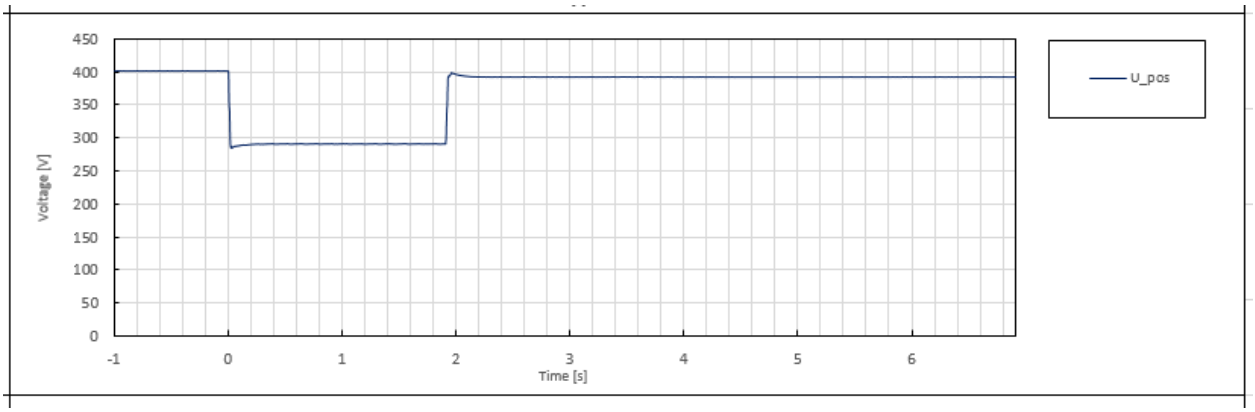
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	65		phase 3	t1+300ms	p.u.	N/A
	66		phase 1	t1+500ms	p.u.	N/A
	67		phase 2	t1+500ms	p.u.	N/A
	68		phase 3	t1+500ms	p.u.	N/A
	69		phase 1	t1+1000ms	p.u.	N/A
	70		phase 2	t1+1000ms	p.u.	N/A
	71		phase 3	t1+1000ms	p.u.	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.01
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.073

Idle result

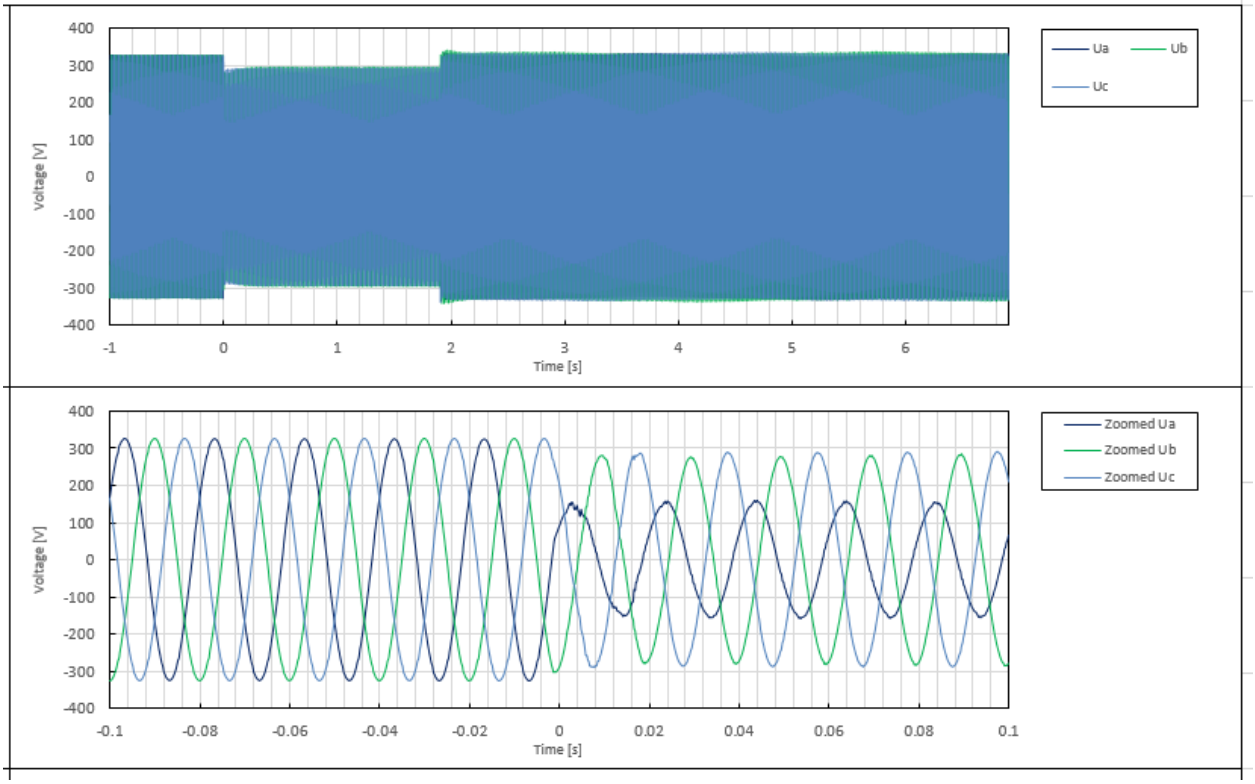

Ua
Ub
Uc
Voltage [V]
Time [s]

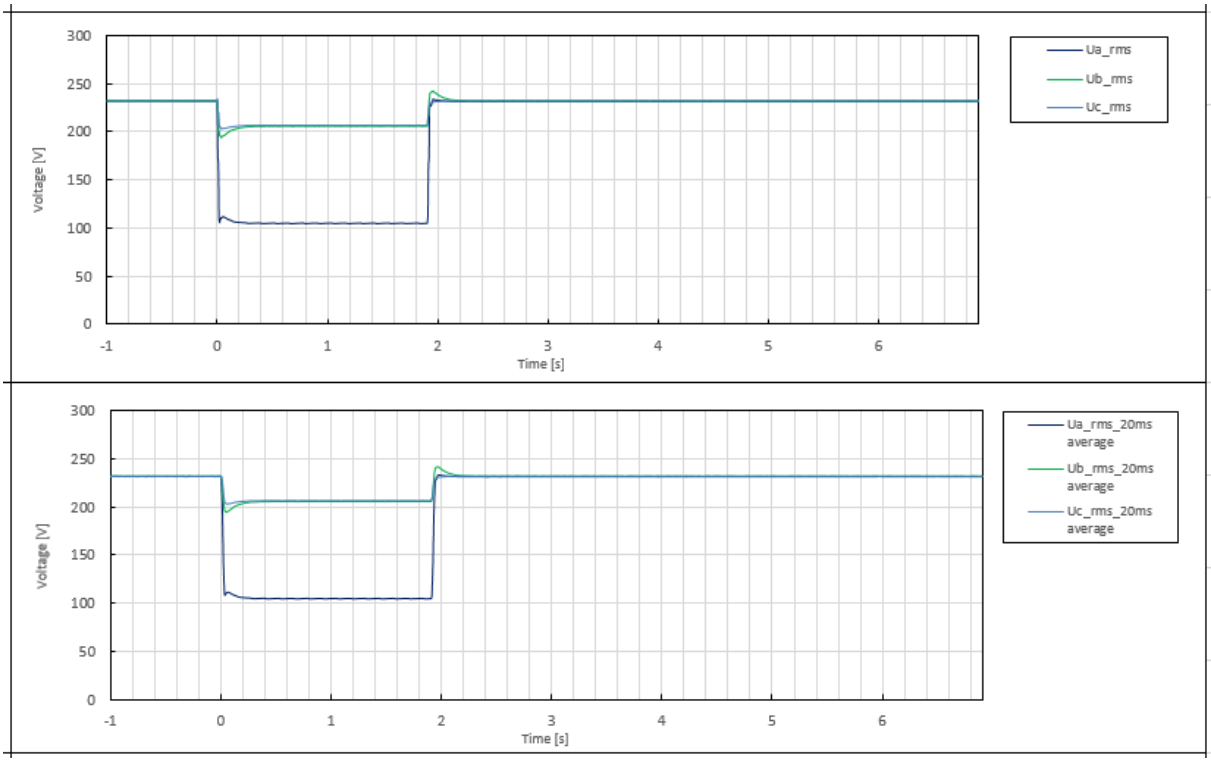
Zoomed Ua
Zoomed Ub
Zoomed Uc
Voltage [V]
Time [s]

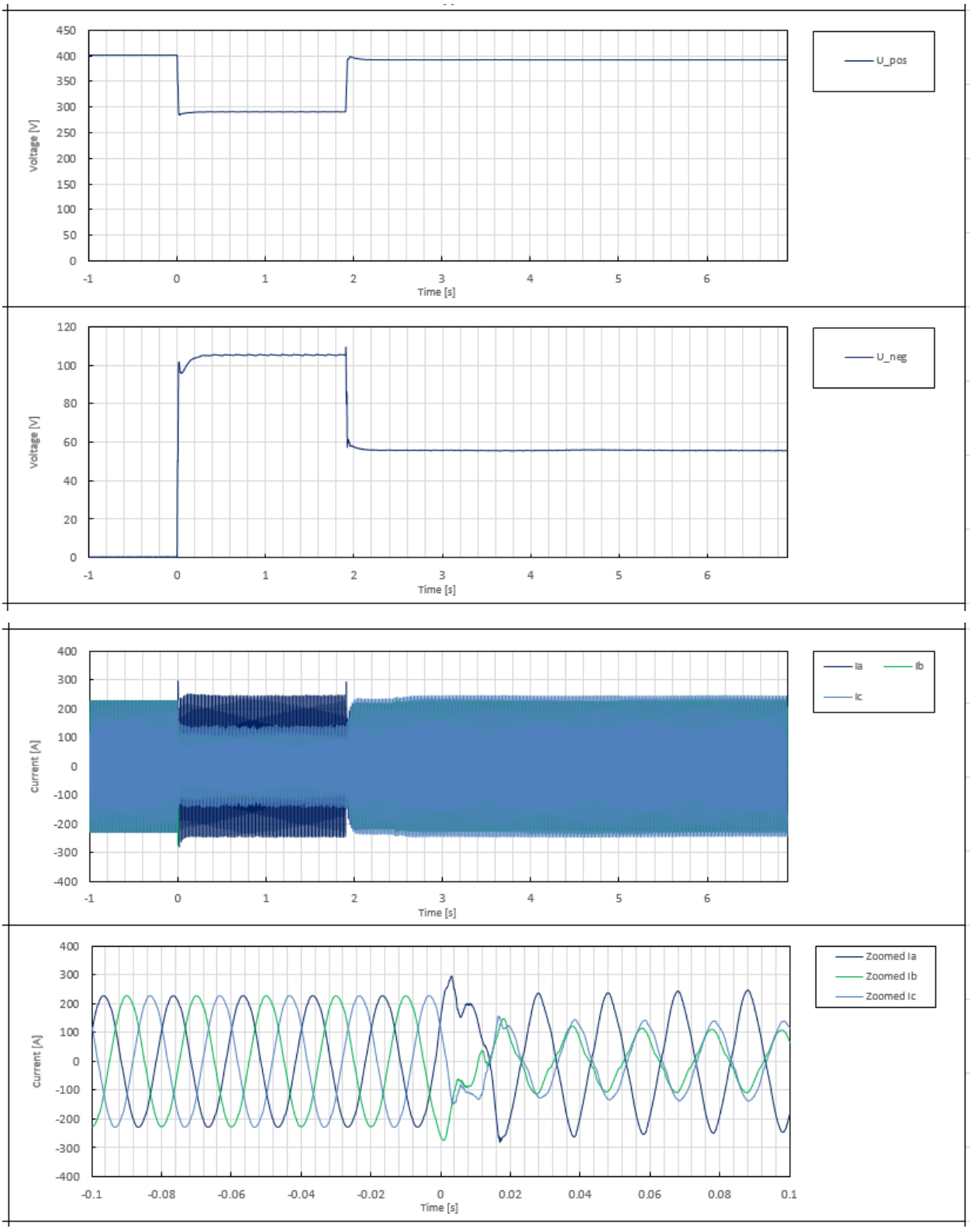

Ua_rms
Ub_rms
Uc_rms
Voltage [V]
Time [s]

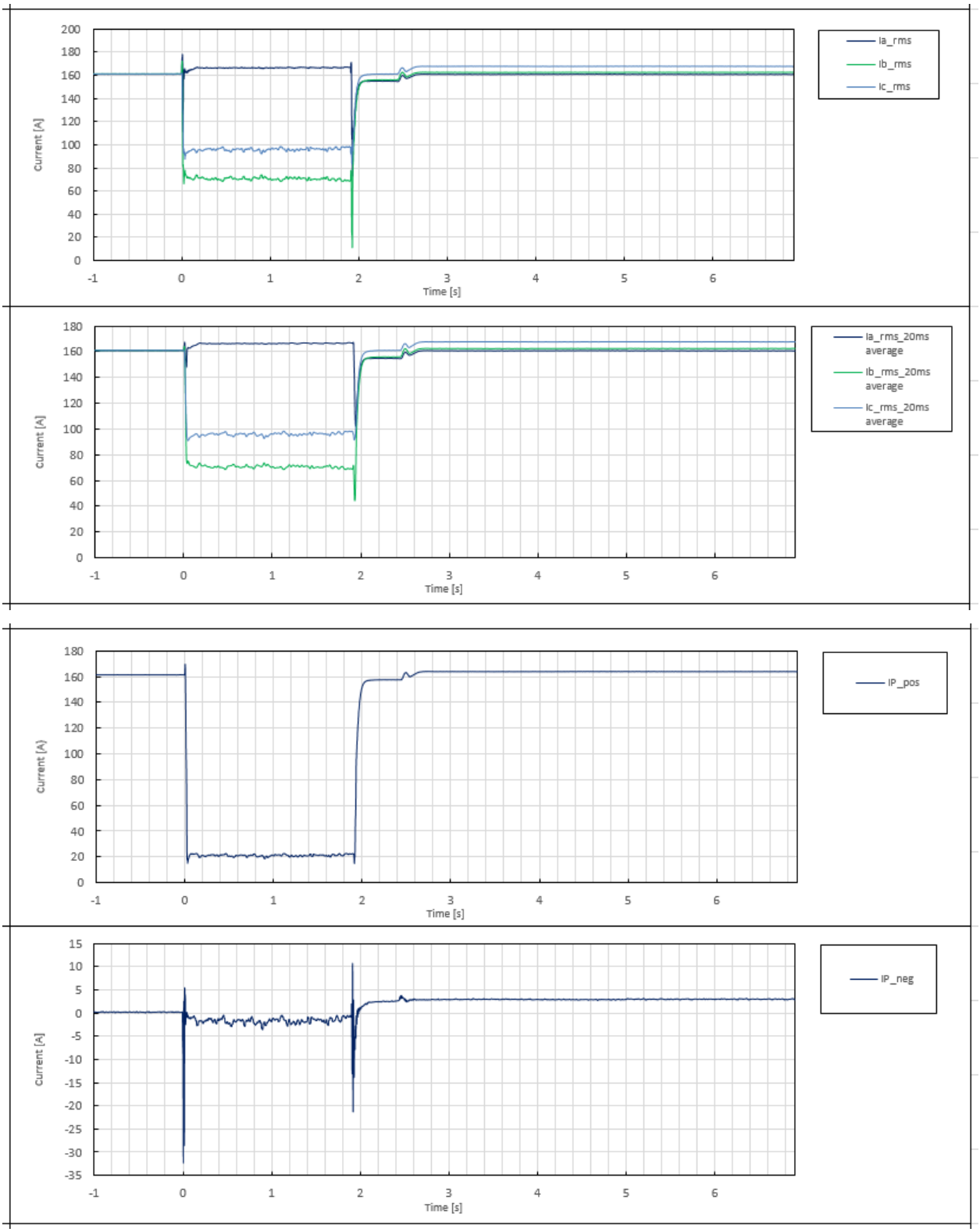

U_pos
Voltage [V]
Time [s]

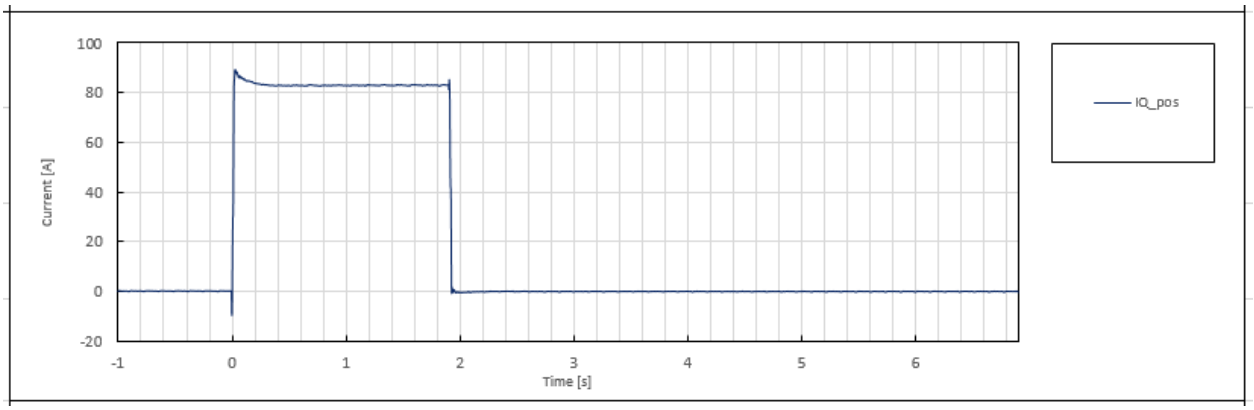
Load result

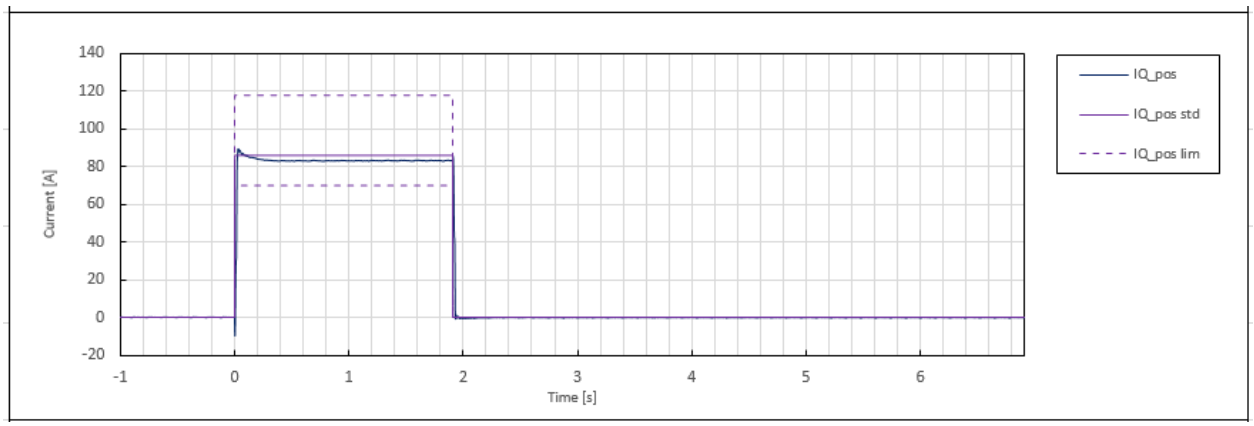

Ua
Ub
Uc
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc

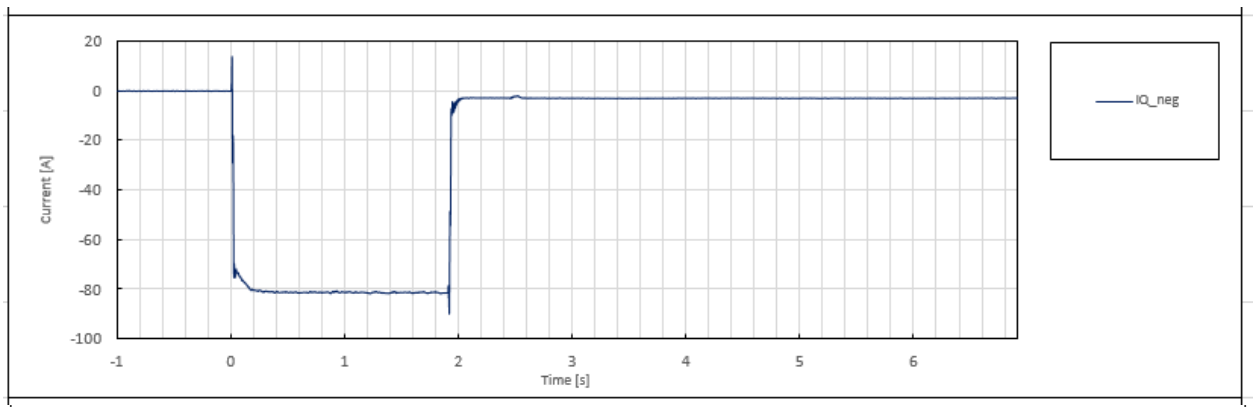

Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average
Voltage [V]
Time [s]

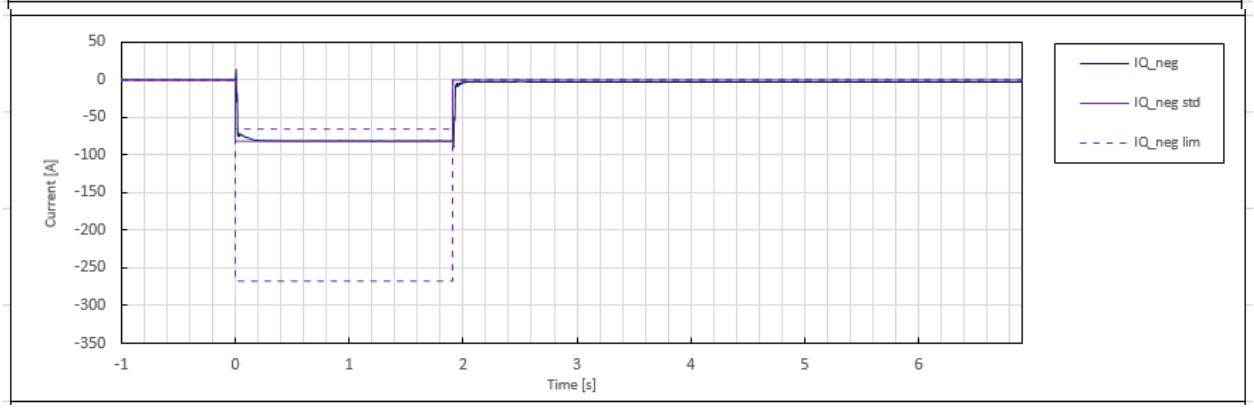

U_pos
Voltage [V]
Time [s]
U_neg
Voltage [V]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic
Current [A]
Time [s]

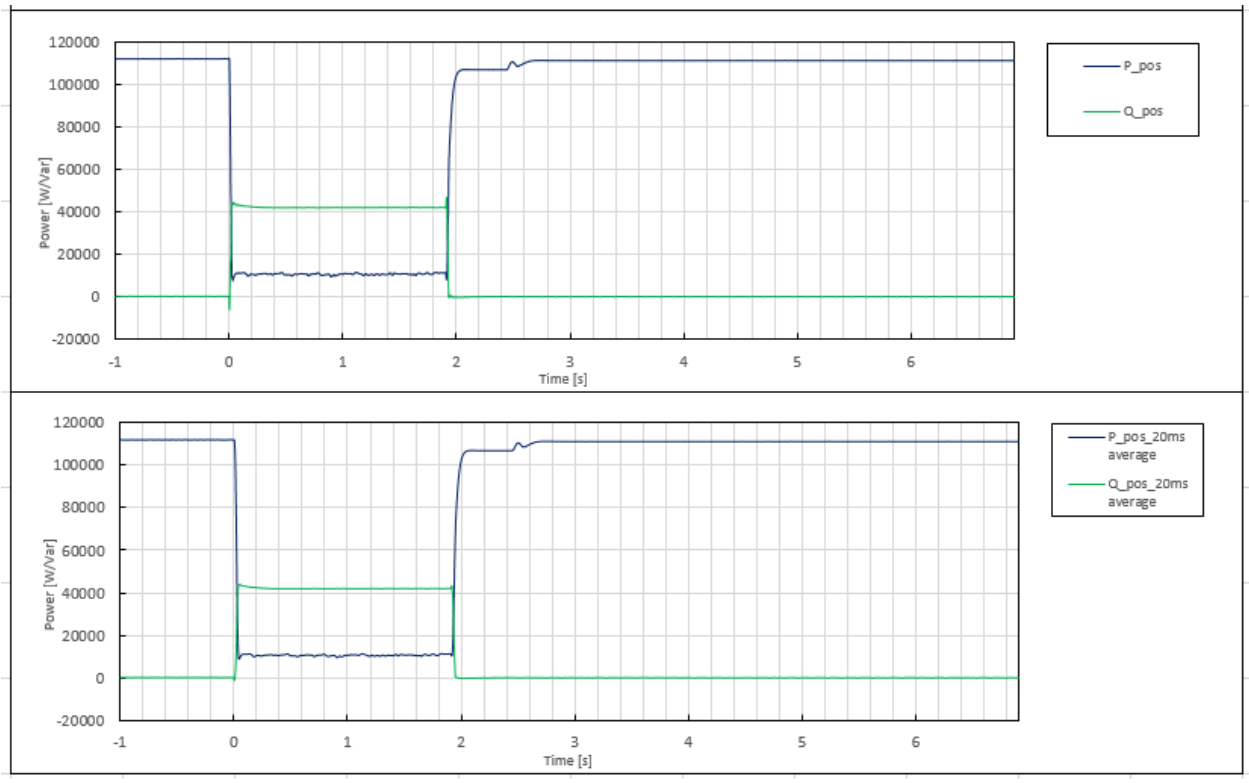

Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



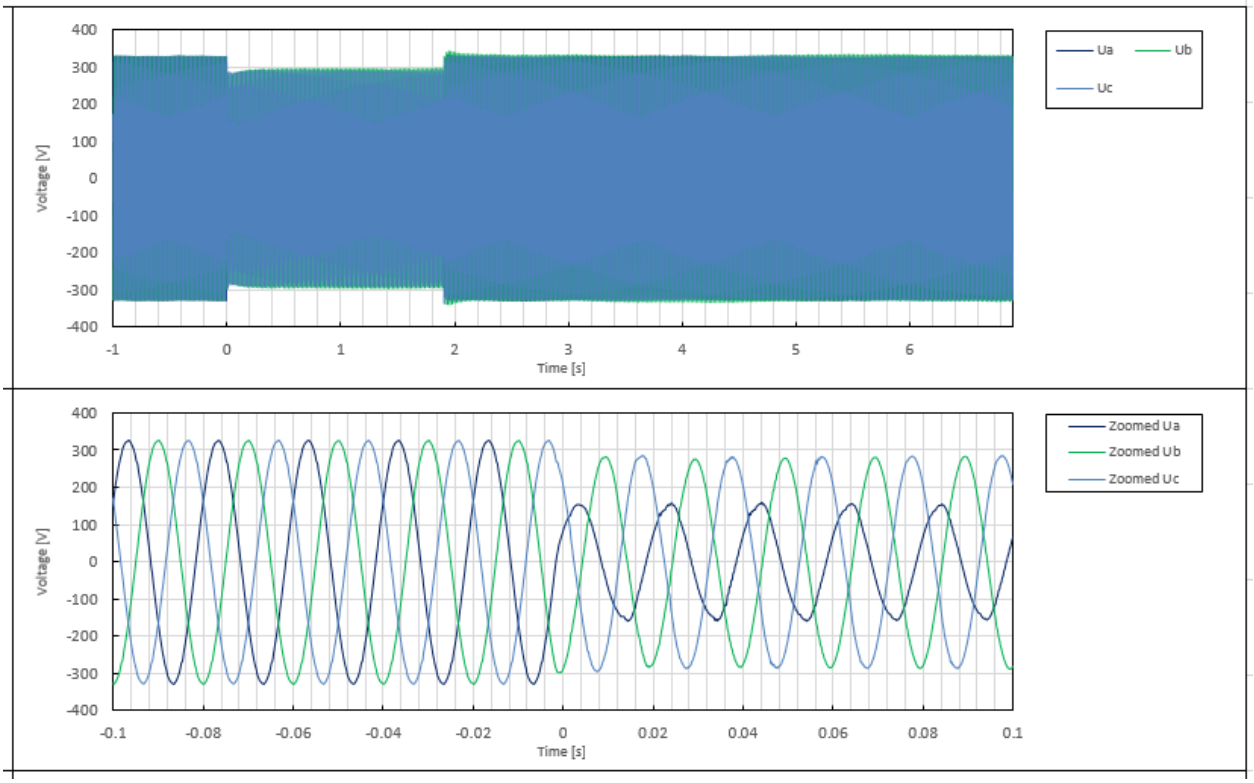
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	50.4
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	3:58:41 PM
	4	Type of fault	--	--	--	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.46
	6	Drop duration setpoint	--	--	ms	1908
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	1908
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	1908
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.46
	17		pos			0.73
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00

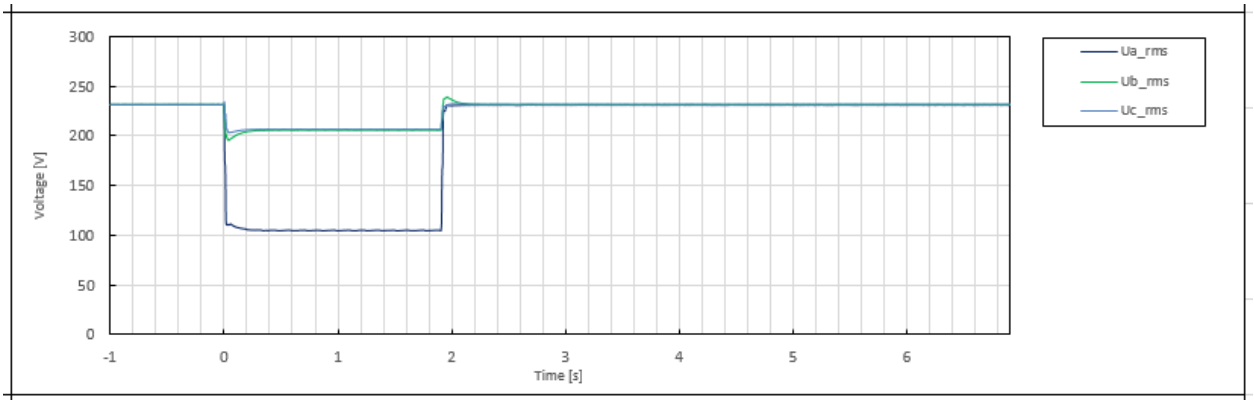
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	31	Active current	pos	t1-1s to t1	p.u.	0.20
	32	Active power	total	t1-10s to t1	p.u.	0.20
	33		total	t1-2s to t1	p.u.	0.20
	34		pos	t1-500ms to t1-100ms	p.u.	0.20
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.004209821
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.81
	38		neg	--	--	1.95
	39	Reactive current settling up time	pos	--	ms	20
	40		neg	--	ms	21
	41	Reactive current settling time	pos	--	ms	20
	42		neg	--	ms	21
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.73
	44		neg	t1+100ms to t2-20ms	p.u.	0.26
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.50
	46		neg	t1+100ms to t2-20ms	p.u.	-0.51
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.52
	48		neg	t1+100ms to t2-20ms	p.u.	0.51
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.33
	50		pos	t1+100ms to t2-20ms	p.u.	0.10
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	N/A
	52		phase2	t1 to t1+20ms	A	N/A
	53		phase3	t1 to t1+20ms	A	N/A

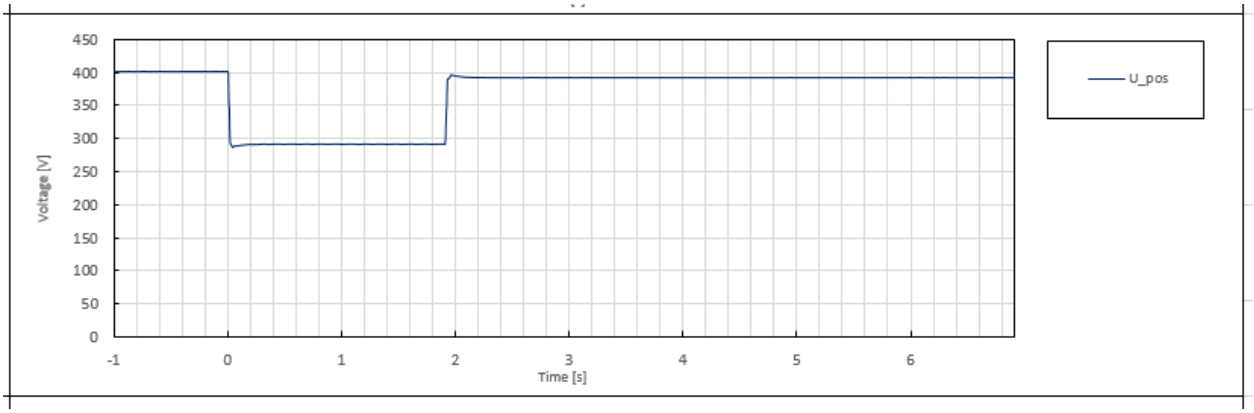
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A
	55		phase 2	t1+20ms	p.u.	N/A
	56		phase 3	t1+20ms	p.u.	N/A
	57		phase 1	t1+100ms	p.u.	N/A
	58		phase 2	t1+100ms	p.u.	N/A
	59		phase 3	t1+100ms	p.u.	N/A
	60		phase 1	t1+150ms	p.u.	N/A
	61		phase 2	t1+150ms	p.u.	N/A
	62		phase 3	t1+150ms	p.u.	N/A
	63		phase 1	t1+300ms	p.u.	N/A
	64		phase 2	t1+300ms	p.u.	N/A
	65		phase 3	t1+300ms	p.u.	N/A
	66		phase 1	t1+500ms	p.u.	N/A
	67		phase 2	t1+500ms	p.u.	N/A
	68		phase 3	t1+500ms	p.u.	N/A
	69		phase 1	t1+1000ms	p.u.	N/A
	70		phase 2	t1+1000ms	p.u.	N/A
	71		phase 3	t1+1000ms	p.u.	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.023

Idle result

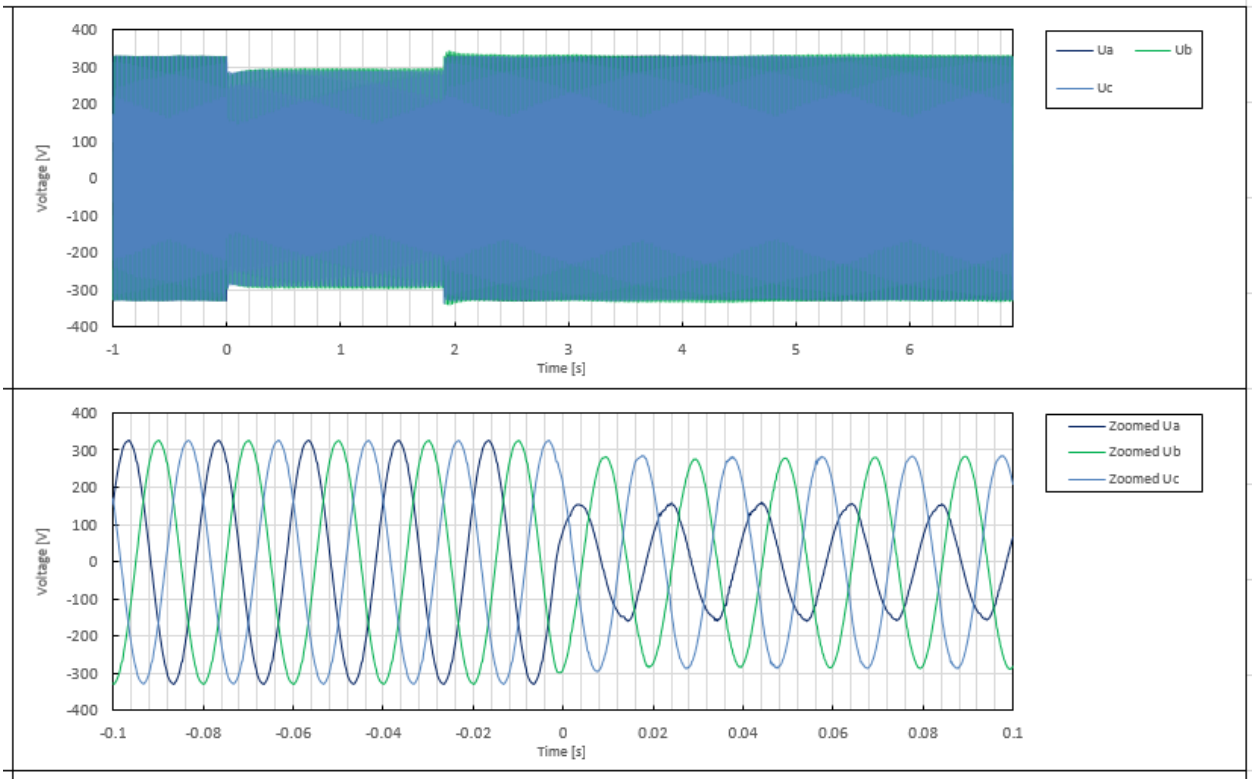

Voltage [V]
Time [s]
Ua
Ub
Uc

Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc

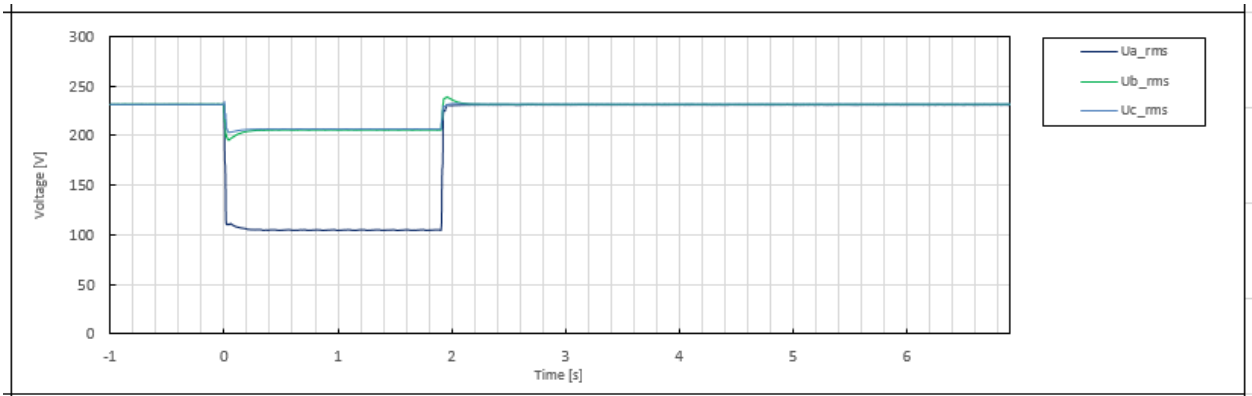

Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms

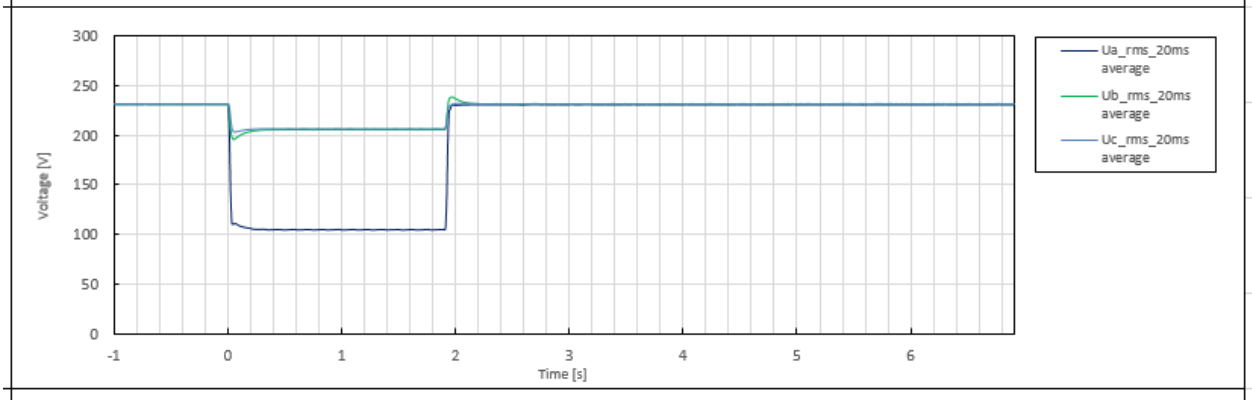

Voltage [V]
Time [s]
U_pos

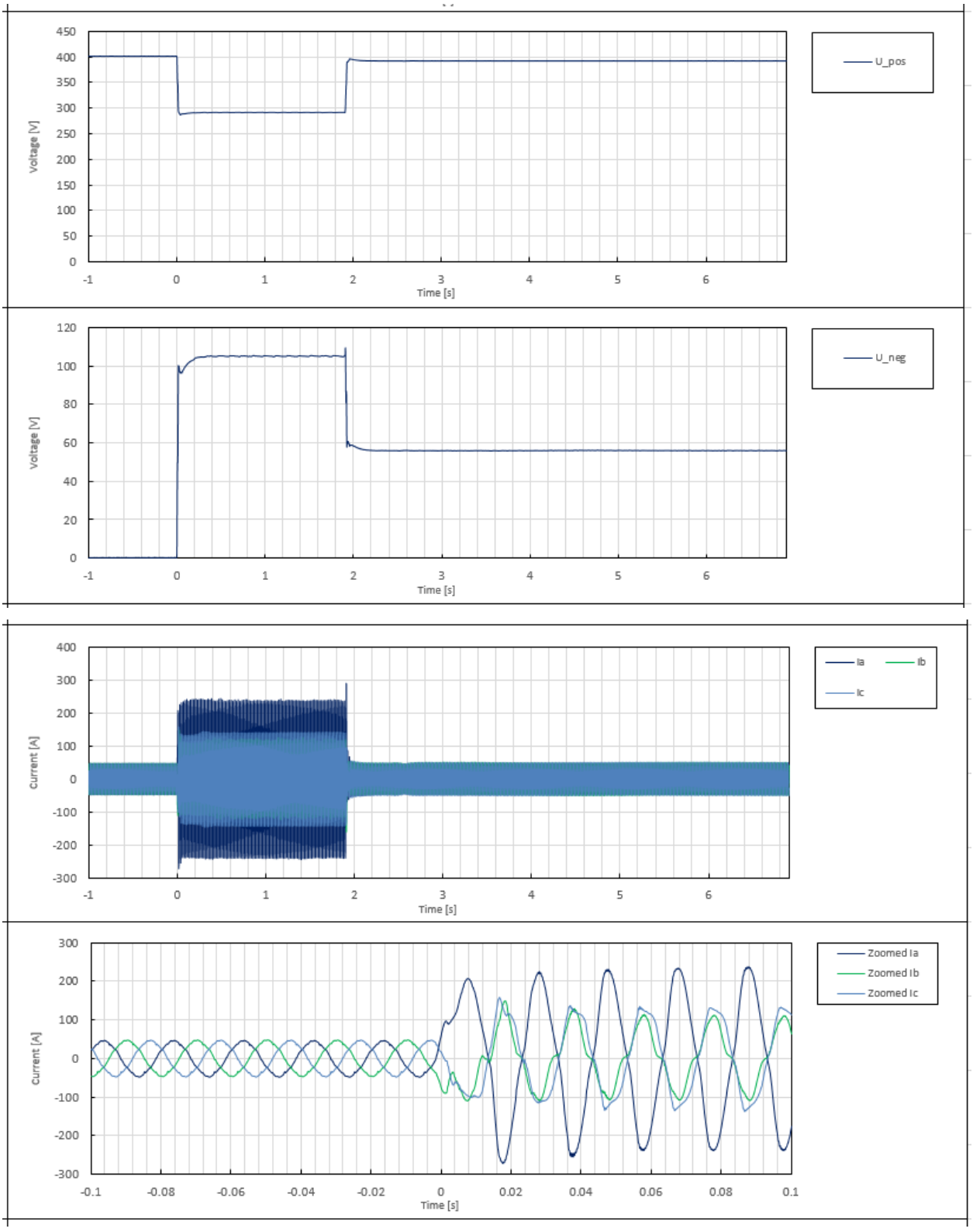
Load result

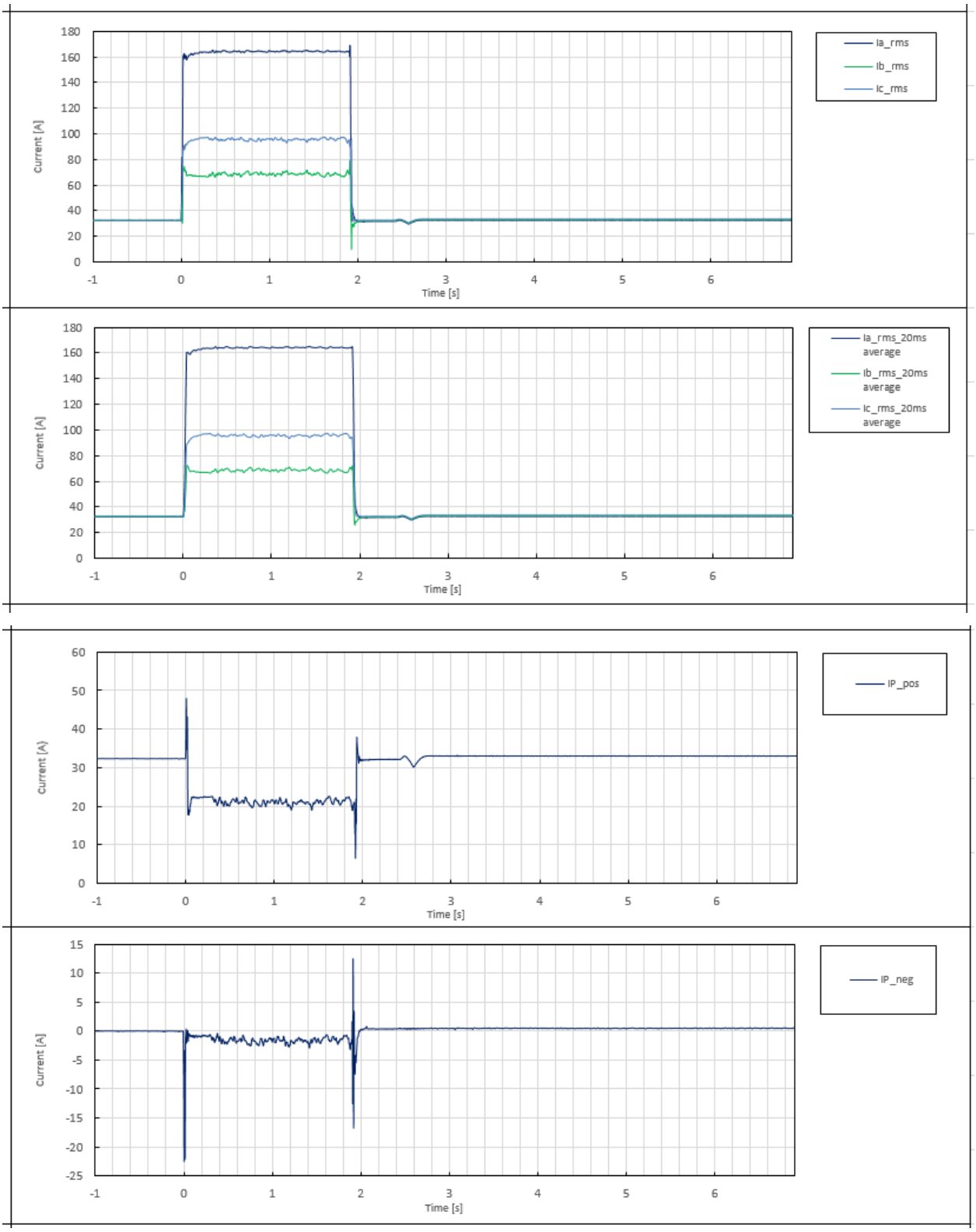

Voltage [V]
Time [s]
Ua
Ub
Uc

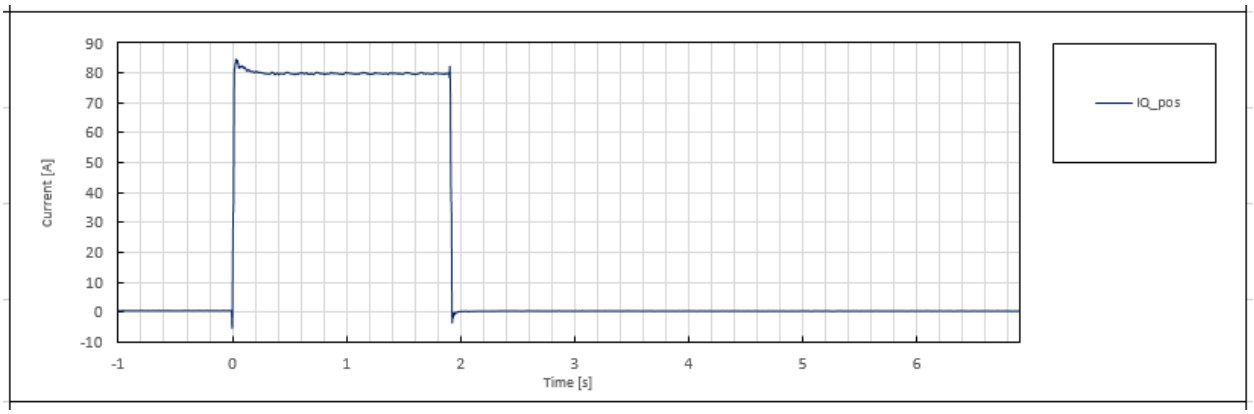
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc

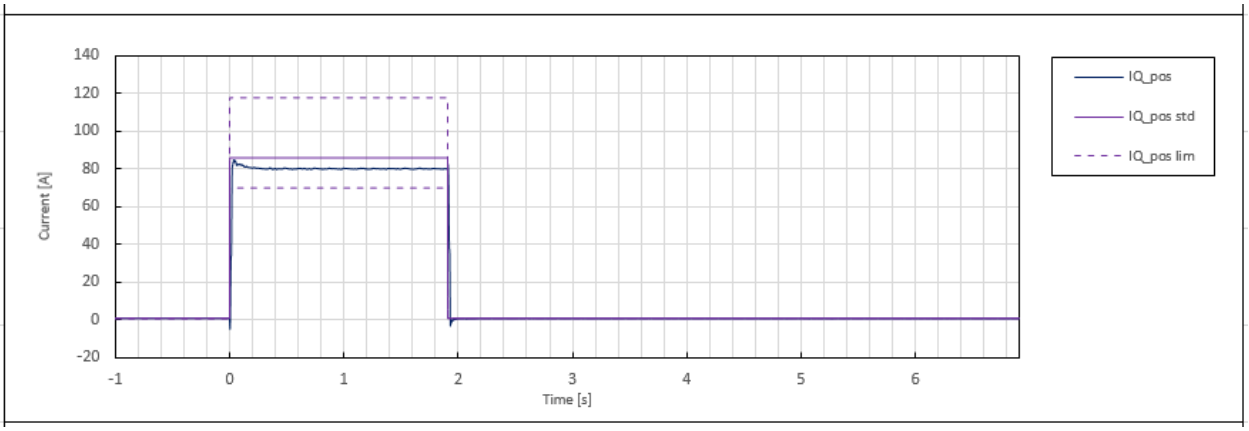

Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms

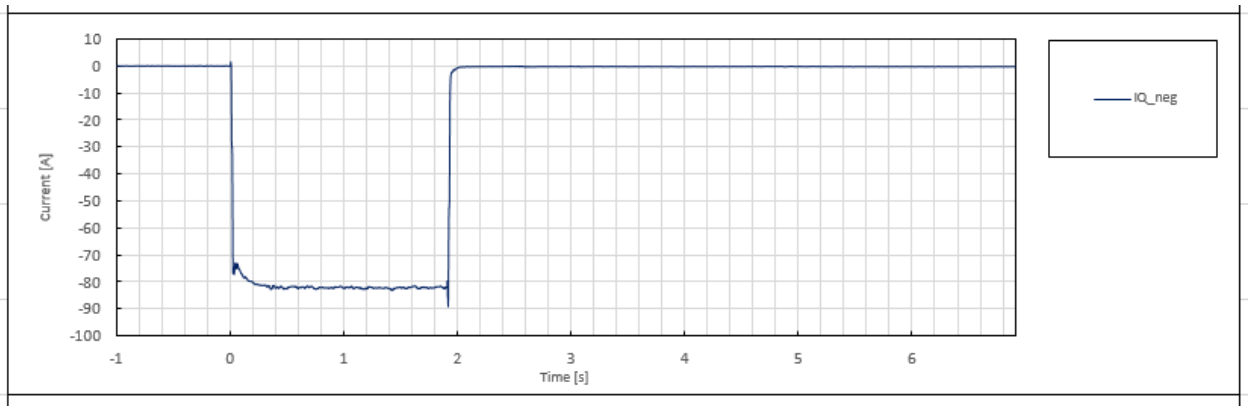

Voltage [V]
Time [s]
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

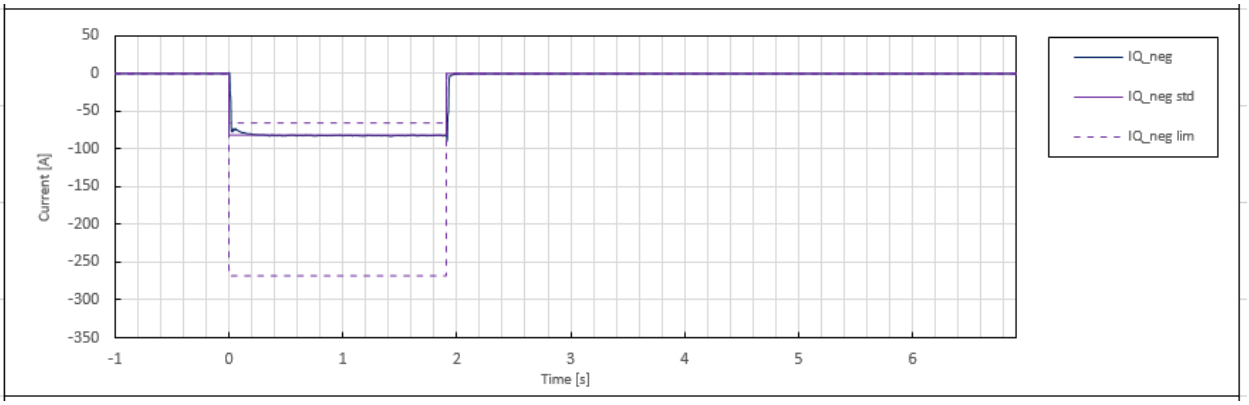

U_pos
Voltage [V]
Time [s]
U_neg
Voltage [V]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic
Current [A]
Time [s]

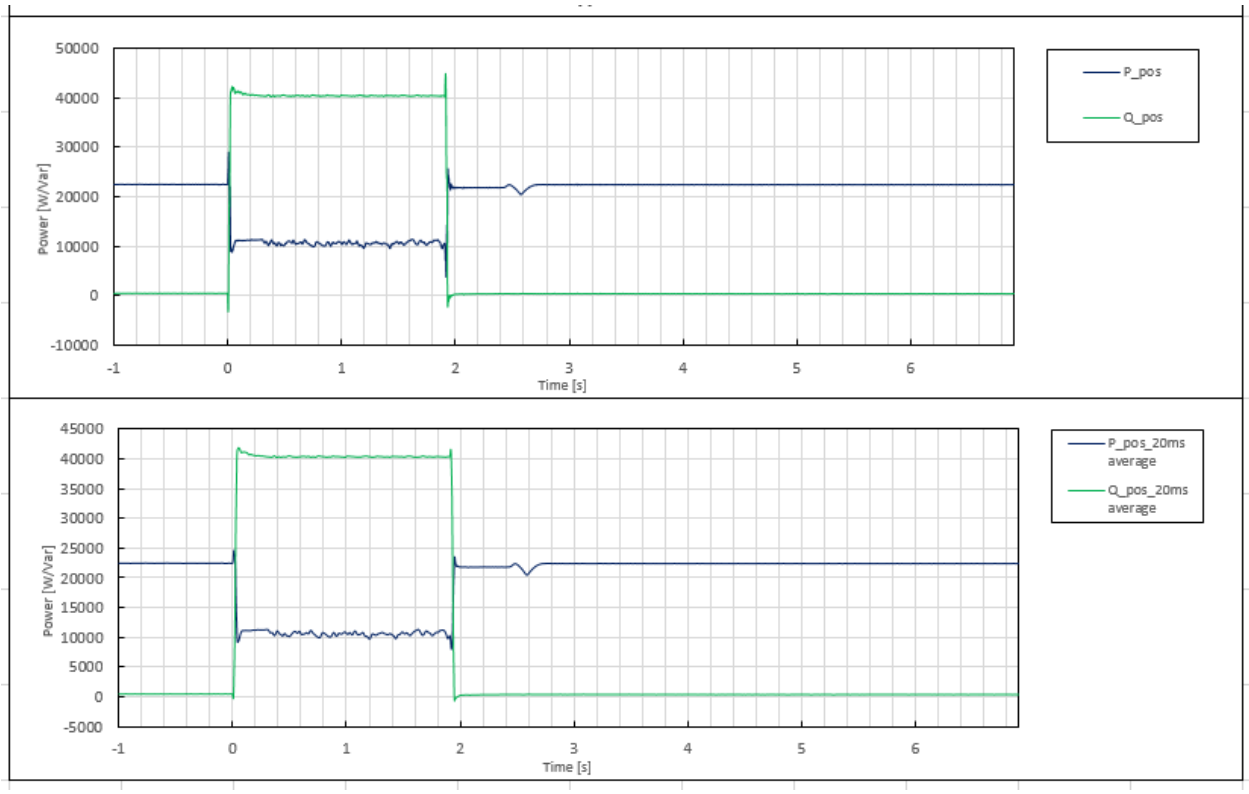

Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



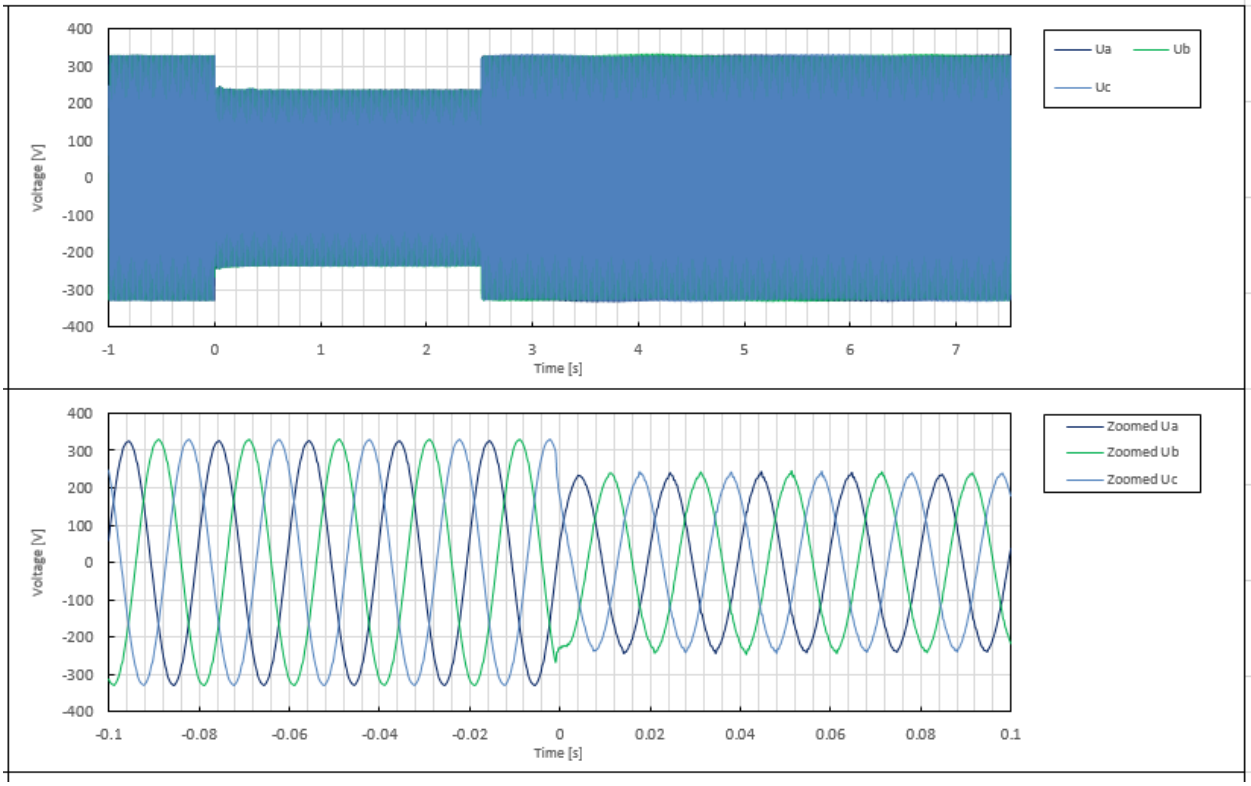
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	75.5
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	4:00:39 PM
	4	Type of fault	--	--	--	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.71
	6	Drop duration setpoint	--	--	ms	2519
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A

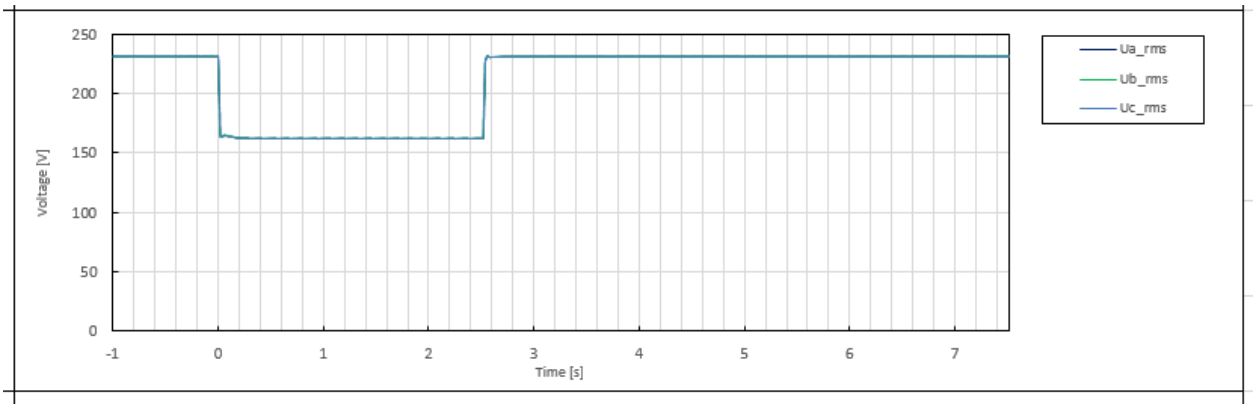
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	2519
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	2519
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.71
	17		pos			0.71
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00

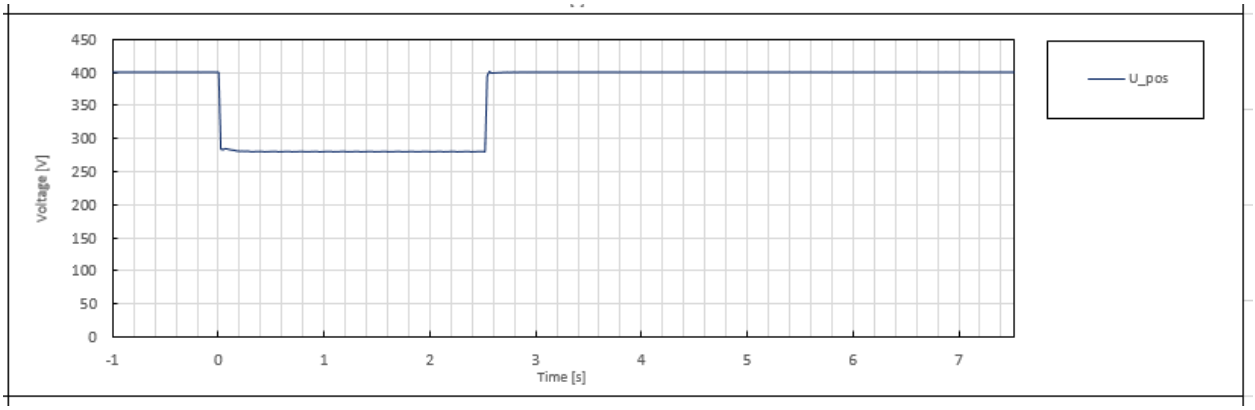
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	31	Active current	pos	t1-1s to t1	p.u.	0.20
	32	Active power	total	t1-10s to t1	p.u.	0.20
	33		total	t1-2s to t1	p.u.	0.20
	34		pos	t1-500ms to t1-100ms	p.u.	0.20
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.004163597
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.86
	38		neg	--	--	N/A
	39	Reactive current settling up time	pos	--	ms	23
	40		neg	--	ms	N/A
	41	Reactive current settling time	pos	--	ms	23
	42		neg	--	ms	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.71
	44		neg	t1+100ms to t2-20ms	p.u.	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.56
	46		neg	t1+100ms to t2-20ms	p.u.	-0.02
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.61
	48		neg	t1+100ms to t2-20ms	p.u.	0.03
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.16
	50		pos	t1+100ms to t2-20ms	p.u.	0.16
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	135.08
	52		phase2	t1 to t1+20ms	A	148.09
	53		phase3	t1 to t1+20ms	A	124.99

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.53
	55		phase 2	t1+20ms	p.u.	0.54
	56		phase 3	t1+20ms	p.u.	0.32
	57		phase 1	t1+100ms	p.u.	0.59
	58		phase 2	t1+100ms	p.u.	0.62
	59		phase 3	t1+100ms	p.u.	0.57
	60		phase 1	t1+150ms	p.u.	0.59
	61		phase 2	t1+150ms	p.u.	0.59
	62		phase 3	t1+150ms	p.u.	0.59
	63		phase 1	t1+300ms	p.u.	0.60
	64		phase 2	t1+300ms	p.u.	0.60
	65		phase 3	t1+300ms	p.u.	0.60
	66		phase 1	t1+500ms	p.u.	0.60
	67		phase 2	t1+500ms	p.u.	0.60
	68		phase 3	t1+500ms	p.u.	0.60
	69		phase 1	t1+1000ms	p.u.	0.60
	70		phase 2	t1+1000ms	p.u.	0.60
	71		phase 3	t1+1000ms	p.u.	0.60
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.021

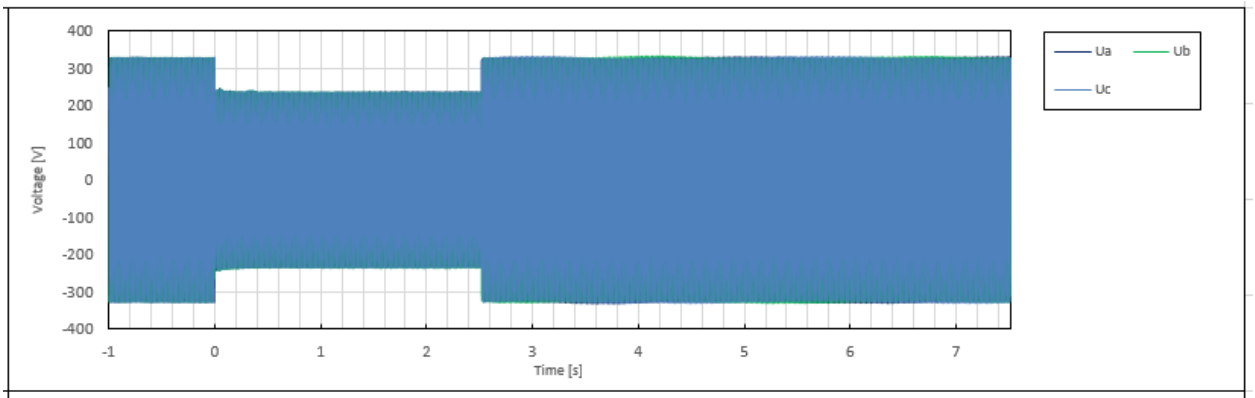
Idle result

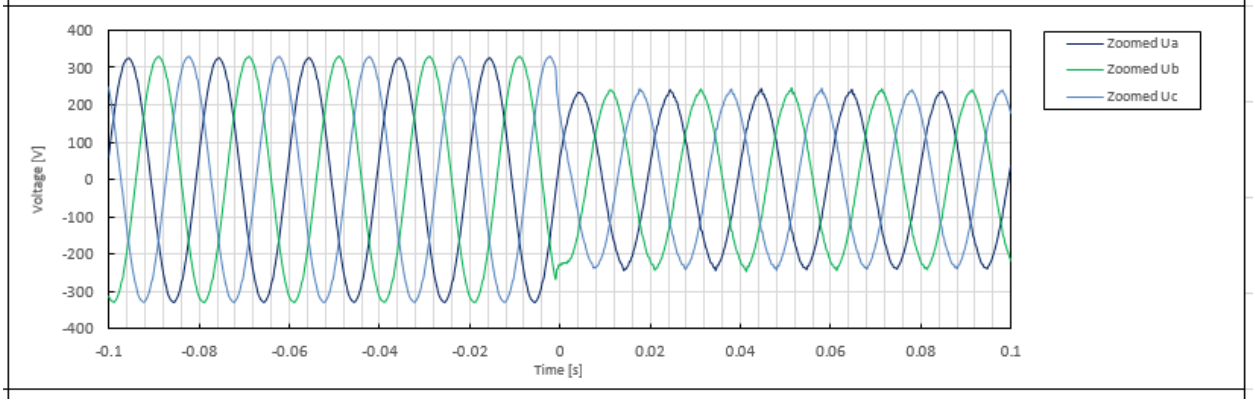

Ua
Ub
Uc
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc
Voltage [V]
Time [s]



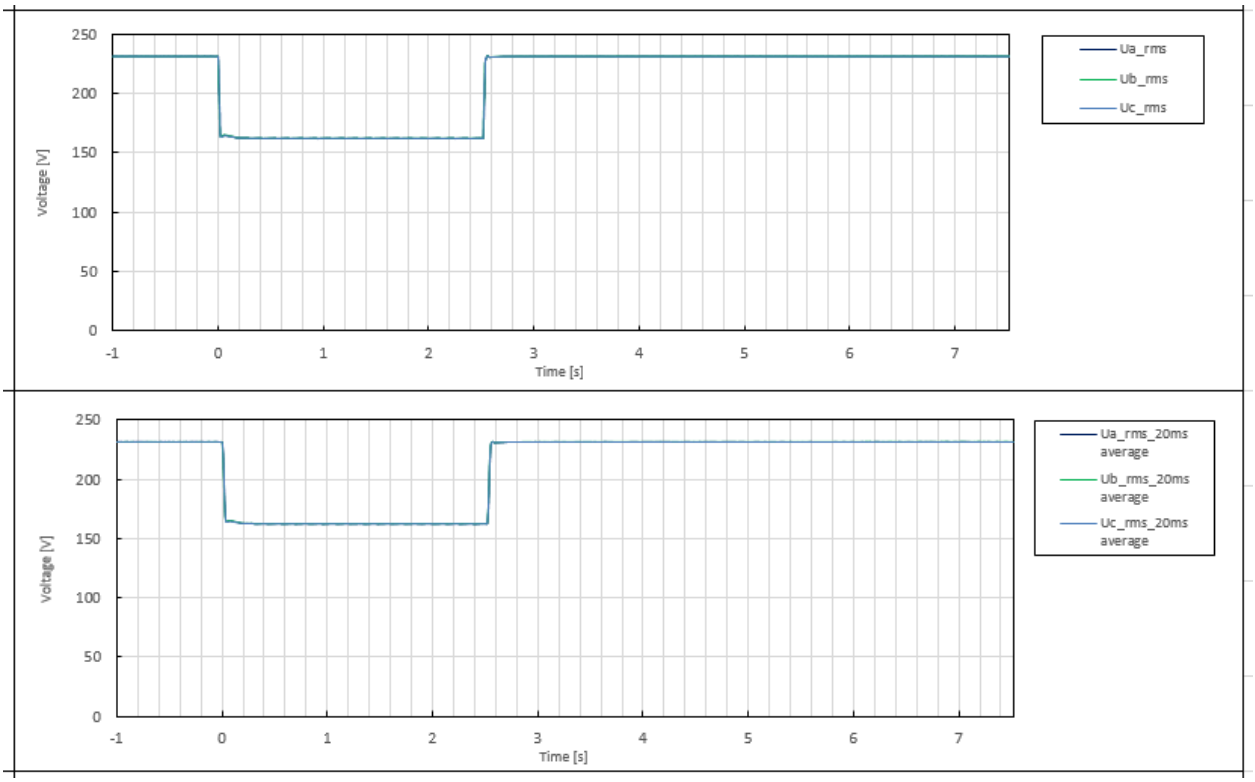


Load result

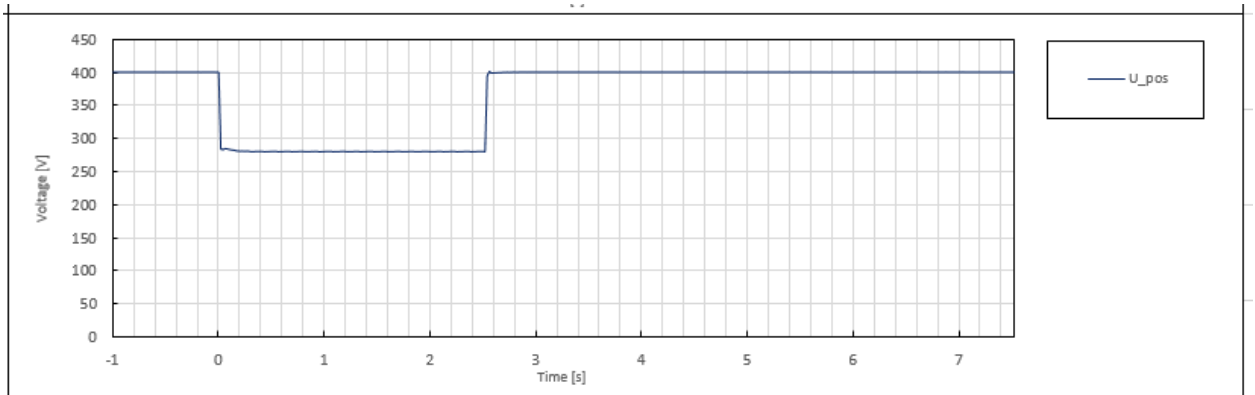


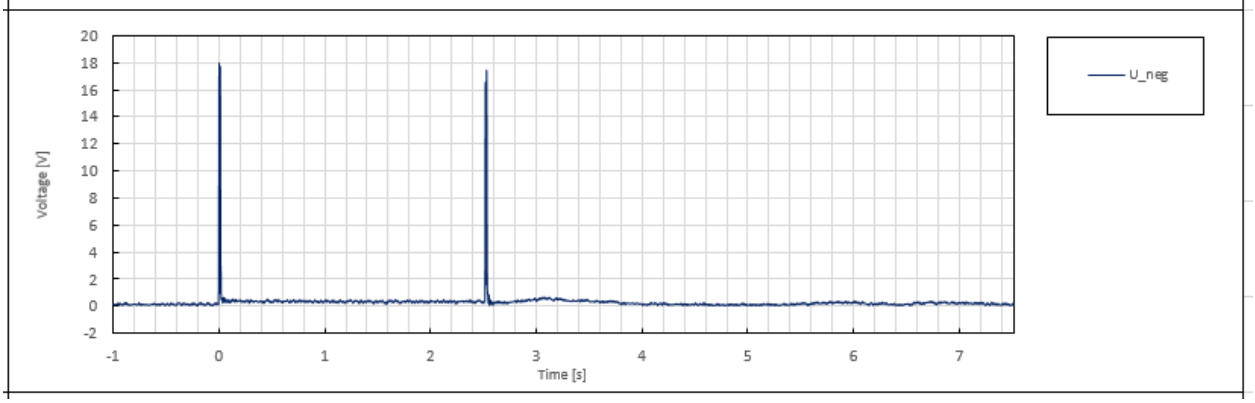


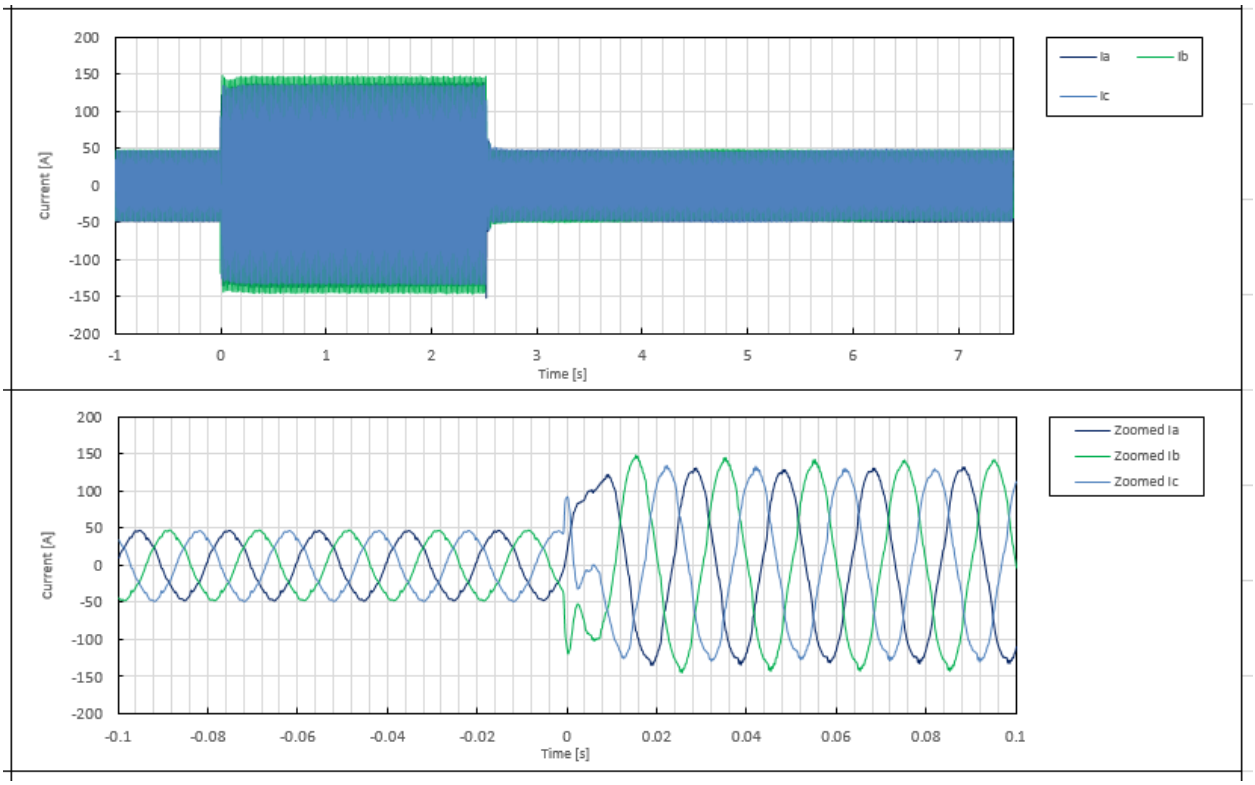
G99: 2020 Type A/B/C/D


Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms

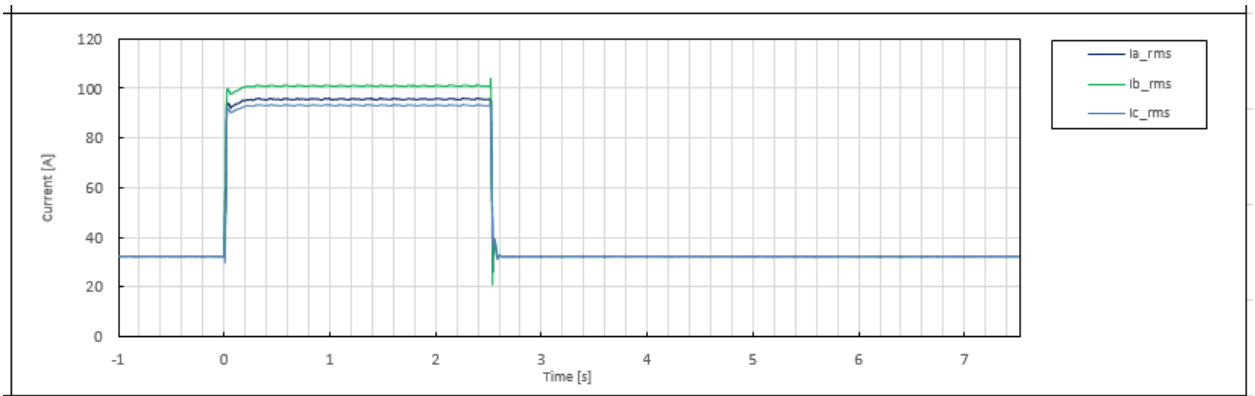
Voltage [V]
Time [s]
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

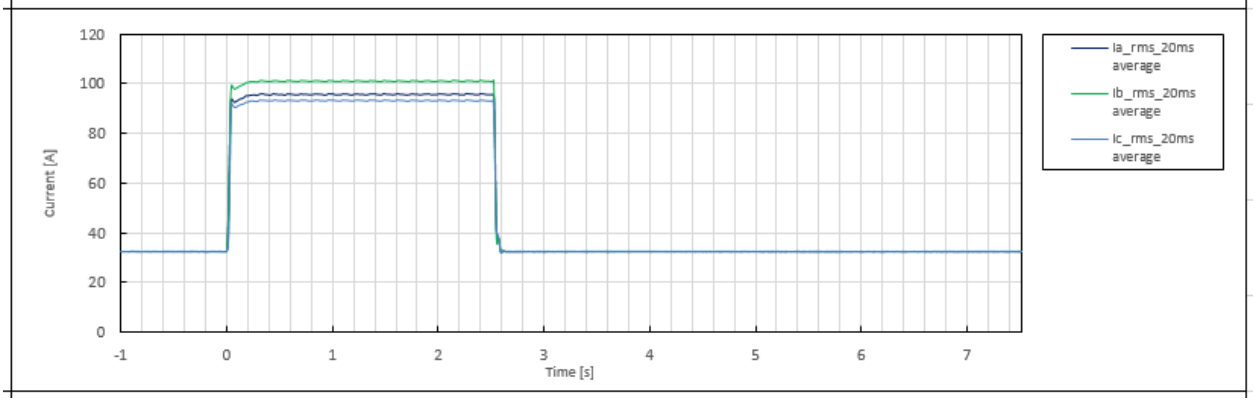

Voltage [V]
Time [s]
U_pos

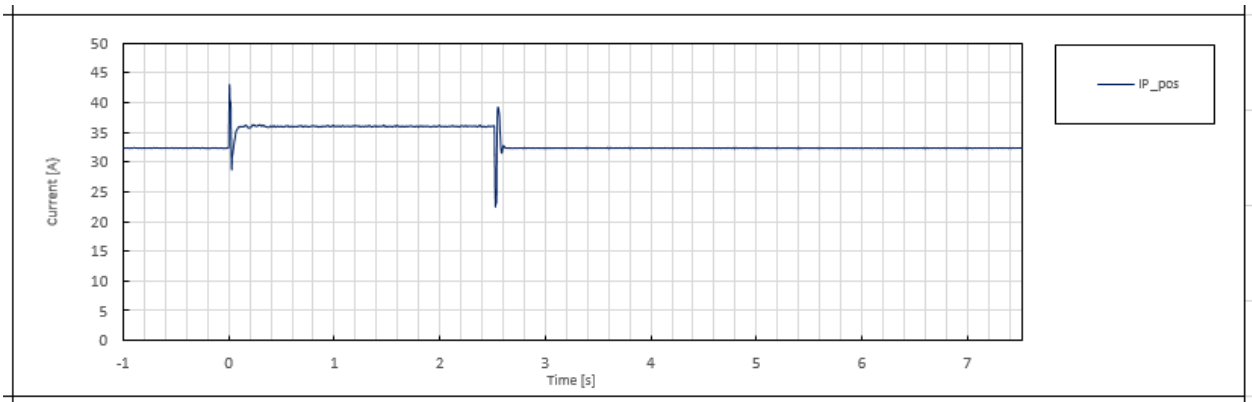

Voltage [V]
Time [s]
U_neg

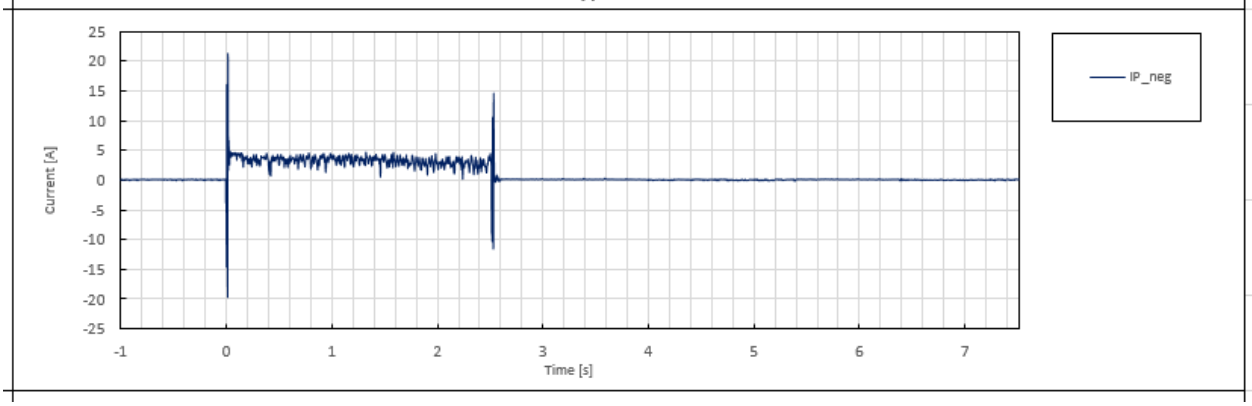

Current [A]
Time [s]
Ia
Ib
Ic

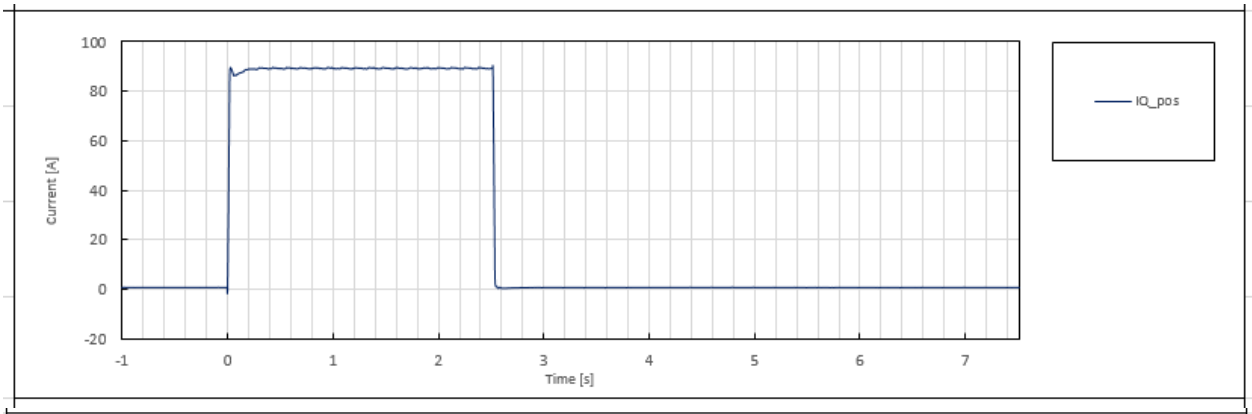
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic


Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms


Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average


Current [A]
Time [s]
IP_pos


Current [A]
Time [s]
IP_neg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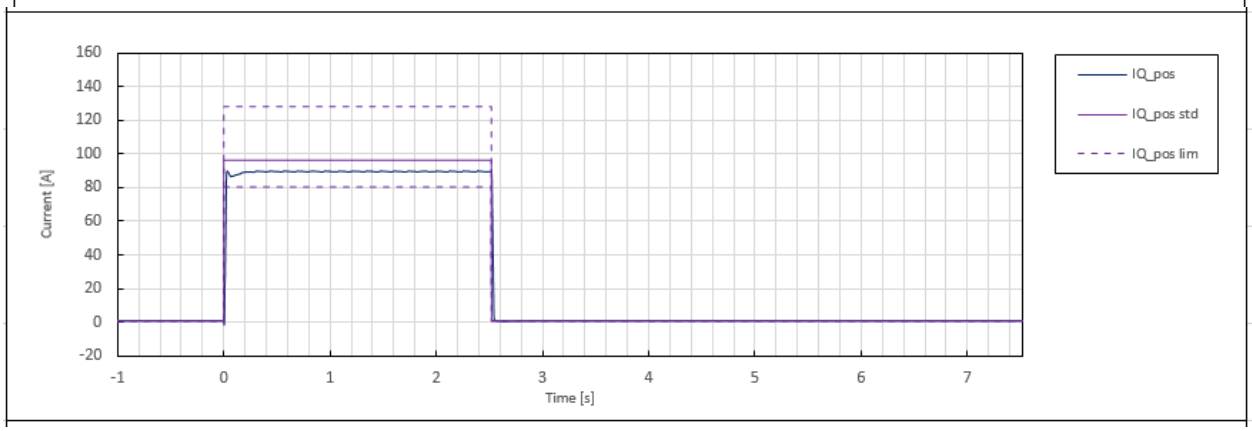
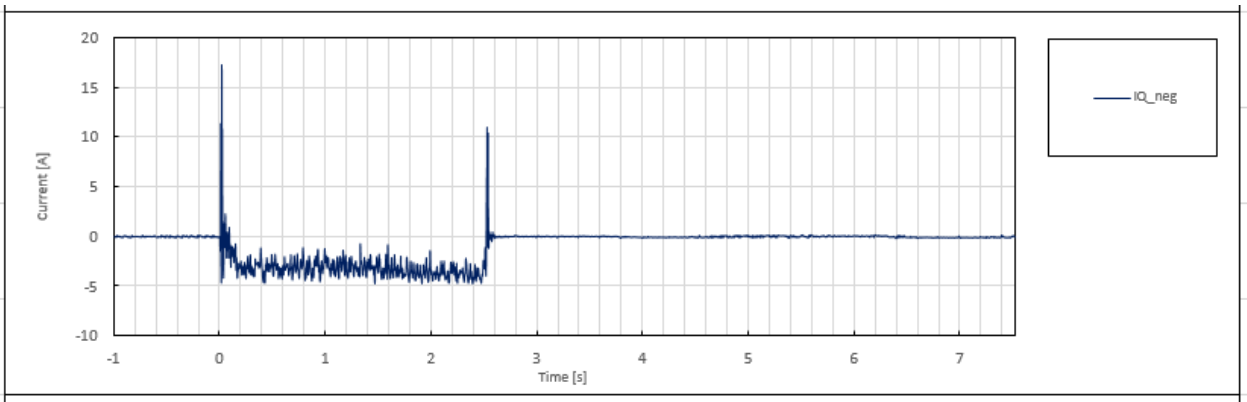
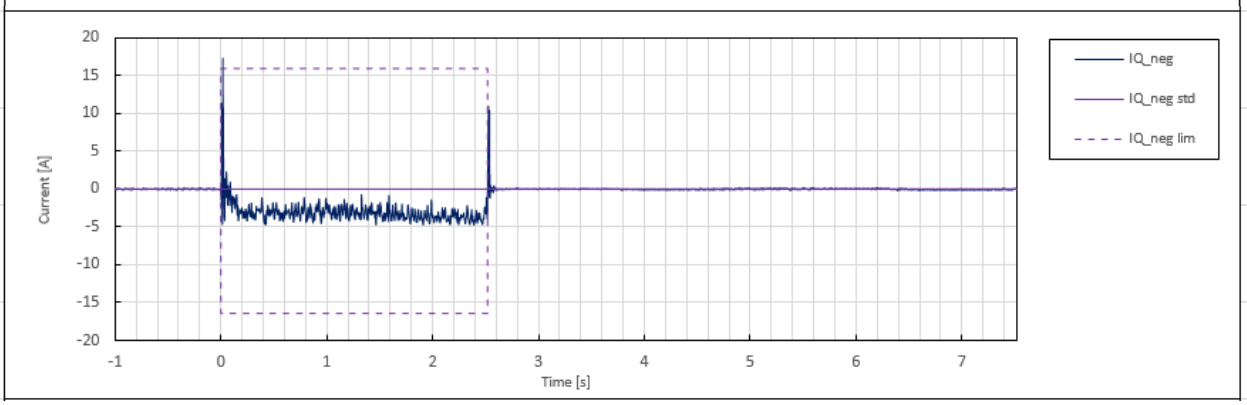
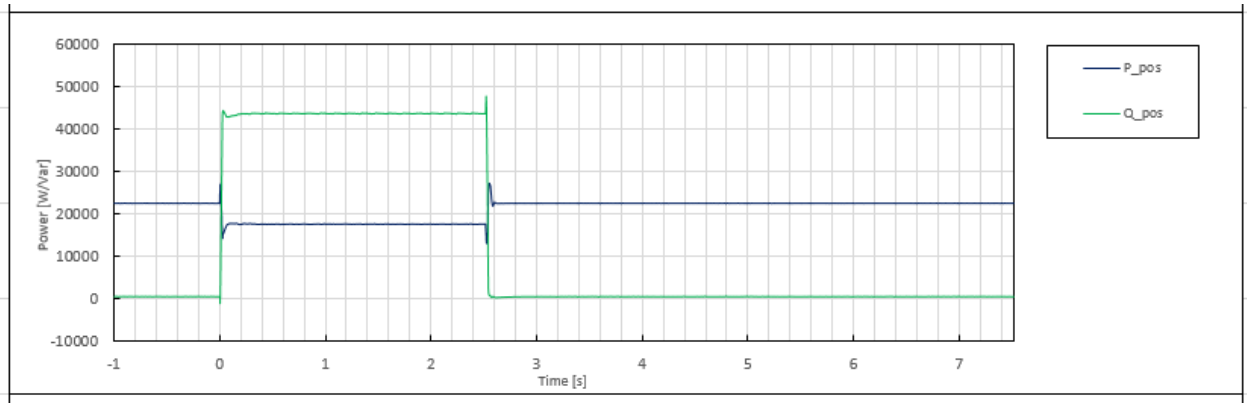
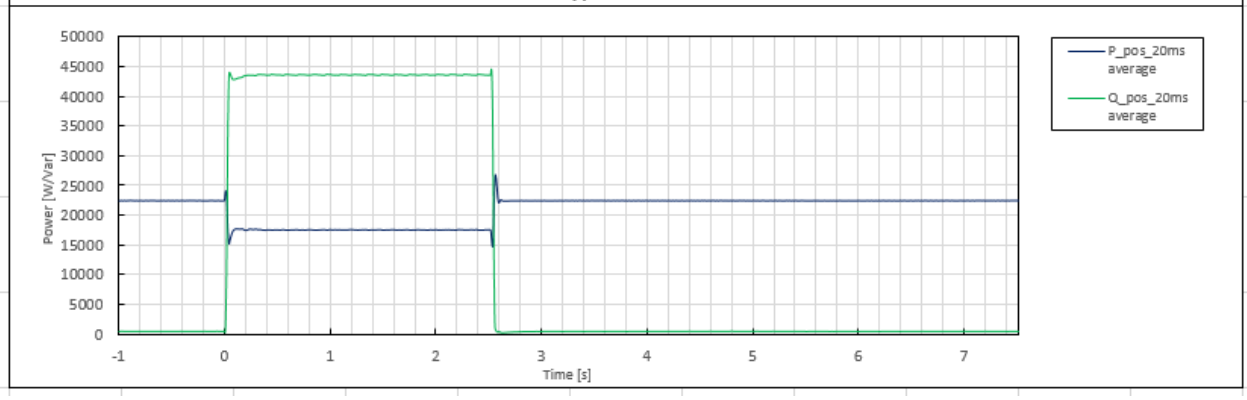
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


Current [A]
Time [s]
IQ_neg


Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


Power [W/Var]
Time [s]
P_pos
Q_pos


Power [W/Var]
Time [s]
P_pos_20ms average
Q_pos_20ms average

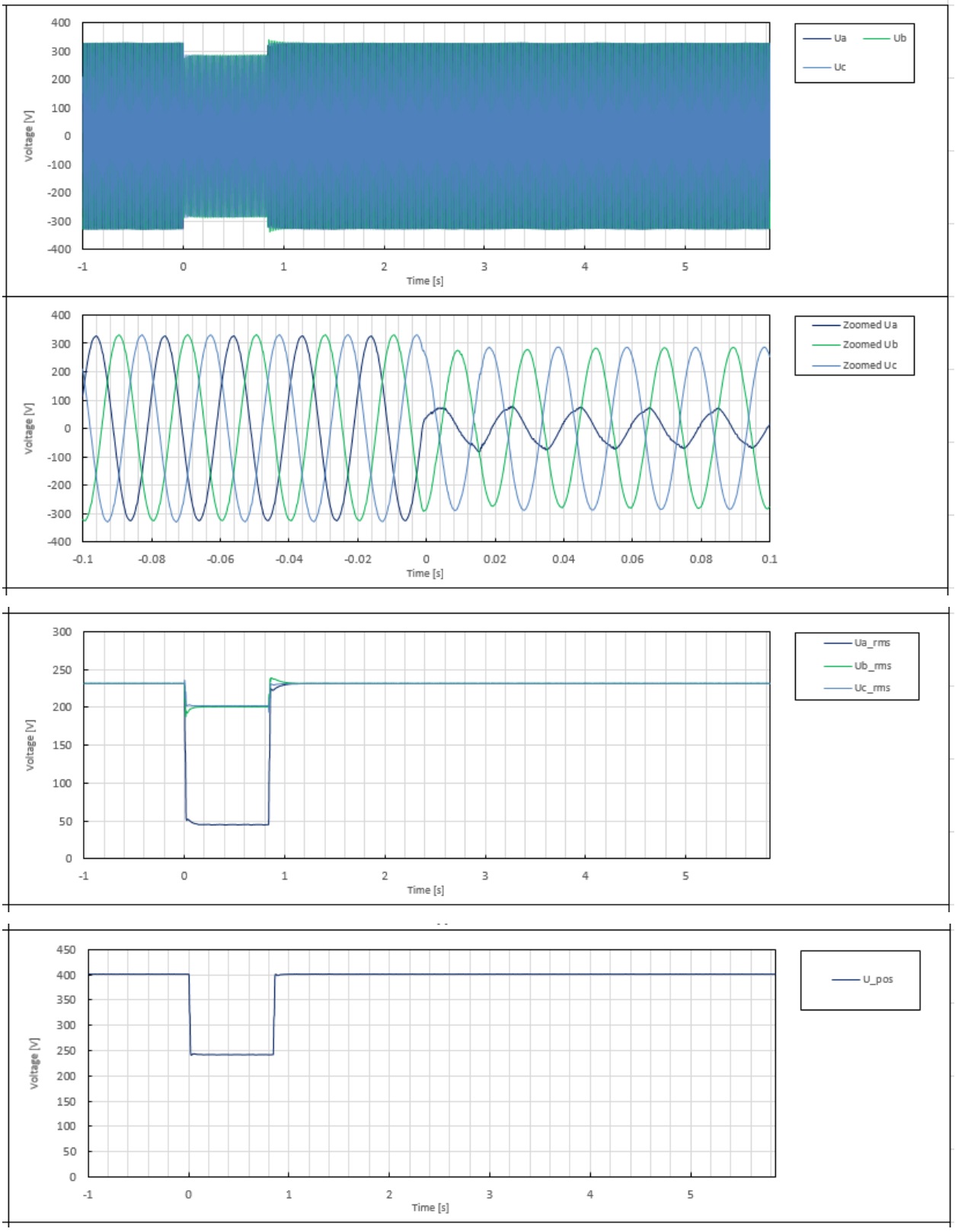
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
General Info.	1	Test number	--	--	--	75.8
	2	Date	--	--	dd.mm.yyyy	25.9.2023
	3	Time	--	--	hh:mm:ss.f	4:02:05 PM
	4	Type of fault	--	--	--	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.73
	6	Drop duration setpoint	--	--	ms	842
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A
	12	Fault occurrence (t1)	--	--	ms	0
	13	Fault clearance (t2)	--	--	ms	842
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A
	15	Fault duration determined from test	--	--	ms	842
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.20
	17		pos			0.61
Bef	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01
	23		neg	t1-60s to t1	p.u.	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01
	25		pos	t1-1s to t1	p.u.	1.01
	26		neg	t1-1s to t1	p.u.	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00
	29		pos	t1-1s to t1	p.u.	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.20
	32	Active power	total	t1-10s to t1	p.u.	0.20
	33		total	t1-2s to t1	p.u.	0.20
	34		pos	t1-500ms to t1-100ms	p.u.	0.20
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.004271355
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.28
	38		neg	--	--	1.30
	39	Reactive current settling up time	pos	--	ms	20
	40		neg	--	ms	21
	41		pos	--	ms	20

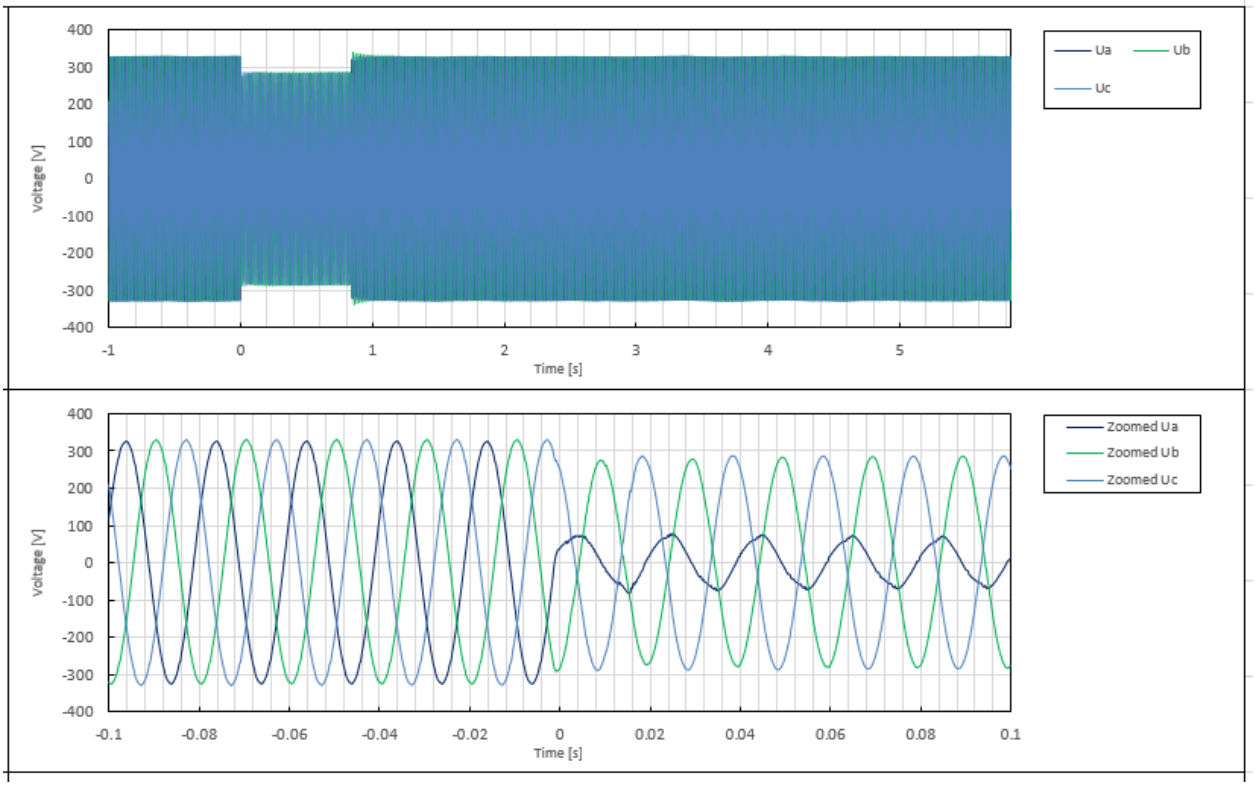
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	42	Reactive current settling time	neg	--	ms	21
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.61
	44		neg	t1+100ms to t2-20ms	p.u.	0.40
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.52
	46		neg	t1+100ms to t2-20ms	p.u.	-0.51
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.54
	48		neg	t1+100ms to t2-20ms	p.u.	0.51
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.32
	50		pos	t1+100ms to t2-20ms	p.u.	0.08
	51	Short-circuit currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase1	t1 to t1+20ms	A	N/A
	52		phase2	t1 to t1+20ms	A	N/A
	53		phase3	t1 to t1+20ms	A	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A
	55		phase 2	t1+20ms	p.u.	N/A
	56		phase 3	t1+20ms	p.u.	N/A
	57		phase 1	t1+100ms	p.u.	N/A
	58		phase 2	t1+100ms	p.u.	N/A
	59		phase 3	t1+100ms	p.u.	N/A
	60		phase 1	t1+150ms	p.u.	N/A
	61		phase 2	t1+150ms	p.u.	N/A
	62		phase 3	t1+150ms	p.u.	N/A
	63		phase 1	t1+300ms	p.u.	N/A
	64		phase 2	t1+300ms	p.u.	N/A

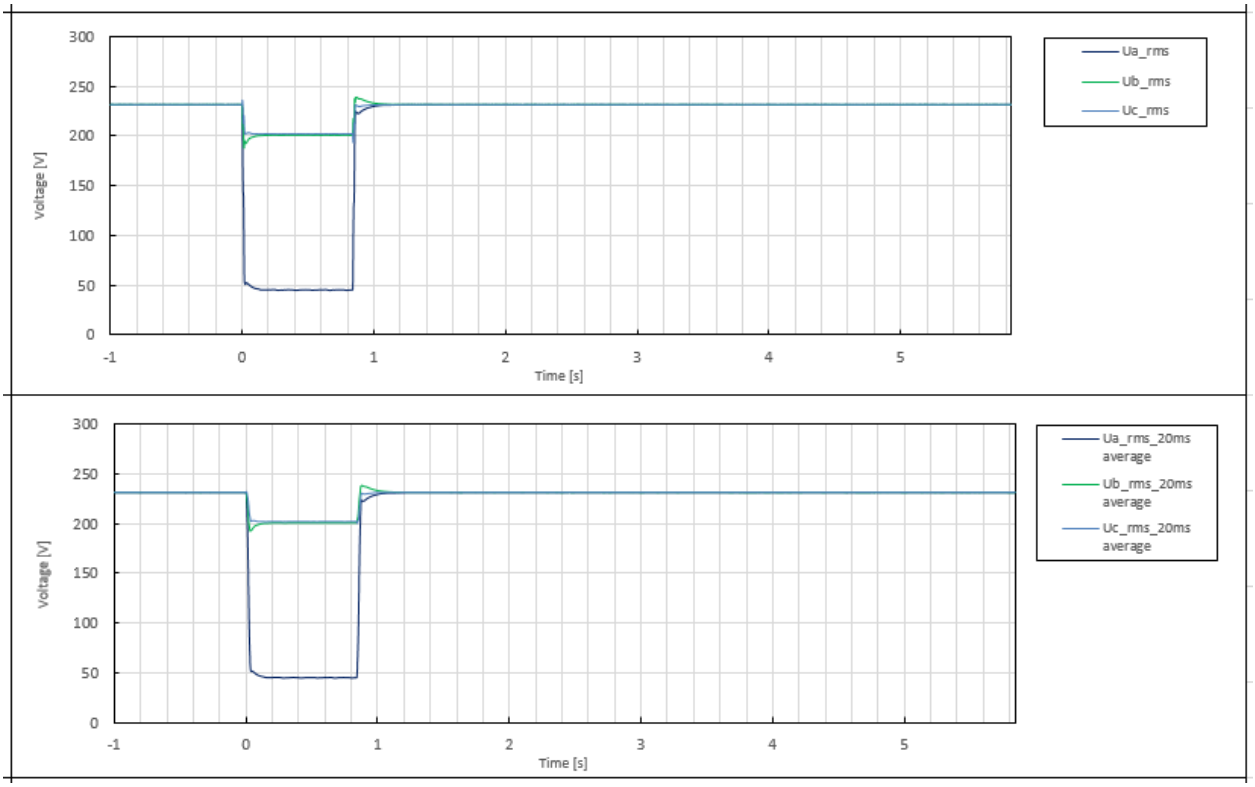
	No.	Parameter	Phase ref.	Time ref.	unit	Measurement
	65		phase 3	t1+300ms	p.u.	N/A
	66		phase 1	t1+500ms	p.u.	N/A
	67		phase 2	t1+500ms	p.u.	N/A
	68		phase 3	t1+500ms	p.u.	N/A
	69		phase 1	t1+1000ms	p.u.	N/A
	70		phase 2	t1+1000ms	p.u.	N/A
	71		phase 3	t1+1000ms	p.u.	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A
	74	Active current rise time	pos	--	s	0.048

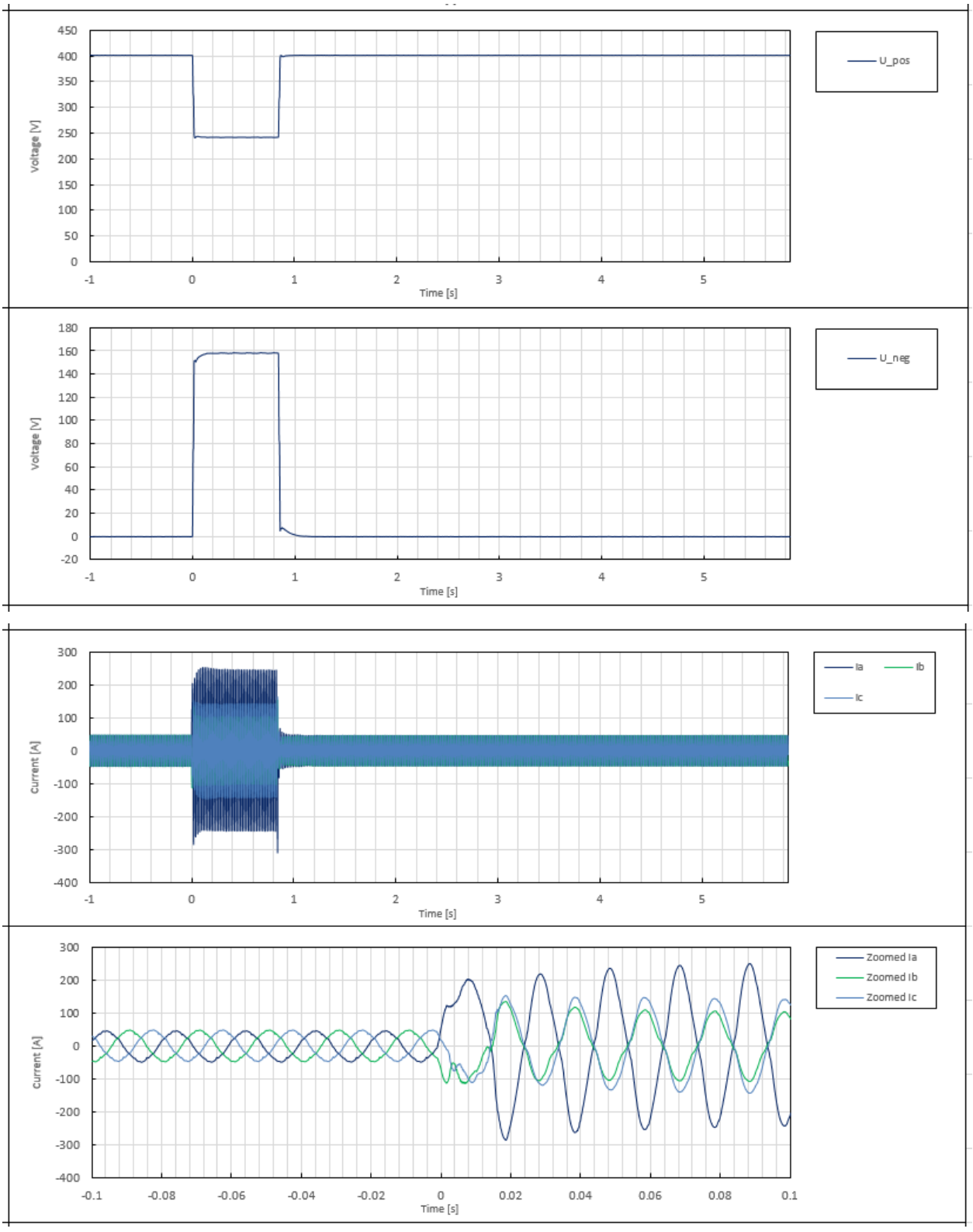
Idle result

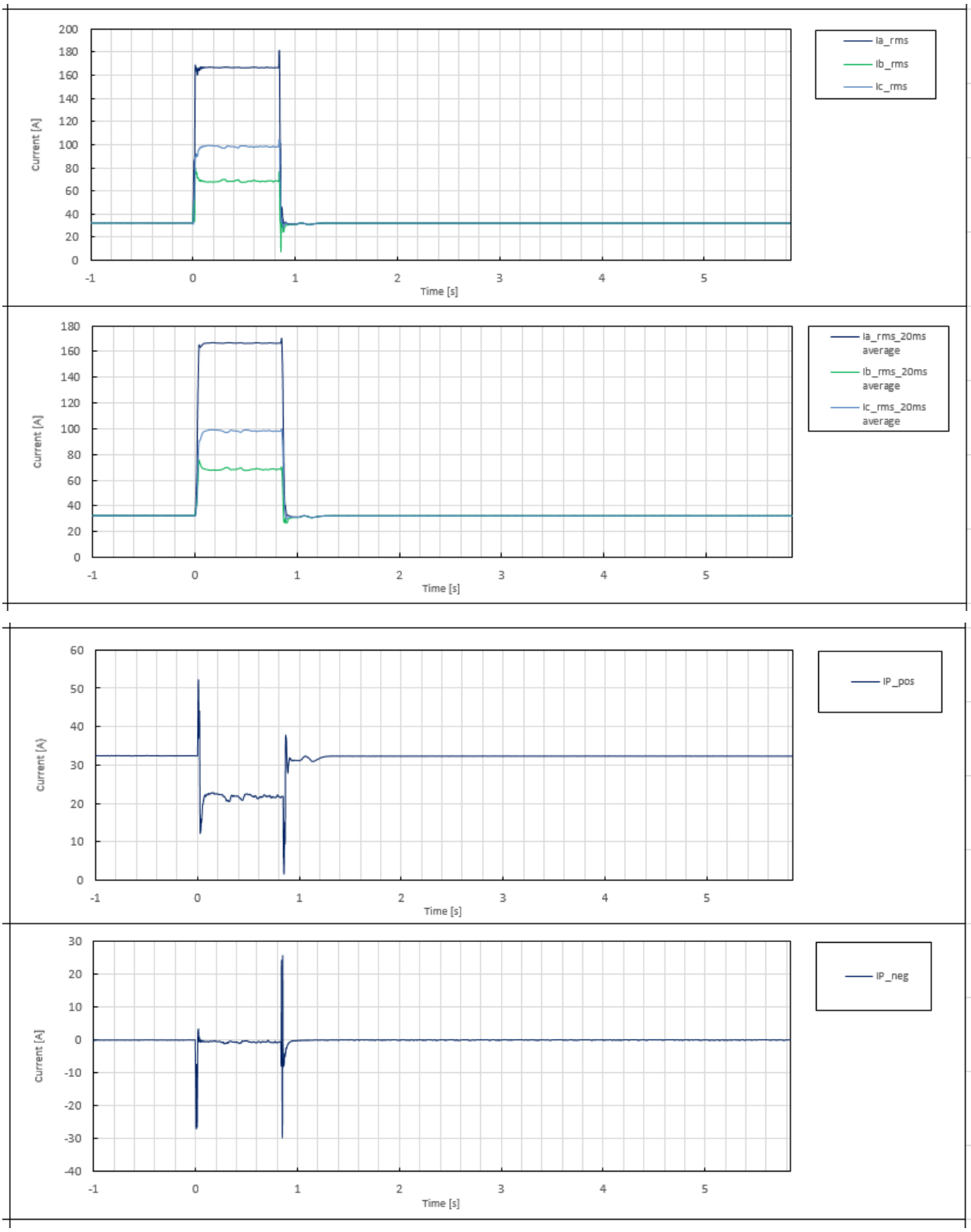

Ua
Ub
Uc
Voltage [V]
Time [s]
Zoomed Ua
Zoomed Ub
Zoomed Uc
Ua_rms
Ub_rms
Uc_rms
U_pos

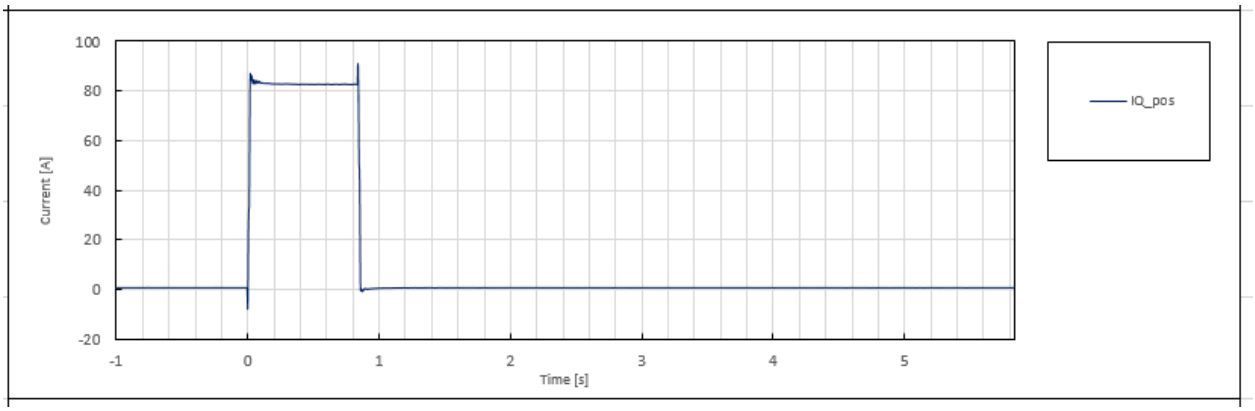
Load result

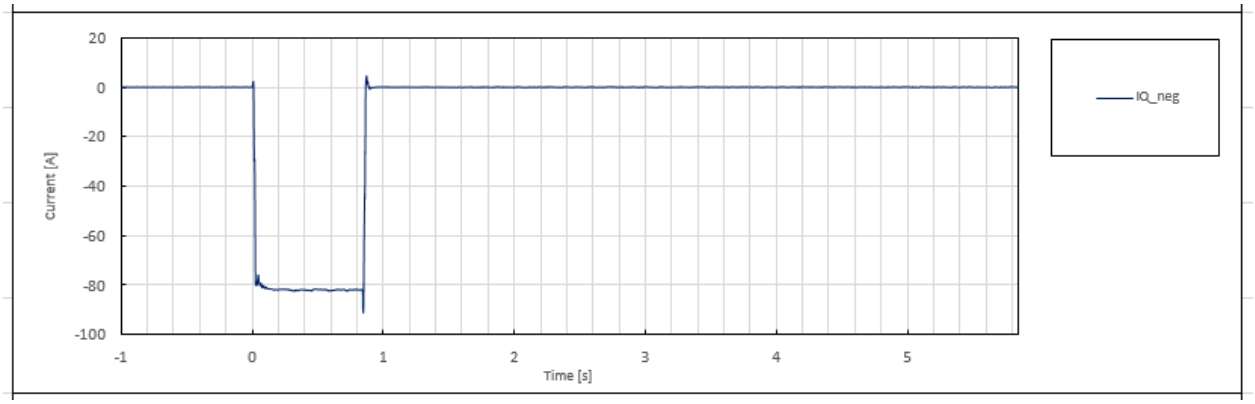

Voltage [V]
Time [s]
Ua
Ub
Uc
Zoomed Ua
Zoomed Ub
Zoomed Uc

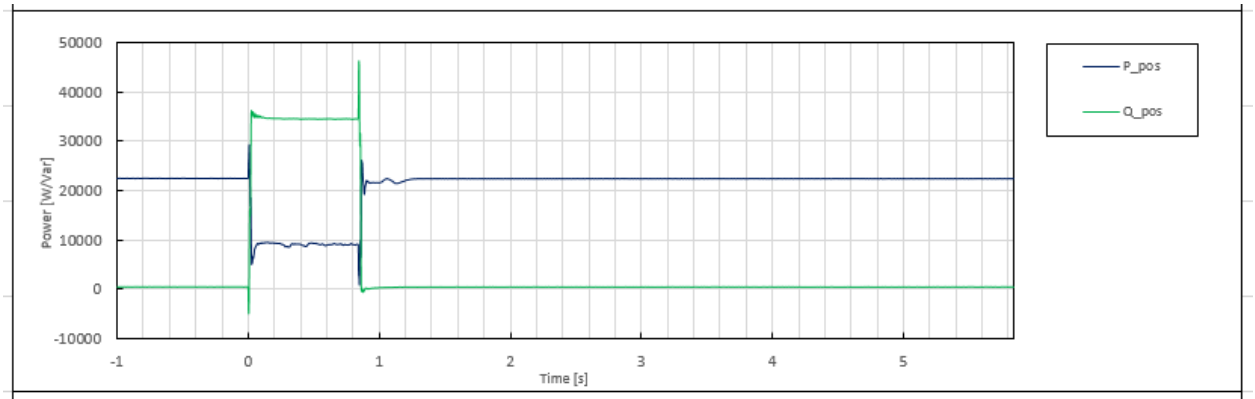

Voltage [V]
Time [s]
Ua_rms
Ub_rms
Uc_rms
Ua_rms_20ms average
Ub_rms_20ms average
Uc_rms_20ms average

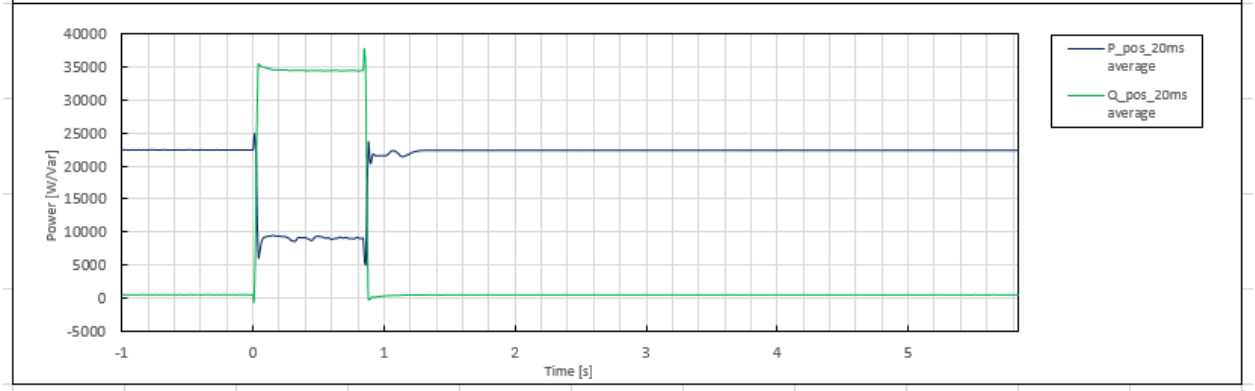

Voltage [V]
Time [s]
U_pos
Voltage [V]
Time [s]
U_neg
Current [A]
Time [s]
Ia
Ib
Ic
Current [A]
Time [s]
Zoomed Ia
Zoomed Ib
Zoomed Ic


Current [A]
Time [s]
Ia_rms
Ib_rms
Ic_rms
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average
IP_pos
IP_neg


Current [A]
Time [s]
IQ_pos


Current [A]
Time [s]
IQ_neg

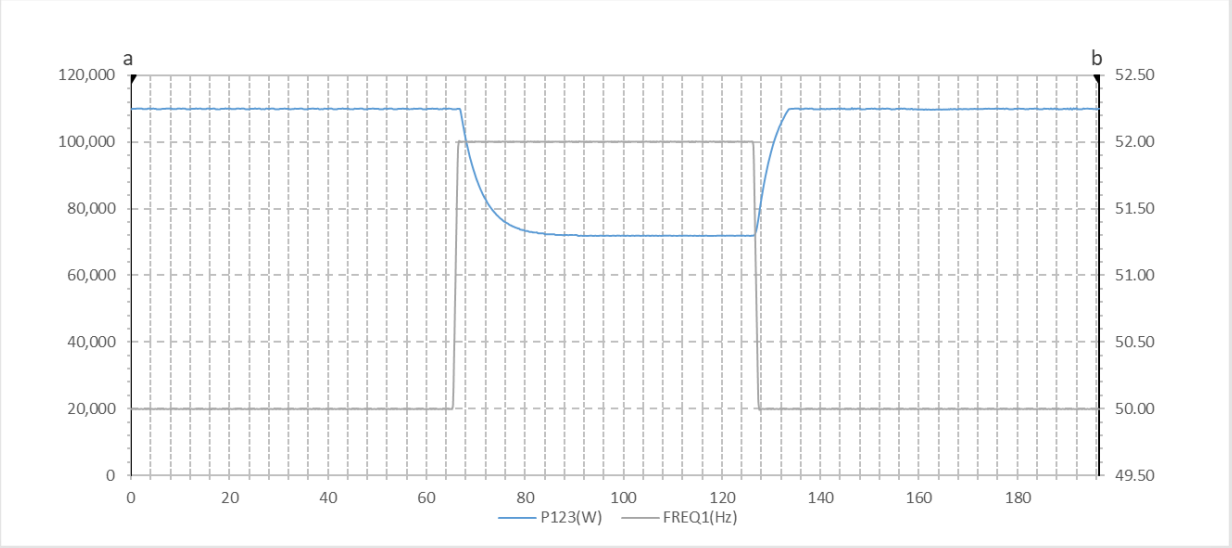

Power [W/Var]
Time [s]
P_pos
Q_pos


Power [W/Var]
Time [s]
P_pos_20ms average
Q_pos_20ms average

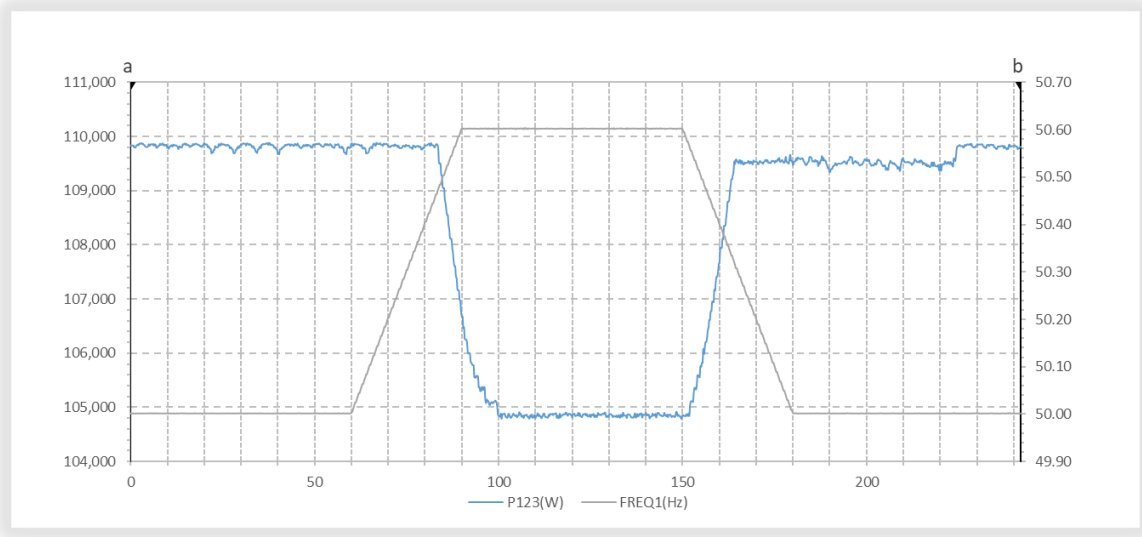
18	TABLE: Loss of Mains Protection per B2-2								P
Calibration and Accuracy Tests									
Ramp in range 49.0-51.0 Hz									
	Pickup (±0.025 Hz/s)				Relay Operating Time RoCoF= +0.10 Hz/s above setting				
Setting = 1.0 Hz/s	Lower Limit	Measured Value	Upper Limit	Result	Test Condition	Lower Limit	Measured Value	Upper Limit	Result
Increasing Frequency	0.975	1.023	1.025	P	1.10 Hz/s	>0.5s	0.89	<1.0s	P
Increasing Frequency	0.975	1.024	1.025	P	1.10 Hz/s	>0.5s	0.92	<1.0s	P
Ramp in range 48.5-51.5 Hz									
	Pickup (±0.025 Hz/s)				Relay Operating Time RoCoF= +0.10 Hz/s above setting				
Setting = 1.0 Hz/s	Lower Limit	Measured Value	Upper Limit	Result	Test Condition	Lower Limit	Measured Value	Upper Limit	Result
Increasing Frequency	0.975	1.023	1.025	P	3.00 Hz/s	>0.5s	0.92	<1.0s	P
Increasing Frequency	0.975	1.020	1.025	P	3.00 Hz/s	>0.5s	0.94	<1.0s	P
Stability Tests (confirm no trip of Interface Protection)									
Ramp in range 49.0-51.0 Hz									
	Test Condition		Test frequency ramp		Test Duration		Confirm No Trip		Result
Inside Normal band	< RoCoF setting (increasing f)		+0.95 Hz/s		2.1s		No trip		P
Inside Normal band	< RoCoF setting (reducing f)		-0.95 Hz/s		2.1s		No trip		P
Ramp as shown									
Inside Normal band	< RoCoF setting (increasing f)		+1.20 Hzs-1 (ramp between 49.80 and 50.34 Hz)		0.45s		No trip		P
Inside Normal band	< RoCoF setting (reducing f)		- -1.20 Hzs-1 (ramp between range 50.30 and 49.76 Hz		0.45s		No trip		P

19	TABLE: Frequency Response per B.6.2					P
Test Conditions	Measurements			Target value	Δ	Limitation
f [Hz]	P/Pn [%]	f [Hz]	Droop	Droop	Droop	Δ Droop
a) 50.0	99.90%	50.00	--	--	--	-1.5% to 2.5%
b) step to 52.0	65.29%	52.00	11.56%	10%	1.56%	
c) step to 50.0	99.82%	50.00	--	--	--	

Diagram:



Test Conditions	Measurements			Target value	Δ	Limitation
f [Hz]	P/Pn [%]	f [Hz]	Droop	Droop	Droop	Δ Droop
a) 50.0	99.88%	50.00	--	--	--	-1.5% to 2.5%
b) ramp to 50.6 (0.02Hz/s)	95.34%	50.60	10.83%	10%	0.83%	
c) step to 50.0	99.87%	50.00	--	--	--	



Revision History:

Date YYYY-MM-DD	Contents of modification (latest on top)	Prepared by	Approved by
2020-09-17	Originated and released into QM system	Tobias Yang	Weichun Li
2023-12-22	Added test items 1 (100%Un, 49.0Hz; 100%Un, 51.0Hz), 16.3, 18 and 19	Eva Wu	Allen Hu

TÜVRheinland®

PHOTO DOCUMENTATION

CN23D9MI 001

for

Grid Connected PV Inverter

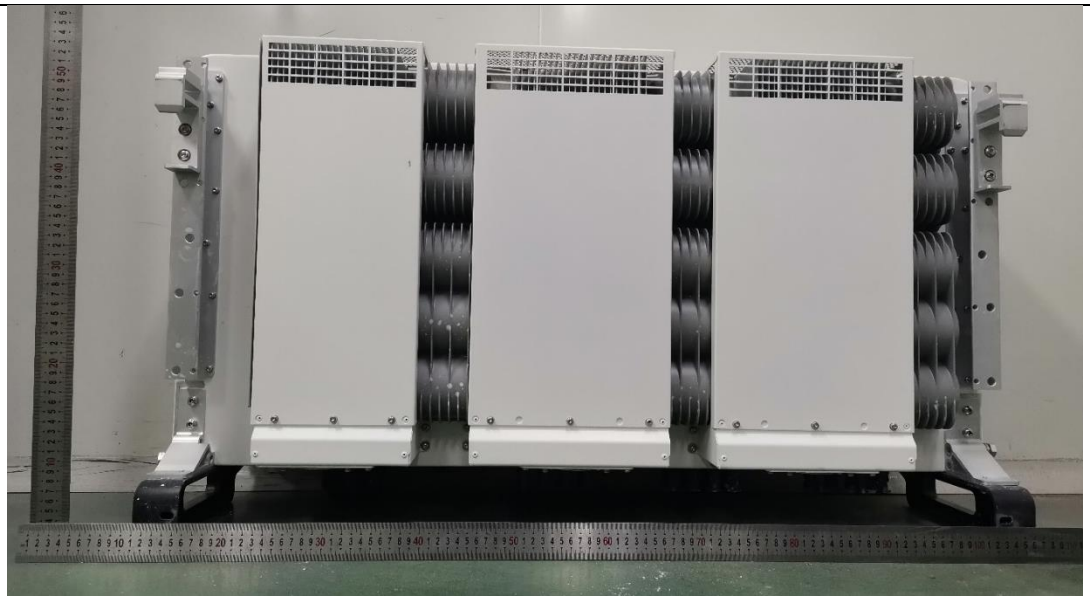
Solis-80K-5G-PRO, Solis-100K-5G-PRO,
Solis-110K-5G-PRO

Ginlong technologies Co., Ltd.

This documentation consists of 13 pages (excluding this cover page)

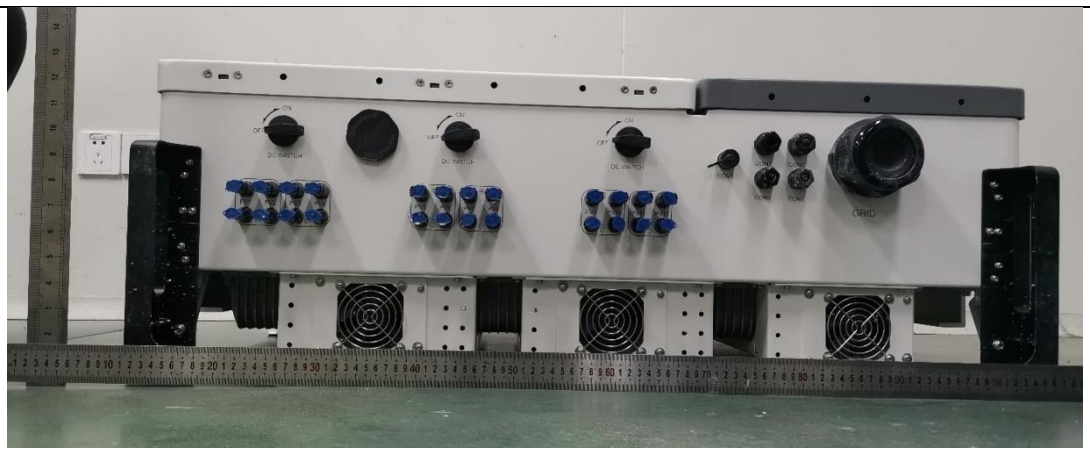
Front view of Solis-80K-5G-PRO

Front view other than Solis-80K-5G-PRO

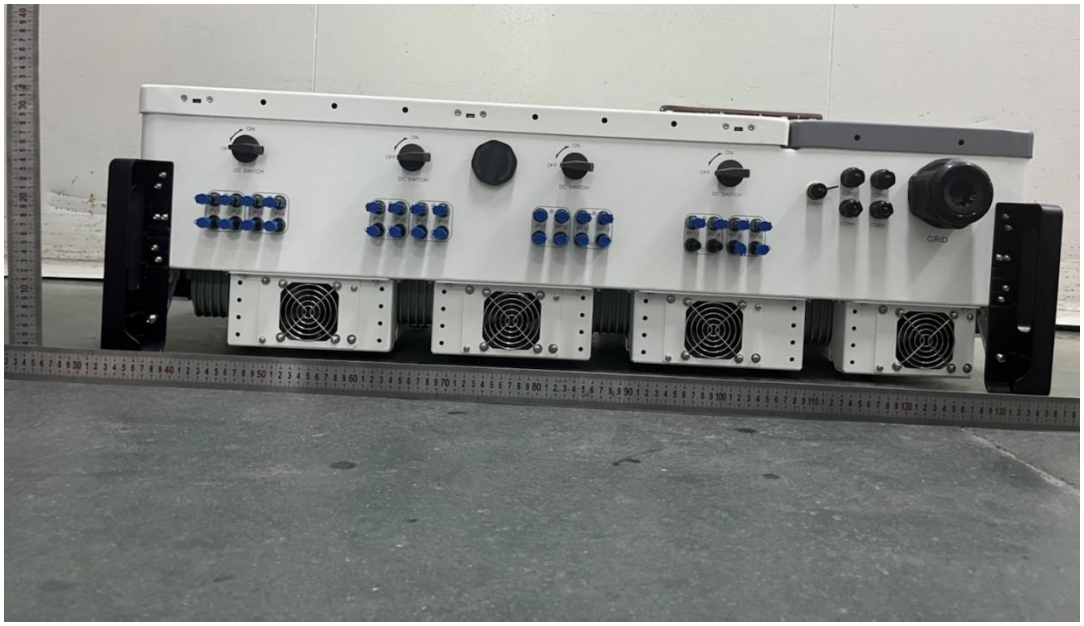


Back view of Solis-80K-5G-PRO

Back view other than Solis-80K-5G-PRO



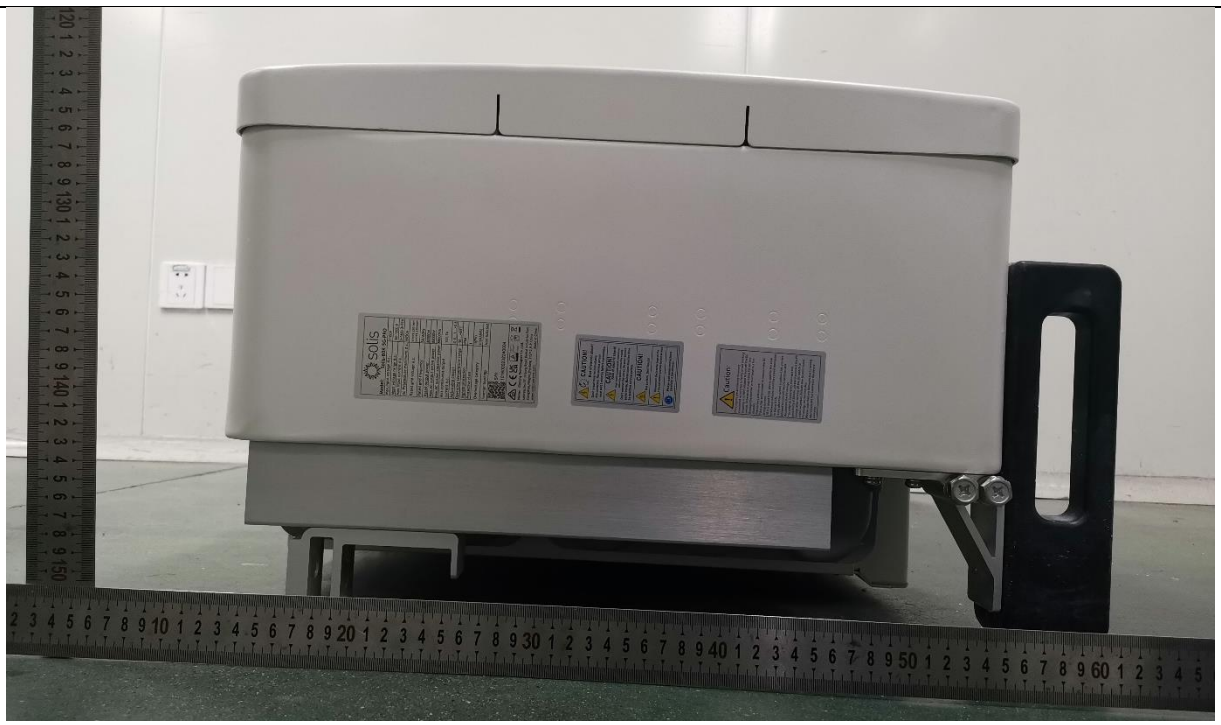
Bottom view of Solis-80K-5G-PRO



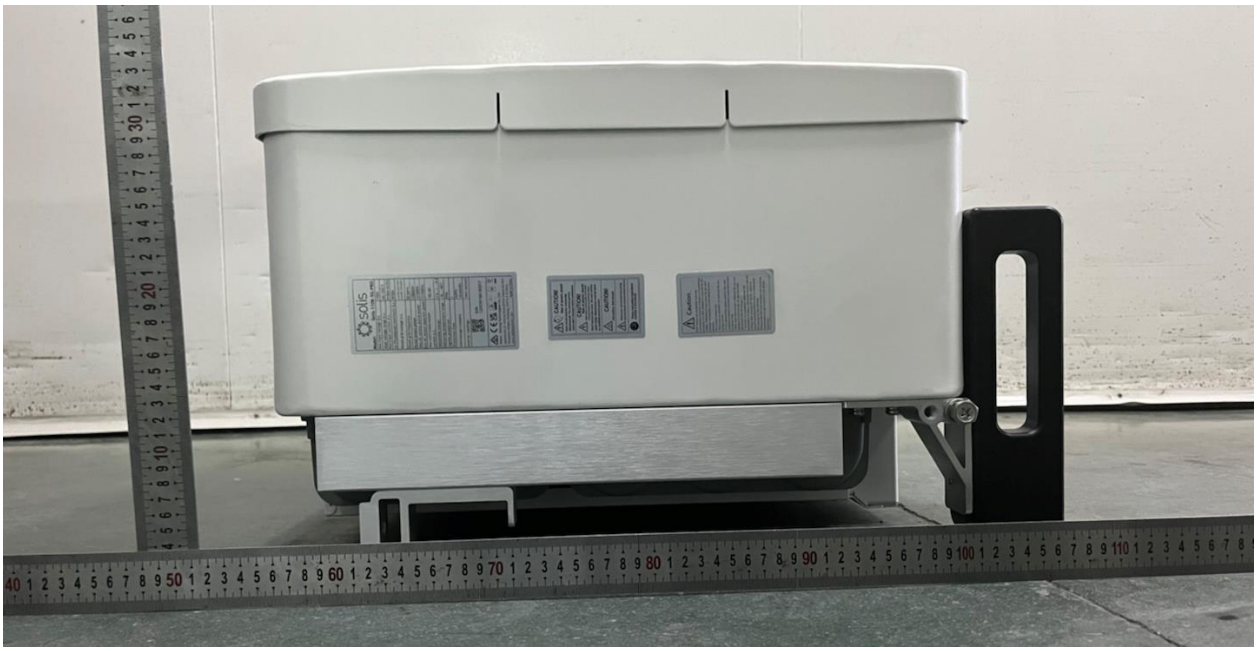
Bottom view other than Solis-80K-5G-PRO

Top view of Solis-80K-5G-PRO

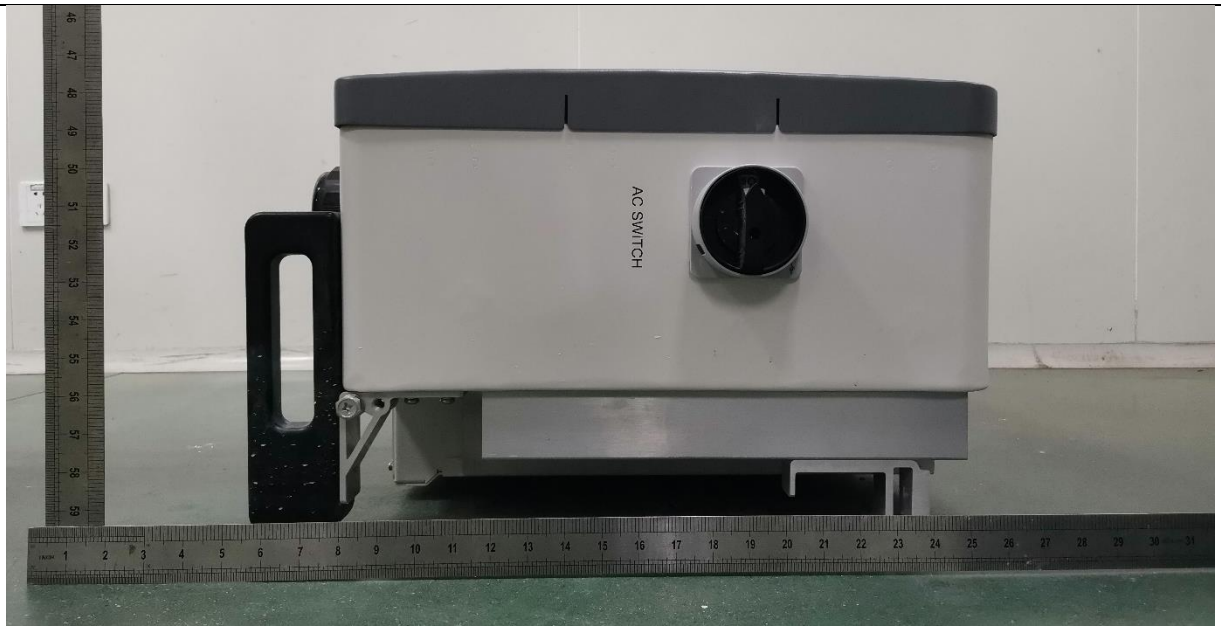
Top View other than Solis-80K-5G-PRO



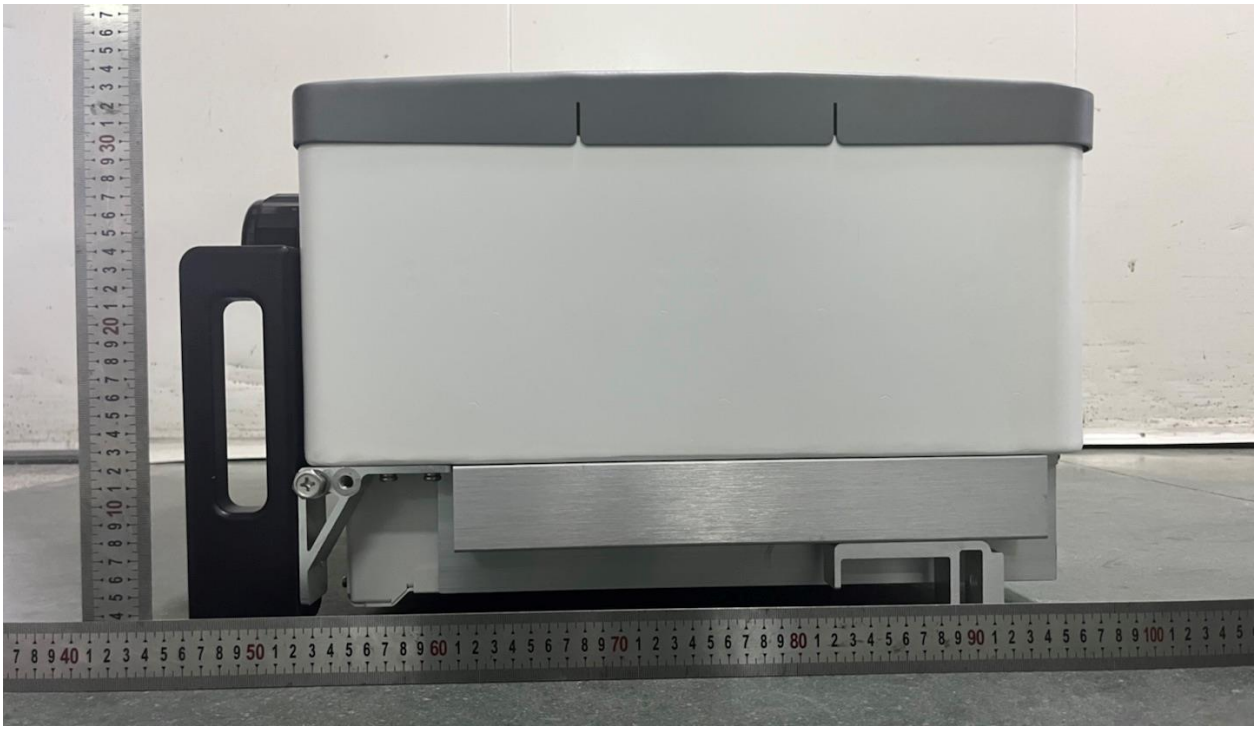
Side view 1 of Solis-80K-5G-PRO



Side view 1 other than Solis-80K-5G-PRO

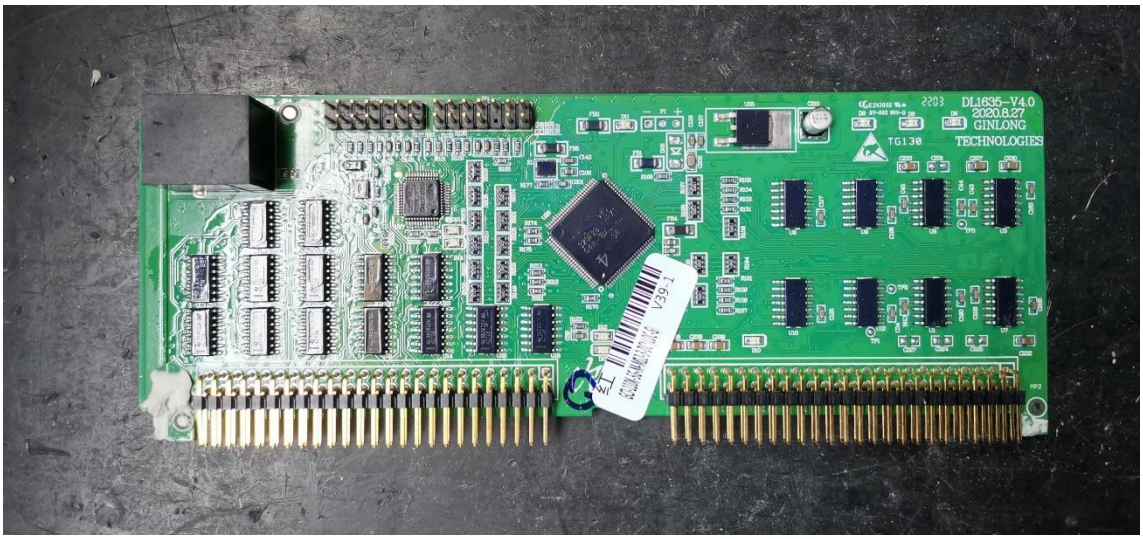


Side view 2 of Solis-80K-5G-PRO

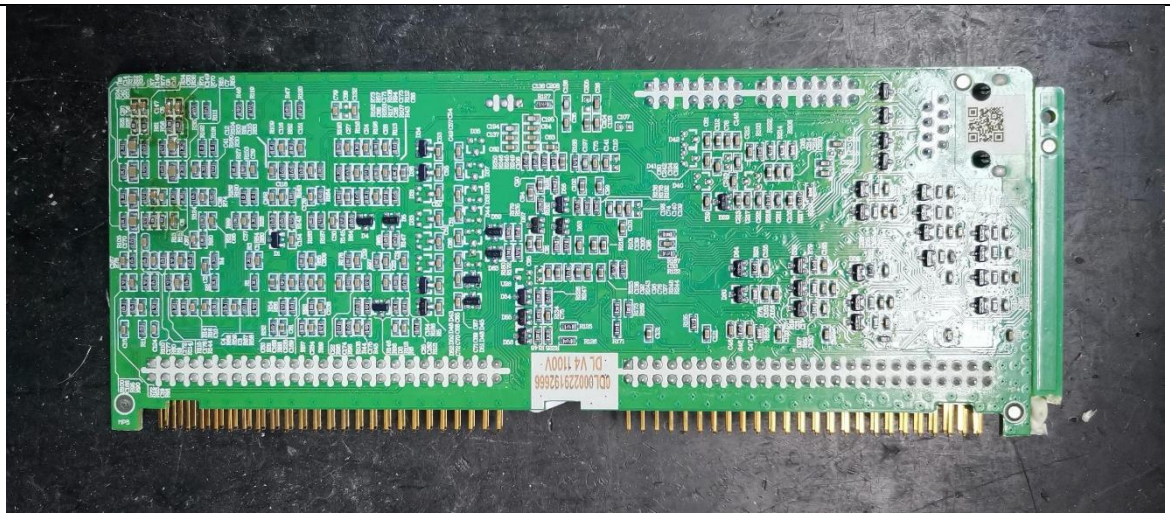


Side view 2 other than Solis-80K-5G-PRO

Internal view



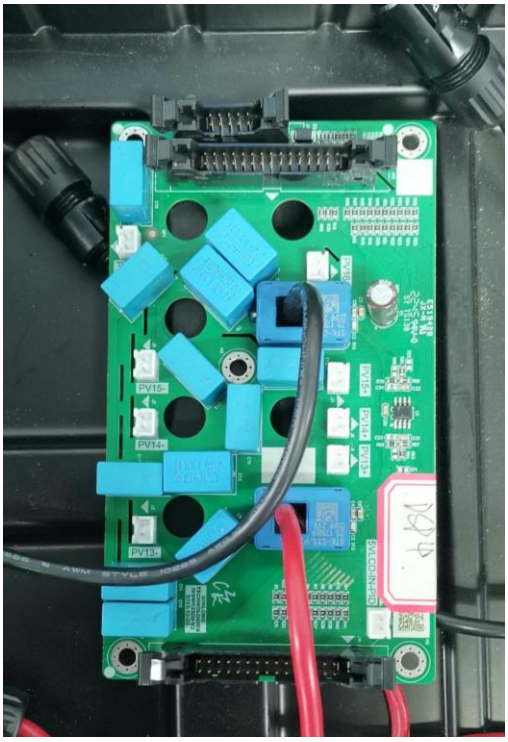
DSP Board 1



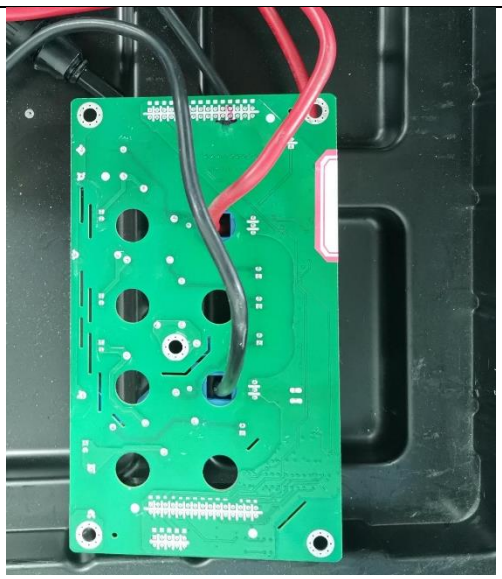
DSP Board 2

LCD board 1

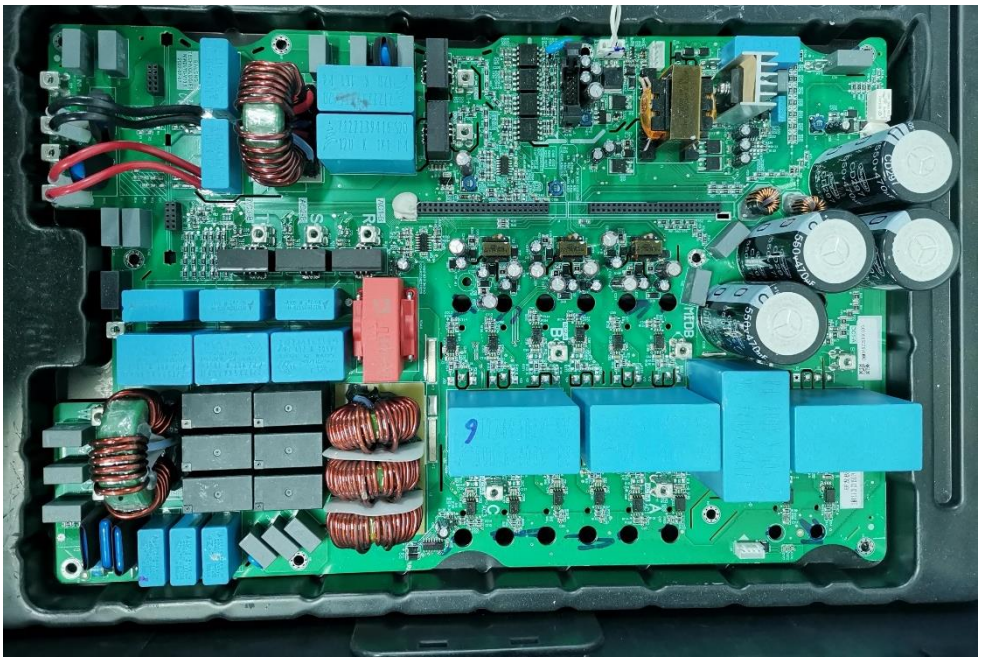
LCD Board 2



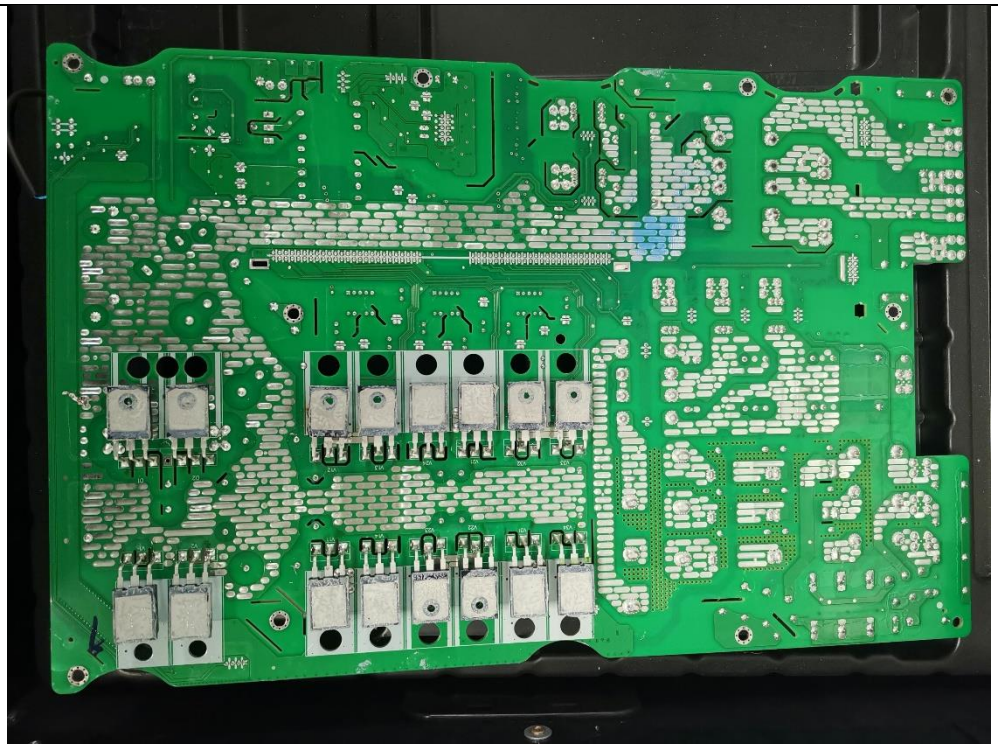
PV string Input board 1



PV string Input board 2

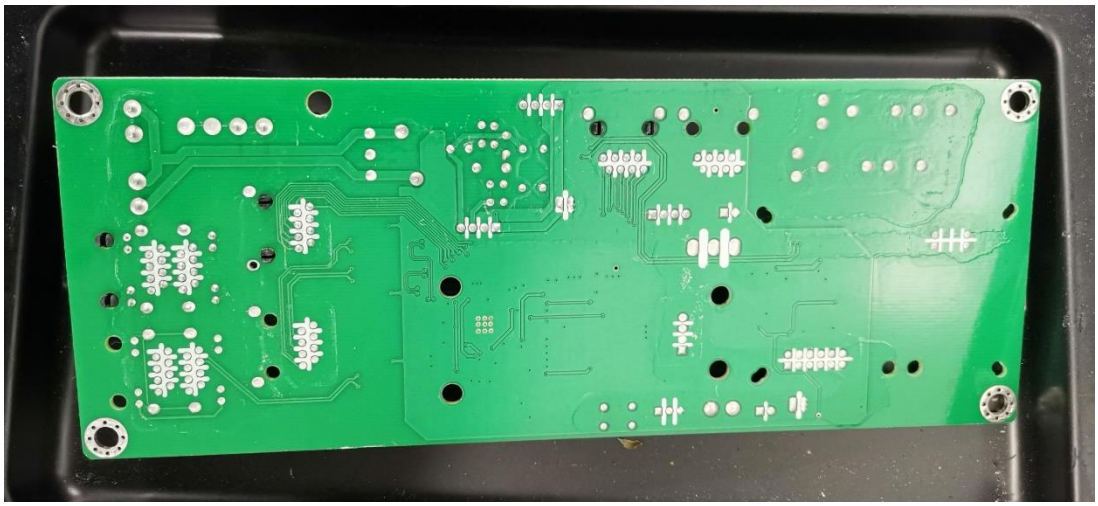


Main Power board 1

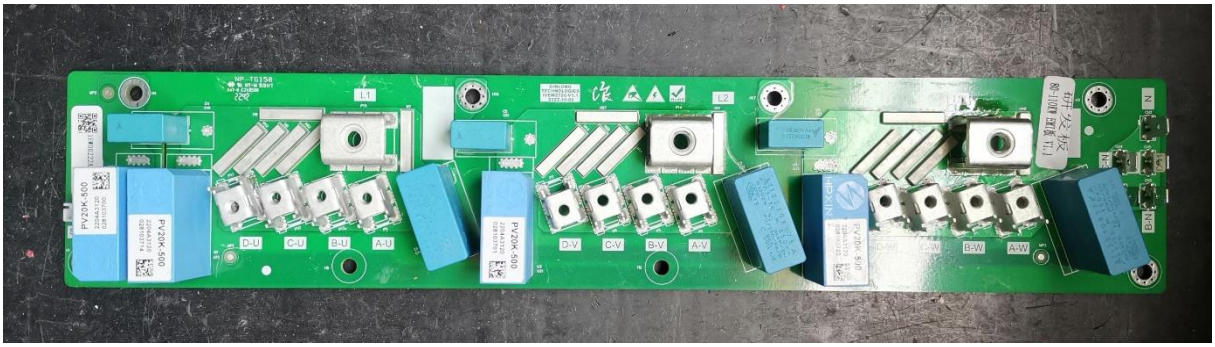


Main Power board 2

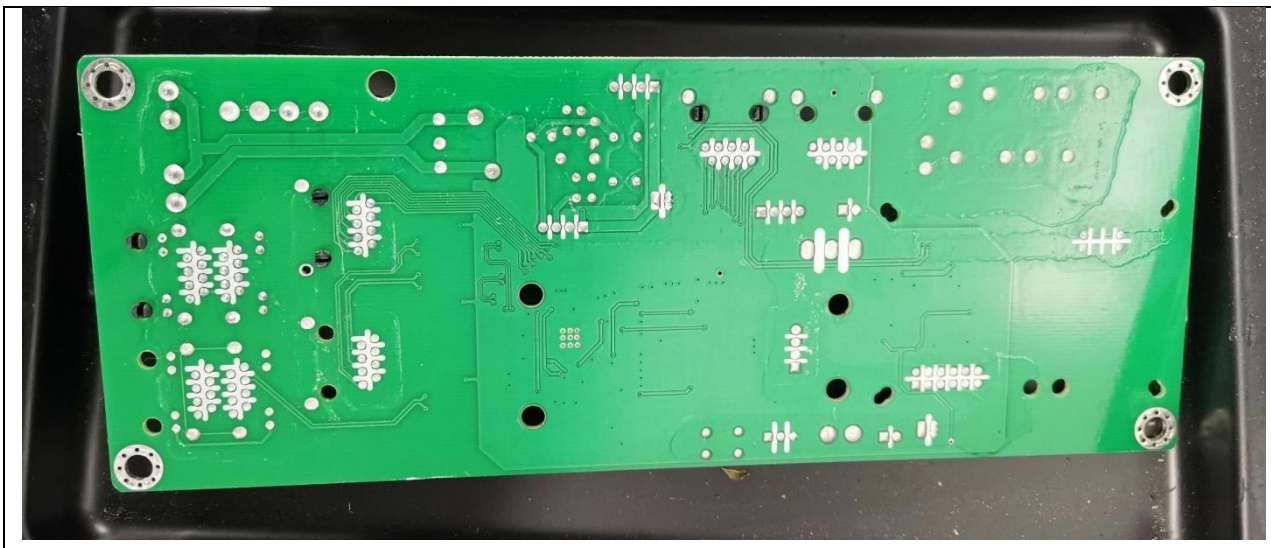
Communication board 1



Communication board 2



Lightning protection board 1



Lightning protection board 2